FERRIS STATE UNIVERSITY
COLLEGE OF ARTS AND SCIENCES

TO: Matt Wagenheim, Chair, Academic Program Review Council (APRC)
CC: Joe Lipar, Department Chair, Biological Sciences
Cliff Franklund, Chair, Program Review Panel

FROM: J. Andy Karafa, Interim Dean, Arts & Sciences

RE: Biology B.S. & B.A.

DATE: 09/01/2015

Biology represents one of the largest majors in the College of Arts & Sciences. In many ways, because of its many concentrations, the major represents a collection of programs, making such a review challenging. Despite the program's complexity, the review panel did a commendable job arriving at an informative, data-rich report.

It is obvious that Biology has focused on the needs of its students. It has modified or is planning to modify its various curricula based on the job market (e.g., Forensic Biology), student success issues (e.g., general requirements), and program assessment outcomes (e.g., scientific understanding). In addition, the area faculty is, perhaps, the most active within the College in regard to creating research opportunities for students, supporting the College's burgeoning teacher-scholar approach to education. Finally, the program provides the theory-application balance that is consistent with the mission of the College and University. This is, perhaps, best illustrated by the statement that "the program helps to deliver the well-rounded graduates needed for today's workplaces."

The dean's office believes that the Biology Program is strong, in large part because it is well attended to by the faculty and department leadership.

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Academic Program Review
Panel Report

B.S. in Biological Sciences

August, 2015

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Membership of the Program Review Panel

Chair: ..... Clifton Franklund

Administrative Representative: ..... Joe Lipar

Program Coordinator: ..... Brad Isler

Program Faculty: ..... Mary Beth Zimmer

Program Faculty: ..... Paul Klatt

Program Faculty: ..... Chris Westerkamp

Individual with Special Interest in the Program: ..... Jenice Winowiecki

Faculty Member from Outside the College: ..... Tara Lee

Program Name and History

Program Name

This document pertains to the Bachelor of Science degree in Biological Sciences at Ferris State University.

Program History

The Biology Program at Ferris began in 1972 as the Applied Biology Program. The focus of the program, at that time, was to provide an alternate route to a hospital internship for medical technology students; only a handful of students were enrolled. Since that time, the Biology Program has evolved into two degree programs; a B.S. in Biology and a B.A in Biology are currently offered. Several different curricular tracks are available within the B.S. degree to meet the needs of our majors. These tracks include Environmental Biology, Forensic Biology, Pre-Dentistry, Pre-Medicine, Pre-Optometry, Pre-Physical Therapy, and Pre-Veterinary Medicine. Stemming from its roots as a service unit, the Biology program continues to supply courses to meet the needs of General Education, and diverse health-related programs (e.g. pre-nursing, pre-dental hygiene, pre-radiography, and pre-pharmacy). Effective in the fall of 2007, the official name of the program was changed from Applied Biology to Biology to reflect the current focus of the program and to assist in recruitment. The number of students who complete the Biology program has increased steadily over time. In the 2015-2016 academic year, for example, it is expected that approximately between 80 and 90 students will graduate with a B.S. in Biology. The number of B.A. graduates in Biology has remained very low. Over the past five years, just 10 total B.A. in Biology degrees have been awarded. Due to low enrollment, and to reduce administrative overhead, we recommend that the B.A. in Biology be discontinued at this time.

Incorporation of Our History into Our Programmatic Culture

The Biology program's origins in providing courses to meet the needs of other units on campus continues to impact its structure even today. The Biology program is in constant communication with other units in the health sciences to ensure that the courses offered meet their needs and expectations. Similarly, program faculty regularly contact admissions officers in graduate and professional schools to inquire about the perceived quality of our Ferris applicants. Finally, as the Biology program has matured over time, ongoing discussions among the faculty have been the primary driver for curricular development. The institutional history possessed by our senior faculty helps to keep our programs connected to our past but at the same time, relevant for our students' futures.

Program Mission

Ferris State University Mission Statement

Ferris State University prepares students for successful careers, responsible citizenship, and lifelong learning. Through its many partnerships and its career-oriented, broad-based education, Ferris serves our rapidly changing global economy and society.

College of Arts and Sciences Mission Statement

Through academic programs, general education, and outreach activities, the College of Arts and Sciences provides a learning-centered education that prepares students to contribute to a complex and diverse world.

Department of Biological Sciences Mission Statement

The Department of Biological Sciences provides excellent teaching, quality advising, and exposure to relevant experiences, setting a solid foundation of knowledge and skills that will allow students to become productive citizens and pursue successful careers.

BS Biology Program Mission Statement

The bachelor's of science program in Biology provides graduates with a solid foundation of knowledge in the major disciplines of biology and develops their skills of observation, analysis, and critical thinking so that they are well prepared for entry into professional school, graduate school, or the workforce.

Incorporating our Mission

The mission statement of the Biology program is in direct alignment with those of the department, college, and university. In providing the necessary biological skills and knowledge, the program helps to deliver the well-rounded graduates that are needed in today's workplaces. In addition, the program's curricular tracks are targeted to specific

career opportunities in the biological sciences. The Biology program also provides students with skills in deductive and inductive reasoning, oral and written communication, data analysis, and problem solving that are in high demand in the job market today.

Facilitating and improving student learning is the driving force behind any changes in the Biology B.S. program. This includes alterations of the curriculum, assessment processes, or hiring. This focus is clearly communicated during faculty discussions, both in committee work, and in general meetings. The impacts of such changes on student learning, as measured with our assessment process, are also openly discussed in program faculty meetings.

The B.S. in Biology represents the vast majority of all majors in the Biological Sciences. The courses delivered in the program exemplify the excellent instruction and active learning experiences that are hallmarks of the department. In addition, this program serves to elevate both the College of Arts and Sciences and the university. Many students in this program are involved in research projects and attend regional or national scientific meetings. In addition, the Biology program regularly places its graduates into a variety of graduate and professional programs. Finally, many of its graduates pursue rewarding careers in health-related fields without pursuing post-graduate work. The success of these individuals improves the reputation of the entire institution.

Program Goals

Defining Our Goals

In 2010, a set of six goals were set for the Biology program. The department is currently re-evaluating these goals and is in the process of creating an updated strategic plan. The six original goals are listed below. In addition, the 2010 strategic plan is attached to this report. **[See Appendix A]**

- Centralize and improve advising of Biology majors within the department
- Improve B.S. Biology curriculum
- Revise procedures for selecting biology award recipients
- Increase learning opportunities for students outside of class
- Enhance department recruitment activities
- Strengthen assessment activities in the department

Incorporating Our Goals

Communicating our goals – The program goals have been presented to all faculty and staff members in general departmental meetings. These goals are overseen by the Planning

Committee. Members of that committee provide annual updates to the department at the beginning of each academic year. The copy of the strategic plan is maintained in the departmental shared drive and is freely available for examination by all faculty and staff.

Evaluating the status of our goals – A brief overview of the past and current activities related to each program goal are summarized below.

Review process – The status of the strategic plan initiatives is monitored over time by the Departmental Planning Committee in coordination with the department chair. Their analysis and suggestions are brought to the faculty for discussion during scheduled department meetings for discussion.

Current successes – Progress has been made in most of our strategic goals over the past five years. Some of the more notable successes are listed below.

- **Centralize and improve advising of Biology majors within the department**
  In an effort to improve the quality of student advising, a professional advisor was hired for the program. This individual advises all incoming freshman and then hands the students off to faculty advisors at the end of the students' second year. As a result of this action, the student evaluations of our program advising have shown modest improvement. There is, though, still room for improvement. The reduced advising of early students has allow faculty members to spend more time advising juniors and seniors as they prepare to apply for post-graduate school or jobs in their careers. In addition, new program check sheets have been distributed to faculty members and are available on the Biology shared drive. Training workshops have also been provided to optimize their use in advising..
- **Improve B.S. Biology curriculum**
  In an effort to improve the quality of our curriculum, a variety of changes have been made or are currently under development in our various program tracks. These changes are documented in the "Curricular" portion of this document.
- **Revise procedures for selecting biology award recipients**
  A new process was developed to simplify and standardize the manner in which biology award recipients are selected. This procedure was added to our departmental bylaws and has greatly streamlined the process.
- **Increase learning opportunities for students outside of class**
  Ongoing efforts are being made to increase student learning opportunities available through newly-acquired resources. Examples include the large tract of land recently donated to the department and the newly formed Shimadzu core lab. Some work has also been done in increase the number of research opportunities available for our students. This has been aided by the research interests of several of our new tenure-track hires in the department. The program has also begun holding Friday Afternoon

Research Talks over the past two years. Internal and external speakers (including Biology alumni) are invited to give seminars on biological topics. These have been well received and well attended by our students.

- **Enhance department recruitment activities**
  Efforts are being made to improve the profile of the Biology program by involving faculty in more recruiting activities. This goal is still in its infancy.
- **Strengthen assessment activities in the department**
  Finally, the program has been working to increase the quantity and quality of assessment activities used to measure student learning. Although much progress has been made, automation and standardization of these processes are still required. The status of this goal is more completely discussed in the "Assessment of Student Learning" portion of this document.

Plans for future goals – The Department Planning Committee has been tasked with creating new goals for the B.S. program over the next five years.

A plan is currently in development to create a new research design core for the B.S. program. A series of courses is envisioned that would provide our students with the marketable skills that are necessary for success in today's workforce. These classes would focus upon empirical reasoning, critical analysis of the primary scientific literature, and clear written and oral communication. By delivering these courses throughout the four years of the curriculum, we will be able to reinforce these critical skills in our program's graduates. This plan was initiated based upon deficiencies identified from faculty survey results and program assessment activities.

The Biology program faculty are also eager to find new ways to increase the number of research possibilities for our students. These approaches would be in the context of student learning and remain congruent to our primary goals as a teaching institution.

As discussed in the "Assessment of Student Learning" section, we performed an internal analysis of our program assessment processes. Based upon these findings, a number of specific recommendations have been made to improve the program's assessment procedures.

Very little has been accomplished with the recruitment goal. This goal will be retained and specific action steps developed to promote activities that may improve our program's overall profile and our ability to attract and retain prospective students. One aspect of this goal may be to improve the overall visibility and marketing of the program to the public. By coordinating with the Dean's office and University and Marketing, we hope to initiate new marketing plans to increase the reputation of the Biology program in Michigan.

The advising and student award goals have largely been completed. Continued monitoring and minor adjustments may be required, but these goals will likely not be retained in the new strategic plan.

Curriculum

Program Check sheets – Program check sheets can be found at the end of the report. **[See Appendix B]**

Course Syllabi – Course syllabi are also at the end of the report. **[See Appendix C]**

Program Policies and Procedures – The department of biological sciences maintains an active curriculum committee that plays an active role in monthly departmental meetings. Because of the number and breadth of program concentrations within the department, the committee relies on consultation from professional advisors, lead concentration advisors, and faculty advisors that have deeper insight into their respective advising areas. The hiring of two full time professional advisors that advise all first and second year students has been a great help to the curriculum process, as these advisors have a wider view of the needs of all students within the biology department. The professional advisors (along with faculty advisors) also serve as the primary communicators of program requirement information to both prospective and current students.

Experiential Education – Only one biology concentration (environmental biology) requires an external internship for graduation. However, the professional advisors stress the importance of job shadowing to students in all biology concentrations beginning in FSUS 100. For many of the pre-professional concentrations, job shadowing is highly recommended or required for admission into their professional school.

Previous Curricular Changes – A number of minor and major curricular changes have been made to biology concentrations since the last APR review.

- **Forensic biology** – Due to the increasing competitiveness for jobs in this area, requirements for the concentration were increased to require more organic chemistry and biochemistry. The result has been that students in this concentration are now far more competitive for employment and (especially) admission into forensic science graduate programs.
- **Environmental biology** – With an increase in the number and diversity of organismal biology courses being offered in the department (zoology, plants and fungi, medical botany, environmental assessment, animal behavior, ornithology), it was decided to integrate these courses into the environmental biology curriculum. This has resulted in environmental biology students being better prepared for employment in a wider variety of environmentally-based areas.

- **Pre-professional concentrations** – Several pre-professional concentrations have had minor curriculum cleanups to mirror changes made to the admission requirements for their respective professional schools.
- **General biology and chemistry requirements** – It was noted by the professional advisors and general biology instructors that the subset of FTIAC students that entered Ferris with a MATH 115 placement were underperforming in BIOL 121 and 122. Traditionally, these students were permitted to begin the general biology sequence immediately upon entrance to Ferris, but were required to complete a lower-level chemistry course (CHEM 114) before beginning the general chemistry (CHEM 121 and 122) sequence. This placed these students in a situation where they their general biology and chemistry progression was out of sync. In addition, the addition of CHEM 114 to their course load did not seem to greatly increase their performance in either general biology or chemistry. To bring these students into sync with their general biology and chemistry courses, and to aid in their progression through later biology and chemistry courses, it was decided to eliminate the use of CHEM 114 as a "preparatory" course and require all students to complete MATH 115 before beginning the general biology and chemistry sequence in the spring semester of their first year. This curricular change has now been in place for several years and student performance in general biology has been notably increased in this cohort of students.

Future Curricular Changes – There are several curricular changes that are currently being discussed by the department.

- **Pre-physician's assistant concentration** – As the medical profession continues to increase the use of physician's assistants, there has been increased interest by students in this career option. The biology department currently has an unofficial curriculum that we share with students interested in admission to physician's assistants schools. However, the addition of a formal concentration would allow us to better recruit and advise these students.
- **Capstone course revision** – A common piece of feedback we receive from external stakeholders is that new graduates from <u>all universities</u> are generally weak in communication and data analysis skills. To assist our students post-graduation, the department is discussing the revision of our capstone experience from a one semester course (BIOL 460) taken in the final semester before graduation to a multi-year, three semester sequence that is more fully integrated with the natural laddering of courses in the biology curriculum. A key part of this new capstone experience would be the incremental integration of communication and data analysis skills that should result in graduates that are better trained in these areas. In addition, we feel this could be an excellent recruiting tool, as this is a fairly unique idea in the biological sciences.

Assessment of Student Learning

Assessment is the systematic collection, review, and use of information to increase students' learning and development. It is important because it tells us what and how much students are learning. It also provide insight into how the program might be modified to improve their learning. The structure and processes used to assess student learning in the Biology program are explained below.

Student learning outcomes

The Biology program has eight defined student learning outcomes. The first four are all content areas in which our students are expected to become proficient. The final "outcome" is actually more of a goal; efforts are currently underway to improve the last outcome. The current program learning outcomes are listed below.

Knowledge of cell biology - Graduates will recognize, analyze, and explain the physiological properties, environmental interactions, life cycle, division, and death of cells at both a microscopic and molecular level.

Knowledge of molecular genetics - Graduates will recognize, analyze, and explain the structure, flow, regulation, and manipulation of genetic information encoded in the DNA, RNA, and proteins of biological systems.

Knowledge of organismal biology - Graduates will recognize, analyze, and explain the diversity of living organisms with regard to how they are identified and classified within groups, how organisms are structured, and how they function.

Knowledge of evolution and ecology - Graduates will recall, apply, and explain the fundamental tenets of ecology and evolution as they pertain to the interactions of individuals or populations with other organisms and their environment at the levels of genetics, physiology, and behavior.

Utilization of the scientific literature - Graduates will evaluate, analyze, and synthesize information from the scientific literature and communicate their findings in written and/or oral forms.

Application of the scientific method - Graduates will formulate hypotheses, perform careful observations, analyze data, make inferences, and draw conclusions that either support or disprove their initial premise.

Proficiency in lab and field methods - Graduates will safely and correctly follow protocols to collect and record experimental data while performing laboratory and field techniques appropriate for their discipline.

Graduate placement - Graduates of the BS biology program will be prepared for successful entry into graduate school, professional school, or a position related to the discipline.

Curricular map

The core courses of the B.S. in Biology were mapped onto the course outcomes. This is available on TracDat and has been reproduced below. Every outcome is introduced, reinforced, and mastered at some point in the curriculum. In addition, multiple assessment points have been identified for each outcome.

Required Biology courses for the **BS in Biology**		**BIOL 121** General Biology 1	**BIOL 122** General Biology 2	**BIOL 205 (a)** Human Anatomy	**BIOL 206 (a)** Adv. Human	**BIOL 218 (b)** Microbial Ecology	**BIOL 286 (b)** General	**BIOL 321 (a)** Human Physiology	**BIOL 322 (a)** Human Physiology	**BIOL 346 (c)** Ecological	**BIOL 347 (c)** Environmental	**BIOL 353 (a)** Plant Physiology	**BIOL 375** Principles of	**BIOL 386 (b)** Microbiology and	**BIOL 442 (c)** Ecology	**BIOL460** Current Topics in Biology
Graduates will demonstrate a solid foundation of knowledge in the major disciplines of biology.	Syllabus	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Imp
	Level *(Cell Bio)*	I	I	R	R	R	R	R	M	–	–	R	R	M	–	M
	Level *(Mol Gen)*	–	I	–	–	R	R	–	–	–	–	–	M	R	–	M
	Level *(Org Biol)*	I	I	R	M	R	–	R	M	M	M	M	–	–	M	M
	Level *(Evo Eco)*	I	–	–	–	R	R	–	–	M	M	R	R	R	M	M
	Assess	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Graduates will evaluate, analyze, and synthesize information from scientific literature.	Syllabus	–	–	Exp	–	Exp	Exp	–	–	Imp	Exp	Imp	–	Exp	Imp	Exp
	Level	–	–	I	–	I	R	?	?	R	R	R	–	R	R	M
	Assess	–	–	A	–	A	A	–	–	A	A	A	–	A	A	A
Graduates will formulate hypotheses, make careful observations, analyze data, and draw conclusions.	Syllabus	Exp	Exp	Exp	–	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp
	Level	I	I	R	–	R	R	R	R	M	M	R	?	R	M	M
	Assess	A	A	A	–	A	A	A	A	A	A	A	A	A	A	A
Graduates will be proficient in laboratory and field techniques appropriate for their discipline.	Syllabus	Exp	Exp	Exp	–	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	–
	Level	I	I	I	–	R	R	R	R	M	M	M	?	M	M	–
	Assess	A	A	A	–	A	A	A	A	A	A	A	A	A	A	–
Graduates will be prepared for successful entry into graduate or professional school, or a position related to the discipline.	Syllabus	Imp	Imp	Imp	Exp	Imp	Imp	Imp	Imp	Imp	Imp	Imp	Imp	Imp	Imp	Imp
	Level	I	I	I	R	R	R	R	R	R	R	R	R	R	R	R
	Assess	–	–	–	–	–	–	–	–	–	–	–	–	–	–	A?

a) - Depending upon their track, students may elect to take either BIOL 205, BIOL205 and BIOL206, BIOL 231 and BIOL 232, or BIOL 353 to satisfy the physiology content area.
b) - Depending upon their track, students may elect to take BIOL 218, BIOL 286, or BIOL 386 to satisfy the microbiology content area.
c) - Depending upon their track, students may elect to take BIOL346, BIOL 347, or BIOL 442 to satisfy the ecology content area.
Syllabus: The program outcome is either explicitly stated (Exp) or implied (Imp) in the course syllabus.
Level: Course materials either introduce (I), reinforce (R), or lead to mastery (M) of the program outcome. The levels for outcome one are sub-divided into Cell Biology, Molecular Biology/Genetics, Organismal Biology, and Population Biology/Evolution/Ecology as defined by the Biology Major
Assess: Coursework is analyzed to assess the progress toward the program outcome (A); assessment information is collected for TracDat (T)

Assessment measures

Course syllabi were examined to categorize the types of assessment instruments currently used to measure student learning. Focus group discussions were also held with faculty from the General Biology, Microbiology, Anatomy and Physiology, Field Biology, and Molecular Biology faculty. These groups discussed how each of the course objectives were measured and how these objectives align with the program outcomes.

The most common form of assessment measure used was exams (which includes quizzes). Less common were student products (papers) and performances (laboratory procedures). Upper division courses were less reliant upon exams than lower division courses. On average though, approximately 90% of all course points and assessments were completed using quizzes or exams. Moreover, the vast majority of these instruments were used to collect student learning data related only to program learning outcome number one (the content-based outcomes for the major concepts of biology).

Assessment outcomes

Historically, assessment of outcomes for the Biology Program has been implemented primarily at the course level. Members of the Biology faculty have utilized a variety of means to measure and track student learning. These have included but are not limited to pre/post tests, assessment questions embedded into extant exams, research projects, and laboratory experiments. In many cases, this data has been collected and archived for decades. Despite a concerted effort by the assessment coordinator, there is still no formal mechanism to aggregate and analyze student performance data with respect to specific program outcomes. Members of the faculty instead continue to voluntarily summarize their findings and these have been used to guide discussions concerning course effectiveness and programmatic success. Four examples of assessment data from the Biology program taken from the past five years are provided below. These show the range of approaches that are regularly used to measure student success within the program.

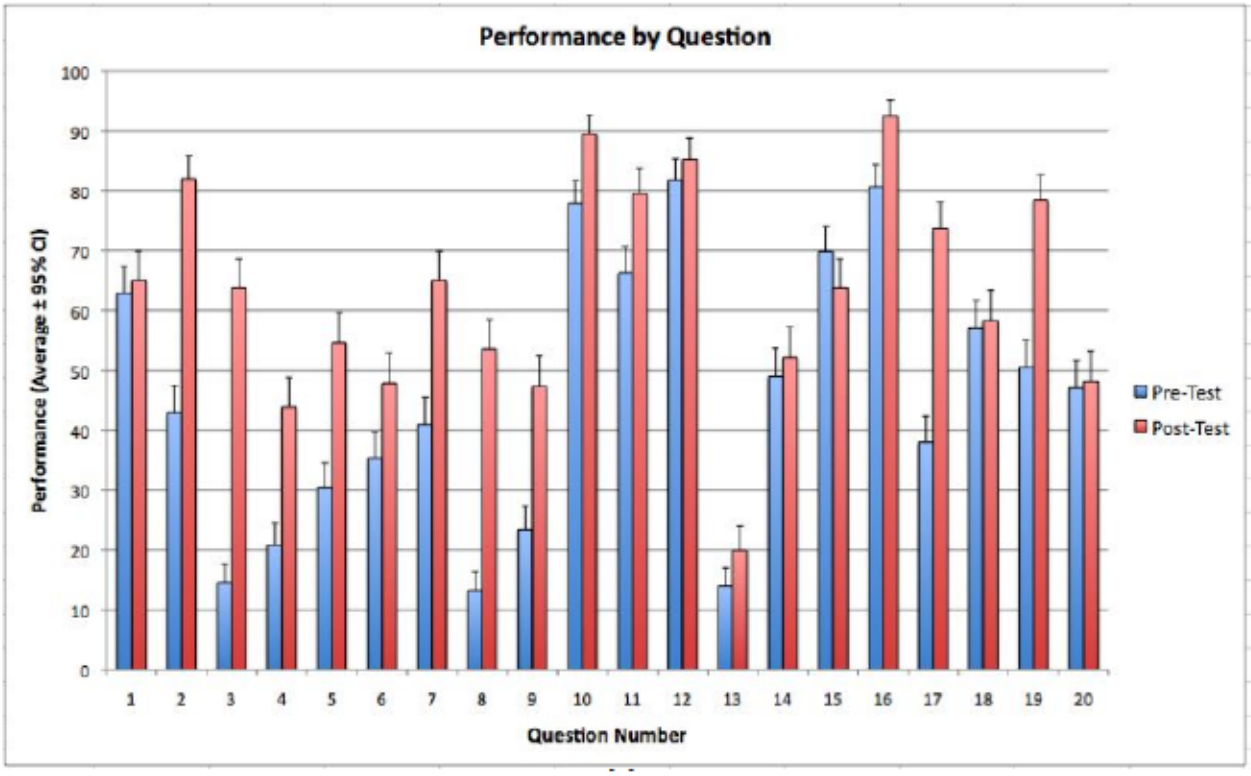
BIOL121/122: General Biology 1 and 2 – In the introductory biology courses, a pre-test/post test assessment approach is used. A standard 20-question instrument is given to the class at the beginning and end of the semester. The first ten questions require lower levels of Bloom's taxonomy (remember, understand), while the last ten questions use higher levels (apply, analyze, evaluate). The student performance on each administration is evaluated as is the improvement in performance over time. A representative report is included here.

The changes in performance for each question are summarized below. The change in score is the difference between the post-test and pre-test average. An unpaired t-test was used to calculate the significance of this difference. Two different measures are used to determine the size of the effect. <g> is the averaged normalized gain. Basically, it is a ratio of change to the maximum possible change for the pre-test (e.g. pre-test=30, post-test=70, <g>=(70-30)/(100-30)=0.57). Values below 0.3 are considered small, between 0.3 and 0.7 are moderate, and over 0.7 are high gains. Cohen's d was also calculated. This is essentially the ratio of the change to the summed variance for the tests.

#	Pre-Test Results			Post-Test Results			Change	T-test (p)	Signif.	< g >	Cohen's d	Effect Size
	N	Mean	SD	N	Mean	SD						
1	461	62.91	48.36	372	65.05	47.74	2.15	0.522	n.s.	0.06	0.04	Trivial
2	461	42.95	49.55	372	81.99	38.48	39.04	8.40E-33	****	0.68	0.87	Large
3	461	14.53	35.28	372	63.71	48.15	49.18	8.24E-56	****	0.58	1.19	Large
4	461	20.82	40.65	372	43.82	49.68	22.99	4.87E-13	****	0.29	0.51	Medium
5	461	30.37	46.03	372	54.57	49.86	24.20	8.44E-13	****	0.35	0.51	Medium
6	461	35.36	47.86	372	47.85	50.02	12.49	2.58E-04	***	0.19	0.26	Small
7	461	41.00	49.24	372	65.05	47.74	24.06	2.58E-12	****	0.41	0.50	Medium
8	461	13.23	33.92	372	53.49	49.94	40.26	3.43E-39	****	0.46	0.96	Large
9	461	23.43	42.40	372	47.31	49.99	23.88	2.20E-13	****	0.31	0.52	Medium
10	461	77.87	41.55	372	89.52	30.68	11.64	7.65E-06	***	0.53	0.31	Small

11	461	66.38	47.29	372	79.57	40.37	13.19	2.19E-05	***	0.39	0.30	Small
12	461	81.78	38.64	372	85.22	35.54	3.44	0.186	n.s.	0.19	0.09	Trivial
13	461	13.88	34.61	372	19.89	39.97	6.01	0.020	*	0.07	0.16	Trivial
14	461	49.02	50.04	372	52.15	50.02	3.13	0.370	n.s.	0.06	0.06	Trivial
15	461	69.85	45.94	372	63.71	48.15	-6.14	0.061	n.s.	-0.20	-0.13	Trivial
16	461	80.69	39.51	372	92.47	26.42	11.78	9.99E-07	****	0.61	0.34	Small
17	461	37.96	48.58	372	73.66	44.11	35.69	2.72E-26	****	0.58	0.77	Large
18	461	57.05	49.55	372	58.33	49.37	1.28	0.710	n.s.	0.03	0.03	Trivial
19	461	50.54	50.05	372	78.49	41.14	27.95	2.34E-17	****	0.57	0.60	Large
20	461	47.07	49.97	372	48.12	50.03	1.05	0.764	n.s.	0.02	0.02	Trivial

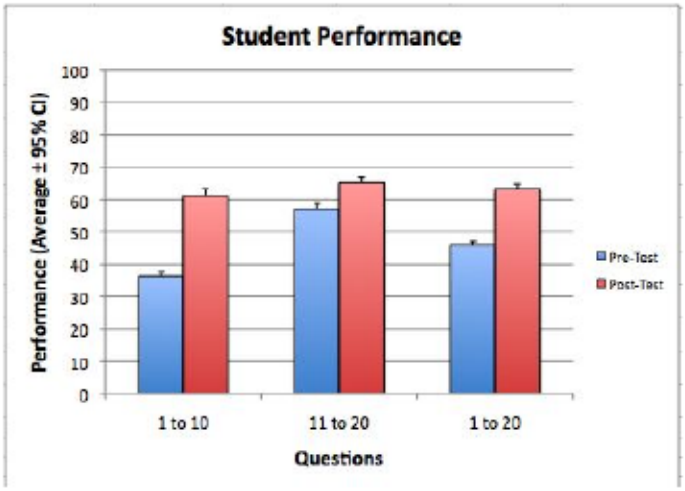
Even a cursory glance at these data reveals that the first ten questions showed much larger gains than the last ten. There were a couple (Q17 and Q18) that performed well. This is largely due to the fact that the last ten questions were easier during the pre-test. The gains per question are shown graphically below.



Overall improvement: The performance on questions 1-10, 11-20, and 1-20 were also compared.

Num	Pre-Test Results			Post-Test Results			Change	T-test (p)	Signif.	< g >	Cohen's d	Effect Size
	N	Mean	SD	N	Mean	SD						
1-10	461	36.25	16.03	372	61.24	19.51	24.99	1.13E-74	****	0.39	1.42	Large
11-20	461	57.14	17.72	372	65.16	17.05	8.02	6.96E-11	****	0.19	0.46	Medium
1-20	461	45.84	13.43	372	63.20	15.42	17.36	7.72E-58	****	0.32	1.21	Large

These data clearly show that most of the gains were made in the first ten questions. The data are also shown graphically below.



BIOL286: General Microbiology – General Microbiology uses a different approach. In this course, questions that are mapped to specific course or program outcomes are embedded into the in-class exams. The exam results are then analyzed to extract meaningful assessment data for the respective outcomes. An example of an analysis of one final exam is included here.

Many or most of the questions in this exam have been mapped onto specific learning outcomes for the course. The class performance on each of these outcomes is plotted to the right, with the criterion of success (70%) indicated as a horizontal dashed line. The average values of each outcome were compared against the criterion of success using a series of

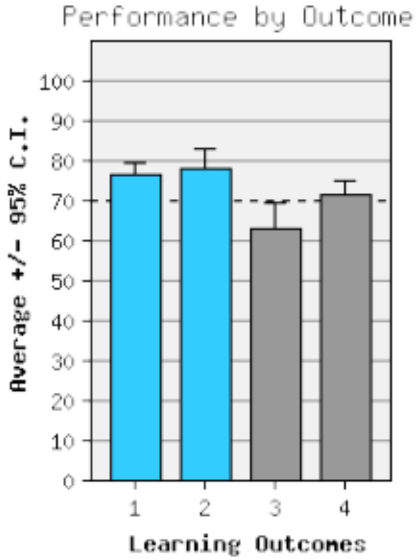
two-tailed, one-sample t-tests. The Dunn-Sidak correction for multiple comparisons was used to limit the likelihood of type I errors. Each individual t-test was performed with a smaller α (p = 0.01) in order to keep the family-wise α low (p = 0.039). The sheer size of the sample size keeps the probability of a type II error reasonable under these conditions.

Blue columns denote content areas with performance that was statistically better than the criterion of success.

Red columns indicate content areas with performance that was statistically worse than the criterion of success.

Gray columns show the content areas with performances that were deemed to be not statistically different from the criterion of success.

The overall class results on the materials from each content area are summarized below. You may quickly navigate to a particular section by clicking on the desired column in the graph.



1 **Microbial Diversity** - *By the completion of this course, students will be able to compare and contrast different types of microbes (including viruses, bacteria, fungi, and protozoa) with regard to their structure, function, and composition.* This learning outcome was assessed by items worth a total of 30 points (20.0% of the total exam). The class scored 23.0 ± 1.0 of these points (average ± 95% confidence interval). That gives a sub-score for this learning outcome of **76.6% ± 3.3%**. A total of 47 of the students (73.4% of the class) met or exceeded the criterion of success defined for this section. The class average for this material was **significantly better** than the criterion of success - t (63) = 3.89, p < 0.039. The magnitude of the effect size for this score was **small (Cohen's *d* = 0.49)**. The class scored measurably better than the criterion of success on this learning outcome. The stated goal for this learning outcome **has been exceeded** by the class. *Most of the class performed well on this learning outcome. However, a sizable number of students had difficulty with this material. The class as a whole appears to have a good grasp of this material.*

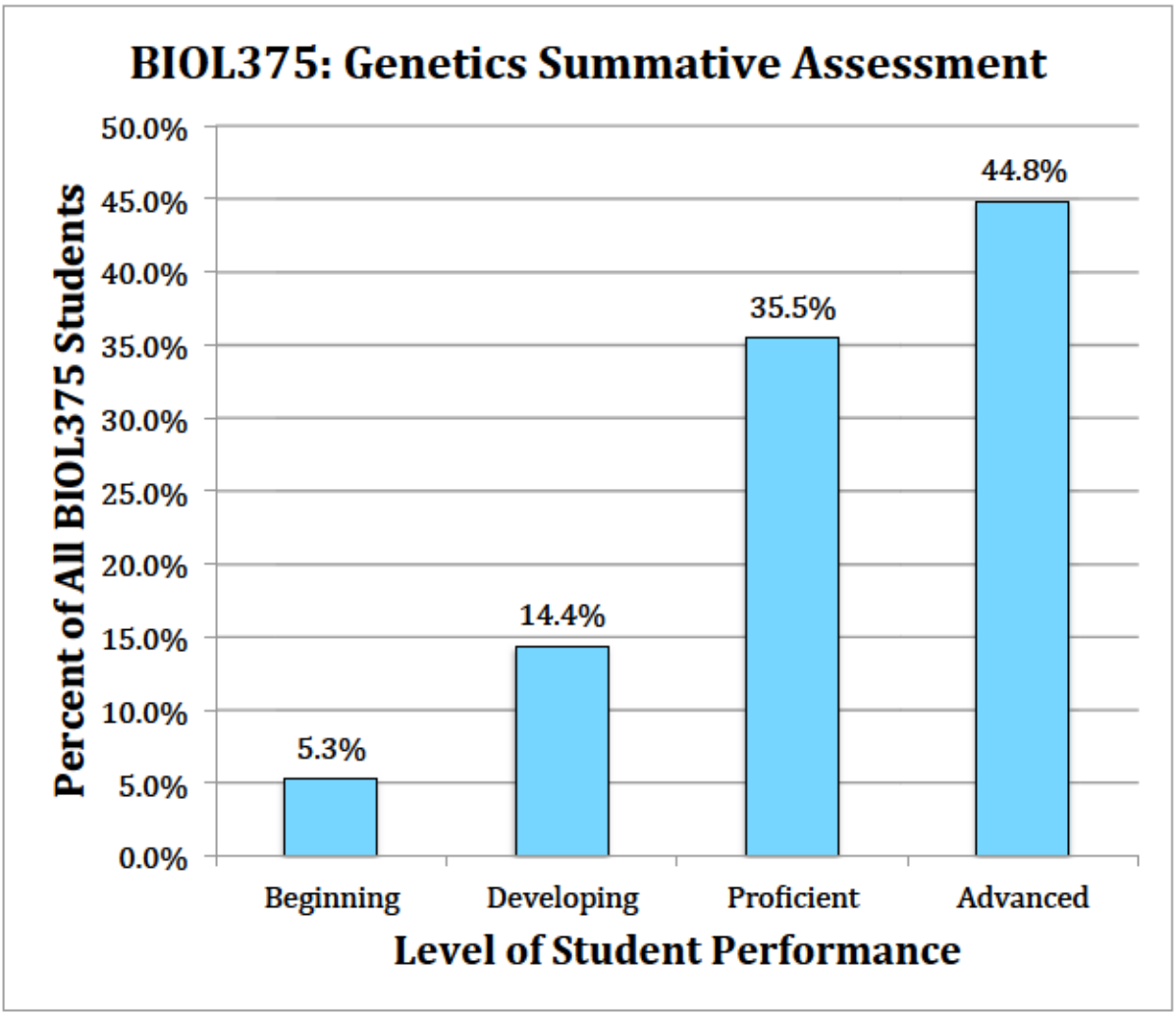
2 **Microbial Metabolism** - *By the completion of this course, students will be able to explain the various strategies employed by microbes with respect to their metabolism and growth in relationship to their structure and composition.* This learning outcome was assessed by items worth a total of 30 points (20.0% of the total exam). The class scored 23.4 ± 1.1 of these points (average ± 95% confidence interval). That gives a sub-score for this learning outcome of **78.0% ± 5.4%**. A total of 46 of the students (71.9% of the class) met or exceeded the criterion of success defined for this section. The class average for this material was **significantly better** than the criterion of success - t (63) = 2.92, p < 0.039. The magnitude of the effect size for this score was **medium (Cohen's *d* = 0.53)**. The class

performed meaningfully better than the criterion of success for this learning outcome. The stated goal for this learning outcome **has been exceeded** by the class. *Most of the class performed well on this learning outcome. However, a sizable number of students had difficulty with this material. The class as a whole appears to have a good grasp of this material.*

3 **Microbial Genetics** - *By the completion of this course, students will be able to explain the various genetic strategies employed by microbes to express, regulate and share genetic information.* This learning outcome was assessed by items worth a total of 30 points (20.0% of the total exam). The class scored 18.9 ± 1.4 of these points (average ± 95% confidence interval). That gives a sub-score for this learning outcome of **63.1% ± 6.9%**. A total of 25 of the students (39.1% of the class) met or exceeded the criterion of success defined for this section. The class average for this material was **not significantly different** from the criterion of success - t (63) = -1.94, p > 0.039. The magnitude of the effect size for this score was **small (Cohen's *d* = -0.35)**. Therefore, we can conclude that the class as a whole performed measurable worse than the criterion of success. We are unable to discount the null hypothesis - that the course performance equals the criterion of success. Therefore, we retain the belief that the stated goal for this learning outcome **has been met** by the class. *Very few members of the class met the performance standard for this material. A large number of students are apparently struggling with facts, concepts, and procedures covered in this learning outcome. The class does not yet exhibit an adequate mastery of this learning outcome.*

4 **Host-Microbe Interactions** - *By the completion of this course, students will be able to compare the different interactions possible between host and microbial cells and describe several different molecular strategies employed by specific microbial pathogens.* This learning outcome was assessed by items worth a total of 60 points (40.0% of the total exam). The class scored 43.1 ± 2.2 of these points (average ± 95% confidence interval). That gives a sub-score for this learning outcome of **71.8% ± 3.8%**. A total of 42 of the students (65.6% of the class) met or exceeded the criterion of success defined for this section. The class average for this material was **not significantly different** from the criterion of success - t (63) = 0.95, p > 0.039. The magnitude of the effect size for this score was **tiny (Cohen's *d* = 0.12)**. The class average is essentially indistinguishable from the criterion of success. The class performance was adequate. We are unable to discount the null hypothesis - that the course performance equals the criterion of success. Therefore, we retain the belief that the stated goal for this learning outcome **has been met** by the class. *Most of the class performed well on this learning outcome. However, a sizable number of students had difficulty with this material. The class as a whole appears to have a good grasp of this material.*

BIOL375: Genetics - The genetics course uses still another approach. In this course the students are graded holistically based upon the sum of their performances in class. An analysis summarizing the past five years of students (n=1,396) is given below. It is apparent that about 80% of all students were judged to be proficient or better by the end of the course.



BIOL460: Current Topics in Biology – The is the capstone course for the Biology program and represents still another assessment strategy. Current Topics focuses upon reading, analyzing, and evaluating the scientific literature. In this process, students are required to write several long papers and make several oral presentations. These student works are scored using a standard rubric. Since all students are required to complete this capstone, the success rate is very high (nearly 100%). The rubric evaluations, however, have revealed gaps in our students' abilities – such as the ability to properly interpret statistical analyses in manuscripts.

ETS Major Field Test –As an external direct measure of the educational outcomes of the Biology Program, all seniors have been required to complete the Major Field Test in Biology. This is a national, standardized exam administered by the Educational Testing Service (ETS). Approximately 400 colleges and universities administer the exam to their students nationwide. Each student who completes the exam receives a Total Score and sub-scores in four areas: Cell Biology; Molecular Biology and Genetics; Organismal Biology; and Population Biology, Evolution, and Ecology. Those four sub-scores, not coincidentally, correspond directly to the first four outcomes of the Biology Programs.

We have found no significant differences in the Total Score or in any of the four sub-scores when the average scores of cohorts (students who take the exam in the same semester) are compared to national averages. When the cumulative scores of all Ferris students from Fall 2009 to Spring 2013 were compared to national averages, there were no significant differences in the Total Score or the four sub-scores, our students tend to score near or slightly below the 50th percentile. In general, we have learned that our Biology students are doing about as well as other biology students around the country on the Biology Field Exam.

We have also administered the field test to a cohort of freshmen in the. When their scores were compared to the senior cohort who took the exam during the same semester, there were highly significant differences in the Total Score and in each of the four sub-scores. These results indicate that students do indeed gain significant amounts of information during their time in the Biology Program. **[See Appendix D]**

Biology Field Exam Sections	Ferris Freshmen 2013			Ferris Seniors 2013		
	Average	Std. Dev.	N	Average	Std. Dev.	N
Cell Biology	36	11	279	54.0	11.0	197
Molecular Biology and Genetics	36	11	279	54.0	12.0	197
Organismal Biology	37	10	279	53.0	11.0	197
Population Biology, Evolution, and Ecology	38	11	279	54.0	12.0	197
Total Score	134	13	279	154.0	11.0	197

Difference	DF	t	p	Significance	d	Effect Size
18	474	17.547	1.77E-53	Highly significant	1.64	Large
18	474	16.895	1.81E-50	Highly significant	1.58	Large
16	474	16.457	1.84E-48	Highly significant	1.54	Large
16	474	15.018	5.60E-42	Highly significant	1.40	Large
20	474	17.561	1.52E-53	Highly significant	1.64	Large

Application of assessment outcomes

Assessment of student learning has helped to identify a few specific areas where improvements could be made. Two of the main discoveries of the past five years were:

1) Our students do not do as well in Botany as we would like.
2) Our students do not have the ability to analyze scientific literature and use scientific reasoning skills to the degree that we would like.

Student scores on botany materials, both on the ETS field exam and in-course assessments, is much lower than in other subject areas. For now, the instructors of BIOL121 and BIOL122 are working to emphasize these materials more to our Freshman. There is not currently a traditional botanist on our faculty. Sadly, there is also not enough demand to enable us to attempt to hire one. Our newest faculty member, Chris DeFraia, works with *Arabidopsis* (a small plant) but is not a true botanist. For the time being, we will work with what we have to attempt to improve the coverage of plants in our curriculum.

The second issue is currently the focus of a curricular design project in the department. There is a growing sense among the Biology faculty that our students are not able to analyze scientific literature and use scientific reasoning skills sufficiently. To address this perceived gap, two new courses are being developed. Together with BIOL121/122 and BIOL460, these would represent a core of courses that all Biology B.S. students would complete. The new classes would represent excellent assessment points for program learning outcomes 2 and 3. These outcomes are not currently covered very systematically by the curriculum. All of these core courses would cover aspects of critical thinking, reading and analyzing the primary scientific literature, experimental design and analysis, scientific writing, and oral presentations. Each course would build upon those preceding it. This would enable our graduating seniors to attain higher levels of proficiency in these crucial skills. A rough idea of the connection between the courses is given below.

Theme	BIOL121/122	BIOL260	BIOL360	BIOL460
	Thinking like a biologist	*Asking questions like a biologist*	*Interpreting data like a biologist*	*Communicating like a biologist*
	Introducing scientific reasoning using pre-defined exercises with known outcomes	*Reinforcing data representation skills with prepared data sets and student collected data*	*Applying appropriate statistical tests to data sets and interpreting the results of these analyses*	*Interpreting and evaluating research finding in the primary literature*

Evaluation of the program assessment

In the process of assembling this report, it became apparent to the members of the review panel that the program's assessment processes are not very efficient. While the quality of the assessment data is good, it is extremely difficult to gather and analyze. To determine the exact status of the program's assessment, a comprehensive study was conducted. The results of this analysis is included at the end of this report. **[See Appendix E]** The recommendations from that report are also included in the "Implementation of Findings" at the end of this document.

Program Profile

Note: All programs are on-campus only.

BIOL = Bachelor of Arts in Biology

BIBS = Bachelor of Science in Biology

BIEB = Bachelor of Science in Biology (Environmental Biology)

BIFB = Bachelor of Science in Biology (Forensic Biology)

BIPD = Bachelor of Science in Biology (Pre-Dentistry)

BIPM = Bachelor of Science in Biology (Pre-Medicine)

BIPO = Bachelor of Science in Biology (Pre-Optometry)

BIPO = Bachelor of Science in Biology (Pre-Pharmacy)

BIPO = Bachelor of Science in Biology (Pre-Physical Therapy)

BIPO = Bachelor of Science in Biology (Pre-Veterinary Medicine)

Applications, Admits, and Enrolled

Number of Applications to Program				
	2011/12	2012/13	2013/14	2014/15
BIOL	0	2	0	0
BIBS	74	63	57	57
BIEB	23	28	21	32
BIFB	58	76	45	67
BIPD	39	36	39	40
BIPM	155	213	212	166
BIPO	110	109	97	107
BIPP			19	5
BIPT	81	77	88	97
BIPV	63	63	73	70
Total	603	667	651	641

Number of Admissions to Program				
	2011/12	2012/13	2013/14	2014/15
BIOL	0	0	0	0
BIBS	52	43	45	42
BIEB	15	17	13	23
BIFB	46	53	34	53
BIPD	32	31	26	35
BIPM	126	146	162	134
BIPO	97	91	80	95
BIPP			14	5
BIPT	58	49	59	70
BIPV	41	41	56	48
Total	467	471	489	505
% Admitted	77	71	75	79

Number Enrolled in Program				
	2011/12	2012/13	2013/14	2014/15
BIOL	N/A	N/A	N/A	0
BIBS	N/A	N/A	N/A	6
BIEB	N/A	N/A	N/A	3
BIFB	N/A	N/A	N/A	20
BIPD	N/A	N/A	N/A	9
BIPM	N/A	N/A	N/A	21
BIPO	N/A	N/A	N/A	46
BIPP	N/A	N/A	N/A	5
BIPT	N/A	N/A	N/A	11
BIPV	N/A	N/A	N/A	8
Total	N/A	N/A	N/A	

The number of applications to the program increased over the four years presented, and it may have plateaued. The percentage of applicants who are admitted appears to be rather consistent, ranging from 71% to 79%. For the one year that data were available (2014/2015), 25% of applicants that were admitted actually enrolled in the program.

Compared to many programs on campus, interest in biology programs is high. In the past, the department has not put much effort into marketing the program and actively recruiting students specifically for our programs. Due to projected decreases in the number of college-age individuals in Michigan in upcoming years, it may be a focus of the department to become more active in this process.

Enrollment – Headcounts

Students Enrolled in Major											
Year	BIOL	BIBS	BIEB	BIFB	BIPD	BIPM	BIPO	BIPP	BIPT	BIPV	Total
2010/11	7	95	23	72	32	80	114	0	46	21	490
2011/12	2	89	24	62	34	79	110	0	42	12	454
2012/13	3	104	17	60	27	68	121	0	41	19	460
2013/14	2	65	31	40	21	83	106	63	51	25	487
2014/15	0	46	31	41	29	84	94	96	44	22	487

Total headcounts for all programs has remained steady over the past five years, with a bit of a decrease for the second and third years of the period. During the previous five-year period, total enrollment increased from 278 to 446, so the numbers presented here represent historically values. The program appears to be quite healthy with respect to number of students enrolled (although efforts to recruit students more actively in the future may be necessary). There does not appear to be a desire amongst the faculty to increase enrollment numbers from their current values.

Due to the very low numbers of students enrolled in the B.A. in Biology program, we are going to propose that we close that program in the near future. That program has always had low enrollment, but it was kept due to the fact that it provided a good option for students who might want to pursue careers that combined biological knowledge with another field of study, such as environmental law, medical illustration, or scientific writing. However, because there is now a Bachelor of Integrated Studies degree offered by the College of Arts and Sciences, those students could pursue a similar combination of courses within that very flexible degree program.

About three years ago we made changes to the Forensic Biology program that consisted of increasing the requirements for mathematics and chemistry, among other changes. We made these changes to ensure that our students would be more competitive for entry into graduate programs, which are necessary in many cases. We expected to see a reduction in the number of students enrolled in the program, and that is exactly what we have seen thus far.

In 2013 we introduced a new concentration within the B.S. in Biology umbrella. This new concentration, Pre-Pharmacy (BIPP), is intended for students who want to complete an undergraduate degree before applying to a pharmacy school. So far, enrollment in this program has been strong. Previously, students in this situation declared BIBS as their major, which is why you will notice that as the numbers in BIPP have increased, there has been a concomitant decrease in the numbers enrolled in BIBS.

Student Credit Hour Trends

Student Credit Hours				
Year	Summer	Fall	Spring	Fall + Spring
2009/10	2140	8462	7331	15,793
2010/11	1214	7903	7845	15,748
2011/12	1454	8142	7866	16,008
2012/13	1051	8116	7708	15,824
2013/14	994	7674	7164	14,838

The number of student credit hours has remained steady, although there was a noticeable decrease from the 2012 to 2013 academic years. This decrease was due primarily to a single curricular change that we made at the time, in which we increased the mathematics co-requisite for entry into BIOL 121 (General Biology 1) from MATH 115 to MATH 120. This resulted in a large number of students in their first year of study who could not take BIOL 121 right away during their first semester. This change was made due to fact that students who had been placed into MATH 115 performed more poorly, significantly so, than students with a higher math placement. We have not yet collected enough data to determine if this change has made a real difference in student performance.

Productivity

Student Credit Hours/Full-Time Equated Faculty				
Year	Summer	Fall	Spring	Fall + Spring
2009/10	226	296	274	571
2010/11	155	338	331	669
2011/12	160	313	265	575
2012/13	158	324	297	620
2013/14	156	322	319	641

Campus Average - Student Credit Hours/Full-Time Equated Faculty				
Year	Summer	Fall	Spring	Fall + Spring
2009/10	145	232	221	454
2010/11	142	238	228	466
2011/12	150	233	222	455
2012/13	148	235	228	463
2013/14	141	238	231	469

Productivity numbers for faculty in the program have been consistent over time, and our averages appear to be much higher than the campus averages.

Enrollment – Residency

Students Enrolled in Major – Residents vs. Non-Residents										
	2010/11		2011/12		2012/13		2013/14		2014/15	
BIOL	7	0	2	0	2	1	1	1	0	0
BIBS	92	3	84	3	96	4	63	1	42	1
BIEB	23	0	23	0	17	0	29	0	30	0
BIFB	68	1	61	0	60	0	39	0	38	0
BIPD	30	1	33	2	24	1	18	3	25	2
BIPM	77	2	76	3	63	4	74	3	78	3
BIPO	110	0	104	2	116	2	100	1	91	0
BIPP							55	1	85	1
BIPT	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	40	3
BIPV	20	1	12	0	17	0	24	0	21	0

Overwhelmingly, the students enrolled in this program (97.5%) are residents of Michigan. We do not anticipate that this will change in the future, as Ferris State is a regional state university that is most attractive to students in our area.

Average Age of Enrolled Students					
	2010/11	2011/12	2012/13	2013/14	2014/15
BIOL	25	20	20	20	
BIBS	23	23	23	22	21
BIEB	24	24	21	23	22
BIFB	21	21	20	21	20
BIPD	21	20	19	20	20
BIPM	20	20	21	20	21
BIPO	20	20	20	20	19
BIPP				21	21
BIPT	N/A	N/A	N/A	N/A	20
BIPV	20	20	19	19	19

The data indicate that most of our students are of a traditional college age and that there are not many non-traditional students with respect to age.

Average GPA of Enrolled Students					
	2010/11	2011/12	2012/13	2013/14	2014/15
BIOL	2.68	3.31	3.67	3.42	
BIBS	3.04	3.02	3.08	3.05	3.17
BIEB	2.80	2.76	2.75	3.04	2.99
BIFB	2.93	2.82	2.91	2.85	2.94
BIPD	3.15	3.01	3.18	3.27	3.20
BIPM	3.17	3.17	3.23	3.20	3.26
BIPO	3.19	3.25	3.24	3.31	3.29
BIPP				3.09	3.27
BIPT	N/A	N/A	N/A	N/A	3.09
BIPV	2.61	3.02	3.03	3.18	3.09

The average GPA does appear to vary from concentration to concentration and from year to year. However, it should be noted that in some cases the sample size used for each data set is rather small (sometimes only one student). This makes it difficult to assess the data effectively. For each concentration, there appears to be an increase in average GPA from 2010/11 to 2014/15. However, we have not performed a statistical analysis to determine if these changes are statistically significant.

Average ACT of Enrolled Students					
	2010/11	2011/12	2012/13	2013/14	2014/15
BIOL	22.50	26.50	26.00	16.00	
BIBS	22.14	22.34	23.33	23.55	23.53
BIEB	20.95	22.18	22.33	23.64	23.70
BIFB	22.98	22.96	23.23	23.69	23.68
BIPD	21.66	21.83	23.15	22.16	22.63
BIPM	24.11	24.29	25.08	25.17	25.62
BIPO	24.46	24.83	25.08	25.38	25.07
BIPP				23.92	25.33
BIPT	N/A	N/A	N/A	N/A	22.86
BIPV	21.95	25.18	24.11	24.50	24.57

The average ACT does appear to vary from concentration to concentration and from year to year. However, it should be noted that in some cases the sample size used for each data set is rather small (sometimes only one student). This makes it difficult to assess the data effectively. For each concentration, there appears to be an increase in average ACT from 2010/11 to 2014/15. However, we have not performed a statistical analysis to determine if these changes are statistically significant.

Enrollment – Gender and Ethnicity

Students Enrolled in Major – Gender Comparison (Male vs. Female)										
	2010/11		2011/12		2012/13		2013/14		2014/15	
BIOL	2	5	1	1	1	2	1	1		
BIBS	35	60	37	52	48	56	23	42	13	33
BIEB	13	10	9	15	10	8	16	15	14	17
BIFB	13	59	15	47	12	48	10	30	9	32
BIPD	12	20	10	25	9	18	9	12	8	21
BIPM	40	40	35	45	31	37	30	53	35	49
BIPO	39	75	43	67	56	66	53	53	41	53
BIPP							24	39	45	51
BIPT	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	24	20
BIPV	7	14	2	10	2	17	3	22	2	20
% Female	63.7%		63.3%		59.9%		61.2%		60.8%	

The data indicate that the majority of enrolled students are female, the relative numbers remained consistent over this five-year period. This is a trend that has been seen in biology programs across the country, so it is not unexpected. This is not something that will be addressed at this time.

Students Enrolled in Major – Ethnicity Comparison (White vs. Non-White)										
	2010/11		2011/12		2012/13		2013/14		2014/15	
BIOL	7	0	2	0	2	0	0	1		
BIBS	83	10	72	13	80	17	52	7	37	4
BIEB	19	0	20	2	17	1	30	1	27	1
BIFB	62	8	54	4	53	4	37	1	37	4
BIPD	24	5	26	4	22	3	13	5	20	6
BIPM	68	7	65	8	55	7	70	8	71	8
BIPO	98	13	88	15	106	10	93	7	85	7
BIPP							50	12	73	16
BIPT	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	32	4
BIPV	17	3	12	0	16	2	20	3	19	2
% White	89.2%		88.1%		90.0%		89.0%		88.5%	

The data indicate that the students in the program are overwhelmingly White. (For this table, we have combined the data for Black, Hispanic, Native, Asian, and Hawaiian and labeled them as Non-White. This was due to the low numbers of students in each of those individual categories.) This is a reflection of low numbers of minority students in general at Ferris State coupled with the national issue that some minority groups are significantly under-represented in science, technology, and mathematics fields. If efforts are to be made to increase the numbers of Non-White students in this program, they should be made in the context of a campus-wide effort, as that would be most effective.

Students Enrolled in Major – Full-Time vs. Part-Time										
	2010/11		2011/12		2012/13		2013/14		2014/15	
BIOL	4	3	2	0	3	0	2	0		
BIBS	78	17	73	16	93	11	56	9	37	9
BIEB	19	4	20	4	15	3	29	2	26	5
BIFB	68	4	57	5	58	2	39	1	37	4
BIPD	30	2	34	1	27	0	21	0	28	1
BIPM	73	7	75	5	64	4	79	4	82	2
BIPO	112	2	109	1	120	2	105	1	92	2
BIPP							62	1	94	2
BIPT	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	41	3
BIPV	19	2	11	1	18	1	25	0	20	2
% FT	90.8%		92.0%		94.5%		95.9%		97.5%	

The data indicate that the overwhelming majority of students in the program are full-time students. Many of our students plan to attend graduate or professional school after they receive their undergraduate degree, so most of them have a desire to complete their undergraduate program as quickly as they can. No efforts in this area seem to be warranted.

Retention

Retention of Students to Second Year										
Year	BIOL	BIBS	BIEB	BIFB	BIPD	BIPM	BIPO	BIPP	BIPT	BIPV
2009/10		80	100	83	75	67	89		60	83
2010/11		40	25	75	100	83	79		57	0
2011/12	100	67	0	69	60	58	78		50	67
2012/13	100	88	0	87	50	74	78		90	75
2013/14		100	50	71	67	78	74		77	86

Although the numbers in the table above appear to vary significantly in some cases, the data presented are based, at times, on very low sample sizes (n=1 in some cases). Therefore, it is difficult to discern any real trends.

Retention of students is a real concern for our program, as it is for all programs on campus, both for the sake of the students and the health of the program in general. One of the goals of the new strategic plan for the College of Arts and Sciences, which was approved in the Spring of 2015, is retention. Our department will therefore be involved in efforts by the college to improve retention. Specific strategies have not yet been outlined.

One specific change that me made to the biology program in an attempt to increase retention of first-year students was to increase the mathematics corequisite for entry into BIOL 121 (General Biology 1, which is the entry course for the program) from MATH 115 to MATH 120. We had noticed that students who had been placed into MATH 115 performed more poorly, significantly so, than students with a higher math placement. In general, those students were not well-prepared to take a first-semester combination of BIOL 121, a chemistry class, and a math class. By postponing the start of BIOL 121 and CHEM 121 until their second semester, we hoped that they might have time to develop better study skills and become more accustomed to the demands of college. We have not yet collected enough data to determine if this change has made a real difference in student performance.

In our department, we have also moved to an advising model where all freshmen, sophomores, and new transfer students are advised by professional advisors dedicated to our program. This allows for more consistent and complete advising for our students (and the potential for more attention), all of which can contribute to increased retention.

Program Graduates

Note: All graduates are on-campus only.

Graduates											
Year	BIOL	BIBS	BIEB	BIFB	BIPD	BIPM	BIPO	BIPP	BIPT	BIPV	Total
2009/10	3	40	6	13	1	9	11		4	1	88
2010/11	2	48	5	14	5	10	11		1	1	97
2011/12	1	37	7	6	7	12	6		6	1	83
2012/13	1	36	1	10	1	4	14		1	2	70
2013/14	1	37	4	18	2	11	9		10	0	91

The numbers of graduates from the program has remained relatively steady, with a small decrease in 2012/2013. However, compared to recent historical data, these numbers are quite high. (The numbers of graduates from 2003/04 to 2007/08 were 36, 40, 52, 60, and 75.) With respect to the numbers of graduates, the program has definitely grown and is healthy. We expect this to continue, as long as the number of students enrolled in the program remains steady, as discussed above.

Six-Year Graduation Rate

Percentage of Students who Graduate after Six Years*									
BIOL	BIBS	BIEB	BIFB	BIPD	BIPM	BIPO	BIPP	BIPT	BIPV
	80	0	64	75	50	63		63	50

*This is for students who entered the program in the Fall of 2008. This was the only year for which this data was available.

Although the numbers in the table above appear to vary significantly in some cases, the data presented are based, at times, on very low sample sizes (n=1 in some cases). Therefore, it is difficult to discern any real trends. Efforts related to improving these numbers are directly related to those discussed in the section on retention, above.

Graduate Average GPA

Average FSU GPA of Graduates										
Year	BIOL	BIBS	BIEB	BIFB	BIPD	BIPM	BIPO	BIPP	BIPT	BIPV
2009/10	2.83	3.00	3.14	3.32	3.51	N/A	3.24		3.51	N/A
2010/11	3.14	3.17	3.35	3.37	3.39	3.76	3.30		3.07	N/A
2011/12	N/A	3.09	3.10	3.02	3.39	3.47	3.37		3.51	3.41
2012/13	N/A	3.09	3.05	3.18	3.90	3.73	3.38		3.76	N/A
2013/14	3.09	3.23	3.33	3.21	3.64	3.46	3.29		3.39	3.75

The average GPA for graduates has not appeared to increase or decrease over time. There is variability from year to year within concentrations, but there are no discernible trends. Nothing here seems to warrant action of any kind.

Graduate Average ACT

Average ACT of Enrolled Students					
	2010/11	2011/12	2012/13	2013/14	2014/15
BIOL	22.50	26.50	26.00	16.00	
BIBS	22.14	22.34	23.33	23.55	23.53
BIEB	20.95	22.18	22.33	23.64	23.70
BIFB	22.98	22.96	23.23	23.69	23.68
BIPD	21.66	21.83	23.15	22.16	22.63
BIPM	24.11	24.29	25.08	25.17	25.62
BIPO	24.46	24.83	25.08	25.38	25.07
BIPP				23.92	25.33
BIPT	N/A	N/A	N/A	N/A	22.86
BIPV	21.95	25.18	24.11	24.50	24.57

Average ACT of Graduates					
	2009/10	2010/11	2011/12	2012/13	2013/14
BIOL	21.00	24.00			26.00
BIBS	22.69	22.74	22.81	22.62	25.34
BIEB	20.67	26.40	20.40	23.00	27.00
BIFB	26.00	24.20	24.25	24.30	22.69
BIPD	25.00	22.40	23.00	26.00	24.00
BIPM		25.56	24.83	27.33	24.82
BIPO	22.57	22.22	25.20	24.67	24.75
BIPP					
BIPT	19.00	20.00	25.50	26.00	25.20
BIPV			25.00		28.00

Again, no discernible trends are evident. In some cases, the average ACT of graduates is lower than that of the ACT of newly-enrolled students, and in some cases it is higher. This very likely is due in part to small samples sizes in some cases, which makes a complete analysis difficult.

State and National Examinations – We do not maintain or have access to data in this area.

Program Value beyond Productivity and Enrollment Numbers

The Biology Program, including its faculty and facilities, is beneficial to the University, to the students who are enrolled in the program, and to the public.

Benefits to the University include the teaching of service courses, the teaching of general education courses, the presence of faculty on committees, faculty support of RSOs, and the administration of facilities such as the Animal Care Facility, the John and Rhea Smith Greenhouse, and the Card Wildlife Education Center. The institution also benefits from the recruiting potential of this program. The healthcare job market is currently very active.

Many of the tracks within the Biology program are tailored to prepare students for lucrative careers in these emerging areas. The recruitment of pre-professional students to Ferris through this program contributes to the overall enrollment at the institution.

Benefits to students include the transfer of valuable biological knowledge by faculty of the program, the provision of research opportunities, the opportunity for professional experience at meetings, and the ability to complete a curriculum that is relevant to their career goals.

The Biology Program also provides benefits to individuals who are not associated with the university. Multiple benefits are provided by the program faculty through lectures to community groups, involvement in extracurricular events, and various classroom activities. In addition, the Card Wildlife Education Center and the John and Rhea Smith Greenhouse welcome the public and provide educational opportunities to visitors.

Program Flexibility and Access

Currently, our course offerings at offsite locations are, by design, limited. The only courses that we teach away from the Big Rapids campus are offered in Grand Rapids as a part of the Molecular Diagnostics (DMOL) program through the College of Health Professions. Students in that program, who are in their third or fourth year, take all of their courses in Grand Rapids. The courses that we offer for those students include sections of BIOL 300 (Pathophysiology), BIOL 373 (Cell Biology), BIOL 375 (Genetics), and BIOL 475 (Bioinformatics). Each of these courses is taught once per year. These courses were first offered during the Summer of 2014. Enrollment is limited to students who are enrolled in the DMOL program. Enrollment has ranged from 5 to 18 students per course. We do not intend to offer additional courses at offsite locations in the near future.

Due to the fact that many of our BIOL courses include labs, we do not offer many courses in an online format. The two courses that are currently offered online include BIOL 345 (Environmental Regulations), which is taught every spring semester, and BIOL 310 (Nutrition), which is taught every summer. We do not intend to offer additional courses in an online format in the near future.

We do not offer courses on weekends. The only courses that are taught regularly during the evening hours are some laboratory sections of BIOL 321 (Anatomy and Physiology I) and BIOL 322 (Anatomy and Physiology II). This is done primarily to avoid conflicts with the organic chemistry courses that are taken by most students in the same year.

Accelerated program completion really depends on whether students might take additional coursework during the summer. Unfortunately, student enrollment during the summer,

and therefore the number of courses and sections offered, has been declining for the past few years, as evidenced in the table below:

Year	Sections Offered	Total Enrollment
2010	25	343
2011	28	416
2012	21	291
2013	19	273
2014	19	262

While many students enter into our programs as incoming freshman, large numbers of them also transfer in from other programs on campus or from other institutions. Also, quite a number of our students will transfer from one program to another under the B.S. Biology umbrella (e.g. from Pre-Dentistry to Pre-Medicine). The fact that all of the programs under that umbrella are relatively similar allows them to do so rather easily. Due to the fact that multiple upper-level options are available and that courses are offered often and regularly to meet demand, entry into the program at various stages is possible. We do have a requirement within our department that at least 50% of the credits in the major (excluding general education courses) must be taken at Ferris.

During the past five years, student enrollment in biology programs has remained high, especially compared to previous time periods, and we continue to offer new courses to accommodate the needs of the students. Since the last program review, five new courses have been added as elective options (BIOL 301 – Exercise Physiology, BIOL 310 – Nutrition, BIOL 330 – Zoology, BIOL 343 – Ornithology, BIOL 350 – Plants and Fungi, and BIOL 423 – Neurobiology). In some cases, these new courses replaced other courses, while others were completely new. In all cases, the needs of students were the primary driving force.

To help ensure full schedules for incoming students, we coordinate with the Physical Sciences and Mathematics Departments to create science block scheduling for new freshman and transfers. This cooperative effort has increased the efficiency of introductory offerings and ensures we have a workable first semester schedule for students throughout the summer orientation process.

We use a pre-approval process for upper level biology classes to allow for efficient use of the seats in our upper-level biology courses. Seniors are given first access to upper-level

biology courses, thus ensuring that their graduation will not be delayed. When scheduling occurs, every effort is made to avoid conflicts with Chemistry and Physics courses, which all students in the program have to take.

Visibility and Distinctiveness

The Biology program has several features that make it distinctive. In addition to the general B.S. degree in Biology, students may elect to complete one of seven different tracks by following the guidelines of the respective check sheets. These tracks include Environmental Biology, Forensic Biology, Pre-Dentistry, Pre-Medicine, Pre-Optometry, Pre-Physical Therapy, and Pre-Veterinary Medicine. Many of these fields currently have abundant job opportunities. Copies of the check sheets are attached. **[See Appendix B]**

Most of the program courses are taught by tenured and tenure-track faculty members. Some lecture courses may be of a moderate size (~100), but the majority of the program courses have a low student-to-teacher ratio, with cap sizes of 24 or less. In addition, most of the courses in the program are taught with labs; this allows the students a greater degree of hands-on participation.

The Biology Program employs faculty with expertise in a variety of areas. In addition, half of the 20 faculty members have been hired during the last ten years. The presence of younger faculty increases the number of research opportunities for students and helps to bring new ideas to the program.

The Biology program remains relevant by responding to changes in the discipline and the needs of the students and employers. For example, we noticed that a significant number of our introductory biology students were not reaching the level of proficiency that we desire. Further analysis revealed that students entering our program having taken MATH115 and CHEM114 were at a much higher risk of not successfully completing BIOL121. We, therefore, changed our prerequisites for BIOL121 to now require MATH120. As a consequence, the DFW rate for that course has improved. Other curricular changes have been made as a result of discussions with external groups. Dr. Douglas Workman acted as an external consultant and aided the program with a revision of the Environmental Biology track. Similarly, we worked with representative from the National Academy of Forensic Sciences to improve the curriculum in the Forensic Biology track.

Its affiliation with the professional schools at Ferris (Allied Health Sciences, Optometry, and Pharmacy) also makes the Biology program desirable for students.

Geographically, the two main competitors for the Biology Program, with respect to attracting students, are Central Michigan University and Grand Valley State University. However, nearly every biology program in the state of Michigan could be considered a

competitor for attracting students, as almost all biology programs provide similar curricula and attempt to prepare their students for employment in the same general areas and for admittance to the same graduate/professional schools. The programs at Grand Valley State University and at Central Michigan University are similar to the Biology program at Ferris, in that they employ faculty with a wide range of interests and that they both offer multiple tracks within their degree. Their tracks, however, are different than the ones offered at Ferris. The class sizes at these institutions are also similar to those at Ferris.

One major distinction between the Biology Program at Ferris and those at the other two institutions is that a much greater emphasis is put on teaching at Ferris. This is evidenced by the fact that the research requirements for the faculty at both of those institutions is greater than at Ferris. In both cases, about 35 faculty members are employed; this allows for more time to be devoted to research. These these universities have invested heavily in improving their research facilities. New science buildings have been constructed and Central has opened a new Medical School. Ferris cannot hope to emulate this type of research activity. A greater emphasis on teaching, as we have in our program, should result in better student learning.

We are not aware of any "preeminent" Biology programs that are similar to Ferris'. Biology programs exist at three fundamentally different sorts of settings in the United States. Many, like the University of Michigan or Michigan State University, focus primarily upon the research efforts of their faculty. The undergraduate courses there tend to be large and are typically taught by post-docs or graduate students. Others, like Hope College or Hillsdale College, are focus upon the Liberal Arts. At these institutions, the sciences are tend to support the overall goal of creating well-rounded students – as opposed to being more career-oriented. The last group includes institutions that try to strike a balance between research and teaching. Ferris, CMU, and GVSU all fall into the this category.

Demand

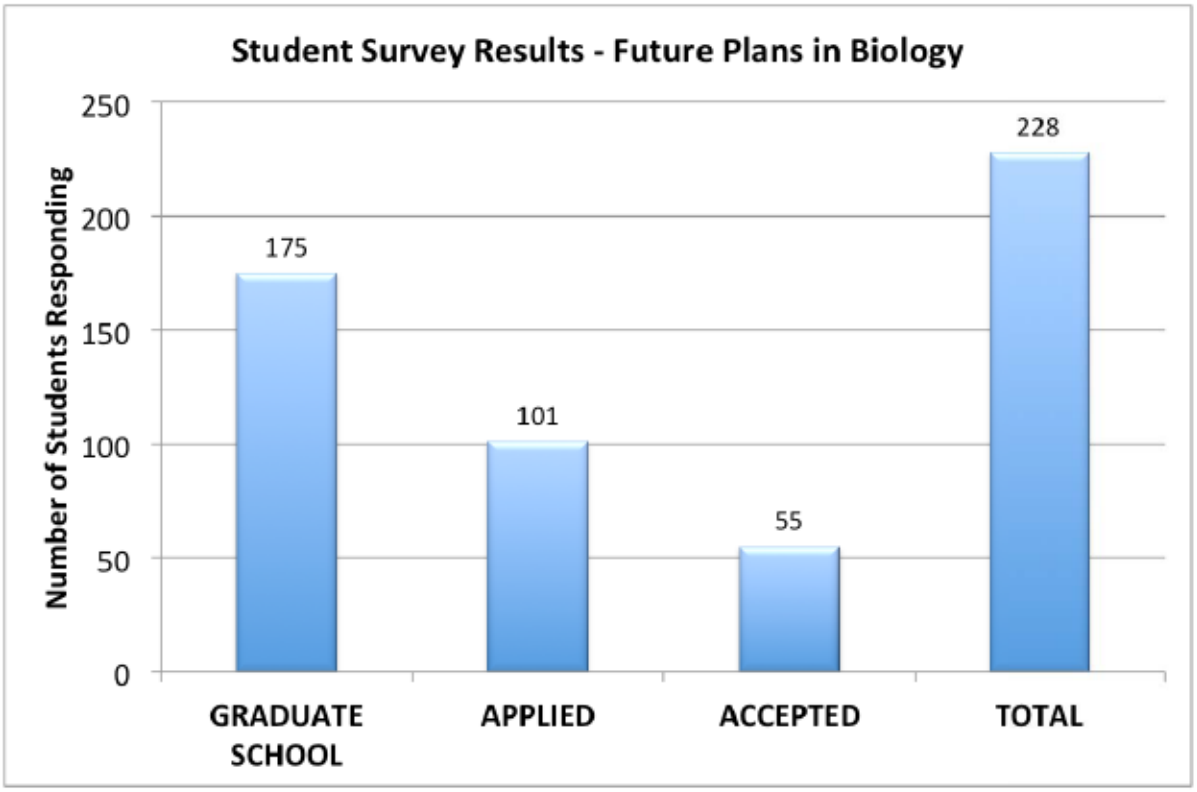
The primary reason that students choose the Biology program is to pursue a career in a health-related fields. About one third of our students transfer in from other institutions, one third switch from a pre-professional degree to Biology while remaining at Ferris, and the final third enter as true freshmen.

Based on exit interviews of 228 graduating students in recent years, 175 (about 77%) plan to continue their education in the near future. Approximately 62% of students state that they will apply to graduate school and/or professional study in medical fields such as optometry, medicine, dentistry, veterinary medicine, physical therapy, chiropractic, or podiatry. About 10% of graduates were seeking employment in such fields as forensic biology or environmental biology. Another 5% percent planned to pursue a second

undergraduate degree in fields such as nursing or biotechnology. Over 100 students had actually completed an application to graduate or professional school at the time of the survey. Over half of those that applied had already been accepted into the post-graduate program of their choice. Due to the timing of the survey, many other applicants were still awaiting news from the admissions committee. It would not be surprising if 75% or more of all applicants were ultimately accepted into their programs. In addition, many of the students not pursuing a graduate degree reported that they were interviewing for or had been hired in biology-related positions. These included marketing and sales positions in the biomedical field, for instance.

As a whole, the program is well regarded by our students. According to Biology majors responding to the NSSE, 64% rank their educational experience at Ferris as excellent. Additionally, 67% stated that they would choose the program again if they had it to do over.

The job demand for biology students is not particularly high in Michigan at this time. A Labor Insight Jobs analysis was performed to determine the number of job postings for entry-level biology-related positions over the past twelve months. A total of 11,372 job postings were identified nationally; the were 208 postings for biology-related positions in Michigan. This ranks Michigan as 18th in the nation and below the average demand seen over the last twelve months. The skills most in demand for our graduates were communication, problem solving, project management, and biological knowledge. The



largest area of opportunity at this time is in laboratory technician positions, both in Michigan and nationwide. The average posted salary for the available biology-related jobs was about $51,000 this year. These market analyses are included at the end of this report. **[See Appendix F]**

The Bureau of Labor Statistics' forecast (access at http://www.bls.gov/ooh/life-physical-and-social-science/home.htm) for biology jobs is also modest. The job outlook for the next decade in Agriculture and Food Sciences, Conservation Sciences, Forensic Sciences, and Wildlife Sciences are all projected to grow at a rate slower than the overall economy. On a brighter note, positions in the health-related fields (Medicine, Optometry, Pharmacy, Nursing, Physical Therapy, laboratory technicians) are all expected to grow faster than the overall job market for the next decade.

Our program advising is strongly influenced by the current market demands for biologists. The majority of students entering into our program initially intend to attend post-graduate professional school (medical, dental, *etc.*). Promising students are actively advised toward post-graduate work in health-related fields. These students are directed toward the classes and extracurricular activities that will best position them for post-graduate work. Working in coordination with the Center for Leadership, Activities, and Career Services, all students are a provided with a wealth of information about job opportunities in other biology-related careers.

Student Achievement

Student success and achievement is a top priority in our department. As faculty members, we try to provide our students with the appropriate educational background in the classroom, but we also try to encourage and engage our students in activities outside of the classroom. Many of these outside activities help our students become successful in the careers that they desire. These activities include (but are not limited to) participation in RSO's on campus, membership in the Honor's Program, research experience, job-shadowing, and participation in other community and volunteer services.

Within the Department of Biological Sciences, we have many programs that are designed to offer students a course of study that will allow them to achieve the required coursework necessary to apply for professional schools. Over the years, students in the biology programs have formed various RSOs which help students navigate the entrance requirements into specific professional schools and help them choose activities that give them an edge over other students competing to get into these schools. In the Biology program, we have 5 RSOs that coincide with our various biology concentration degrees; the Pre-Veterinary Club, Pre-Medicine Club, Pre-Dental Club, Pre-Optometry Club, and the Pre-Physical Therapy Club. These RSOs are advised by biology faculty that specialize in these

specific areas. Many of our undergraduate students that are in each of these degree concentrations have belonged to these clubs at some point in their University career at Ferris. In addition, many of our biology students (as well as some faculty) are also active in other RSOs including Golden-Key International Honor Society, fraternities and sororities, Circle K International, Crafters Anonymous, Petsavers, Table tennis, and the Running club (to name a few).

Many of the biology students that are thinking about applying to professional schools after their Bachelor's degree also have to perform additional job-shadowing volunteer experiences outside of school. These students spend numerous hours in clinics, hospitals, and nursing homes observing doctors and optometrists, and people in the medical field. They also become medical scribes, certified nursing assistants and work in the medical field all while attending Ferris State University. Some of these jobs are simply volunteer experiences while others are paid employment. These are required activities by many professional schools and most of our students that are applying for post-graduate education perform these activities.

Most students at Ferris, including the biology students need supplemental income to help pay for room and tuition. Many of these students take work outside of the University. While we don't have exact figures on the numbers of students that work outside of the University we do keep track of those students working within our department. We have students working in the department office, the greenhouse, the Card Wildlife Center, with our laboratory facility coordinators and in the Animal Care facility. On average, most of these students work ~10hr/wk.

Many biology students are also active members of the Honor's Program at Ferris State University. These students are high achieving students and do very well in our classes. In fact, over the past 5 years, 4 biology students have won the Outstanding Scholar Award which is the highest recognition given to students in the Honor's Program. Biology Honor's students have also been recognized in Leadership and Service within the Honor's Program. Within the Department of Biology we also award a senior with the Outstanding Graduate in Biology. Over the years, many of these students were also in Honor's Program; 2010 Jason Workman, 2011 Cody Becksvoort, 2012 Jeffrey Ackroyd, 2013 Abigail Dutkiewicz and 2014 Emily Pietrowicz. The Outstanding Graduate in Biology is awarded in the spring at the College of Arts and Science Awards Ceremony. In biology we offer a variety of awards and scholarships. For example, last year (Sp15) we awarded 16 students with activity-based scholarships and a variety of additional scholarships were awarded to students;

- Robert and Frances Friar Scholarship (5 students),
- Grandchildren of Robert and Frances Friar Scholarship (1 student)
- John Edward Newell Memorial Scholarship (1 student),
- Michigan Garden Clubs, Inc. Scholarship (2 students),
- Helen Ferris Vartan Biology Scholarship (2 students),

- Richard Hunter Environmental Education Scholarship (1 student),
- Kenneth Spoerk Memorial Scholarship (1 student),
- Outstanding Graduate in Biology (3 finalists were awarded a scholarship).

Professional schools also strongly require biology students to have some research experience to strengthen and support their application. Over the past 5 years, 45% of our faculty members have engaged students in research activities. Many of these research experiences have occurred during the school year when both faculty and students are busy with school. However, we have also had students work with faculty doing summer research fellowships. Students have been involved in various types of research projects in labs that are run by 9 faculty members. A few of the most recent examples include 1) Sarah Mathie examining the effects of nutritional parameters on the growth and surface growth pattern of soil isolates *Paenibacillus* species strains A1 and A3 with Dr. Spain, 2) Shaughna Langerak examining the functional role of Activin signaling in muscles of aging fruit flies with Dr. Zhu, 3) Michelle Dunn describing the phenotype of extraocular muscles of anophthalmic rats with Dr. Westerkamp, 4) Jacqueline Tieu examining the effect of spinal cord injury on learning and memory in rats with Dr. Zimmer and 5) Amanda Kruse examining the biological function of newly discovered genes in the model plant, *Arabidopsis thaliana* with Dr. DeFraia.

The Summer Research Fellowship program began in 2011 as a means to promote research at Ferris State University. Since its inception the Biology students have been very active in this program; 11 students have participated over the past 4 years with 6 different faculty members. Samples of the types of research carried out include:

1) Liala Al-Shatel (BS Biology/ Pre-Medicine)
   Project: Alligator & Rat Brainstems

2) Catherine Plischke (BS Biology/ Pre-Medicine / Forensic Biology)
   Project: The Effect of Spinal Cord Injury on Learning and Memory

3) Shaughna Langerak (Biotechnology / Environmental Biology)
   Project: Dosage effect ofTGF-β signaling on aging regulation in fruit flies (Drosophila melanogaster)

4) Ashley Wachowicz (Biology)
   Project: Effects of IWR on Melanocytes after NCP Treatment

For two years (2012-2014), the Office of Academic Research also offered Student Research Assistantships. We had 11 students that worked with 5 different faculty members doing research throughout these two years. Many of our research students have also had the

opportunity to present their findings at Regional, National and International Meetings. This has been funded in part by grants obtained by individual faculty members, by departmental funds as well as the Special Grants committee from the Arts and College Dean's office. Students have presented at the West Michigan Regional Undergraduate Science Research Conference in Grand Rapids, MI; at Experimental Biology in San Diego, CA; at Experimental Biology in Boston MA; at the International Symposium on Neural Regeneration in Pacific Grove, CA; American Society for Microbiology General Meeting in New Orleans, LA; American Society for Microbiology Michigan Branch Fall Meeting, Traverse City MI; American Society for Microbiology General Meeting in Denver CO.

The Biology program collects data on student achievement in multiple ways. We collect student surveys of past students, we collect student surveys of students in our senior capstone course (BIOL460) and we collect student research activities by surveying our faculty. We plan to incorporate some of the requested data in this current academic program review into our student surveys. For example, we don't have exact number of students that participate in RSOs across campus and we don't have data regarding student paid employment outside of the department. We do have an impression from student communication with individual faculty members on the numbers of students that work or participate in RSO and that is indicated in this report. We also examine the number of students that get into their desired programs to determine how well we are doing as a department. For example, the pre-Dentistry Program has had 3 students accepted into dental school in the past 3 years. Dental school is extremely hard to get accepted into on the first round of applications, the numbers of students are up compared to previous years. This is most likely due to the increased number of students getting research experience at Ferris State University. We are continuing to strive to look for ways to improve student achievement both at Ferris State as well as improve student's abilities to succeed beyond Ferris State.

Employability of Graduates

Employment Post-Graduation – The following tables show post-graduation employment data from the university's annual graduate follow-up report, as this is the best source of post-graduation data. Survey response rates have been included in the tables to illustrate the small sample sizes and poor response rates (0%-50%) from these surveys.

2009-10

	Number of Graduates	Number of Responses	% Responses	Number of Responses Employed or Continuing Education	% Responses Employed or Continuing Education
Biology (BIBS)	44	10	23%	9	90%
Biology/Environmental	6	2	33%	2	100%
Biology/Forensic	13	1	8%	1	100%
Biology/Pre-Dentistry	1	0	0%		
Biology/Pre-Medicine	8	1	13%	1	100%
Biology/Pre-Optometry	11	1	9%	1	100%
Biology/Pre-Phys Therapy	4	2	50%	2	100%
Biology/Pre-Veterinary	1	0	0%		

2010-11

	Number of Graduates	Number of Responses	% Responses	Number of Responses Employed or Continuing Education	% Responses Employed or Continuing Education
Biology (BIBS)	49	7	14%	6	86%
Biology/Environmental	5	1	20%	1	100%
Biology/Forensic	14	2	14%	2	100%
Biology/Pre-Dentistry	5	0	0%		
Biology/Pre-Medicine	10	1	10%	1	100%
Biology/Pre-Optometry	11	0	0%		
Biology/Pre-Phys Therapy	1	0	0%		
Biology/Pre-Veterinary	1	0	0%		

2011-12

	Number of Graduates	Number of Responses	% Responses	Number of Responses Employed or Continuing Education	% Responses Employed or Continuing Education
Biology (BIBS)	38	6	16%	6	100%
Biology/Environmental	7	1	14%	1	100%
Biology/Forensic	6	2	33%	1	50%
Biology/Pre-Dentistry	7	0	0%		
Biology/Pre-Medicine	12	2	17%	2	100%
Biology/Pre-Optometry	6	4	67%	3	75%
Biology/Pre-Phys Therapy	6	1	17%	1	100%
Biology/Pre-Veterinary	1	1	100%	1	100%

2012-13

	Number of Graduates	Number of Responses	% Responses	Number of Responses Employed or Continuing Education	% Responses Employed or Continuing Education
Biology (BIBS)	37	9	24%	7	78%
Biology/Environmental	1	1	100%	1	100%
Biology/Forensic	10	6	60%	4	67%
Biology/Pre-Dentistry	1	0	0%		
Biology/Pre-Medicine	4	0	0%		
Biology/Pre-Optometry	14	3	21%	3	100%
Biology/Pre-Phys Therapy	1	0	0%		
Biology/Pre-Veterinary	0	0			

2013-14

	Number of Graduates	Number of Responses	% Responses	Number of Responses Employed or Continuing Education	% Responses Employed or Continuing Education
Biology (BIBS)	38	13	34%	12	92%
Biology/Environmental	4	1	25%	1	100%
Biology/Forensic	18	7	39%	7	100%
Biology/Pre-Dentistry	2	0	0%		
Biology/Pre-Medicine	11	3	27%	2	67%
Biology/Pre-Optometry	9	4	44%	4	100%
Biology/Pre-Phys Therapy	9	1	11%	1	100%
Biology/Pre-Veterinary	2	1	50%	1	100%

Overall (2009-14)

	Number of Graduates	Number of Responses	% Responses	Number of Responses Employed or Continuing Education	% Responses Employed or Continuing Education
Biology (BIBS)	206	45	22%	40	89%
Biology/Environmental	23	6	26%	6	100%
Biology/Forensic	61	18	30%	15	83%
Biology/Pre-Dentistry	16	0	0%		
Biology/Pre-Medicine	45	7	16%	6	86%
Biology/Pre-Optometry	51	12	24%	11	92%
Biology/Pre-Phys Therapy	21	4	19%	4	100%
Biology/Pre-Veterinary	5	2	40%	2	100%

From the post-graduate data, it appears that biology graduates perform quite well when pursuing employment or admission into professional/graduate school. The sample size for post-graduate data in the biology concentrations is quite small, so meaningful analysis is difficult. However, for graduates of the BS biology program (BIBS), there were a sufficient number of survey responses to make some conclusions. Over the span of the review cycle, BIBS graduates had a high level of post-graduate employment or continuing education, with a five year average of 89%. This high level of post-graduate employment/continuing education is consistent with efforts by the biology department to increase the marketability of our graduates via continuing revisions to our curriculum and advising policies.

Salary data for biology graduates is not included in this report, as many post-graduate survey respondents did not report their salaries. This reduces the sample size to an extent that makes accurate conclusions from these data impossible.

Stakeholder Perceptions of the Employability of Graduates – Alumni and advisory board survey data is unavailable. However, both professional advisors and faculty advisors are in frequent contact with stakeholders in their specific areas. For example, pre-professional advisors consistently attend seminars and workshops dedicated to changes in admission standards for professional schools. These advisors then communicate these changes to their advisees. Advisors in areas where students perform external internships are in contact with internship supervisors and use this as a networking portal to connect our students to stakeholders outside of Ferris. The department also hosts "pre-professional nights" several times a year where a professional from a specific area is invited to come to Ferris and network with interested students.

The majority of students in the biology department receive career assistance via the professional advisors or their faculty advisors. A minority of our students use the campus career services office. However, the department is working to increase ties with the career services office to increase the utility of this office to our students.

Faculty Composition and Engagement

Organization – During the 2014/2015 academic year, there were 20 tenure-line or tenured faculty within the Department of Biological Sciences. All of these faculty teach the majority of their load on the Big Rapids campus, and nearly all of them teach the entirety of their load here. (Two courses are taught online, and four courses are taught in Grand Rapids.) During the 2014/2015 academic year, there were 9 adjunct faculty (Level 1, Level 2, or Level 3) within the Department of Biological Sciences. All of these faculty teach entirely on the Big Rapids campus. In addition, two of our staff members co-teach a single laboratory course once per year. This particular balance of tenure-track and adjunct faculty has remained relatively consistent for at least 10 years, and it allows us to teach the combination of non-majors and majors courses that we provide on a regular basis. Our recently-written bylaws outline the types of courses that adjuncts of various levels are allowed to teach within the department, dependent also on their level of education. No major changes are required.

Curriculum Vitae –The CV's for all individuals listed below are included as an appendix to this document. **[see Appendix G]**

Tenure-Line or Tenured Faculty		
Name	Highest Degree Earned	Average Semester Load (FTE)
Dr. Karen Barkel	Ph.D.	1.29
Dr. Daisy Daubert	Ph.D.	1.15
Dr. Christopher DeFraia	Ph.D.	1.00
Dr. Olukemi Fadayomi	Ph.D.	1.10
Dr. Clifton Franklund	Ph.D.	1.27
Dr. Robert Friar	Ph.D.	1.14
Dr. Scott Herron	Ph.D.	1.13
Dr. James Hoerter	Ph.D.	1.00
Dr. Bradley Isler	Ph.D.	1.26
Dr. Paul Klatt	Ph.D.	1.20
Dr. Joseph Lipar	Ph.D.	0.25 FTE (Dept. Chair)
Dr. Roger Mitchell	Ph.D.	1.07
Dr. Mary Murnik	Ph.D.	1.04
Dr. Gary Rodabaugh	Ph.D.	1.00
Dr. Michael Ryan	Ph.D.	1.18
Dr. James Scott	Ph.D.	1.10
Dr. Anne Spain	Ph.D.	1.06
Dr. Christopher Westerkamp	Ph.D.	1.10

Dr. Changqi Zu	Ph.D.	1.06
Dr. Mary Zimmer	Ph.D.	1.10

Adjunct Faculty		
Name	Highest Degree Earned	Average Semester Load (FTE)
Kim Andrus	M.S.	0.78
Dr. Crystal Austin	Ph.D.	0.57
Cindy Fitzwilliams-Heck	M.S.	1.01
Dr. David Griffith	Ph.D.	1.18
John Johnson	M.S.	1.10
Dr. Gary Miller	Ph.D.	1.11
Anna Rizzo	B.S.	1.14
Arlene Westhoven	M.S.	0.63
Dr. Doug Workman	Ph.D.	0.90

Service – The service work of our tenure-line faculty members during the time period of this review is listed below.

- Dr. Karen Barkel
  Institutional: Institutional Animal Care and Use Committee, Hazardous Substance Abuse and Compliance Committee, Institutional Review Board, Faculty Research Committee, Faculty Development Committee, Honors Advisory Board, Diverse Workforce Taskforce, University Portfolio Software Assessment Committee
  College: CAS Diversity Committee, CAS Assessment Committee, CAS Scientific Understanding Committee

Departmental: Biotech Advisory Board, Card Wildlife Center Advisory Board, Departmental Search Committee.

- Dr. Daisy Daubert
  Institutional: Academic Senate, Health Promotion Committee
  Departmental: Biology Awards Committee, Biology Faculty Development Committee, Biology Planning Committee, Departmental Search Committee

- Dr. Clifton Franklund
  Institutional: General Education Coordinator, Vice-President of Student Affairs Search Committee, Human Subjects Review Committee, General Education Scientific Understanding Committee, University Assessment Committee
  College: CAS Planning Committee, CAS Assessment Committee
  Departmental: Biology Planning Committee, Biology Awards Committee, Biology Assessment Committee, Departmental Search Committee

- Dr. Mary Murnik
  Institutional: General Education Scientific Understanding Committee, University Diversity Planning Committee, FSUS Advisory Board, Pre-Dental Club Faculty Advisor, Ferris NOW Faculty Advisor, University General Education Writing-Intensive Outcomes Assessment Committee
  Departmental: Biology Awards Committee, Biology Planning Committee, Pre-Dental Advisory Committee, Pre-Med Advisory Committee

- Dr. Michael Ryan
  Institutional: Ferris Faculty Association Executive Board, Ferris Communicable Disease Task Force, Ferris Ad Hoc Title IX Committee, Faculty Senate Ad Hoc Committee on Study Abroad Education, Pre-Medical Club Faculty Advisor
  College: Pre-Medical Advisory Committee

- Dr. Anne Spain
  Institutional: Senate Health Promotions Committee
  College: CAS Standards and Policies Committee, CAS Promotion and Merit Committee, CAS Special Grants Committee
  Departmental: Biology Curriculum Committee, Departmental Search Committee

- Dr. Christopher Westerkamp
  Institutional: Senate Athletic Advisory Committee, Senate Health Promotion and Substance Abuse Prevention Committee, Institutional Animal Care and Use Committee, University Planning Committee (SPARC), General Education Scientific Understanding Committee, Ferris Striders Running Club Faculty Advisor
  College: CAS Standards and Policies Committee, CAS Planning Committee
  Departmental: Biology Curriculum Committee, Biology Planning Committee, Departmental Search Committee

- Dr. Changqi Zhu
  Institutional: University Graduate and Professional Council, University Graduate and Professional Council, Member of Ferris Global Reflection Committee
  College: CAS Promotion Committee
  Departmental: Biology Curriculum Committee, Biology Faculty Development Committee, Biology Awards Committee

- Dr. Beth Zimmer
  Institutional: Academic Senate, Academic Program Review Council, Institutional Strategic Planning Committee, Circle K International Faculty Advisor
  College: CAS Graduate Education Committee, CAS Curriculum Committee
  Departmental: Biology Awards Committee, Research Seminar Coordinator, Biology Faculty Development Committee, Biology Curriculum Committee

Research – Examples of research carried out by our tenure-line faculty members. In almost all cases, the research programs focus on providing research experiences for students in our programs. This often includes travel by the students to conferences to present their work.

- Dr. Karen Barkel (2015) visited the Smithsonian Marine Station at Carrie Bow Cay in Belize for a research/training experience, with the goal of reinitiating a research program.

- Dr. Daisy Daubert was a visiting scientist at the Oregon Health & Sciences University (Summer 2012) and at the University of Florida (Summer 2013).

- Dr. Christopher DeFraia – "If we are to harness the full potential of plants as a source of food, energy, medicine, and enjoyment we must determine function of their genes. Combining the powerful genetic resources of the model plant *Arabidopsis thaliana* with a novel genetic screening technique, my students and I are characterizing genes of unknown function using genetic, molecular, and bioinformatics techniques. I am currently working with who have had a very successful summer of research, and have determined the biological function of five plant genes. Their newly discovered functions include drought resistance, regulation of leaf shape, chlorophyll production, and flowering time."

- Dr. Anne Spain – "We are working with two soil bacterial strains, *Paenibacillus* sp. A1 and A3, in my lab that are capable of moving across solid surfaces (e.g. the agar surface of growth media in a petri dish) in a highly unusual pattern, which we call "scattering." I have supervised many students on research projects related to this project. Currently, my student, Sarah Mathie, has been investigating the nutritional profile of these isolates. Because of her work, we have come up with the hypothesis that the surface movement behavior of our bacterial isolates might vary depending on the nutrient composition of what they are degrading."

- Dr. Christopher Westerkamp – Carries out research in the area of exercise physiology. Recent student abstracts under his mentorship include the following titles: Phenotype of extraocular muscles from anophthalmic rats. Reliability of the Lactate Threshold in Long Distance Runners. The 30-minute Time Trial as a Predictor of Ventilatory Threshold Running Velocity and Heart Rate. Skeletal Muscle Hyperplasia in Response to Synergist Removal.

- Dr. Changqi Zhu – "My current research project is "The role of Drosophila Activin signaling in aging regulation of adult fruit flies". Shaughna Langerak and Hannah Lamberg have been actively working with me on this research project.

- Dr. Beth Zimmer – Carries out research in the area of neurobiology. Her recent projects have examined the effects of spinal cord injury on learning and memory.

Continuing Education –

- Dr. Clifton Franklund – Received a Graduate Certificate in Higher Education Assessment from James Madison University (2015). Also received an Online Certificate in Data Science from Johns Hopkins University (2015).

- Dr. Mary Murnik – Serves as a Test Writer for the Dental Admission Test and the Optometry Admission Test.

- Dr. Christopher Westerkamp – Was a Fulbright Scholar at Health Science University in Mongolia.

Stakeholder Perceptions of the Quality and Composition of Faculty – Due to concerns about the privacy of our faculty, we have decided to not include copies of IDEA or SAI forms. This decision is supported by the Dean of the College of Arts and Sciences.

There is, in general, variability amongst our faculty in the scores and comments that they receive from students. Some faculty members consistently receive very high scores, while others tend to receive lower scores. In all cases, the IDEA and SAI forms are reviewed by the department chair, and conversations are held with faculty whenever they receive below-average scores in a course. A plan is developed to try to improve their teaching effectiveness. At times this can occur very quickly, in other cases it is a longer process. Overall, the goal is to improve the quality of instruction in the department. For new faculty, conversations are held for all courses for at least two full years after they begin teaching, and often for longer than that if warranted. This process appears to be useful for the faculty in general.

We did not perform surveys with either our alumni or our advisory board members.

Program Policies and Procedures – The department uses Faculty Development Funds, which are supplied by the CAS Dean's Office, to help support professional development. These funds are used mostly for travel to and attendance at professional conferences and workshops. Most of these funds are used for tenure-line faculty, but some is used for supporting the professional development of adjunct faculty. Additional funds may come from the department at the discretion of the Department Chair. For the past couple of years, the Chair has had conversations with Adjunct Faculty to encourage them to take part in some professional development. Additionally, each tenure-line faculty member receives

some PDI funds on an annual basis that are linked to their performance as academic advisors. These funds can also be used for travel, but they are often used to purchase materials for use in the classroom or laboratory.

The minimum qualifications for tenure-line faculty are that they must hold a Ph.D. in the Biological Sciences or a related field.

The minimum qualifications for adjunct faculty are outlined in the department's bylaws as follows:

- Within the Department of Biological Sciences, it is strongly preferred that Level 3 Instructors hold a Ph.D. in the Biological Sciences.
- Adjunct faculty that teach the lecture portion of non-majors courses must hold, at minimum, a Master's Degree in the Biological Sciences.
- Adjunct faculty that teach the lecture portion of Biology majors courses must hold a Ph.D. or comparable degree in the Biological Sciences.
- In extraordinary circumstances, the Department Chair may make temporary exceptions to these policies after first consulting with the voting members in the department of Biological Sciences.

Hiring and Retention – In general, our hiring and retention process focuses on identifying and hiring well-qualified and capable individuals and then providing them with appropriate guidance and feedback to succeed as faculty members in the department. When we conduct searches for tenure-line faculty members, there is a culture within the department that all or nearly all of the members of the department take an active part in the interview process by meeting with the candidate, attending the candidate's teaching seminar, and joining the candidate at meals. We also ask students to meet with the candidates. We make a concerted effort to provide a genuine picture of the department and our students for the candidates. We have had good success with searches over the years, as those who have been hired have developed into productive members of the department.

The tenure process is outlined in detail as part of the Departmental Bylaws, which were updated in 2014. We believe in provided constructive feedback to our tenure-track faculty to help them reach their potential as teachers and as colleagues. This process has been successful for many years, as no members of the department have failed to achieve tenure for at least 20 years.

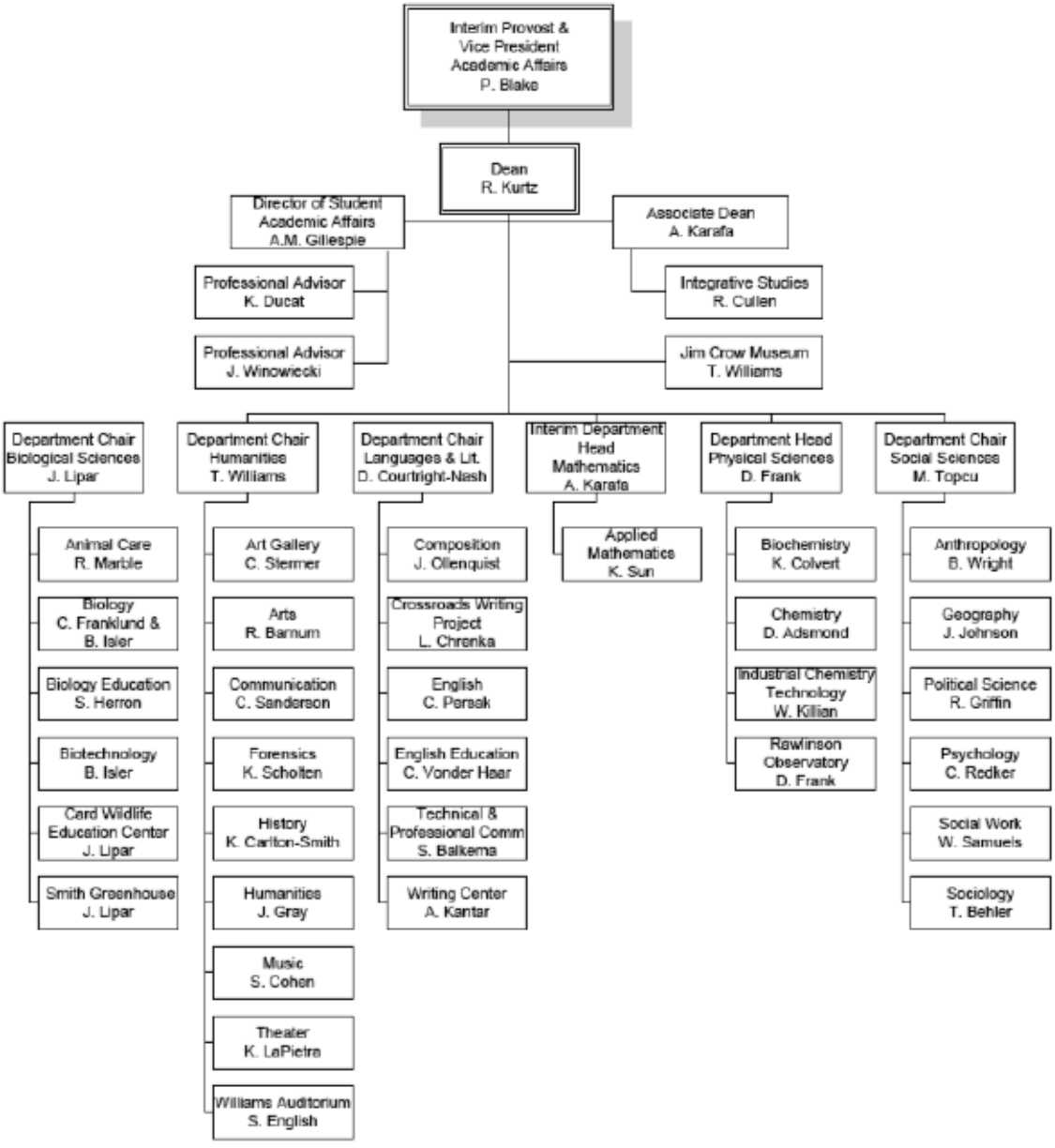
Program Administration and Support

The organizational chart of the College of Arts and Sciences indicates the position of the Biology program in the academic hierarchy of Ferris.

FERRIS STATE UNIVERSITY

ACADEMIC AFFAIRS DIVISION

COLLEGE OF ARTS & SCIENCES



The College of Arts and Sciences moved from a Department Head to a Department Chair model for the 2014/2015 academic year. At that time Dr. Lipar moved from an Interim Department Head model (3 years) to a position as Department Chair. Because chairs are now required to teach (0.25 FTE), some duties must be delegated to other members of the department, including the Program Coordinators. This process of delegation is ongoing. An evaluation of the effectiveness of a Chair model really cannot occur until more time has passed.

In reality, the Department Chair model is not much different than the previous Department Head Model for our department, except for the delegation of some duties. We have a history in our department of having open communication channels between the department leadership and the faculty/staff. Faculty are often asked for input, and they generally feel free to provide feedback and ask questions about departmental issues.

Our Biology Program Coordinator position was split between Dr. Isler and Dr. Franklund to take advantage of each of their particular strengths. Each receives a small amount of release time to perform their duties (0.25 FTE total between them). This appears to be enough time for them to complete the tasks asked of them.

Administrative Positions with Program Oversight:

Name	Title	Highest Degree Earned	Experience in Position
Dr. Clifton Franklund	Program Coordinator (Assessment)	Ph.D.	4 years
Dr. Bradley Isler	Program Coordinator (Curriculum)	Ph.D.	4 years
Dr. Joseph Lipar	Department Chair	Ph.D.	4 years
Dr. Andy Karafa	Interim Dean	Ph.D.	1 year

The Dean of the College of Arts and Sciences holds regular meetings with the department leadership in the college both as a group and one-on-one. This allows for the regular exchange of information. In addition, department leadership is always welcome to approach the Dean's office at any time when necessary.

No changes to the current structure are required at this time.

Staff Positions within the Department of Biological Sciences:

Name	Title
Patricia Bunce	Department Secretary
Richard Marble	Animal Care Facility Coordinator
Frank Hartley	Laboratory Coordinator
Lisa French	Laboratory Coordinator
Jessica Parker	Assistant Laboratory Coordinator (Part-Time)
Andrea Lodholtz	Greenhouse Manager (Part-Time)

All staff members within the department perform their duties efficiently and effectively. The current structure allows for all work to be completed in a timely fashion.

No changes to the structure are needed at this time.

Support Services

In general, services are well-provided to our program by units from across campus. In general, there have been no major concerns or complaints regarding our interactions with those units. Some units in particular, as listed below, provide particularly important services for us.

Faculty Center for Teaching and Learning – FCTL regularly provides learning opportunities for our faculty, and a number of our faculty take advantage of the resources provided. For example, during the Fall of 2015, two of our Adjunct Faculty Members (Dr. Crystal Austin and Dr. Gary Miller) are taking part in the Learn Lab project. They will be teaching smaller, separate sections of their courses so that they can carry out and evaluate some alternative pedagogical techniques.

Tutoring Center – We work closely with the Tutoring Center every semester to provide specialized tutors for some of our courses with high enrollment and to provide SLA instructors for some of our lower-level courses that are more difficult for the students.

Institutional Research and Testing – Our faculty regularly take their multiple-choice exams over to this office to have them graded and evaluated. In addition, this office has

helped us to administer our Biology Field Exam from ETS, which was given for many years to our graduating seniors.

Educational Counseling and Disabilities – Our department works regularly with this office when we have students with disabilities or who are looking for advice on potential career pathways. Their office is invited to one of our departmental meetings each year so they can provide an overview of the services they provide.

Facilities and Equipment

Space

Instructional Facilities	
Lecture Rooms	SCI 120 (mornings), SCI 126, SCI 137, STR 136, and IRC 120
Teaching Labs	SCI 207, 208, 211, 212, 215, 216, 222, 227, 228, 231, 232, and 235 SCI 337 is shared with the Department of Physical Sciences.
Research Labs	SCI 102A, 143, 201, 229, 233, and 234.
Additional Teaching Facilities	Card Wildlife Education Center, Smith Greenhouse, Animal Care Facility (SCI 153 and PHR 314)

When scheduling courses, the Department of Biological Sciences has first access to all of the lecture rooms listed above. The exception is IRC 120, which is regulated by the Provost's Office and must be requested. We typically use that room for one or two lectures per semester, usually those classes have an enrollment of at least 75. We generally use the other rooms to 70-80% capacity each semester. All of our lecture spaces have been updated in recent years with new computers and projection equipment, which appears to be adequate in all cases. Overall, there is not a need for more lecture space.

We have sole access to the teaching labs listed above. Each room is specialized for use in specific courses. In general, there is not a need for more teaching laboratory space. All but just one laboratory space has been updated in recent years with new computers and projection equipment. We plan to request an update to that sole laboratory within the next couple of years.

The research labs and auxiliary facilities listed above are not used on a regular basis for teaching courses but may be used as destinations for classes when particular methods or topics are being taught.

The research labs listed above are used primarily by faculty and students for ongoing research projects. In general research space is shared amongst faculty, as there is not enough space for each faculty member to "own" their own space. As new faculty have been hired over the past several years, they have been more likely to want to carry out research with students. Due to this, we currently do not have enough research space to satisfy everyone's needs. Two changes should alleviate this problem in the near future. First, we plan to convert one of our former teaching laboratories (SCI 231, which was used for our now-defunct Ornamental Horticulture Program) into a research space. Plans have been developed in conjunction with Physical Plant, and tentative financial support has been provided by the Dean's office. We expect that the project could be completed within two years. In addition, a new Core Research Facility, which has been developed through donations from Shimadzu Corporation, will be opening during the Fall 2015 semester on the first floor of the Arts and Sciences Commons. This research space is intended to be used by the Department of Biological Sciences, the Department of Physical Sciences, the College of Pharmacy, and any other units on campus who might have a need for the equipment in the facility. A full-time laboratory manager is currently being hired to run the facility. Although members of our department won't be able to carve out space in that facility, it will provide opportunities for faculty and students to have access to some very powerful, high-end research equipment.

Computers

Computer resources appear to be adequate at this time. All of our faculty are on the university's computer replacement program, and all of our adjunct faculty have offices that contain computers. Computers that are used in research labs are either purchased by faculty with grant money or by the department in some cases. One of our teaching labs for anatomy and physiology, SCI 228, is equipped with 13 computer stations. Those computers were all replaced in 2013 with equipment funds from the Provost's office (see below). Only one of our courses uses computer labs, and that course is taught only once per year; we are generally able to find a computer lab for that course. No changes to computer availability are needed at this time.

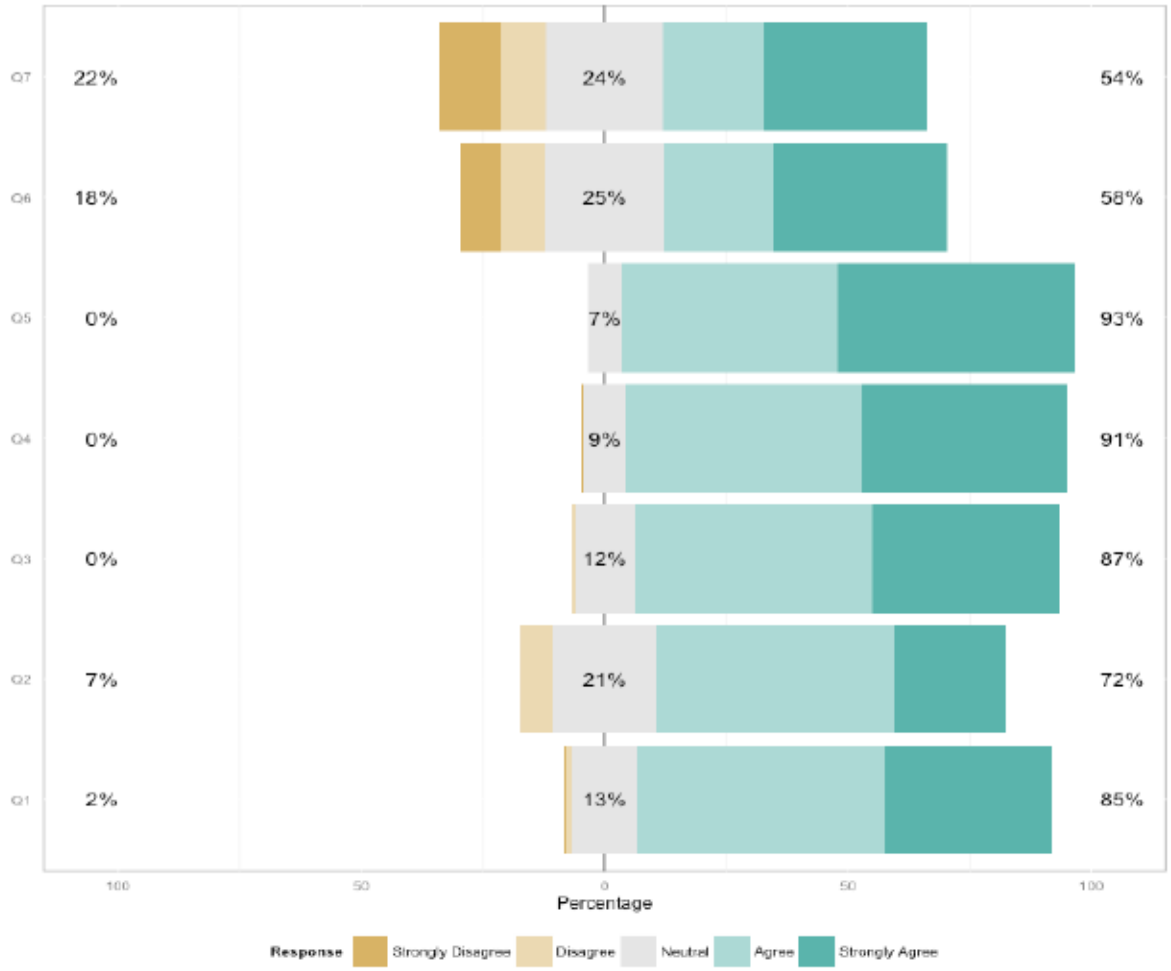
Equipment

Due to the nature of our field, our teaching, research, and support facilities require continual upgrades to scientific equipment to ensure that our students have experiences that will prepare them well for what they might see in the future. We also must provide continuous maintenance for many of those pieces of equipment. Minor equipment is purchased through the departments supply and expense operating budget. Larger pieces of equipment have traditionally been purchased through equipment funds from the Provost's office. Examples during the last five years include the replacement of 25 microscopes for use in our general biology labs, a new automated washer/sterilizer for the animal care facility, a real-time thermocycler, replacement of a control panel on one of our autoclaves,

and a Nano-Drop spectrophotometer. There is a currently a "wish list" of about five larger pieces of equipment that have been requested in the recent past and will continue to be requested in the near future. One other source of equipment funds is an endowed fund that has been used about once every three years to purchase moderately expensive items.

Perceptions of Overall Quality

Student Perceptions – Student opinions concerning the quality of the Biology program were queried using a senior exit survey. The aggregated results from the past five years (n=228) are shown below.



The prompts used in this instrument are listed below. The same instrument was used for the 2009 Biology program review.

Q1 The biology program provided a solid foundation of knowledge in the major disciplines of biology such that I am competitive for entry into graduate school, professional school, or the workforce.

Q2 My coursework allowed me to develop proficiency in the laboratory and field techniques appropriate for my discipline.

Q3 The coursework developed my ability to formulate hypotheses, make careful observations, analyze data, and draw conclusions.

Q4 My coursework developed my ability to evaluate, analyze, and synthesize information from scientific literature and exhibit critical thinking skills.

Q5 My coursework was intellectually challenging.

Q6 My advisor was helpful in planning my course selections and completing my degree.

Q7 My advisor was helpful with respect to providing advice about my career.

Mean student scores on the exit survey for 2009 and 2015

	2009	2015
Q1	3.86	4.17
Q2	3.73	3.88
Q3	4.02	4.25
Q4	4.16	4.32
Q5	4.16	4.42
Q6	3.49	3.68
Q7	3.08	3.53

The students uniformly affirmed the program with their responses to the first five questions. Overall, the students are satisfied with the discipline content and skills that the Biology program provides. The responses were somewhat more mixed for the perceived quality of advising. We have focused upon improving programmatic advising over the past five years. Many of the more negative responses came from earlier survey results. The general student attitude concerning advising today is much better than it was five years ago.

The student survey results are compared with those from a different cohort of students in the last Biology program review is shown to the right. There is a clear improvement of all mean survey scores for 2015. The largest gain was for question seven concerning advising about career choices (+0.45). Because standard deviations and n's were not available from the 2009 data set, no statistical analysis of these differences was attempted. It appears, though, that our efforts at improving advising are making a difference.

Faculty Perceptions – The faculty are also content with the current structure and function of the program. Faculty opinions were analyzed using an online survey.

The survey prompts were as follows:

q1a The mission of the Biology program is consistent with the FSU Mission Statement.

q1b The procedures and practices of the Biology program are consistent with the objectives and goals of the FSU Biology department.

q1c The Biology faculty supports the Biology program.

q1d The FSU administration supports the Biology program.

q1e The Biology faculty receives adequate clerical support.

q1f The Biology program and the Biology department are run in an efficient manner by the department head.

q1g Class schedules are effectively and efficiently prepared.

q1h The committee structure within the Biology department is effective and useful.

q1i Students are able to complete the required coursework in a timely manner.

q1j The admissions standards of FSU are rigorous enough to provide quality students for the Biology program.

q1k Current classrooms, labs, and technology are adequate for instructional purposes.

q1l The computing resources that are allocated to the Biology program are adequate.

q1m Online services, such as FerrisConnect, are effective and useful.

q1n Library resources for the Biology program are adequate.

q1o The number of biology electives offered to our students is sufficient.

q1p All Biology students, regardless of career choice, should be required to complete an internship.

q1q The courses of the Biology program are arranged in a logical sequence from least expertise required to greatest expertise required.

q1r The Biology program offers sufficient opportunity for students to develop good oral and written communication skills.

q1s The Biology program offers sufficient opportunity for students to develop critical thinking and problem solving skills.

q1t The Biology program offers sufficient opportunity for students to master a broad knowledge of the major areas of biology, in reasonable depth.

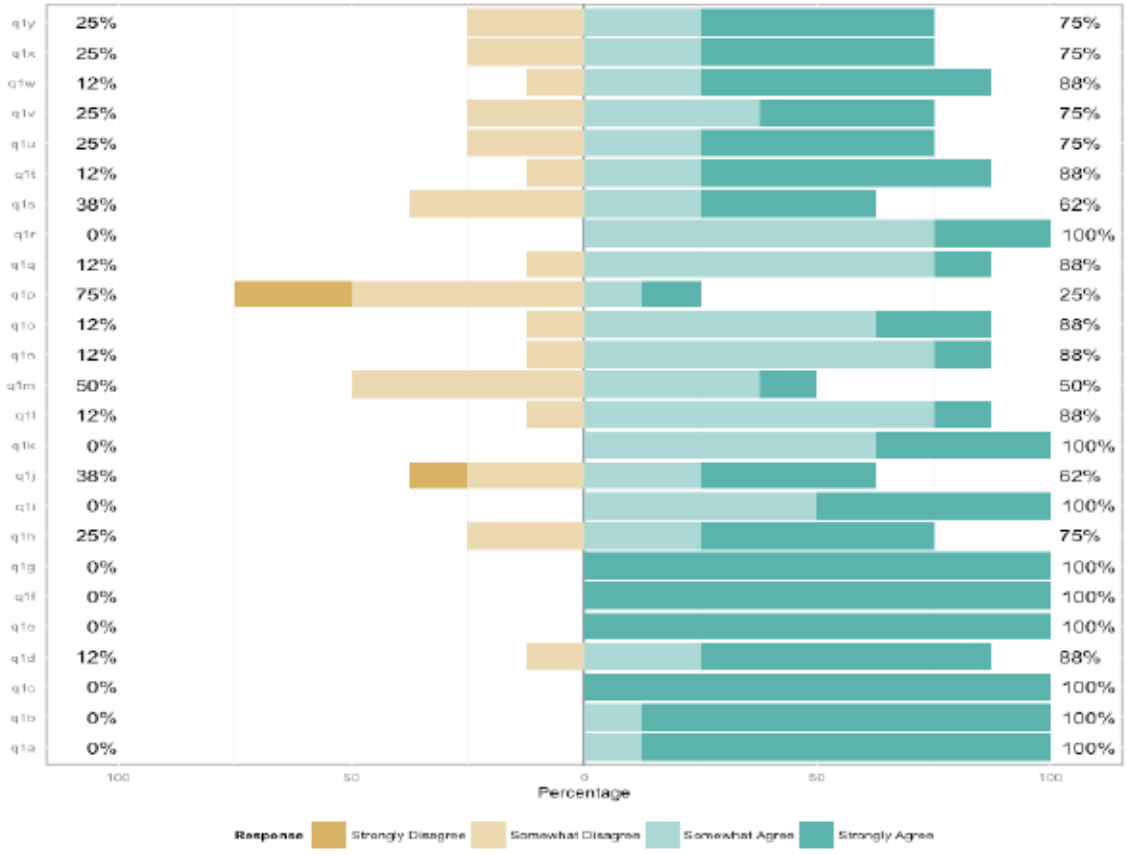
q1u The curricula of the B.S degree in Biology challenges students academically.

q1v The curricula of the B.S. degree in Biology is relevant to the career goals of students.

q1w The Biology program offers students an opportunity to pursue academic excellence.

q1x The FSU Biology program prepares students sufficiently for success in their chosen fields of employment.

q1y The B.S. degree in Biology is a quality degree that is comparable to other baccalaureate degrees.



In 16 out of the 25 questions posed, the >80% of the faculty somewhat or strongly agreed. These questions tended to cluster around the current administration of the Biology program. As a whole, the faculty are satisfied with the work of the Biology Chair, the departmental clerical support, and the general structure of the program itself.

From 75-80% of the faculty responded affirmatively in 5 of the questions (H, U, V, X, and Y). This indicates that there is some level of dissatisfaction among the faculty with regard to these issues. The common theme in theme among these items is the degree to which we are preparing our students for their future careers. These results were part of the impetus for beginning development of a new core of research design courses in the program.

Finally, in 4 of the 25 questions (J, M, P, and S), less than 75% of the faculty responded positively. This indicates a fairly strong negative response to the prompts. Two of these items correspond to the perceived lack of rigor at Ferris and in the program. The new core courses might make a positive contribution to this felt need. The other two items are

pedagogical issues. The program faculty in Biology have never been strongly supported mandatory internships for our students. Likewise, Blackboard is not well-loved by the faculty. It is seen as being too complex and kludgy. This is compounded by the frequent "fixes" and "patches" that serve to disrupt active production shells during the semester.

Program Coordinator Perceptions – I would give our current program a rating of 85 out of 100 (a solid B). The strengths of the program lie primarily with its faculty. The diverse training that our program faculty possess, coupled with our smaller class sizes, creates an excellent learning environment. The current curriculum is prepares our students very well for their careers; this is reflected by the number of graduates that are admitted into post-graduate work. While Ferris does not possess all of the cutting-edge tools of a research institution, we have access to adequate resources for instructional purposes. There are opportunities for internships and research experiences for students that are interested and motivated. Finally, the possession of new resources (the new tract of 200 acres of woodland and the Shimadzu lab) coupled with other resources (the greenhouse and the Card Wildlife Center), make Ferris' Biology program unique and attractive to students.

The program could be strengthened by increasing the opportunities for students to participate in faculty-led research projects. Additionally, the program faculty should have a larger voice in the selection of technological resources for teaching spaces. And finally, if the department is going to grow, more tenure-track lines will need to be filled (we could use a botanist and a zoologist to round out our strengths in the department).

Department Chair Perceptions - I can honestly say that I am proud to be a member of the Department of Biological Sciences. In my opinion, the faculty consists of individuals who have a passion for teaching and who truly care about the academic success of their students. In addition, the faculty treat each other with respect and are collegial to one another. The students in the program are, on average, quite strong academically. Many of them enter the program with strong academic credentials from high school or from a previous college experience. Overall, I find that they work hard and are appreciative of the efforts of our faculty. I think that the department does a lot of things well, but there is certainly always room for improvement. I think it is true that we have always provided a very strong "science knowledge" background for our students to prepare them for careers or for entry into graduate or professional schools. We are now focusing on providing them with other skills that should make them even more marketable by making curricular changes that will essentially create a series of courses, one for each year in the program, that will develop their skills in the areas of written communication, oral communication, experimental design, and statistical analysis in addition to increasing the ability to locate, read, understand, analyze, and apply the information found in scientific literature. A committee is currently working on the development of these courses, which will be presented to the department as a whole sometime this fall. Another area for improvement that I think we should focus on is marketing of the program and recruitment of students.

Although are program numbers are quite high, we really have not done anything actively in the past with respect to marketing. We have assumed that the students will always be there. However, it is almost certainly true that the number of college-age individuals in the state of Michigan will be declining for several years, and it may be necessary for us to more actively recruit students to maintain our current enrollment numbers. A third focus, for me, is to think about how the members of our department can utilize both a new piece of property that has been donated to Ferris State for use by the Department of Biological Sciences (located between Horsehead and Jensen Lakes) and the new Shimadzu Core Research Facility that will be opening this fall. I think that both offer many possibilities for teaching our students in unique and effective ways.

Dean Perceptions - The Dean's perceptions will be provided in a letter that is forthcoming.

PRP member with Special Interest in the Program Perceptions – I would rate BIBS with a score of 85 out of 100. We have quality classes and labs that prepare our students to advance into graduate or professional programs. Our students graduate with a solid background in the biological sciences as well as with a strong foundation in the supporting sciences of MATH, CHEM, and PHYS. Class sizes are small , which allows students to develop meaningful relationships with their faculty directly. Because we do not utilize Teaching Assistants or Graduate Assistants as substitutes for faculty in any of our majors level classes, our students benefit from the expertise and experience of quality faculty.

There are a few ways that I think that the program could be potentially improved. Students might benefit from an internship experience. Additionally, students would profit from more, or required, research and lab application experiences. Finally, students would benefit for admission into professional programs by the partnership with Certified Nurse Assistant training programs.

PRP Faculty Member from Outside the College Perceptions – I would rate the Bachelor of Biology with a score of 86 out of 100. Students are provided quality classes and labs that prepare them to advance in our professional program. Students graduate with a solid background in not only the biological sciences, but also in the supporting sciences of MATH, CHEM, and PHYS. These courses are the foundation for entry into the Doctor of Pharmacy program. One area for potential program improvement would be to include internships. We feel that these would be helpful to any student graduating from a Bachelor Degree.

Implementation of Findings

While the assembly of this report has not necessarily resulted in new revelations regarding the Biology program, it has certainly served to reinforce some of the observations that we have made over the past several years. The main tasks that have been identified for the upcoming review period are delineated below.

Closing the B.A. program in Biology – The Bachelor's of Arts degree in Biology has become an anachronism. Only 10 students have been enrolled in the B.A. program over the past five years. In addition, the requirements for the B.A. program are highly redundant with those of the B.S. program. The few students that were served by this program can now get a B.I.S. degree instead. The administrative overhead (tracking, scheduling, and assessing) greatly outweighs any benefits of retaining this degree.

Updating the program's strategic plan – The Biology Planning Committee will work to develop a new strategic plan for the next five years. This plan will be intentionally mapped onto the current college and university strategic plans. The core of the strategic plan will most likely encompass the next four tasks in some manner.

Increasing research opportunities for our students – Ongoing efforts will be made to increase the number of research opportunities offered in our program. This may involve developing new processes for assigning release time, allocating credit for directing research, and acquiring the requisite funding. This is obviously not something that is going to be accomplished in the short run.

Developing a new Biology research and design core – An *ad hoc* committee has been formed and is meeting regularly to develop a new set of research design courses for the Biology program. These courses will constitute 3 new credits in the mandatory program (replacing one elective in the major). The classes will introduce and reinforce the marketable skills that today's job market demands – excellent communication, collaboration, and problems solving abilities.

Improving assessment data management – One deficiency that was clearly identified during the preparation of this report was the lack of assessment data management in the Biology program. Currently, very little of the program assessment data is centrally stored, much less input into TracDat. The current quantity and quality of program assessment data is excellent. However, it is extremely difficult to access and analyze. This may be problematic for the next HLC accreditation visit. Another sustained effort, therefore, will be initiated in an attempt to rectify this situation. A sustainable process needs to be created by standardizing and automating the collection of program learning outcome data. The Biology program plans to piggyback on the progress made by the Natural Sciences General Education committee. We hope to leverage the assignment feature of TracDat (along with

faculty training and support) to improve the frequency of data entry. Hopefully, this would also facilitate future analyses of our program assessment.

Initiating a Biology program recruiting and marketing campaign – Finally, we plan to partner with the Dean's office and University Advancement and Marketing to increase the profile of our program. We plan to focus upon finding ways to involve the program faculty and students in this process.

Sharing our findings – The findings and recommendations of this report will be shared with the faculty and staff of the Biology program at a department meeting in the fall of 2015. A PDF version of this document will also be stored on the Biology network drive and will be available for all faculty and staff to review. Finally, the department chair may elect to share some of these findings at campus-wide meetings (such as Academic Leadership Council).

Department Planning Alignment Template

Department: Biological Sciences **Date: Feb 3, 2009**

Department Statement of Purpose/Mission:

The Department of Biological Sciences provides excellent teaching, quality advising, and exposure to relevant experiences, setting a solid foundation of knowledge and skills that will allow students to become productive citizens and pursue successful careers.

Strategic Planning Goals

#	Goal
1	Centralize and improve advising of Biology majors within the Department
2	Improve BS Biology curriculum
3	Revise procedures for selecting biology award recipients
4	Increase learning opportunities for students outside of class
5	Enhance Department Recruitment Activities
6	Strengthen assessment activities in the Department
7	
8	
9	
10	

Strategic Planning Goal 1:

Department Goal	Desired Outcome	Strategic Plan Alignment	Start Date	End Date	Collaborators
1. Centralize and improve advising of Biology majors within the Department	Advising in the department is restructured to provide proactive, accurate, and consistent advising to students in Biology programs	Goal 5, Init 5	11/07	cont	Department faculty University College Honors Program CAS Dean's office
Action Steps for the Goal	**Contributing Steps, Evidence, or Status**				
1. Redefine faculty advising roles	1a. Proposal developed and approved by CAS		11/07	1/08	Depart coords, Dept faculty. Dept. Head
	1b. Feedback gathered and incorporated into proposal		12/07	3/08	CAS Dean, Assoc Dean, counselor, admissions officer, department heads Univ College Dean
2. Enroll new Biology majors into Biology FSUS 100 and HRRS 100 seminar classes	2a. Schedule 5 sections of FSUS 100 for new FTIAC Biology majors that work with block schedules		1/08	2/08	FSUS coordinator and Dept Head
	2b. Reserve 1 section of HNRS 100 for Biology FTIACS		1/08	2/08	HNRS Program director and Dept Head
	2c. Enroll students in restricted sections		6/08	8/08	CAS counselor, Summer reg counselors, Dept Head
3. Hire and train Biology advisor	3a. Seek approval for new temporary position 3b. Conduct search for advisor 3c. Train new Biology advisor		2/08 7/ 08 8/08	7/08 8/08 cont	CAS Dean, VPAA, President Dept faculty Faculty advisors, Department Head, CAS counselor, Registrar,
4. Consolidate and edit advising materials to improve consistency and ease of advising	4a. Revised check sheets that include information from multipage advising handout and function like audit sheet		2/08	3/08	Biology coordinator, Dept Head, CAS counselor
	4b. Edit check sheets based on faculty input		4/08	cont	Department faculty, Biology advisor, Dept Head
5.Improve consistency in advising across the department	Discuss advising structure/process with Faculty advisors via Dept meetings and email		4/08	cont	Department faculty, Biology advisor, Dept Head, Dept Secretary

Strategic Planning Goal 1:

6. Assess advising in the Department	6a. Survey student perceptions in FSUS 100 Pre/post and Biology/Prepharm 6b. Survey student perceptions in BIOL 375, 460 6c. Seek input from faculty advisors and Biology advisor	9/08 10/08	Cont cont	Biology advisor Dept faculty

Strategic Planning Goal 2:

Department Goal	Desired Outcome	Strategic Plan Alignment	Start Date	End Date	Collaborators
2. Improve BS Biology curriculum	Program requirements are more clearly defined, and better reflect the mission of the Department	Goal 1, Init 5	7/06	Fall 2009	Department faculty And curriculum committee
Action Steps for the Goal	**Contributing Steps, Evidence, or Status**				
1. Evaluation of BS Biology curriculum	Identify problems in present program requirements and advising materials		7/06	8/08	Department faculty advisors, coordinators CAS counselor Students, alumni
2. Meet with faculty to discuss curriculum problems and possible solutions	2a. Curriculum discussed in department meetings 2b. Department comes to consensus as to changes required		4/08	4/08, 8/08 9/08	Department faculty Biology coordinator Biology Advisor Department Head
3. Produce revised check sheets for each program concentration area that incorporate the proposed changes and seek input	Check sheets clearly articulate program requirements to students, even without interpretation by advisor		9/08	11/08	Department Head, Biology Coordinator, lead advisors and Concentration heads
4. Prepare curriculum proposals that clearly articulate changes desired by faculty	4a. Feedback proposals improved based on faculty feedback 4b. Curriculum proposals are approved by Department, CAS, and University Curriculum committees		8/08 11/08	11/08 Cont.	Depart faculty Curriculum committees
5. Educate advisors on revised program requirements	Advisors disseminate information on program requirements to their advisees		8/09	Cont	Department faculty Biology advisor
6. Assess revised BS Biology curriculum	Data gathered from stakeholders on the quality of the program is used to plan future improvements		9/09	Cont	Department faculty advisors, coordinators CAS counselor Students, alumni

Department Goal	Desired Outcome	Strategic Plan Alignment	Start Date	End Date	Collaborators
3. Revise procedures for selecting biology award recipients	Develop process that allows increased student and faculty participation.	1.2 2.6	SP08	Cont.	Department faculty CAS Deans office CAS gift officer
Action Steps for the Goal	**Contributing Steps, Evidence, or Status**				
1. Form an ad hoc committee of Department faculty	1a. Faculty asked to volunteer, coordinators asked to participate 1b. Committee established : Joe Lipar, Brad Isler, Gary Rodabaugh, Mike Ryan, John Vanderploeg, Dept Head		4/ 08	Aug 08	Department faculty Department Head
2. Establish application procedure for student awards and scholarships	Draft application forms discussed /revised at committee meetings Oct 17 08, Nov 7 08, and Dec 4 08		10/08	12/ 08	Awards committee members
3. Establish a time-line for selection	Set deadlines for application submission, student selection, and dissemination of awards.		10/08	12/ 08	Awards committee members
4. Establish awards ceremony for recipients	4a. Committee discussion of possible methods 4b. Committee selects year-end even with speaker and awards ceremony 4c. Event planned, budget developed		10/08	11/ 08 11/08 Conts	Awards committee members
5. Seek input from Department	5a. Send department update that includes application form, and planned process 5b. Collect and discuss feedback		12/ 08	12/ 08	Department faculty
6. Advertise award process to students	6a. Keep application forms in Department office 6b. Use targeted email message to Biology students 6c. Ask faculty to pass out applications to qualified students 6d. Post application form on University website		1/09	Cont	Department faculty Gayle Driggers (CAS Dean's office)

Funding Request Template

Department: **Date:**

Action Steps Prioritized for Funding	4. Establish awards ceremony for recipients			
Alignment	1.2 2.6			
Projected total cost				
Cost covered internal to the unit and means of funding				
Additional funds requested				
Initial date of fund request				
Duration of fund request				
If an established project, College, Divisional, or University funds already spent on project				
Additional funds requested beyond initial request				

A no more than half page rationale for each request for funding.

Department Goal	Desired Outcome	Strategic Plan Alignment	Start Date	End Date	Collaborators
4. Increase learning opportunities for students outside of class	Students become more engaged in the Department and better prepared to pursue successful careers.	1.3 5.5	SP09	Cont	Department Faculty
Action Steps for the Goal	**Contributing Steps, Evidence, or Status**				
1. Start a Department lecture series	1a. Identify faculty interested in organizing events 1b. Develop budget 1c. Plan events for Fall 09-SP10		SP09	Cont	Department Faculty
2. Encourage student participation in research	2a. Encourage students to attend lectures (speakers) 2b. Advertise research opportunities within the department 2c. Advertise student research grants (CAS Dean's office)		SP09	Cont	Department Faculty
3. Start a competitive student travel award	3a. Identify funds for the award ($1000??) 3b.Develop selection process (awards committee?) 3c. Advertise availability of award		SP09	Cont	Planning committee Awards Committee Department Faculty
4. Expand Department awards ceremony into a scientific meeting that includes research presentations	4a. Require students that do an independent study to do a presentation (poster or oral) 4b. Require students with internship credit to do a presentation. 4c. Student that conduct research may use BIOL 485 /492/497 in place of 460 if they present at the meeting		Fall 09	Cont	Department Faculty Curriculum committee Awards Committee
5. Develop guidelines for earning credit for internships and independent studies	5a. Develop general guidelines and approval process 5b. Incorporate presentation at year-end meeting		F09	Cont	Curriculum committee Awards committee
6. Increase awareness of student organizations	6a. Compile list student organizations and contact info and make it available in the office and website 6b. Work with Biology advisor to disseminate information of student organizations		Sum 09	Cont	Biology advisor Department faculty Students

Department Goal	Desired Outcome	Strategic Plan Alignment	Start Date	End Date	Collaborators
5. Enhance Department Recruitment Activities	Students interested in Ferris get a more accurate representation of the opportunities available in the Department through a variety of channels.	3.2	Sum08	Cont	Dept. Faculty Marketing? Angie Mishler CAS Dean's office
Action Steps for the Goal	**Contributing Steps, Evidence, or Status**				
1. Website revision	1a. Develop and approve plan Include access to information on student groups and careers Improved faculty Bios 1b. Get Faculty Bios /Arrange to take Current Faculty Photos 1c. Consider group Faculty photo (perhaps at award ceremony?)		Sum08 SP09 SP09	Sp09 Cont. Cont	Cliff Franklund Depart Planning Committee Dept. Faculty Marketing?
2. Development of Brochures	Department /Program –specific brochures produced that may be mailed to prospective students		SP09	Cont	Department Coordinators Lead advisors Concentration heads Angie Mishler CAS Dean's office
3. Send letter/materials to admitted students	3a. Get names addresses of admitted students interested in Biology 3b. Develop Welcome letter to Department (possibly program specific) 3c. Send letters to students 3d. Consider follow up Contact		SP09 SP09 SP09	Cont	Angie Mishler Vicky Taylor

Department Goal	Desired Outcome	Strategic Plan Alignment	Start Date	End Date	Collaborators
6. Strengthen assessment activities in the Department	Information from assessment of student learning is used to improve and Department courses and programs	1.1	Fall 2007	Cont	Department Faculty Department Assessment Coordinator Department Head CAS assessment Committee Advisory board members
Action Steps for the Goal	**Contributing Steps, Evidence, or Status**				
1. Develop course outcomes and assessment plans	1.1 Course learning outcomes added to all syllabi started Fall 2007		SP07	Cont	Department Faculty Assessment coordinator
	1.2 Workshop for Biology faculty with Todd Stanislov on using exams for assessment of student learning		Oct 08	Oct 08	CAS Dean Todd Stanislov
	1.3 Faculty participate in CAS assessment initiative. (stipend to develop assessment plan for their courses)		Fall 07	Cont	
	1.4 Review of course assessment plans		SP 09	Cont	
	1.5 Enter course outcomes and assessment plans into TracDat		SP09?		
2. Develop/revise program outcomes and assessment plan	2.1 Program outcomes (BA/BS Biology)revised by Department faculty, and accepted		July 08	Sept 08	Department Faculty Assessment coordinator CAS Assessment Committee
	2.2 Program outcomes (BA/BS Biology)reviewed by CAS assessment Committee		Sept 08	Sept 08	Todd Stanislov Biotech Advisory Board
	2.3 Program outcomes (BA/BS Biology)reviewed by Faculty Center Director Todd Stanislov		Sept 08	Sept 08	
	2.4 Biotechnology outcomes/ assessment program developed		Jan 09	Cont	
	2.5 Enter Program outcomes and assessment plans into TracDat		Dec 08	Feb 09	

3. Map our curriculum against program outcomes	3.1 Attend Curriculum mapping webinar for TracDat 3.2. Work with Department Faculty to map curriculum 3.3 Attend session with TracDat consultant Paul DeSanto 3.4 Enter Curriculum Map into TracDat	Jan 09 Jan 09 Feb 09 Mar 09	Jan 09 Mar 09 Feb 09 Mar 09	Department Faculty Assessment coordinator CAS Assessment Committee Todd Stanislov Biotech Advisory Board
4. Use Assessment data for continuous improvement	4.1. Collect and analyze assessment data 4.2 Discuss review assessment with related stakeholders (for programs) 4.3 Make warranted changes	SP09	Cont	Department Faculty Assessment coordinator CAS Assessment Committee Advisory board members

Funding Request Template

Department: **Date:**

Action Steps Prioritized for Funding				
Alignment				
Projected total cost				
Cost covered internal to the unit and means of funding				
Additional funds requested				
Initial date of fund request				
Duration of fund request				
If an established project, College, Divisional, or University funds already spent on project				
Additional funds requested beyond initial request				

A no more than half page rationale for each request for funding.

ID: Name:

ENVIRONMENTAL BIOLOGY
BACHELOR OF SCIENCE IN BIOLOGY

FERRIS STATE UNIVERSITY
Lead Advisor: Dr. Paul Klatt
PHONE: (231) 591-2671 OFFICE: ASC 2114 E-MAIL: klattp@ferris.edu

Admission requirements: First year student admission is open to high school graduates (or equivalent) who demonstrate appropriate academic preparedness, maturity and seriousness of purpose. High school courses and grade point average, ACT composite score, and ACT Mathematics and Reading sub scores will be considered in the admission and course placement process. Transfer students must have at least 12 credits at the time of application with a minimum 2.0 overall GPA including an English and mathematics course or they will be considered as first year students.

Graduation Requirements:
1. 2.0 CUMULATIVE Grade Point Average in all coursework.
2. No grade lower than C- in courses that apply to major, supporting sciences, and biology application area.
3. Residency requirement: 30 minimum FSU semester credits, at least 50% FSU semester credits in major.
4. Minimum of 40 credits numbered 300 or higher.
5. 121 minimum semester credits including general education requirements.
6. Students may earn only one degree in Biology (either B.S. or B.A.) from Ferris State University.

Number of 300+ Credits:

Program Requirements: Effective for students entering Environmental Biology Fall Semester 2014

REQUIRED		COURSE TITLE –See FSU catalog course descriptions for prerequisites not indicated below		Credits	Grade
MAJOR –38 Credit Hours Required					
BIOL	121	General Biology 1	(CHEM 121 concurrent)	4	
BIOL	122	General Biology 2	(BIOL 121 and CHEM 121)	4	
BIOL	218	Microbial Ecology	(BIOL 121)	3	
BIOL	330	Zoology	(BIOL 122)	4	
BIOL	350	Plants and Fungi	(BIOL 122)	4	
BIOL	343 or 344 or 348	Ornithology Entomology Animal Behavior	(BIOL 122) (BIOL 122) (BIOL 122)	3	
BIOL	375	Principles of Genetics	(BIOL 122)	3	
BIOL	453	Plant Physiology	(BIOL 122 & BIOL 350)	4	
BIOL	460	Current Topics in Biology	(ENGL 311, 321 or 323 and Sr. Standing)	2	
BIOL	492	Biology Internship		1 – 6	
BIOL	346 or 347 or 442	Ecological Assessment Environmental Conservation Ecology	(BIOL 122) (BIOL 122) (BIOL 122)	3	
Biology Elective: Choose one 300+ BIOL elective. The following courses are recommended. An additional course from among BIOL 346/347/442 may also be taken.					
BIOL	340 or 345	Evolution Environmental Regulations	(BIOL 122) (BIOL 122)	3	
SUPPORTING SCIENCES – 28-40 Credit Hours Required					
MATH	130	Advanced Algebra/Analytical Trigonometry	(MATH 120 or by placement)	4	
CHEM	121	General Chemistry 1	(MATH 115 and prior Chemistry class)	5	
CHEM	122	General Chemistry 2	(CHEM 121)	5	
CHEM	214 or 321/322	Fundamentals of Organic Chemistry Organic Chemistry 1 & 2	(CHEM 114 or CHEM 121) (CHEM 122)	4 10	
CHEM	324 or 364	Fundamentals of Biochemistry Biochemistry	(CHEM 214) (CHEM 322)	3 4	
PHYS	130 or 211/212	Concepts in Physics Introductory Physics 1 & 2	(MATH 110) (MATH 120)	4 8	
GEOL	121 or 131	Physical Geology Geology and Land Use Management		4 3	
BIOLOGY APPLICATION AREA – 6 Credit Hours Required					
MATH	251	Statistics for the Life Sciences	(MATH 130)	3	
GISC or GEOG	225 311	Principles of Geographic Information Systems Social Implications of Geographic Information Systems	(Basic Computer Skills) (Jr. Standing)	3	

ELECTIVES – 7-19 Credit Hours of courses to reach the minimum of 121 credits required for this degree.				

GENERAL EDUCATION REQUIREMENTS

Courses which qualify in the Scientific Understanding (Z), Cultural Enrichment (C) and Social Awareness (S) categories are delineated in the General Education section of the FSU electronic catalog:

http://www.ferris.edu/htmls/academics/gened/courses.html

A. COMMUNICATION COMPETENCE 12 Sem Credits		
Course	Grade	Credit
ENGL 150		3
ENGL 250		3
ENGL 311 or 321 or 323		3
COMM 121 program requirement		3
	TOTAL	

B. SCIENTIFIC UNDERSTANDING 7 Sem Credits
This requirement is achieved in the program major.

C. QUANTITATIVE SKILLS
This requirement is achieved in the program major.

D. CULTURAL ENRICHMENT 9 Sem Credits		
Only approved "C" courses may count toward this category. Requirements: 1) one course must be 200+ level, 2) maximum 5 credit hours of music and/or theater activities may apply		
Course	Grade	Credit
200+ level		
	TOTAL	

E. SOCIAL AWARENESS 9 Sem Credits		
Only approved "S" courses may count toward this category. Requirements: 1) two different subject areas including at least one "foundation" course, 2) one course must be 200+ level		
Course	Grade	Credit
Foundation		
200+ level		
	TOTAL	

F. GLOBAL CONSCIOUSNESS
Each student must complete one course from the list of qualifying courses presented in the FSU catalog. This course may also count toward fulfilling the Cultural Enrichment or Social Awareness requirement.
Course:

G. RACE/ETHNICITY/GENDER
Each student must complete one course from the list of qualifying courses presented in the FSU catalog. This course may also count toward fulfilling the Cultural Enrichment or Social Awareness requirement.
Course:

Note: To complete this program in four years, students must average 15-16 credit hours per semester. Students MUST consult their faculty advisor to develop a course sequence plan appropriate to their academic development and educational plans.

NOTICE REGARDING WITHDRAWAL, RE-ADMISSION AND INTERRUPTION OF STUDIES

Students who return to the university after an interrupted enrollment (not including summer semester) must normally meet the requirements of the curriculum which are in effect at the time of their return, not the requirements which were in effect when they were originally admitted.

ID: Name:

FORENSIC BIOLOGY
BACHELOR OF SCIENCE IN BIOLOGY

FERRIS STATE UNIVERSITY

Lead Advisor: Dr. Gary Rodabaugh

PHONE: (231) 591-2308 OFFICE: ASC 2016 E-MAIL: rodabaug@ferris.edu

Admission requirements: First year student admission is open to high school graduates (or equivalent) who demonstrate appropriate academic preparedness, maturity and seriousness of purpose. High school courses and grade point average, ACT composite score, and ACT Mathematics and Reading sub scores will be considered in the admission and course placement process. Transfer students must have at least 12 credits at the time of application with a minimum 2.0 overall GPA including an English and mathematics course or they will be considered as first year students.

Graduation Requirements:

1. 2.0 CUMULATIVE Grade Point Average in all coursework.
2. No grade lower than C- in courses that apply to major, supporting sciences, and biology application area.
3. Residency requirement: 30 minimum FSU semester credits, at least 50% FSU semester credits in major
4. Minimum of 40 credits numbered 300 or higher.
5. 121 minimum semester credits including general education requirements.
6. Students may earn only one degree in Biology (either B.S. or B.A.) from Ferris State University.

Number of 300+ Credits: _____

Program Requirements: Effective for students entering Forensic Biology Fall Semester 2014

REQUIRED		COURSE TITLE – See FSU catalog course descriptions for prerequisites not indicated below		FSU S.H.	GRADE
MAJOR – 37 Credit Hours Required					
BIOL	121	General Biology 1	(CHEM 121 concurrent)	4	
BIOL	122	General Biology 2	(BIOL 121 & CHEM 121)	4	
BIOL*	205 or	Human Anatomy and Physiology	(CHEM 114 or CHEM 121)	5	
	321/322	Human Physiology and Anatomy 1 & 2	(BIOL 122 & CHEM 122)	8	
BIOL	207	Forensic Biology		4	
BIOL**	286	General Microbiology	(CHEM 122)	3	
BIOL	375	Genetics	(BIOL 122)	3	
BIOL	346 or	Ecological Assessment	(BIOL 122)	3	
	347 or	Environmental Conservation	(BIOL 122)		
	442	Ecology	(BIOL 122)		
BIOL	407	Forensic DNA Analysis	(BIOL 207 & BIOL 375)	3	
BIOL	460	Current Topics in Biology	(ENGL 311, 321 or 321 and Sr. Standing)	2	
BIOL Electives (300 level or above) for a total of 37 credits in BIOL courses (see next page).				3-6	
SUPPORTING SCIENCES – 40-46 Credit Hours Required					
MATH	220	Analytical Geometry – Calculus 1	(MATH 130 or by placement)	4	
CHEM	121	General Chemistry 1	(MATH 115 and prior Chemistry class)	5	
CHEM	122	General Chemistry 2	(CHEM 121)	5	
CHEM	207	Science and Crime		3	
CHEM	321	Organic Chemistry 1	(CHEM 122)	5	
CHEM	322	Organic Chemistry 2	(CHEM 321)	5	
CHEM	324 or	Fundamentals of Biochemistry	(CHEM 322)	3	
	364	Biochemistry	(CHEM 322)	4	
CHEM	231 or	Quantitative Analysis	(CHEM 122)	4	
	307 or	Forensic Chemistry	(BIOL 207 & CHEM 207)	3	
	332	Biochemistry Lab 1	(CHEM 322 & CHEM 364 concurrent)	2	
PHYS	211/212 or	Introductory Physics 1 & 2	(MATH 120)	8	
	241/242	General Physics 1 & 2	(MATH 220)	10	

BIOLOGY APPLICATION AREA - 9 Credit Hours Required					
MATH	251	Statistics for the Life Sciences	(MATH 130)	3	
CRIM	110	Introduction to Criminal Justice		3	
CRIM	301	CJ Investigation Issues	(CRIM 110)	3	
ELECTIVES – 0-5 Credit Hours of courses to reach the minimum 121 credits required for this degree.					

GENERAL EDUCATION REQUIREMENTS

Courses which qualify in the Scientific Understanding (Z), Cultural Enrichment (C) and Social Awareness (S) categories are delineated in the General Education section of the FSU electronic catalog:

http://www.ferris.edu/htmls/academics/gened/courses.html

A. COMMUNICATION COMPETENCE 12 Sem Credits		
Course	Grade	Credit
ENGL 150		3
ENGL 250		3
ENGL 311 or 321 or 323		3
COMM 121 program requirement		3
	TOTAL	

B. SCIENTIFIC UNDERSTANDING 7 Sem Credits
This requirement is achieved in the program major.

C. QUANTITATIVE SKILLS
This requirement is achieved in the program major.

D. CULTURAL ENRICHMENT 9 Sem Credits		
Only approved "C" courses may count toward this category. Requirements: 1) one course must be 200+ level, 2) maximum 5 credit hours of music and/or theater activities may apply		
Course	Grade	Credit
	TOTAL	

E. SOCIAL AWARENESS 9 Sem Credits		
Only approved "S" courses may count toward this category. Requirements: 1) two different subject areas including at least one "foundation" course, 2) one course must be 200+ level		
Course	Grade	Credit
PSYC 150 recommended		
PSYC 350 recommended		
	TOTAL	

F. GLOBAL CONSCIOUSNESS
Each student must complete one course from the list of qualifying courses presented in the FSU catalog. This course may also count toward fulfilling the Cultural Enrichment or Social Awareness requirement.
Course:

G. RACE/ETHNICITY/GENDER
Each student must complete one course from the list of qualifying courses presented in the FSU catalog. This course may also count toward fulfilling the Cultural Enrichment or Social Awareness requirement.
Course:

Note: To complete this program in four years, students must average 15-16 credit hours per semester. Students MUST consult their faculty advisor to develop a course sequence plan appropriate to their academic development and educational plans.

Biology Electives (Consult with Advisor):

BIOL 300	Pathophysiology	3	BIOL 349	Medical Parasitology	3	BIOL 472	Proteins	3
BIOL 301	Exercise Physiology	3	BIOL 350	Plants and Fungi	4	BIOL 473	Proteins Laboratory	3
BIOL 310	Nutrition	3	BIOL 370	Developmental Biology	4	BIOL 474	Adv. Cell / Mol. Biology	3
BIOL 330	Zoology	4	BIOL 373	Cell Biology	3	BIOL 475	Bioinformatics	3
BIOL 340	Evolution	3	BIOL 421	Endocrinology	3	BIOL 476	Adv. Techniques Biotechnology	2
BIOL 343	Ornithology	3	BIOL 423	Neurobiology	3	BIOL 485	Biology Research	1-9
BIOL 344	Entomology	3	BIOL 453	Plant Physiology	4	BIOL 490	Special Topics in Biology	3-4
BIOL 345	Environmental Regulations	3	BIOL 470	Molecular Genetics	4	BIOL 492	Biology Internship	1-9
BIOL 348	Animal Behavior	3	BIOL 471	Recombinant DNA Lab	3	BIOL 497	Independent Study	1-6

*Credit toward the degree cannot be earned in both BIOL 205 and BIOL 321/322.
**BIOL 386 may substitute for BIOL 286.

NOTICE REGARDING WITHDRAWAL, RE-ADMISSION AND INTERRUPTION OF STUDIES

Students who return to the university after an interrupted enrollment (not including summer semester) must normally meet the requirements of the curriculum which are in effect at the time of their return, not the requirements which were in effect when they were originally admitted.

ID: Name:

PRE-DENTISTRY
BACHELOR OF SCIENCE IN BIOLOGY

FERRIS STATE UNIVERSITY
Lead Advisor: Dr. Mary Murnik
PHONE: (231) 591-2546 OFFICE: ASC 2117 E-MAIL: murnikm@ferris.edu

Admission requirements: First year student admission is open to high school graduates (or equivalent) who demonstrate appropriate academic preparedness, maturity and seriousness of purpose. High school courses and grade point average, ACT composite score, and ACT Mathematics and Reading sub scores will be considered in the admission and course placement process. Transfer students must have at least 12 credits at the time of application with a minimum 2.0 overall GPA including an English and mathematics course or they will be considered as first year students.

Graduation Requirements:
1. 2.0 CUMULATIVE Grade Point Average in all coursework.
2. No grade lower than C- in courses that apply to major, supporting sciences, and biology application area.
3. Residency requirement: 30 minimum FSU semester credits, at least 50% FSU semester credits in major.
4. Minimum of 40 credits numbered 300 or higher.
5. 121 minimum semester credits including general education requirements.
6. Students may earn only one B.S. or B.A. degree in Biology from Ferris State University.

Number of 300+ Credits: _____

Program Requirements: Effective for students entering the Pre-Dentistry Concentration Fall Semester 2014

REQUIRED		COURSE TITLE –See FSU catalog course descriptions for prerequisites not indicated below		Credits	Grade
MAJOR – 36 credit hours of required courses					
BIOL	121	General Biology 1	(CHEM 121 concurrent)	4	
BIOL	122	General Biology 2	(BIOL 121 & CHEM 121)	4	
BIOL	321	Human Physiology and Anatomy 1	(BIOL 122 & CHEM 122)	4	
BIOL	322	Human Physiology and Anatomy 2	(BIOL 321)	4	
BIOL	286 or	General Microbiology	(CHEM 122)	3	
	386	Microbiology and Immunology (recommended)	(BIOL 322 & CHEM 214 or 321)	5	
BIOL	375	Principles of Genetics	(BIOL 122)	3	
BIOL	346 or	Ecological Assessment	(BIOL 122)	3	
	347 or	Environmental Conservation	(BIOL 122)		
	442	Ecology	(BIOL 122)		
BIOL	460	Current Topics in Biology	(ENGL 311, 321 or 323 & Sr. Standing)	2	
BIOL Electives (300 level or above) for a total of 36 credits in BIOL courses (see next page).				7 - 9	
BIOL	370	Developmental Biology (recommended)	(BIOL 122)	4	
SUPPORTING SCIENCES – 34 to 37 Credit Hours of Required Courses					
MATH	120	Trigonometry (minimum requirement)	(MATH 115 or by placement)	3	
CHEM	121	General Chemistry 1	(MATH 115 and prior Chemistry class)	5	
CHEM	122	General Chemistry 2	(CHEM 121)	5	
CHEM	321	Organic Chemistry 1	(CHEM 122)	5	
CHEM	322	Organic Chemistry 2	(CHEM 322)	5	
CHEM	324 or	Fundamentals of Biochemistry	(CHEM 322)	3	
	364	Biochemistry (recommended)	(CHEM 322)	4	
PHYS	211/212 or	Introductory Physics 1 & 2	(MATH 120)	8	
	241/242	General Physics 1 & 2	(MATH 220)	10	
BIOLOGY APPLICATION AREA - 5 Credit Hours Required (In addition to the course listed below, choose at least one more course from the list on the next page for a total of 5 credits. Additional credits in BIOL courses may also be used.)					
RMLS	122	Responding to Emergencies (recommended)		2	
ELECTIVES - 12-15 Credit Hours of courses to reach the minimum of 121 credits required for this degree.					
MGMT	310	Small Business Management (recommended)		3	

GENERAL EDUCATION REQUIREMENTS

Courses which qualify in the Scientific Understanding (Z), Cultural Enrichment (C) and Social Awareness (S) categories are delineated in the General Education section of the FSU electronic catalog: **http://www.ferris.edu/htmls/academics/gened/courses.html**

A. COMMUNICATION COMPETENCE	12 Sem Credits	
Course	Grade	Credit
ENGL 150		3
ENGL 250		3
ENGL 311 or 321 or 323		3
COMM 121 program requirement		3
	TOTAL	

B. SCIENTIFIC UNDERSTANDING	7 Sem Credits
This requirement is achieved in the program major.	

C. QUANTITATIVE SKILLS
This requirement is achieved in the program major.

D. CULTURAL ENRICHMENT	9 Sem Credits	
Only approved "C" courses may count toward this category. Requirements: 1) one course must be 200+ level, 2) maximum 5 credit hours of music and/or theater activities may apply		
Course	Grade	Credit
200+ level		
	TOTAL	

E. SOCIAL AWARENESS	9 Sem Credits	
Only approved "S" courses may count toward this category. Requirements: 1) two different subject areas including at least one "foundation" course, 2) one course must be 200+ level		
Course	Grade	Credit
Foundation PSYC 150 recommended		
SOCY 121 recommended		
200+ level		
	TOTAL	

F. GLOBAL CONSCIOUSNESS
Each student must complete one course from the list of qualifying courses presented in the FSU catalog. This course may also count toward fulfilling the Cultural Enrichment or Social Awareness requirement.
Course:

G. RACE/ETHNICITY/GENDER
Each student must complete one course from the list of qualifying courses presented in the FSU catalog. This course may also count toward fulfilling the Cultural Enrichment or Social Awareness requirement.
Course:

Note: To complete this program in four years, students must average 15-16 credit hours per semester. Students MUST consult their faculty advisor to develop a course sequence plan appropriate to their academic development and educational plans.

Biology Electives (Consult with Advisor):

BIOL 300	Pathophysiology	3	BIOL 350	Plants and Fungi	4	BIOL 472	Proteins	3
BIOL 301	Exercise Physiology	3	BIOL 370	Developmental Biology	4	BIOL 473	Proteins Laboratory	3
BIOL 310	Nutrition	3	BIOL 373	Cell Biology	3	BIOL 474	Adv. Cell/Mol. Biology	3
BIOL 330	Zoology	4	BIOL 407	Forensic DNA Analysis	3	BIOL 475	Bioinformatics	3
BIOL 340	Evolution	3	BIOL 421	Endocrinology	3	BIOL 476	Adv. Techniques Biotechnology	2
BIOL 343	Ornithology	3	BIOL 423	Neurobiology	3	BIOL 485	Biological Research	1-9
BIOL 344	Entomology	3	BIOL 453	Plant Physiology	4	BIOL 490	Special Topics in Biology	3-4
BIOL 345	Environmental Regulations	3	BIOL 470	Molecular Genetics	4	BIOL 492	Biology Internship	1-9
BIOL 348	Animal Behavior	3	BIOL 471	Recombinant DNA Lab	3	BIOL 497	Independent Study	1-6
BIOL 349	Medical Parasitology	3						

Application Area (Consult with advisor): Any of the Biology electives above may be used. Other common classes include:

CAHS 160	Nutrition for Healthy Living	3	MRIS 102	Orientation to Med Vocab	1 or
EDPE 338	Biomechanics	3	MRIS 103	Medical Terminology	4
MATH 251	Statistics for the Life Sciences	3			

NOTICE REGARDING WITHDRAWAL, RE-ADMISSION AND INTERRUPTION OF STUDIES

Students who return to the university after an interrupted enrollment (not including summer semester) must normally meet the requirements of the curriculum which are in effect at the time of their return, not the requirements which were in effect when they were originally admitted.

ID: Name:

PRE-MEDICINE
BACHELOR OF SCIENCE IN BIOLOGY

FERRIS STATE UNIVERSITY
Lead Advisor: Dr. Mike Ryan
PHONE: (231) 591-5892 OFFICE: ASC 2115 E-MAIL: ryanm@ferris.edu

Admission requirements: First year student admission is open to high school graduates (or equivalent) who demonstrate appropriate academic preparedness, maturity and seriousness of purpose. High school courses and grade point average, ACT composite score, and ACT Mathematics and Reading sub scores will be considered in the admission and course placement process. Transfer students must have at least 12 credits at the time of application with a minimum 2.0 overall GPA including an English and mathematics course or they will be considered as first year students.

Graduation Requirements:
1. 2.0 CUMULATIVE Grade Point Average in all coursework.
2. No grade lower than C- in courses that apply to major, supporting sciences, and biology application area.
3. Residency requirement: 30 minimum FSU semester credits, at least 50% FSU semester credits in major.
4. Minimum of 40 credits numbered 300 or higher.
5. 121 minimum semester credits including general education requirements.
6. Students may earn only one B.S. or B.A. degree in Biology from Ferris State University.

Number of 300+ Credits: _____

Program Requirements: Effective for students entering the Pre-Medicine Concentration Fall Semester 2014

REQUIRED		COURSE TITLE –See FSU catalog course descriptions for prerequisites not indicated below		Credits	Grade
MAJOR – 36 Credit Hours of Required Courses					
BIOL	121	General Biology 1	(CHEM 121 concurrent)	4	
BIOL	122	General Biology 2	(BIOL 121 & CHEM 121)	4	
BIOL	321	Human Physiology and Anatomy 1	(BIOL 122 & CHEM 122)	4	
BIOL	322	Human Physiology and Anatomy 2	(BIOL 321)	4	
BIOL	386	Microbiology and Immunology	(BIOL 322 & CHEM 214 or 321)	5	
BIOL	375	Principles of Genetics	(BIOL 122)	3	
BIOL	346 or 347 or 442	Ecological Assessment Environmental Conservation Ecology	(BIOL 122) (BIOL 122) (BIOL 122)	3	
BIOL	460	Current Topics in Biology	(ENGL 311 or ENGL 321 and Senior Standing)	2	
BIOL	370	Developmental Biology	(BIOL 122)	4	
BIOL Elective (300 level or above) for a total of 36 credits in BIOL courses (see next page).				3	
SUPPORTING SCIENCES – 36 to 40 Credit Hours of Required Courses					
MATH	130 or 230	Advanced Algebra/Analytical Trigonometry Analytical Geometry & Calculus 2	(MATH 120 or by placement) (MATH 220)	4	
CHEM	121	General Chemistry 1	(MATH 115 and prior Chemistry class)	5	
CHEM	122	General Chemistry 2	(CHEM 121)	5	
CHEM	321	Organic Chemistry 1	(CHEM 122)	5	
CHEM	322	Organic Chemistry 2	(CHEM 322)	5	
CHEM	364	Biochemistry	(CHEM 322)	4	
PHYS	211/212 or 241/242	Introductory Physics 1 & 2 General Physics 1 & 2	(MATH 120) (MATH 220)	8 10	
BIOLOGY APPLICATION AREA - 5 Credit Hours Required (Consult your advisor) Additional courses in Biology may satisfy this requirement. See next page for list of commonly used classes.					
ELECTIVES - 10-14 Credit Hours of courses to reach the minimum of 121 credits required for this degree.					
MGMT	310	Small Business Management (recommended)		3	

GENERAL EDUCATION REQUIREMENTS

Courses which qualify in the Scientific Understanding (Z), Cultural Enrichment (C) and Social Awareness (S) categories are delineated in the General Education section of the FSU electronic catalog: **http://www.ferris.edu/htmls/academics/gened/courses.html**

A. COMMUNICATION COMPETENCE	12 Sem Credits	
Course	Grade	Credit
ENGL 150		3
ENGL 250		3
ENGL 311 or 321 or 323		3
COMM 121 program requirement		3
	TOTAL	

B. SCIENTIFIC UNDERSTANDING	7 Sem Credits
This requirement is achieved in the program major.	

C. QUANTITATIVE SKILLS
This requirement is achieved in the program major.

D. CULTURAL ENRICHMENT	9 Sem Credits	
Only approved "C" courses may count toward this category. Requirements: 1) one course must be 200+ level, 2) maximum 5 credit hours of music and/or theater activities may apply		
Course	Grade	Credit
200+ level		
	TOTAL	

E. SOCIAL AWARENESS	9 Sem Credits	
Only approved "S" courses may count toward this category. Requirements: 1) two different subject areas including at least one "foundation" course, 2) one course must be 200+ level		
Course	Grade	Credit
Foundation		
200+ level		
	TOTAL	

F. GLOBAL CONSCIOUSNESS
Each student must complete one course from the list of qualifying courses presented in the FSU catalog. This course may also count toward fulfilling the Cultural Enrichment or Social Awareness requirement.
Course:

G. RACE/ETHNICITY/GENDER
Each student must complete one course from the list of qualifying courses presented in the FSU catalog. This course may also count toward fulfilling the Cultural Enrichment or Social Awareness requirement.
Course:

Biology Electives (Consult with Advisor):

BIOL 300	Pathophysiology	3
BIOL 301	Exercise Physiology	3
BIOL 310	Nutrition	3
BIOL 330	Zoology	4
BIOL 340	Evolution	3
BIOL 343	Ornithology	3
BIOL 344	Entomology	3
BIOL 345	Environmental Regulations	3
BIOL 348	Animal Behavior	3
BIOL 349	Medical Parasitology	3
BIOL 350	Plants and Fungi	3
BIOL 373	Cell Biology	3
BIOL 407	Forensic DNA Analysis	3
BIOL 421	Endocrinology	3
BIOL 423	Neurobiology	3
BIOL 453	Plant Physiology	4
BIOL 470	Molecular Genetics	4
BIOL 471	Recombinant DNA Lab	3
BIOL 472	Proteins	3
BIOL 473	Proteins Laboratory	3
BIOL 474	Adv. Cell and Molecular Biology	3
BIOL 475	Bioinformatics	3
BIOL 476	Adv. Techniques Biotechnology	2
BIOL 485	Biological Research	1-9
BIOL 490	Special Topics in Biology	3-4
BIOL 492	Biology Internship	1-9
BIOL 497	Independent Study	1-6

Application Area (Consult with advisor): Any of the Biology electives above may be used. Other common classes include

RMLS 122	Responding to Emergencies	2
CAHS 160	Nutrition for Healthy Living	3
MATH 251	Statistics for the Life Sciences	3
EDPE 338	Biomechanics	3
MRIS 102	Orientation to Medical Vocabulary	1 or
MRIS 103	Medical Terminology	4

NOTICE REGARDING WITHDRAWAL, RE-ADMISSION AND INTERRUPTION OF STUDIES

Students who return to the university after an interrupted enrollment (not including summer semester) must normally meet the requirements of the curriculum which are in effect at the time of their return, not the requirements which were in effect when they were originally admitted.

ID: Name:

PRE-OPTOMETRY
BACHELOR OF SCIENCE IN BIOLOGY

FERRIS STATE UNIVERSITY
Lead Advisor: Dr. Chris Westerkamp
PHONE: (231) 591-5037 OFFICE: ASC 2119 E-MAIL: westerc@ferris.edu

Admission requirements: First year student admission is open to high school graduates (or equivalent) who demonstrate appropriate academic preparedness, maturity and seriousness of purpose. High school courses and grade point average, ACT composite score, and ACT Mathematics and Reading sub scores will be considered in the admission and course placement process. Transfer students must have at least 12 credits at the time of application with a minimum 2.0 overall GPA including an English and mathematics course or they will be considered as first year students.

The following program presents the minimum entrance requirements of the Michigan College of Optometry and the requirements for the Bachelor of Science in Biology. As of Fall 2007, the MCO recommends that applicants will have completed a bachelor degree, however students may be eligible to apply if they have earned a minimum of 90 college credits in specific courses as indicated on this checksheet. Admission to the Michigan College of Optometry is highly competitive, and the completion of this program does not ensure acceptance by the Michigan College of Optometry. Admission requirements for other schools of optometry may vary.

Graduation Requirements:

1. 2.0 CUMULATIVE Grade Point Average in all coursework.
2. No grade lower than C- in courses that apply to major, supporting sciences, and biology application area.
3. Residency requirement: 30 minimum FSU semester credits, at least 50% FSU semester credits in major.
4. Minimum of 40 credits numbered 300 or higher.
5. 121 minimum semester credits including general education requirements.
6. Students may earn only one B.S. or B.A. degree in Biology from Ferris State University.

Number of 300+ Credits: _____

Program Requirements: Effective for students entering the Pre-Optometry Concentration Fall Semester 2014
[Note: Courses marked with an asterisk satisfy the minimum admission requirements of the Michigan College of Optometry.]

REQUIRED		COURSE TITLE –See FSU catalog course descriptions for prerequisites not indicated below		Credits	Grade
MAJOR – 37 Credit Hours Required					
*BIOL	121	General Biology 1	(CHEM 121 concurrent)	4	
*BIOL	122	General Biology 2	(BIOL 121 & CHEM 121)	4	
BIOL	205	Human Anatomy and Physiology	(CHEM 114 or CHEM 121)	5	
*BIOL	286	General Microbiology	(CHEM 122)	3	
BIOL	375	Principles of Genetics	(BIOL 122)	3	
BIOL	346 or 347 or 442	Ecological Assessment Environmental Conservation Ecology	(BIOL 122) (BIOL 122) (BIOL 122)	3	
BIOL	460	Current Topics in Biology	(ENGL 311, 321 or 323 & Sr. Standing)	2	
BIOL	370	Developmental Biology	(BIOL 122)	4	
BIOL	373	Cell Biology	(BIOL 122 & CHEM 214 or 322)	3	
BIOL Electives (300 level or above) for a total of 37 credits in BIOL courses (see next page).				6	
SUPPORTING SCIENCES – 36-37 Credit Hours Required					
*MATH	220	Analytical Geometry & Calculus 1	(MATH 130 or by placement)	4	
*CHEM	121	General Chemistry 1	(MATH 115 and prior Chemistry class)	5	
*CHEM	122	General Chemistry 2	(CHEM 121)	5	
*CHEM	321	Organic Chemistry 1	(CHEM 122)	5	
*CHEM	322	Organic Chemistry 2	(CHEM 322)	5	
CHEM	324 or 364	Fundamentals of Biochemistry Biochemistry	(CHEM 322) (CHEM 322)	3 4	
*PHYS	211	Introductory Physics 1	(MATH 120)	4	
*PHYS	212	Introductory Physics 2	(PHYS 211)	4	
BIOLOGY APPLICATION AREA - 5 Credit Hours Required (In addition to the course listed below, choose at least one more course from the list on the next page for a total of 5 credits. Additional credits in BIOL courses may also be used.)					
*MATH	251	Statistics for the Life Sciences	(MATH 130)	3	

ELECTIVES - 12-13 Credit Hours of courses to reach the minimum of 121 credits required for this degree.					
MGMT ACCT	310 or 201	Small Business Management (recommended) Principles of Accounting 1 (recommended)	(Sophomore Status) (MATH 110)	3	

GENERAL EDUCATION REQUIREMENTS

Courses which qualify in the Scientific Understanding (Z), Cultural Enrichment (C) and Social Awareness (S) categories are delineated in the General Education section of the FSU electronic catalog: **http://www.ferris.edu/htmls/academics/gened/courses.html**

A. COMMUNICATION COMPETENCE 12 Sem Credits		
Course	Grade	Credit
*ENGL 150		3
*ENGL 250		3
ENGL 311 or 321 or 323		3
*COMM 121 program requirement		3
	TOTAL	

B. SCIENTIFIC UNDERSTANDING 7 Sem Credits
This requirement is achieved in the program major.

C. QUANTITATIVE SKILLS
This requirement is achieved in the program major.

D. CULTURAL ENRICHMENT 9 Sem Credits		
Only approved "C" courses may count toward this category. Requirements: 1) one course must be 200+ level, 2) maximum 5 credit hours of music and/or theater activities may apply		
Course	Grade	Credit
*200+ level		
*		
*		
	TOTAL	

E. SOCIAL AWARENESS 9 Sem Credits		
Only approved "S" courses may count toward this category. Requirements: 1) two different subject areas including at least one "foundation" course, 2) one course must be 200+ level		
Course	Grade	Credit
*Foundation PSYC 150		
*		
*200+ level		
	TOTAL	

F. GLOBAL CONSCIOUSNESS
Each student must complete one course from the list of qualifying courses presented in the FSU catalog. This course may also count toward fulfilling the Cultural Enrichment or Social Awareness requirement.
Course: *

G. RACE/ETHNICITY/GENDER
Each student must complete one course from the list of qualifying courses presented in the FSU catalog. This course may also count toward fulfilling the Cultural Enrichment or Social Awareness requirement.
Course: *

Note: To complete this program in four years, students must average 15-16 credit hours per semester. Students MUST consult their faculty advisor to develop a course sequence plan appropriate to their academic development and educational plans.

Biology Electives (Consult with advisor):

BIOL 300	Pathophysiology	3	BIOL 350	Plants and Fungi	4	BIOL 472	Proteins	3
BIOL 301	Exercise Physiology	3	BIOL 370	Developmental Biology	4	BIOL 473	Proteins Laboratory	3
BIOL 310	Nutrition	3	BIOL 373	Cell Biology	3	BIOL 474	Adv. Cell/Mol. Biology	3
BIOL 330	Zoology	4	BIOL 407	Forensic DNA Analysis	3	BIOL 475	Bioinformatics	3
BIOL 340	Evolution	3	BIOL 421	Endocrinology	3	BIOL 476	Adv. Techniques Biotechnology	2
BIOL 343	Ornithology	3	BIOL 423	Neurobiology	3	BIOL 485	Biological Research	1-9
BIOL 344	Entomology	3	BIOL 453	Plant Physiology	4	BIOL 490	Special Topics in Biology	3-4
BIOL 345	Environmental Regulations	3	BIOL 470	Molecular Genetics	4	BIOL 492	Biology Internship	1-9
BIOL 348	Animal Behavior	3	BIOL 471	Recombinant DNA Lab	3	BIOL 497	Independent Study	1-6
BIOL 349	Medical Parasitology	3						

Application area (Consult with advisor): Any of the Biology electives above may be used. Other common classes taken include

RMLS 122	Responding to Emergencies	2	MRIS 102	Orientation to Medical Vocabulary	1 or
CAHS 160	Nutrition for Healthy Living	3	MRIS 103	Medical Terminology	4
EDPE 338	Biomechanics	3			

Note: MCO will accept either STQM 260 or PSYC 210 as a substitute for MATH 251. However, only MATH 251 applies toward the B.S. in Biology.

Note: The Optometry Admission Test (OAT) is required for admission to MCO. Students should consider taking the OAT in early summer of the year prior to the year of entry into MCO. This test may be taken as often as desired without penalty imposed by MCO, however the OAT imposes mandatory wait periods between test dates. More information can be found at www.opted.org.

NOTICE REGARDING WITHDRAWAL, RE-ADMISSION AND INTERRUPTION OF STUDIES

Students who return to the university after an interrupted enrollment (not including summer semester) must normally meet the requirements of the curriculum which are in effect at the time of their return, not the requirements which were in effect when they were originally admitted.

ID: Name:

PRE-PHARMACY
BACHELOR OF SCIENCE IN BIOLOGY

FERRIS STATE UNIVERSITY
Lead Advisor: Angie Mishler
PHONE: (231) 591-2745 OFFICE: ASC 3078 E-MAIL: mishlera@ferris.edu

Admission requirements: First year student admission is open to high school graduates (or equivalent) who demonstrate appropriate academic preparedness, maturity and seriousness of purpose. High school courses and grade point average, ACT composite score, and ACT Mathematics and Reading sub scores will be considered in the admission and course placement process. Transfer students must have at least 12 credits at the time of application with a minimum 2.0 overall GPA including an English and mathematics course or they will be considered as first year students.

The following program presents the minimum entrance requirements of the College of Pharmacy and the requirements for the Bachelor of Science in Biology. Students may be eligible to apply if they have credit in specific courses as indicated on this checksheet. Admission to the College of Pharmacy is highly competitive, and the completion of this program does not ensure acceptance. Admission requirements for other schools of Pharmacy may vary.

Graduation Requirements:

1. 2.0 CUMULATIVE Grade Point Average in all coursework.
2. No grade lower than C- in courses that apply to major, supporting sciences, and biology application area.
3. Residency Requirement: 30 minimum FSU semester credits, at least 50% of credits in major must have a BIOL prefix and be earned at FSU.
4. Minimum of 40 credits numbered 300 or higher.
5. 121 minimum semester credits including general education requirements.
6. Students may earn only one degree in Biology (either B.S. or B.A.) from Ferris State University.

Number of 300+ Credits: _____

Program Requirements: Effective for students entering the Pre-Pharmacy Concentration Fall Semester 2014 [Note: Courses marked with an asterisk satisfy the minimum admission requirements of the College of Pharmacy at Ferris State University.]

REQUIRED		COURSE TITLE –See FSU catalog course descriptions for prerequisites not indicated below		Credits	Grade
MAJOR – 36 Credit Hours Required					
*BIOL	121	General Biology 1	(CHEM 121 concurrent)	4	
*BIOL	122	General Biology 2	(BIOL 121 & CHEM 121)	4	
*BIOL	286 or	General Microbiology	(CHEM 122)	3	
	386	Microbiology and Immunology	(BIOL 322 & CHEM 214 or 321)	5	
*BIOL	321	Human Physiology and Anatomy 1	(BIOL 122 & CHEM 122)	4	
*BIOL	322	Human Physiology and Anatomy 2	(BIOL 321)	4	
BIOL	346 or	Ecological Assessment	(BIOL 122)	3	
	347 or	Environmental Conservation	(BIOL 122)		
	442	Ecology	(BIOL 122)		
*BIOL	375	Principles of Genetics	(BIOL 122)	3	
BIOL	460	Current Topics in Biology	(ENGL 311, 321 or 323 & Sr. Standing)	2	
BIOL Electives (300 level or above) for a total of 36 credits in BIOL courses (see next page).				7-9	
BIOL	373 or	Cell Biology (recommended)	(BIOL 122 & CHEM 214 or 322)	3	
	474	Adv. Cell-Molecular Biol	(BIOL 375 & CHEM 364)		
SUPPORTING SCIENCES – 34-37 Credit Hours Required					
*MATH	220	Analytical Geometry & Calculus 1	(MATH 130 or by placement)	4	
*CHEM	121	General Chemistry 1	(MATH 115 and prior Chemistry class)	5	
*CHEM	122	General Chemistry 2	(CHEM 121)	5	
*CHEM	321	Organic Chemistry 1	(CHEM 122)	5	
*CHEM	322	Organic Chemistry 2	(CHEM 321)	5	
*CHEM	324 or	Fundamentals of Biochemistry	(CHEM 322)	3	
	364	Biochemistry	(CHEM 322)	4	
*PHYS	211	Introductory Physics 1	(MATH 120)	4	
PHYS	212	Introductory Physics 2	(PHYS 211)	4	

BIOLOGY APPLICATION AREA - 5 Credit Hours Required (In addition to the course listed below, choose at least one more course from the list on the next page for a total of 5 credits. Additional credits in BIOL courses may also be used.)					
*MATH	251	Statistics for the Life Sciences	(MATH 130)	3	
ELECTIVES – 13-16 Credit Hours of courses to reach the minimum of 121 credits required for this degree.					

GENERAL EDUCATION REQUIREMENTS

Courses which qualify in the Scientific Understanding (Z), Cultural Enrichment (C) and Social Awareness (S) categories are delineated in the General Education section of the FSU electronic catalog: **http://www.ferris.edu/htmls/academics/gened/courses.html**

A. COMMUNICATION COMPETENCE 12 Sem Credits		
Course	Grade	Credit
*ENGL 150		3
*ENGL 250		3
ENGL 311 or 321 or 323		3
*COMM 121 program requirement		3
	TOTAL	

B. SCIENTIFIC UNDERSTANDING 7 Sem Credits
This requirement is achieved in the program major.

C. QUANTITATIVE SKILLS
This requirement is achieved in the program major.

D. CULTURAL ENRICHMENT 9 Sem Credits		
Only approved "C" courses may count toward this category. Requirements: 1) one course must be 200+ level, 2) maximum 5 credit hours of music and/or theater activities may apply		
Course	Grade	Credit
*200+ level		
*		
*		
	TOTAL	

E. SOCIAL AWARENESS 9 Sem Credits		
Only approved "S" courses may count toward this category. Requirements: 1) two different subject areas including at least one "foundation" course, 2) one course must be 200+ level		
Course	Grade	Credit
*Foundation PSYC 150 or SOCY 121		
*ECON 221		
	TOTAL	

F. GLOBAL CONSCIOUSNESS
Each student must complete one course from the list of qualifying courses presented in the FSU catalog. This course may also count toward fulfilling the Cultural Enrichment or Social Awareness requirement.
Course: *

G. RACE/ETHNICITY/GENDER
Each student must complete one course from the list of qualifying courses presented in the FSU catalog. This course may also count toward fulfilling the Cultural Enrichment or Social Awareness requirement.
Course: *

Note: To complete this program in four years, students must average 15-16 credit hours per semester. Students MUST consult their faculty advisor to develop a course sequence plan appropriate to their academic development and educational plans.

Biology Electives (Consult with advisor):

BIOL 300	Pathophysiology	3	BIOL 350	Plants and Fungi	4	BIOL 472	Proteins	3
BIOL 301	Exercise Physiology	4	BIOL 370	Developmental Biology	4	BIOL 473	Proteins Laboratory	3
BIOL 310	Nutrition	3	BIOL 373	Cell Biology	3	BIOL 474	Adv. Cell/Mol. Biology	3
BIOL 330	Zoology	4	BIOL 407	Forensic DNA Analysis	3	BIOL 475	Bioinformatics	3
BIOL 340	Evolution	3	BIOL 421	Endocrinology	3	BIOL 476	Adv. Techniques Biotechnology	2
BIOL 343	Ornithology	3	BIOL 423	Neurobiology	3	BIOL 485	Biological Research	1-9
BIOL 344	Entomology	3	BIOL 453	Plant Physiology	4	BIOL 490	Special Topics in Biology	3-4
BIOL 345	Environmental Regulations	3	BIOL 470	Molecular Genetics	4	BIOL 492	Biology Internship	1-9
BIOL 348	Animal Behavior	3	BIOL 471	Recombinant DNA Lab	3	BIOL 497	Independent Study	1-6
BIOL 349	Medical Parasitology	3						

Application Area (Consult with advisor): Any of the Biology electives above may be used. Other common classes taken include

CAHS 160	Nutrition for Healthy Living	3	RMLS 122	Responding to Emergencies	2	MRIS 102	Orientation to Med Vocab	1 or
EDPE 338	Biomechanics	3				MRIS 103	Medical Terminology	4

Note: The Pharmacy Admission Test (PCAT) is required for admission to the College of Pharmacy. Students should consider taking the PCAT in the summer of the year prior to the year of entry. More information can be found at www.pcatweb.info.

NOTICE REGARDING WITHDRAWAL, RE-ADMISSION AND INTERRUPTION OF STUDIES

Students who return to the university after an interrupted enrollment (not including summer semester) must normally meet the requirements of the curriculum which are in effect at the time of their return, not the requirements which were in effect when they were originally admitted.

ID: Name:

PRE-PHYSICAL THERAPY
BACHELOR OF SCIENCE IN BIOLOGY

FERRIS STATE UNIVERSITY
Lead Advisor: Dr. Daisy Daubert
PHONE: (231) 591-2554 OFFICE: ASC 2012 E-MAIL: dauberd@ferris.edu

Admission requirements: First year student admission is open to high school graduates (or equivalent) who demonstrate appropriate academic preparedness, maturity and seriousness of purpose. High school courses and grade point average, ACT composite score, and ACT Mathematics and Reading sub scores will be considered in the admission and course placement process. Transfer students must have at least 12 credits at the time of application with a minimum 2.0 overall GPA including an English and mathematics course or they will be considered as first year students.

Successful completion of a Bachelor of Science in Biology and a minimum of 100 hours of observational experience in a physical therapy setting will satisfy the minimum admission requirements of most professional physical therapy programs. Admission to these programs is highly competitive. You are expected to consult with both your FSU advisor and the college to which you intend to complete physical therapy to develop the most appropriate academic plan.

Graduation Requirements:
1. 2.0 CUMULATIVE Grade Point Average in all coursework.
2. No grade lower than C- in courses that apply to major, supporting sciences, and biology application area.
3. Residency requirement: 30 minimum FSU semester credits, at least 50% FSU semester credits in major.
4. Minimum of 40 credits numbered 300 or higher.
5. 121 minimum semester credits including general education requirements.
6. Students may earn only one B.S. or B.A. degree in Biology from Ferris State University.

Number of 300+ Credits: _____

Program Requirements: Effective for students entering Pre-Physical Therapy Fall Semester 2014

REQUIRED		COURSE TITLE –See FSU catalog course descriptions for prerequisites not indicated below		Credits	Grade
MAJOR – 37 Credit Hours of Required Courses					
BIOL	121	General Biology 1	(CHEM 121 concurrent)	4	
BIOL	122	General Biology 2	(BIOL 121 & CHEM 121)	4	
BIOL	321	Human Physiology and Anatomy 1	(BIOL 122 & CHEM 122)	4	
BIOL	322	Human Physiology and Anatomy 2	(BIOL 321)	4	
BIOL	286	General Microbiology	(CHEM 122)	3	
BIOL	375	Genetics	(BIOL 122)	3	
BIOL	346 or 347 or 442	Ecological Assessment Environmental Conservation Ecology	(BIOL 122) (BIOL 122) (BIOL 122)	3	
BIOL	460	Current Topics in Biology	(ENGL 311 or ENGL 321 and Senior Standing)	2	
BIOL	300	Pathophysiology	(BIOL 205 or 322 & CHEM 214 or 321)	3	
BIOL	301	Exercise Physiology	(BIOL 205 or BIOL 322)	4	
BIOL Electives (300 level or above) for a total of 37 credits in BIOL courses (see next page).				3	
SUPPORTING SCIENCES – 29 Credit Hours of Required Courses					
MATH	130	Advanced Algebra & Analytical Trigonometry	(MATH 120 or by placement)	4	
CHEM	121	General Chemistry 1	(MATH 115 and prior Chemistry class)	5	
CHEM	122	General Chemistry 2	(CHEM 121)	5	
CHEM	214	Fundamentals of Organic Chemistry	(CHEM 122)	4	
CHEM	324	Fundamentals of Biochemistry	(CHEM 214)	3	
PHYS	211	Introductory Physics 1	(MATH 120)	4	
PHYS	212	Introductory Physics 2	(PHYS 211)	4	
BIOLOGY APPLICATION AREA – 6 Credit Hours of Required Courses					
MATH	251	Statistics for the Life Sciences	(MATH 130)	3	
MRIS	102	Orientation to Medical Vocabulary		1	
RMLS	122	Responding to Emergencies		2	

ELECTIVES - 20 Credit Hours of courses to reach the minimum of 121 credits required for this degree.				

GENERAL EDUCATION REQUIREMENTS

Courses which qualify in the Scientific Understanding (Z), Cultural Enrichment (C) and Social Awareness (S) categories are delineated in the General Education section of the FSU electronic catalog:

http://www.ferris.edu/htmls/academics/gened/courses.html

A. COMMUNICATION COMPETENCE 12 Sem Credits		
Course	Grade	Credit
ENGL 150		3
ENGL 250		3
ENGL 311 or 321 or 323		3
COMM 121 program requirement		3
TOTAL		

B. SCIENTIFIC UNDERSTANDING 7 Sem Credits
This requirement is achieved in the program major.

C. QUANTITATIVE SKILLS
This requirement is achieved in the program major.

D. CULTURAL ENRICHMENT 9 Sem Credits		
Only approved "C" courses may count toward this category. Requirements: 1) one course must be 200+ level, 2) maximum 5 credit hours of music and/or theater activities may apply		
Course	Grade	Credit
PHIL 320 recommended		
TOTAL		

E. SOCIAL AWARENESS 9 Sem Credits		
Only approved "S" courses may count toward this category. Requirements: 1) two different subject areas including at least one "foundation" course, 2) one course must be 200+ level		
Course	Grade	Credit
PSYC 150 recommended		3
SOCY 121 recommended		3
PSYC 226 recommended		3
PSYC 422 recommended		3
TOTAL		

F. GLOBAL CONSCIOUSNESS
Each student must complete one course from the list of qualifying courses presented in the FSU catalog. This course may also count toward fulfilling the Cultural Enrichment or Social Awareness requirement.
Course:

G. RACE/ETHNICITY/GENDER
Each student must complete one course from the list of qualifying courses presented in the FSU catalog. This course may also count toward fulfilling the Cultural Enrichment or Social Awareness requirement.
Course:

Note: To complete this program in four years, students must average 15-16 credit hours per semester. Students MUST consult their faculty advisor to develop a course sequence plan appropriate to their academic development and educational plans.

Biology Electives (Consult with Advisor):

BIOL 310	Nutrition	3	BIOL 370	Developmental Biology	4	BIOL 472	Proteins	3
BIOL 330	Zoology	4	BIOL 373	Cell Biology	3	BIOL 473	Proteins Laboratory	3
BIOL 340	Evolution	3	BIOL 407	Forensic DNA Analysis	3	BIOL 474	Adv. Cell/Mol. Biology	3
BIOL 343	Ornithology	3	BIOL 421	Endocrinology	3	BIOL 475	Bioinformatics	3
BIOL 344	Entomology	3	BIOL 423	Neurobiology	3	BIOL 476	Adv. Techniques Biotechnology	2
BIOL 345	Environmental Regulations	3	BIOL 453	Plant Physiology	4	BIOL 485	Biological Research	1-9
BIOL 348	Animal Behavior	3	BIOL 470	Molecular Genetics	4	BIOL 490	Special Topics in Biology	3-4
BIOL 349	Medical Parasitology	3	BIOL 471	Recombinant DNA Lab	3	BIOL 492	Biology Internship	1-9
BIOL 350	Plants and Fungi	4				BIOL 497	Independent Study	1-6

NOTICE REGARDING WITHDRAWAL, RE-ADMISSION AND INTERRUPTION OF STUDIES

Students who return to the university after an interrupted enrollment (not including summer semester) must normally meet the requirements of the curriculum which are in effect at the time of their return, not the requirements which were in effect when they were originally admitted.

ID: Name:

PRE-VETERINARY MEDICINE
BACHELOR OF SCIENCE IN BIOLOGY

FERRIS STATE UNIVERSITY
Lead Advisor: Dr. James Scott
PHONE: (231) 591-2620 OFFICE: ASC 2018 E-MAIL: scottj@ferris.edu

Admission requirements: First year student admission is open to high school graduates (or equivalent) who demonstrate appropriate academic preparedness, maturity and seriousness of purpose. High school courses and grade point average, ACT composite score, and ACT Mathematics and Reading sub scores will be considered in the admission and course placement process. Transfer students must have at least 12 credits at the time of application with a minimum 2.0 overall GPA including an English and mathematics course or they will be considered as first year students.

A minimum of 240 hours of veterinary experience under the direction of your local veterinarian will satisfy the admission requirements of the College of Veterinary Medicine at Michigan State University. Requirements for other schools of veterinary medicine may vary.

Graduation Requirements:
1. 2.0 CUMULATIVE Grade Point Average in all coursework.
2. No grade lower than C- in courses that apply to major, supporting sciences, and biology application area.
3. Residency requirement: 30 minimum FSU semester credits, at least 50% FSU semester credits in major.
4. Minimum of 40 credits numbered 300 or higher.
5. 121 minimum semester credits including general education requirements.
6. Students may earn only one B.S. or B.A. degree in Biology from Ferris State University.

Number of 300+ Credits: _____

Program Requirements: Effective for students entering the Pre-Veterinary Medicine Concentration Fall Semester 2014

(Note: Those courses marked with an asterisk will satisfy the minimum admission requirements of the College of Veterinary Medicine at Michigan State University. In addition, a minimum of two courses in Cultural Enrichment, two courses in Social Awareness, and one course in English composition are required as a minimum for admission into that program. Requirements for other schools of veterinary medicine may vary.)

REQUIRED		COURSE TITLE –See FSU catalog course descriptions for prerequisites not indicated below		Credits	Grade
MAJOR – 38 Credit Hours of Required Courses					
*BIOL	121	General Biology 1	(CHEM 121 concurrent)	4	
*BIOL	122	General Biology 2	(BIOL 121 & CHEM 121)	4	
*BIOL	310	Nutrition	(BIOL 122 & either CHEM 214 or CHEM 322)	3	
BIOL	321	Human Physiology and Anatomy 1	(BIOL 122 & CHEM 122)	4	
BIOL	322	Human Physiology and Anatomy 2	(BIOL 321)	4	
*BIOL	373	Cell Biology	(BIOL 122 and CHEM 322)	3	
*BIOL	375	Principles of Genetics	(BIOL 122)	3	
*BIOL	386	Microbiology and Immunology	(BIOL 322 & CHEM 214 or 321)	5	
BIOL	346 or 347 or 442	Ecological Assessment Environmental Conservation Ecology	(BIOL 122) (BIOL 122) (BIOL 122)	3	
BIOL	460	Current Topics in Biology	(ENGL 311, 321 or 323 & Sr. Standing)	2	
BIOL Electives (300 level or above) for a total of 38 credits in BIOL courses (see next page).				Min. of 3	
SUPPORTING SCIENCES – 36 Credit Hours of Required Courses.					
*MATH	130	Advanced Algebra/Analytical Trigonometry	(MATH 120 or by placement)	4	
*CHEM	121	General Chemistry 1	(MATH 115 and Prior Chemistry Class)	5	
*CHEM	122	General Chemistry 2	(CHEM 121)	5	
*CHEM	321	Organic Chemistry 1	(CHEM 122)	5	
*CHEM	322	Organic Chemistry 2	(CHEM 322)	5	
*CHEM	364	Biochemistry	(CHEM 322)	4	
*PHYS	211	Introductory Physics 1	(MATH 120)	4	
*PHYS	212	Introductory Physics 2	(PHYS 211)	4	
BIOLOGY APPLICATION AREA - 5 Credit Hours Required (In addition to the course listed below, choose at least one more course from the list on the next page for a total of 5 credits. Additional credits in BIOL courses may also be used.)					

ELECTIVES - 14 Credit Hours of courses to reach the minimum of 121 credits required for this degree.				

GENERAL EDUCATION REQUIREMENTS

Courses which qualify in the Scientific Understanding (Z), Cultural Enrichment (C) and Social Awareness (S) categories are delineated in the General Education section of the FSU electronic catalog: **http://www.ferris.edu/htmls/academics/gened/courses.html**

A. COMMUNICATION COMPETENCE 12 Sem Credits		
Course	Grade	Credit
ENGL 150		3
ENGL 250		3
ENGL 311 or 321 or 323		3
COMM 121 program requirement		3
	TOTAL	

B. SCIENTIFIC UNDERSTANDING 7 Sem Credits
This requirement is achieved in the program major.

C. QUANTITATIVE SKILLS
This requirement is achieved in the program major.

D. CULTURAL ENRICHMENT 9 Sem Credits		
Only approved "C" courses may count toward this category. Requirements: 1) one course must be 200+ level, 2) maximum 5 credit hours of music and/or theater activities may apply		
Course	Grade	Credit
200+ level		
	TOTAL	

E. SOCIAL AWARENESS 9 Sem Credits		
Only approved "S" courses may count toward this category. Requirements: 1) two different subject areas including at least one "foundation" course, 2) one course must be 200+ level		
Course	Grade	Credit
Foundation		
200+ level		
	TOTAL	

F. GLOBAL CONSCIOUSNESS
Each student must complete one course from the list of qualifying courses presented in the FSU catalog. This course may also count toward fulfilling the Cultural Enrichment or Social Awareness requirement.
Course:

G. RACE/ETHNICITY/GENDER
Each student must complete one course from the list of qualifying courses presented in the FSU catalog. This course may also count toward fulfilling the Cultural Enrichment or Social Awareness requirement.
Course:

Note: To complete this program in four years, students must average 15-16 credit hours per semester. Students MUST consult their faculty advisor to develop a course sequence plan appropriate to their academic development and educational plans.

Biology Electives (Consult with Advisor)

BIOL 300	Pathophysiology	3	BIOL 350	Plants and Fungi	4	BIOL 472	Proteins	3
BIOL 301	Exercise Physiology	3	BIOL 370	Developmental Biology	4	BIOL 473	Proteins Laboratory	3
BIOL 330	Zoology	4	BIOL 407	Forensic DNA Analysis	3	BIOL 474	Adv. Cell/Mol. Biology	3
BIOL 340	Evolution	3	BIOL 421	Endocrinology	3	BIOL 475	Bioinformatics	3
BIOL 343	Ornithology	3	BIOL 423	Neurobiology	3	BIOL 476	Adv. Techniques Biotechnology	2
BIOL 344	Entomology	3	BIOL 453	Plant Physiology	4	BIOL 485	Biological Research	1-9
BIOL 345	Environmental Regulations	3	BIOL 470	Molecular Genetics	4	BIOL 490	Special Topics in Biology	3-4
BIOL 348	Animal Behavior	3	BIOL 471	Recombinant DNA Lab	3	BIOL 492	Biology Internship	1-9
BIOL 349	Medical Parasitology	3				BIOL 497	Independent Study	1-6

Application Area (Consult with advisor): Any of the Biology electives above may be used. Other common classes taken include

CAHS 160	Nutrition for Healthy Living	3	MATH 251	Statistics for the Life Sciences	3	MRIS 102	Orientation to Med Vocab	1 or
EDPE 338	Biomechanics	3	RMLS 122	Responding to Emergencies	2	MRIS 103	Medical Terminology	4

NOTICE REGARDING WITHDRAWAL, RE-ADMISSION AND INTERRUPTION OF STUDIES

Students who return to the university after an interrupted enrollment (not including summer semester) must normally meet the requirements of the curriculum which are in effect at the time of their return, not the requirements which were in effect when they were originally admitted.

BIOL 101 **Genetics: Human Aspects** **Spring 2015**

Instructor: Mary Murnik, Ph.D. Office: ASC 2117 Phone: 591-2546
e-mail: murnikm@ferris.edu

Office Hours: TR 8:20-9:10 am; 3:00-3:50 pm

I am usually in my office when I am not in class and would be happy to see you. Appointments can also be made for different times.

BIOL 101 Genetics - Human Aspects presents fundamental genetic principles and concepts and how these apply to individuals within our culture and society as a whole. Topics include transmission of inherited traits, chromosomal abnormalities, gene structure and function, genes in populations and genetic implications of cancer, genetic engineering, evolution, eugenics and bioethics. The course is designed for non-science majors and is not applicable to the applied biology major. This course meets General Education requirements: Scientific Understanding, Lab

Course Objectives

BIOL 101 is intended as an introduction to the science of genetics for non-science majors with little or no background in science. You will gain factual knowledge about genetics and learn fundamental principles and concepts. BIOL 101 should help you to understand how genes affect human appearance, health, development and evolution. You will learn about the role of the environment and random events on genetic expression. You will consider current controversies about genetic engineering, genetic screening, cloning, stem cells, genes, environmental mutagens and cancer, genetic testing and discrimination, genetic counseling and bioethics.

This course satisfies general education objectives in the natural science area:

1. To increase students' understanding of scientific concepts, scientific methods, the relationship between science and technology, and the role of science in modern society.
2. To increase students' abilities to read critically and to write position papers about contemporary issues in genetics.
3. To increase students' critical thinking and valuing abilities with respect to public debates over contemporary issues, such as genetic screening, genetic testing and discrimination, genetic engineering, cloning, experimental therapeutic use of embryonic stem cells, environmental mutagens, and bioethics.

Course Outcomes

1. General Education

This course may be used to help fulfill the general education requirement for Scientific Understanding. A student succeeding in this course should:

- Have a working knowledge of the fundamental principles of a natural science discipline.
- Be able to use appropriate scientific reasoning skills to interpret and analyze content in the natural sciences.
- Have a basic understanding of the scientific method, scientific concepts, and the evolution of scientific ideas.
- Have a more positive attitude toward science and an increased confidence in their ability to understand science.

2. Course Specific Outcomes

This course is intended as an introduction to the science of genetics for non-science majors with little or no background in science. Upon completion of the course, a student will be able to:

- Demonstrate, using lecture examinations and discussions, an understanding of the fundamentals of Mendelian, molecular, and population genetics.
- Solve basic mathematical problems of Mendelian and population genetics.
- Analyze pedigrees, determine modes of inheritance for genetic diseases, and use this information to calculate phenotypic and genotypic probabilities.
- Operate a microscope and other basic laboratory tools and relate their uses to fundamentals of genetics.
- Interpret scientific articles of a popular nature, formulate an informed opinion, and communicate this opinion to others in a verbal or written fashion.

Texts

1. Human Heredity, Michael Cummings, Brooks/Cole, 11th ed., (9th or 10th ok)
2. Genetics: Human Aspects: Lecture Guide, M. R. Murnik, FSU, 2015*
3. BIOL 101 Laboratory Manual, M. R. Murnik & B. Isler, 2014*

*Only available at Great Lakes Books & Supply, 840 Clark St. (Corner at Perry)

You will need 5 Scantrons, Form 882-E. **Bring one to each exam.**

Attendance Policy

I want you to succeed in this class. Attendance is important to your success. You need to be in class in order to consider the concepts that are presented, understand them, and participate with other students in class.

Attendance at all lectures and laboratory sessions is required. Attendance will be taken in lecture on most days, and each unexcused lecture absence ***will subtract three points from your grade on the next lecture test. Missing 3 or more labs will result in automatic failure in the course.*** *Promptly contact the instructor and provide documentation if you have a valid reason to be absent.* (See *Make-ups* below about the possibility of making up tests or laboratory work.)

"In the Ferris Institute, tardiness is an insult." Woodbridge Ferris Please make every effort to arrive in class before 9:30 am. Tardy arrivals disturb other students, and miss any announcements at the beginning of class. If you are late, please enter as quietly as possible. Students who are more than 5 minutes late will be penalized 1 pt.

Bonus quizzes
There may be random bonus quizzes which will be given *only* at the beginning of the lecture period. (Tardy students will not be given bonus quizzes.) The short quizzes will be on material which was presented during recent lectures.

Class Decorum

The College of Arts and Sciences strives to maintain a positive learning environment and educational opportunity for all students. Patterns of behavior which obstruct or disrupt the learning environment in the classroom will be dealt with under the College *Disruptive Behavior Policy*. ***Cell phones, iPads and laptop computers, etc., must be turned off, and interpersonal conversations cease, during the class period. If you want to read your emails or texts during class, go out in the hall. You may be asked to leave the classroom if you use an electronic device during class time.***

Help!

Dr. Murnik will be happy to help you during office hours or during any other available time. Please stop by the office for help or to arrange an appointment.

A **tutor** is also available to help you with this course. The tutor, **Nicole Christy**, will hold BIOL 101 workshops in **SCI 207** (our lab room) on **Mondays and Wednesdays from 6-7:30pm.** Students who attend tutoring sessions will receive a bonus point for each session attended.

Tests

Students may <u>not</u> use calculators, iPods, blackberries, cell phones, etc., while taking tests. You may not leave the lecture room during an exam. Prepare ahead.

You will need 5 **Scantron** form number **882-E** for the 4 objective tests and final exam. Bring a Scantron to each exam.

Cheating on exams or quizzes will result in failure in the course. Additional action may be taken by the university.

Make ups

Make-up tests will only be offered to students who have written documentation (such as a suitable statement from a physician, a bail bond ticket, evidence of a funeral, etc.) for serious circumstances which made it impossible to take the examination at the scheduled time.

Students with a valid reason for missing a laboratory session should attempt to attend another session later that day, if possible. Otherwise, if you have a valid reason for missing the lab, promptly contact your instructor and arrange to make up the lab within two weeks. Lab exercises will not be available to make up after that time. Some laboratory exercises involve live materials, chemicals, enzymes or DNA; parts of these exercises may not be repeatable. A comprehensive laboratory final exam will be offered to make up for one missed lab exercise.

Grades

Your final grade will be determined from the total of all points earned on lecture tests, lab quizzes, lab work and assignments. Quizzes will include short essay answers, problems to solve and objective questions. Lecture tests are objective: multiple choice and true and false. Tutor bonus points will be added to your overall grade; absence penalties are subtracted from your lecture test score.

	<u>Maximum possible points</u>
Lecture tests	400
Writing assignments	60
Laboratory	140

The final exam (which is **required** if you have any lecture test with a grade below 70%) will replace your lowest lecture test grade (if the final exam grade is higher.) If you do not take the final exam when it was required, your overall percentage grade will be lowered by 10%.

Grading Scale

A 93-100% A- 90-92% B+ 87-89% B 83-86% C+ 77-79% C 73-76%
C- 73-76% D+ 67-69% D 63-66% D- 60-62% F below 60%

Learning Outcomes **A student succeeding in this course should be able to…**	**Measurable Outcome Assessment** (items pertain to all outcomes, not just to that in the same row)
demonstrate understanding of fundamental principles of genetics, including those of Mendelian inheritance, molecular and population genetics	**Comparison of class responses to specific questions** on course examinations
analyze inheritance patterns, determine modes of inheritance and be able to use this information to calculate phenotypic and genotypic probabilities. **Solve** basic mathematical problems of Mendelian and population genetics	**Student discussions and analyses** during regular class sessions and laboratories, will indicate whether students understand the concepts being considered at that time, and provide the opportunity to re-visit the concepts right then if they are not. **Comparison of class responses to specific questions** on course examinations and quizzes
interpret scientific articles of a popular nature, formulate an informed opinion, and communicate this opinion to others in a verbal or written fashion.	**Writing assignments**, both papers and daily assignments, and **class discussions**, allow assessment of students' reasoning through biological concepts
demonstrate basic laboratory skills, such as the proper operation of a microscope, loading and running gels, and relate their uses to fundamental concepts of genetics.	**Performance** in laboratory, where each completed step is assessed, and on specific responses on weekly lab quizzes

BIOL 101 Lecture Schedule
Spring 2015

Date:	Topics	Assigned pages in text
Jan 13	Genetics as a Human Endeavor	Ch. 1
Jan. 15	Cells and Chromosomes; Mitosis	20-33
Jan. 20	Meiosis and Patterns of Inheritance	33-40,44-55
Jan. 22	Inherited traits in humans	58-63; 70-85
Jan. 27	Multiple alleles, linkage and variations in gene expression	63-64,70-78
Jan. 29	Review; Introduction to Development	
Feb. 3	**Test 1**	
Feb. 5	Sex linkage; Development	78-85
Feb. 10	Development and Sex Determination	Ch. 7
Feb. 12	Polyploidy and Aneuploidy	Ch. 6
Feb. 17	Variations in Chromosome Structure	103-143
Feb. 19,14	DNA, Chromosomes and DNA replication	Ch. 8
Feb. 26	**Test 2**	
Mar. 3	RNA, transcription, the Genetic Code and translation	Ch. 9
Mar. 5, 17	Metabolic Pathways and Disease, Recombinant DNA	Ch. 10
Mar. 19	DNA fingerprinting, RFLP analysis	Ch.13
Mar. 24	Mutation, Genomic imprinting	Ch. 14
Mar. 26	Mutation, mutagens, and DNA repair	Ch 11
3/.31, Apr 2	Genes and Cancer	Ch. 12
Apr. 7	**Test 3**	

April 9	Immunogenetics	Ch. 17
Apr. 14	Polygenes	Ch. 5
Apr.16	Twin Studies and Behavior	Ch. 18
Apr. 21	Genes in Populations	Ch. 19
Apr. 23	Human Diversity and Evolution	Ch. 19
Apr. 28	**Test 4**	
Apr. 30	Review Session for Final Exam	

May 4, Monday, Final examination 10-11:40 am SCI 120

Note: The lecture schedule will be modified as needed according to student progress.

BIOL 101 Laboratory Schedule Spring 2014

Date	Topic and Exercise in Laboratory Manual
Jan. 15	Exercise 1: The Use of the Microscope and Examination of Cells
Jan.22	Exercise 2: Mitosis
Jan. 29	Exercise 3: Meiosis
Feb.5	Exercise 4: Genetics I: Monohybrid Crosses
Feb. 12	Exercise 5: Genetics II: Dihybrid Crosses
Feb. 19	Exercise 6: Sex Chromatin, Barr Bodies, and the Human Karyotype
Feb. 27	Exercise 7: DNA Structure and Replication
Mar. 5	Exercise 8: DNA, RNA and Protein Synthesis
Mar. 19	Exercise 9: Reproduction and Development, Genetics and Ethics
Mar. 26	DNA fingerprinting; Exercise 11: Visualization of Normal and Transformed Cells
April 2	Paternity Testing; examination of DNA gels
Apr.9	Exercise 12: Immunogenetics
Apr. 16	Exercise 13: Polygenes
Apr. 23	Exercise 14: Genes in Populations; Evolution
Apr. 29	Optional Lab Final Examination (replaces lowest lab grade)

Laboratory participation is an important part of this course. You will receive points for each lab attended and completed. Laboratory quizzes will be given to assess your understanding of the previous lab exercise and of the introductory material presented for the current lab exercise. The laboratory portion contributes 140 points toward your total score. Lecture examinations may also include pertinent questions based on laboratory experiences.

University safety policy prohibits children in laboratories at any time.

BIOL 103 Biological Concepts **Fall 2014**

Lecture: SCI 120 MWF 11-11:50AM

Lab: SCI 208 211: W 8→10:50, 212 W 12:00 → 2:50 pm, 213 W 3:00 → 5:50 pm

Instructor: Dr. Karen Barkel
Office hours: MW 9-11am or by appointment
Office: 2116 ASC Phone: 591-2544 **email: karenbarkel@ferris.edu**

The goal of this class is give you a foundation in the basic concepts of Biology (please see lecture schedule for list of topics) and show you how these concepts are connected to your every day lives.

Required Materials:

Lecture Text: Biology, A guide to the natural world, 5th edition by Krogh
Laboratory Materials: BIOL 103 Lab Manual (from Great Lakes bookstore only) **/calculator**
Packet of SCANTRON cards (form 882-E), 2 #2 pencils, student ID (or driver's license)

Notes and Recording: Class material will be presented during the lectures. It is your responsibility to attend class, take notes, and become informed of any announcements made during your absence. GET TO KNOW OTHER STUDENTS IN THE CLASS! The questions for the exams will be taken from the material presented in class and the chapters assigned in the textbook. You may use a tape recorder for the lectures.

Attendance: Attendance in lecture is expected. Please BE ON TIME!!!! Random bonus quizzes may be given during the semester, you must be present to get these points!
Attendance in lab is MANDATORY. Labs cannot be made up.
More than 2 missed laboratories (for any reason) will result in a failing grade in the class (Departmental Policy).

General Education Course Outcomes for Scientific Understanding (lab):
Students who have successfully completed their coursework in scientific understanding should:
1. Have a working knowledge of the fundamental principles of a natural science discipline (biology).
2. Be able to use appropriate scientific reasoning skills to interpret and analyze content in the natural sciences
3. Have a basic understanding of the scientific method, scientific concepts, and the evolution of scientific ideas
4. Have a more positive attitude toward science and an increased confidence in their ability to understand science.

Specific Course outcomes:
This course is a broad overview of the field of Biology, for non-biology majors. A student suceeding in this course should be able to:
1. Demonstrate by examination a general understanding of the major unifying themes of biology information and evolution, development and homeostasis,energy and resources.
2. Demonstrate their understanding that the scientific method is a way of discovering how life works.
3. Recognize and appreciate how knowledge of biological principles can help one make more informed political and consumer decisions, and make intelligent decisions regarding personal health and environmental issues.
4. Learn basic laboratory skills to explore the world of biology at the molecular, cellular, and organismal levels.

Exams: Examinations will be given during the normal lecture period on the dates are listed on the class schedule. Exams will include material covered in lecture, lab, and from assigned readings in the textbook. Failure to take an exam at the scheduled time (see class schedule) will result in a grade of 0 for the exam. If you have a valid excuse, inform me ahead of time (except for hospitalization etc.), and provide documentation within 2 weeks of the missed exam (proof of funeral, hospitalization, etc), you may replace your grade of zero with the final exam. Students who take all exams will automatically be allowed to replace their lowest exam score with the comprehensive final.
***Bring a scantron sheet (Form 882-E), 2 #2 pencils**, and your student ID (or drivers license) to **EVERY EXAM**.

Grading: Final grades will be based on points earned in lecture (75%) and laboratory (25%).
Lecture grade (400 points) will be based on the average of 4 exams (100 points each) and an optional CUMULATIVE final (May replace one exam score, 100 points) as well as any bonus quiz points earned during the semester.
Lab grades will be based on the score earned on lab quizzes (10 points each) and lab participation (5 points each lab period). See lab section for more detail. Grade in class = (0.75 x lecture avg.) + (0.25 x lab average)

Grading Scale:

A (≥94%)	C (73 - 76.9%)
A- (90 - 93.9%)	C- (70 - 72.9%)
B+ (87- 89.9%)	D+ (67 - 69.9%)
B (83-86.9%)	D (63 - 66.9%)
B- (80-82.9%)	D- (60 - 62.9%)
C+ (77 - 79.9%)	F (≤ 59.9%)

Academic Integrity: Any form of cheating will not be tolerated, and will result in a 0 for the assignment or exam in question. Additional action may be taken by the University.

To do well in this course: Due to the broad spectrum of material that must be covered, this is a fast pace course that will require regular attendance and studying to keep up. I suggest the following:

Attend all lectures and labs, and BE ON TIME
Exhibit professional behavior during class
Ask questions in class when you don't understand something
Take good notes, and organize them after class
Read the assigned sections of the text book both before and after class
Study your notes EVERY WEEK, not just before the exam
Do the weekly study questions posted on Ferris Connect
Seek help if you need it!!

Lecture Schedule: (subject to change)

Week	Dates	New Topic	Chapter reading
1	Aug 25 Aug 27 Aug 29	Introduction Intro Chemistry Biological molecules	1/2 2,3 3
2	Sept 1 Sept 3 Sept 5	**Labor Day- No class** Cell structure Membranes	 4 4/5
3	Sept 8 Sept 10 Sept 12	Membranes /Energy Energy and Enzymes Continued	5 6
4	**Sept 15** Sept 17 Sept 19	**Exam 1 Monday Sept 15** Cellular Respiration Respiration cont.	___ 7 8
5	Sept 22 Sept 24 Sept 26	Photosynthesis Cont. Mitosis	9 9
6	Sept 29 Oct 1 **Oct 3**	Meiosis (Start Mendel) **Exam 2 Friday Oct 3**	10 ___
7	Oct 6 Oct 8 Oct 10	Mendel Inheritance Continued	11 12
8	Oct 13 Oct 15 Oct 17	DNA Structure and Replication Making Proteins Continued	13 14 15 (part)
9	Oct 20 Oct 22 **Oct 24**	Evolution cont **Exam 3 Friday Oct 24**	16 ___
10	Oct 27 Oct 29 Oct 31	Microevolution- mechanisms Speciation and Classification Continued	17 18
11	Nov 3 Nov 5 Nov 7	Diversity -Bacteria Protists Fungi	21 22
12	Nov 10 Nov 12 Nov 14	Plants Animal diversity Continued	24 23
13	**Nov 17** Nov 19 Nov 21	**Exam 4 Monday Nov 17** Animals: Structure and Function Systems 1	___ 30
14	Nov 24 Nov 26 Nov 28	Systems 2 Reproduction **No Class: Thanksgiving**	31 33
15	Dec 1 Dec 3 Dec 5	Population Ecology Community Ecology Continued	34 35
16	**Dec 11** **Thursday**	10 -11:40am **Exam 5** and optional Final Exam	

Lab information

Lab Grades:

The points earned in lab will count for about 25% of your final course grade.

Labs cannot be made up for any reason. ***Missing more than 2 labs will result in a failing grade in the course. There are no makeup labs, however if you have a valid (and documented) excuse- you may be able to attend another lab section during the week. Make sure to contact your instructor well in advance (not after you have missed the lab).

Lab Quizzes:

Quizzes are worth 10 points and may be given at the beginning or end of the lab period, depending on the exercise covered (ask your lab instructor). Dates of each quiz are listed on the Lab schedule. Your lowest lab quiz will be dropped. There are no make-ups for lab quizzes.

Lab Schedule: (subject to change)

Week	Dates	Topic	Quiz
1	Aug 27	Measurement	
2	Sept 3	Biological molecules	Quiz 1 (Measurement / Metric)
3	Sept 10	Microscope	Quiz 2 (Biological Molecules)
4	Sept 17	Diffusion	Quiz 3 (Microscope)
5	Sept 24	Respiration / Photosynthesis Lab	Quiz 4 (Diffusion)
6	Oct 1	Cell Division: Mitosis Lab	Quiz 5 (Respiration /Photosynthesis)
7	Oct 8	Heredity Lab	Quiz 6 (Cell Division)
8	Oct 15	DNA Replication, transcription and Translation	Quiz 7. (Heredity)
9	Oct 22	Evolution exercise	Quiz 8 (DNA)
10	Oct 29	Bacteria and Protists (including algae)	Quiz 9 (Evolution)
11	Nov 5	Fungi / Plants	Quiz 10 (Bacteria and Protists)
12	Nov 12	Animal Lab I: Invertebrates	Quiz 11 (Fungi / Plants)
13	Nov 19	Animal Lab II: Chordates	Quiz 12 (Invertebrates)
14	Nov 26	Thanksgiving: No Lab this week	
15	Dec 3	Card Wildlife Center	Quiz 13 (Chordates)

BIOLOGY 109
HUMAN ANATOMY & PHYSIOLOGY
4 Credit Hours
Spring Semester 2015

Instructor: John Johnson; Anna Rizzo (rizzoa@ferris.edu)
Office: SCI 141, cubicle F
Phone: 591-5849
Office Hours: M & F 11am-1pm
E-mail: johnsj23@ferris.edu; best to send messages through Ferris Connect

Course Description

An introductory course designed to provide students with a basic understanding of the structural organization and functions of the major systems of the human body. laboratories provide opportunities to observe various anatomical parts and investigate physiological phenomena. For non-science students and is not applicable toward the applied biology major. This course meets General Education requirements: Scientific Understanding, Lab.

Course Materials

1. *Essentials of Anatomy & Physiology*, 6th Ed. Seeley, Stephens, and Tate
   READ YOUR TEXT DAILY.
2. *Basic Human Anatomy & Physiology, Laboratory Exercises for BIOL 109*, Luane Gogolin and Robert Friar.
3. Turning Technologies Response Card NXT Clicker
4. This course is web enhanced with Ferris Connect, it will be necessary for you to access Ferris Connect to receive announcements as well as to take advantage of all the learning materials provided.

Class Schedule

Lecture (IRC 120): MWF 10 – 10:50am

Lab (SCI 232) :		
	Sec. 211 – R 9 - 10 :50am	Sec. 221 - R 12 – 1 :50pm
	Sec. 212 – T 9 - 10:50am	Sec. 222 - M 12 – 1 :50pm
	Sec. 213 – T 12 - 1:50pm	Sec. 223 - M 2 – 3:50pm
	Sec. 214 – W 12 - 1:50pm	Sec. 224 – W 2- 3:50pm
	Sec .215 – TBA	Sec. 225 - TBA

Sections 212- 215; 222- 225 are taught by Anna Rizzo

General Education Outcomes:

This course may be used to help fulfill the general education requirement for Scientific Understanding. A student succeeding in this course should:

1) have a working knowledge of the fundamental principles of a natural science discipline;
2) be able to use appropriate scientific reasoning skills to interpret and analyze content in the natural sciences;
3) have a basic understanding of the scientific method, scientific concepts, and the evolution of scientific ideas;
4) have a more positive attitude toward science and an increased confidence in their ability to understand science.

Course Specific Outcomes: by the end of the semester, you will be able to demonstrate on lecture exams and quizzes, and laboratory quizzes:

1. knowledge of definitions of basic anatomical terminology.
2. an understanding of the relationship between structure (anatomy) and function (physiology)

3. an understanding of the concept of homeostasis, and how it applies to physiology.
4. the ability to describe the major anatomical features and functions of the 11 organ systems.
5. the ability to identify the major parts of the organ systems in the laboratory.
6. the ability to describe and understand case examples of systems pathology.
7. the ability to explain, using specific examples, of how homeostatic mechanisms apply to your daily activities, including diet and exercise.
8. the ability to critically analyze reports in the news media about new developments in health and medicine.

Grading

Lecture Exam 1: 100 points
Lecture Exam 2 : 100 points
Lecture Exam 3 : 100 points
Lecture Exam 4 : 100 points
Optional Final Exam : 100 points (it will replace the lowest grade earned on Exams 1-4)
Lecture Quizzes : to be determined
Lab Quizzes: to be determined
Lab assignments: there may be additional reports that may be turned in for credit. These will be added to the total lab grade.
Extra-credit lecture quizzes (these may be unannounced)
Your grade will be based on: (lecture exams + quizzes) x 75% + (lab scores x 25%)
Source of lecture exam questions: Questions will be taken primarily from lecture and the text. Occasionally, articles may be assigned that may be used for questions as well. I reserve the right to ask questions from the assigned reading on every exam, even if the material **was not covered in class!** You are responsible for reading the text book. Each lecture exam will consist of approximately 50-75 multiple choice or matching questions. The final exam will be comprehensive, which means it will contain material from the first four exams.
Note: There will be **no opportunities for extra credit, with the exception of extra-credit quizzes.** The final exam will only replace the lowest earned grade, this means that you must have taken all of the first four exams in order for the final to replace the lowest.

Any students who have missed a lecture exam *MUST* notify me the day of the exam (via Ferris Connect is best). See _CAS EXCUSED ABSENSE POLICY' further down to see if you can be excused from missing a lecture exam and qualify for no deductions on make-up exam. If sick, a medical note is required in order to do make-up exam without penalty. All others; since persons who take exams late have additional time to prepare for the exam, to be fair to the rest of the class, I will deduct 5points from the score for each day the exam is delayed.

There are no make-ups for missed quizzes. ***The make-up exam may be more difficult and must be completed within 4 school days.*** The comprehensive final exam will be 100 points; it will not replace an exam that you failed to take. The time to worry about your grade is right from the start, not at the end of the semester.

Grading Scale

A	93-100%	B-	80-82.9%	D+	67-69.5%
A-	90-92.9%	C+	77-79.9%	D	63-66.9%
B+	87-89.9%	C	73-76.9%	D-	60-62.9%
B	83-86.9%	C-	70-72.9%	F	Below 60%

Lecture Attendance Policy: PLEASE READ THE NO FAULT POLICY CAREFULLY!

It is the instructor's firm belief that attendance is crucial to success in this class, however, as you are adults it is up to you how you chose to use your time. **Lab attendance, however, is mandatory!** You must attend class on exam days (please make note of the exam dates). **Attendance will be taken every day.** You must let me know immediately if you are unable to attend class. The best way to notify me is through Ferris Connect e-mail. If you miss a lecture exam, you ***must*** contact me the day of the exam and you will have 4 school days in which to make up the exam (see further make-up exam rules in "Grading" section above). If you miss a lecture, you are responsible for the lecture contents and any assignments given during the lecture.

Modification of above policy: according the CAS EXCUSED ABSENCE POLICY

"All student requests to be excused from classes are the responsibility of the faculty member teaching the course. The only excused absence that is a part of University policy involves institutional travel which must be approved by the Vice President for Academic Affairs. Students participating in approved University-related travel are to be excused from classes but are still responsible for making up any missed assignments and/or tests. It is up to the discretion of individual faculty members whether other extenuating circumstances should be considered for an excused absence. The Dean's office does not make these judgments for faculty."

c. Tardiness. Do **not** be late. "[At Ferris], tardiness is an insult." (W.N Ferris, founder). All students who show up late (any time after class begins) will lose 1 point from their grade. You are expected to be in your seat at least 30 seconds **BEFORE** class begins. If you have a special situation which will cause you to be tardy, discuss the situation with me during the first week of class. If you are unable to make it on time, please sneak in as quietly as possible (like a ninja).

d. Seat Assignment: There are no assigned seats. If you have trouble seeing or hearing, sit in the front of the class.

Electronic Devices

Electronic devices (cellular phones, walkmans, etc.) **must** be turned off in the lecture hall. **If your cell phone rings in class, you will be marked absent and asked to leave**. You can handle 50 minutes of not seeing your friend's latest Facebook status.

Lab Assignments

If you miss a lab, you must make it up during the same week by arranging to attend another lab. There are ten lab codes and all are full. Strive to avoid changing a lab. (The labs are listed above along with the day and time that each lab meets.) If you have a special event, e.g. a field trip in another course, PLAN AHEAD to attend another lab. Don't get caught short. (CONTACT me IMMEDIATELY if you miss a lab.) **Attendance to Lab is *MANDATORY*: Biology department dictates that more than 2 lab absences will result in FAILURE of the course!**

a. You MUST GET PERMISSION from me to attend another lab.

b. A lab that is missed and not made up by attending another lab will result in a "zero" grade for that lab.

Lab attendance is mandatory. A quiz will be given each lab session. This quiz must be taken during your lab period. Missing your scheduled lab time and attending a different lab time will result in 2 points deducted for your lab quiz.
If you show up late to lab (anytime after lab is scheduled to begin) you will have 2 points deducted from your lab quiz for that day!

Academic Misconduct

"When any society loses faith in honesty, its disintegration is a certainty." W.N. Ferris, founder. Cheating will not be tolerated.

Students are referred to the section on **ACADEMIC MISCONDUCT** that is found on the final sheet attached to this syllabus.

Disruptive Behaviors

Behaviors that are disruptive to learning will not be tolerated. Talking in class will **NOT** be tolerated. ANY STUDENT WHO HABITUALLY PERSISTS IN TALKING DURING LECTURE WILL BE ASKED TO LEAVE.
This applies to lab as well.

Children in the classroom

Students are strongly discouraged from bringing children to the lecture hall. Because of safety and liability reasons, under no circumstances will children be allowed in the laboratory.

Food and Beverages in the classroom

Water is acceptable, but food and beverages (e.g. pop) should not be consumed in class. Because of safety and liability reasons, no food or beverages are allowed in the laboratory.

Final Exam

Your final exam is scheduled for Tuesday, May 5, at 10-11:40 AM in IRC 120
Note: You **cannot** take the final exam at a different time from your scheduled time **without** prior approval from the instructor. The optional final replaces the lowest EARNED grade from the first 4 exams. You must take the first 4 exams.

*NOTE: Instructor reserves the right to make needed and appropriate adjustments to the syllabus. Any changes will show up on Ferris Connect, but will not be passed out in hardcopy form.

The best time to be concerned with your grade is right from the start. If you are struggling, please come see me as soon as possible. There is also tutoring available at the tutoring center (ASC 1017; (231) 591-3543)

TENTATIVE LECTURE SCHEDULE*

DATE	TOPIC	Reading Assignment
1-12	Introduction to the Human body	Ch 1
1-14	The Chemistry of Life	Ch 2
1-16	The Chemistry of Life	Ch 2
1-19	**Martin Luther King Day: No Class**	
1-21	The Chemistry of Life	Ch 2
1-23	Cell Structures and Their Functions	Ch 3
1-26	Cells, Tissues	Ch 3,4
1-28	Tissues, Glands, and Membranes	Ch 4
1-30	Tissues, Glands, and Membranes	Ch 4
2-2	Integumentary System	Ch 5
2-4	Integumentary System	Ch 5
2-6	**EXAM 1 (Ch.1-5)**	
2-9	Skeletal System	Ch 6
2-11	Skeletal System	Ch 6
2-13	Muscular System	Ch 7
2-16	Muscular System	Ch 7
2-18	Nervous Tissue, Action Potentials	Ch 8
2-20	Nervous Tissue, Action Potentials	Ch 8
2-23	Central Nervous System	Ch 8
2-25	Central Nervous System	Ch 8
2-27	Peripheral Nervous System	Ch 8
3-2	Peripheral Nervous System	Ch 8
3-4	The Senses	Ch 9
3-6	**EXAM 2 (Ch.6-9)**	
3-7→15	SPRING BREAK ✈	
3-16	Endocrine System	Ch 10
3-18	Endocrine System	Ch 10
3-20	Cardiovascular System: Blood	Ch 11
3-23	Cardiovascular System: The Heart	Ch 12
3-25	Cardiovascular System: Blood Vessels & Circulation	Ch 13
3-27	Cardiovascular System: Blood Vessels & Circulation	Ch 13
3-30	Lymphatic System	Ch 14
4-1	Lymphatic System	Ch 14
4-3	Mid-Semster Recess (starting 4-2): NO CLASS	
4-6	Respiratory System	Ch. 15
4-8	Respiratory System/Review	Ch 15
4-10	**EXAM 3 (Ch.10-15)**	

4-13	Digestive System	Ch 16
4-15	Digestive System	Ch 16
4-17	Metabolism	Ch 17
4-20	Urinary System	Ch 18
4-22	Urinary System	Ch 18
4-24	Reproductive System	Ch 19
4-25	Reproductive System	Ch 19
4-27	Review	
4-29	**EXAM 4 (Ch.16-19)**	

FINAL EXAM : Tuesday, May 5, at 10-11:40am in IRC 120

*NOTE: Instructor reserves the right to make needed and appropriate adjustments to the schedule. Check Ferris Connect.

Tentative Laboratory Schedule*

Week of:

1/12:	Lab Exercises 1 & 2: Body Organization; Microscopy
1/19:	**No Lab; Martin Luther King Day**
1/26:	Lab Exercise 3: Epithelial and Muscle Tissues
2/2:	Lab Exercise 4: Osmosis, Connective and Nervous Tissues
2/9:	Lab Exercise 5: Skeletal System
2/16:	Lab Exercise 6: Skeletal Muscles
2/23:	Lab Exercise 7: Brain, Spinal Cord, Reflexes
3/2:	Lab Exercise 8: Sensations
3/9:	**No Lab; Spring Break**
3/16:	Lab Exercise 9: The Heart
3/23:	Lab Exercise 10: Blood and Blood Vessels
3/30:	**No Lab; Mid-Semester Break**
4/6:	Lab Exercise 11: Respiratory & Digestive Systems
4/13:	Lab Exercise 12: Urinary & Reproductive System
4/20:	Lab Exercise 13: Urinary/Reproductive System Quiz/Review
4/27:	Lab Practical

*Note: There will be a quiz given at the beginning of every lab with the possibility of a quiz at the end of lab. Anything in the lab manual is fair game for quiz material. Therefore, you should read the manual and study all diagrams before you come to lab.

*NOTE: Instructor reserves the right to make needed and appropriate adjustments to the lab schedule.

FOR YOUR SAFETY, PLEASE DO NOT BRING FOOD or BEVERAGES into LAB.

FOR THE SAFETY OF SMALL CHILDREN, THEY ARE NOT PERMITTED IN LAB.

2014 Fall Semester - Lab Schedule

Lab Instructor: Arlene Westhoven
Office: ASC 2004 **Phone:** 591-5842 **E-mail:** westhova@ferris.edu
Office Hours – Wednesday 11-noon
Thursday 10:00 - noon

Section #

211 Lab: 9-10:50 T SCI 227 - Workman
212 Lab: 12-1:50 T SCI 227 - Workman
213 Lab: 9-10:50 W SCI 227 - Westhoven
214 Lab: 12-1:50 Th SCI 227 - Westhoven

Required Lab Text: *Biol 111 Environmental Biology*: Rodabaugh 2013 – Available ONLY at Great Lakes Bookstore

Course Description: You have selected BIOL111, Environmental Biology, to fulfill the requirement for a lab science. Laboratory exercises allow you "hands on" experience using the steps of the scientific method to investigate the concepts presented in lecture. You will learn to use tools, techniques, and calculations that will help you draw conclusions from your observations. I hope you find the lab setting to be a rewarding and enjoyable learning experience.

Attendance: You must attend lab at your scheduled time. If you have an OCCASIONAL conflict, you may attend another lab, ONLY with permission from lab instructor. Labs must be made up during the scheduled week.

Hand in the assigned pages at the end of each lab. At the beginning of lab, there will be a 10-point quiz on the previous week's work. At the end of each lab, I will hand out a work sheet to do for the next week's lab.

HAVE YOUR LAB BOOK, A CALCULATOR, AND A PENCIL WHEN YOU COME TO LAB

Lab Schedule

Week	Lab	Lab for the Week
Aug 25		NO LABS First Week
Sept 2	1	Metrics
Sept 8	2	Population dynamics
Sept 15	3	Biological organization/microscope
Sept 22	5	Individual and population genetics
Sept 29	4	Soils and particle distribution
Oct 6	-	Global Warming
Oct 13	-	Field Trip to Big Rapids Wastewater Treatment Fac.
Oct 20	6	Dissolved oxygen (DO)
Oct 27	8	Acid rain
Nov 3	10	Solid waste
Nov 10	2	Population experiment/essay
Nov 17	12	Biodiversity/population essay due
Nov 24		Thanksgiving – NO LABS THIS WEEK
Dec 1	14	Card Wildlife Center

ENVIRONMENTAL BIOLOGY
BIOL 111 – FALL 2014

Instructor: Doug Workman, Ph.D.
Office: ASC 1013
Phone: O: 591-2558 C:(231) 912-0506
E-mail: DougWorkman@ferris.edu

Office Hours: T 3 PM-4PM
W 11AM-12PM
TH 3 PM-4PM
OR BY APPT.

Welcome to Environmental Biology! This is an introductory course for non-majors and is intended to provide fundamental principles of biology as they apply to people, their health, as individual organisms, as species, and as a part of a functioning ecosystem. It is my intent to relate biological concepts to relevant topics. Student participation is strongly encouraged during class and lab. Any time you have a concern about the course material or your grade, DON'T WAIT. Come see me promptly as we cover a lot of material in a short period of time.

General Education Outcomes:
This course may be used to help fulfill the general education requirement for Scientific Understanding. A student succeeding in this course should:

1. Have a working knowledge of the fundamental principles of a natural science discipline;
2. Be able to use appropriate scientific reasoning skills to interpret and analyze content in the natural sciences;
3. Have a basic understanding of the scientific method, scientific concepts, and the evolution of scientific ideas;
4. Have a more positive attitude toward science and an increased confidence in their ability to understand science.

Specific Course outcomes:
This course is a broad overview of the field of biology, for non-biology majors. A student succeeding in this course should be able to:

1. Have a working knowledge of the fundamental principles of a natural science discipline.
2. Demonstrate understanding that the scientific method is a way of discovering how life works.
3. Recognize and appreciate how knowledge of biological principles can help one make more informed political and consumer decisions, and make intelligent decisions regarding personal health and environmental issues.
4. Learn basic laboratory skills to explore the world of biology at the molecular, cellular and organismal levels.

Lecture: Tuesday and Thursday 4:00PM – 5:15 PM in SCI 126

Required Materials:

1. *Lecture Text*: Norm Myers and Scott Spoolman. 2014. Environmental Issues and Solutions
2. Turning Technologies Response Card (Digital Clicker for answering questions in class) – available with course text as a package or may be purchased individually.

FSU sells text and clicker, **or you may find text and clicker cheaper on the internet**.

3. *Lab Book*: BIOL 111 Lab Manual **(Available only at Great Lakes Bookstore)**

***Please be sure to bring a **calculator** to lab with you as well. ***

Attendance Policy: Prompt attendance to all lectures is required and expected. If you miss lecture, you are responsible for the lecture contents and any assignments given out during the lecture. **Attendance in all lab sessions is required as there will be no make up lab period.**

Excused absences (Serious illness, family emergency and very limited circumstances): They only excuses that will be accepted for missing a scheduled lecture exam or laboratory is a signed document from your physician indicating that due to your medical condition you were unable to attend class that day, or a signed statement from a funeral director that you attended a funeral of an immediate family member. All other excuses will not be accepted. You must see me before your next scheduled lab to make up the missed lab. *Any lab that is not made up will result in 0 points recorded for that lab. The reality: You actually wind up missing two weeks worth of points (last week's lab participation and quiz and missing critical information for next week's quiz).* Please schedule your travel and personal commitments accordingly.

Unexcused absences: There will be no makeup for unexcused absences.

Your Grade: Your grade for this course will be based your performance in Four Exams, Weekly Laboratory Quizzes, Lecture quizzes (approximately one each week) and participation in daily class clicker questions.

Examinations and Point Distribution: Your scores will be weighted according to the following: **70%** of your grade will be determined by the results of your lecture quizzes, 3 lecture exams and final exam; **20%** of your grade will be determined by the results of your lab quizzes and lab notebook; **10%** of your grade will be determined by your lecture attendance as determined by participation in daily clicker questions. Failure to take an exam at the scheduled time (see class schedule) will result in the loss of all points for that exam. Please schedule your travel and personal commitments accordingly.

Lecture Quizzes

Lecture quizzes are typically unannounced and are offered as a means to measure your comprehension of class material. Quiz material may show up on lecture and final exams. Participation in lecture quizzes is mandatory and failure to do so will affect your final grade. Your performance on quiz scores is factored into 70% of your class grade as previously described.

Grading Scale

Grading will be done on a straight scale as follows:

A = 93-100%	B = 83-86.9%	C = 73-76.9%	D = 63-66.9%
A- = 90-92.9%	B- = 80-82.9%	C- =70-72.9%	D- = 60-62.9%
B+ = 87-89.9%	C+ = 77-79.9%	D+ = 67-69.9%	F = Below 60%

Grade Disputes

If you believe there is an error in the calculation of any of your graded assignments, you need to come and see me during office hours (or make an appointment) to discuss your assignment.

Important considerations

TURN OFF YOUR CELL PHONES – be respectful to everyone in the class!

The lectures do not necessarily follow the textbook and Powerpoints closely. Be sure to attend each lecture and take good notes.

Lab sections **will not meet** during the first week of class.

Be aware there is discussion during my class and exams may contain discussion material will not be on PowerPoints. Failure to attend class on a regular basis will certainly affect your ability to answer exam questions.

Although we have a defined course outline, the material may change. The instructors reserve the right to alter schedules, topics, exams and any other material needed to manage the course effectively.

Fall 2014 LECTURE SCHEDULE

Date	Chapter	Topic
8/26	1	Syllabus, Text, and Introduction
8/28	1	Sustainability, Scientific Method, Environmental Ethics
		Course clickers are mandatory by second week of semester!
9/2	2	Population Dynamics and Humans
9/4	2	Population Dynamics and Humans
9/9	1	Chemistry and molecules
9/11	1	Molecules, energy, respiration and photosynthesis
9/16	1	Molecules, energy, respiration and photosynthesis
9/18	-	***Exam 1***
9/23	8	Population genetics and natural selection
9/25	13	Ecosystem cycles and Climate Change
9/30	13, 4	Climate change and soil
10/2	4	Soil processes and farming
10/7	10	Water and water cycles
10/9	11	Streams and water pollution
10/14	11	Wastewater Management
10/16	-	***Exam 2***
10/21	5	Energy production
10/23	12	Acid rain and air quality
10/28	14	Solid waste management
10/30	5	Renewable energy – wind and hydroelectric
11/4	6	Non-renewable resources – mining and fracking
11/6	-	***Exam 3***
11/11	10	Groundwater and water rights
11/13	10	Groundwater and water rights
11/18	15	Environment and human health
11/20	9	Stream Habitat Restoration
11/25	15	Environment and human health
11/27		**NO CLASS - THANKSGIVING**
12/2	-	Invasive species
12/4	-	***Exam 4***
12/9 (Tuesday)		Optional **Cumulative Final Exam** (4PM-5:40PM)…Must sign in whether taking exam or not!!!

2014 Fall Semester
Lab Schedule

Lab Instructor: Doug Workman or Arlene Westhoven
Westhoven's Phone: 591-5842
E-mail: westhova@ferris.edu

Section #

211 Lab: 9-10:50 T SCI 227 - Workman
212 Lab: 12-1:50 T SCI 227 - Workman
213 Lab: 9-10:50 W SCI 227 - Westhoven
214 Lab: 12-1:50 Th SCI 227 - Westhoven

Required Lab Text: *Biol 111 Environmental Biology*: Rodabaugh 2013 – Available at Great Lakes Bookstore

Course Description: You have selected BIOL111, Environmental Biology, to fulfill the requirement for a lab science. Laboratory exercises allow you "hands on" experience using the steps of the scientific method to investigate the concepts presented in lecture. You will learn to use tools, techniques, and calculations that will help you draw conclusions from your observations. I hope you find the lab setting to be a rewarding and enjoyable learning experience.

Attendance: You must attend lab at your scheduled time. If you have an OCCASIONAL conflict, you may attend another lab, ONLY with permission from lab instructor. Labs must be made up during the scheduled week.

Lab Schedule

Week	Lab	Lab for the Week
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Sept 2	1	Metrics
Sept 8	2	Population dynamics
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Sept 22	5	Individual and population genetics
Sept 29	4	Soils and particle distribution
Oct 6	-	Global Warming
Oct 13	-	Field Trip to Big Rapids Wastewater Treatment Fac.
Oct 20	6	Dissolved oxygen (DO)
Oct 27	8	Acid rain
Nov 3	10	Solid waste
Nov 10	2	Population experiment/essay
Nov 17	12	Biodiversity/population essay due
Nov 24		Thanksgiving – NO LABS THIS WEEK
Dec 1	14	Card Wildlife Center

SYLLABUS ATTACHMENT
COLLEGE OF ARTS AND SCIENCES – FERRIS STATE UNIVERSITY
FALL 2014

ARE YOU CONSIDERING ADDING A MINOR OR MAJOR TO YOUR CURRENT PROGRAM?
Use **My Degree** to see what classes may already apply.
For more information, stop by the Arts and Sciences Dean's Office!

IMPORTANT DATES		
Late registration	Wed. – Fri.	Aug. 20 – 22
First day of classes	Monday	Aug. 25
Last day for Drop/Add	Thursday	Aug. 28
Labor Day (no classes)	Monday	Sept. 1
Mid-term grades due	Monday	Oct. 20
Last day for "W" grades	Thursday	Oct. 30
Thanksgiving recess begins (no classes)	Wed (noon)	Nov. 26
Thanksgiving recess ends (classes resume)	Monday	Dec. 1
Last day of classes	Friday	Dec. 5
Examination Week	Mon – Fri	Dec. 8 - 12
Commencement	Saturday	Dec. 13
Final grades due by 1:00 pm	Monday	Dec. 15
Grades available to students on MyFSU	Tuesday (after 8AM)	Dec. 16

Sessions	Dates	Last Day to Withdraw
Full Session	Aug. 25 – Dec. 5	Oct. 30
Session A	Aug. 25 – Oct. 14	Sept. 25
Session B	Oct. 15 – Dec. 5	Nov. 14
Session D	Aug. 25 – Sept. 26	Sept. 15
Session E	Sept. 29 – Oct. 30	Oct. 17
Session F	Oct. 31 – Dec. 5	Nov. 20

DEPARTMENT OFFICES

Biology	ASC 2004	591-2550
Humanities	JOH 119	591-3675
Languages & Literature	ASC 3080	591-3988
Mathematics	ASC 2021	591-2565
Physical Sciences	ASC 3021	591-2580
Social Sciences	ASC 2108	591-2735
Dean's Office	ASC 3052	591-3660

WHAT YOU NEED TO KNOW

E-MAIL
All registered FSU students have a Ferris Gmail account. This is the only e-mail to which all official University information about registration, financial aid, student activities, and class cancellations will be sent. Please check your account at least once a week. E-mail is our primary communication resource for students.

CLASS ATTENDANCE IS IMPORTANT!
Attendance usually has a high correlation with how well you do in a course. Many instructors have mandatory attendance policies by which your grade will be affected by absences. Some instructors also have policies about class tardiness to encourage students to be present for the full class period. Check your course syllabus or talk to your instructor about his/her policies.

HOW TO CONTACT A FACULTY MEMBER OR ADVISOR
If you have questions or need help, talk to your instructor. Faculty office locations, phone numbers, and office hours may be obtained from the class syllabus or department office, through the College of Arts and Sciences web page at http://www.ferris.edu/htmls/colleges/artsands/, or through the Directories & Maps link on the FSU home page.

DROPPING CLASSES OR WITHDRAWING */**
Dropping and adding only occurs during the first four days of the term. You can adjust your schedule **online during the first four days** or in person at the Timme Center (from 8-5 except for the last day when it is 12-5). *If you add a class you must pay for your additional charges by the fourth day or your schedule will be dropped.*

If you need to withdraw from a class after the official drop/add period, you must do so **OFFICIALLY**, through your dean's office, in order to avoid receiving an "F" grade in the course. **You may not withdraw online after the first four days of the term.** You will receive a "W" for the course. *You will not receive a refund.* If you need to totally withdraw from the University, you must do so **officially** at Admissions and Records in CSS 101. The last day to withdraw or drop a class may be different for different classes. **CHECK THE SESSIONS DATES SECTION ABOVE OR THE REGISTRATION AND ACADEMIC GUIDE FOR THE WITHDRAWAL DEADLINES FOR THE SEMESTER.**

In cases of extenuating circumstances (e.g., a serious illness requiring you to withdraw from school), contact Birkam Health Center at 591-2614.

INCOMPLETES
The "I" is only considered for extenuating circumstances that have led to a student missing a portion of the course. The intent and appropriate use of the "I" grade is NOT to avoid student probation, dismissal, or unacceptable grades, nor should it be considered as an extended alternative to withdraw from a

class (W). Extenuating circumstances are generally defined as those situations over which a student has little or no control—e.g., illness, birth, jury duty, death of a parent, serious injury. Instructors may require suitable documentation.

Students must have completed at least 75% of the coursework at passing levels before an "I" will be considered, and they may be required to sign an agreement regarding course completion. An "I" grade automatically changes to an "F" after one semester (not counting summer) unless the faculty member files another grade or extends the incomplete.

GRADUATION

Students should apply for graduation the semester prior to their last semester of completion. For associates in arts or associates in science degrees, this needs to be completed at the Dean's Office. For bachelor degrees, this needs to be completed with your program coordinator. Be aware of deadlines for participation in commencement.

INCLEMENT WEATHER CONDITIONS

Only during the most severe weather conditions – which could potentially endanger the safety of students or staff – will the Big Rapids campus consider cancelling classes. The decision to cancel classes due to weather conditions at the Big Rapids site will be made as early as possible. In the event it is necessary to cancel classes, periodic announcements will be made on area radio and television stations. It is the student's responsibility to listen for these announcements. A student may also call the Ferris Information Line at 231-591-5602 to obtain information or check the Ferris website.

ACADEMIC MISCONDUCT

Academic misconduct refers to dishonesty or misrepresentation with respect to assignments, tests, quizzes, written work, oral presentations, class projects, internship experience, or computer usage; violation of computer licenses, programs, or data bases; or unauthorized acquisition or distribution of tests or other academic material belonging to someone else. It includes such behaviors as cheating, copying materials from the internet without documentation, presenting another person's ideas or work as your own, taking someone else's exam for them, violating computer software licenses or program/data ownership, etc. It is the expectation of the College of Arts and Sciences that all work you turn in is your own and is original for the course in which it is being submitted. If you are uncertain about whether a particular behavior might represent academic misconduct, be sure to ask your professor for clarification.

Penalties for academic misconduct can include **FAILURE** of the assignment or the course, and/or disciplinary action up to and including probation or dismissal from the University.

DISRUPTIVE BEHAVIOR

The College of Arts and Sciences strives to maintain a positive learning environment and educational opportunity for all students. Consequently, patterns of behaviors which obstruct or disrupt the teaching/learning environment will be addressed. The instructor is in charge of his or her course (e.g., assignments, due dates, attendance policy) and classroom (e.g., behaviors allowed, tardiness). Harassment, in any form, will not be tolerated.

Penalties for disruptive behavior can include involuntary withdrawal from the course and/or disciplinary action up to and including probation or dismissal from the University. The full Disruptive Behavior Policy is available on the College of Arts and Sciences website at http://www.ferris.edu/HTMLS/colleges/artsands/student-resources/CAS-disruptive-behavior-policy-final.pdf

For additional policies and helpful information, check out the College of Arts & Sciences Student Resources page at http://www.ferris.edu/HTMLS/colleges/artsands/student-resources/

WHERE TO GO FOR HELP

The following services are available to any Ferris student, free of charge. They are designed to help you succeed in your courses, in your career planning, and in meeting the challenges of university life. Don't hesitate to explore and use these services at Ferris.

ACADEMIC ADVISING

All students have an assigned advisor and should confer with that advisor regularly. Students who have declared a major should see an advisor in that major. To find out who your advisor is, login to MyFSU and click on the Academics and Services tab, then Registration Status / Advisor Information link.

ACADEMIC SUPPORT CENTER……ASC 1017 – 591-3543
THE WRITING CENTER……ASC 1017 – 591-2534
The Academic Support Center, Tutoring Services, and Writing Center join together to offer FSU students an array of academic support services. Tutors are available to answer questions for many courses. The Writing Center helps writers individually and in workshops with skills and assignments. There is also study skills assistance to help with note-taking, test-taking, memory and reading strategies, and time management.

DISABILITIES SERVICES……STR 313 – 591-3057
According to the Americans with Disabilities Act, each student with a disability is responsible for notifying the University of his/her disability and requesting accommodations. Students requiring a classroom accommodation due to a physical, learning, mental or emotional disability should contact the Disabilities Services Office.

SCHOLAR PROGRAM……ASC 1021 – 591-5976
SCHOLAR is an academic support program that aids in the student's successful progression by offering a Peer Mentor Program, a Student Retention Program, and an Academic Student Advisory Committee.

PERSONAL COUNSELING, SEXUAL ASSAULT, SUBSTANCE ABUSE BIRKAM HEALTH CENTER …… 2nd Floor - 591-5968 Personal counseling is available confidentially and free of charge. Counselors are available to assist with personal and stress-related problems, family and relationship issues, substance abuse, sexual assault, depression, or other similar problems. Call or stop by to obtain an appointment.

If you or a friend is in immediate crisis, call 911.

EDUCATIONAL & CAREER COUNSELING ……STR 313 – 591-3057
Students wanting to examine their choice of major or career choice, learning styles or strategies can make one-on-one appointments with licensed counselors.

SAFETY
Please observe the posted shelter and evacuation routes in the hallway nearest your classroom.

OTHER RESOURCES

BIRKAM HEALTH CENTER……1st Floor - 591-2614
The Birkam Health Center provides fee-for-service medical care including evaluation and treatment for illness and injury anytime during the year. Patients are seen on a walk-in and by appointment basis.

FLITE LIBRARY……591-2669 Regular hours for FLITE:
Monday – Thursday . . . . . 7:30 a.m. – MIDNIGHT
Friday . . . . . 7:30 a.m. – 6:00 p.m.
Saturday . . . . . NOON – 5:00 p.m.
Sunday . . . . . 1:00 p.m. – MIDNIGHT
Extended Studies Court will begin late night hours September 16, 2014
*Sunday-Thursday/MIDNIGHT to 7:30 a.m. *Friday/6 p.m. to MIDNIGHT
*Saturday/5 p.m. to MIDNIGHT)

FSU BOOKSTORE……14265 NORTHLAND DR. 231 591-2607
Regular on-campus hours for the Bookstore **:
Monday – Thursday . . . . . 9:00 a.m. – 6:00 p.m.
Friday . . . . . 9:00 a.m. – 5:00 p.m.
Saturday. . . . . 12:00 p.m. – 4:00 p.m.
Sunday . . . . . CLOSED

Located at the Save-A-Lot Shopping Center Plaza.

HELPFUL NUMBERS

Admissions	2100	Inst. Testing	3628
Business Office	2125	Public Safety	5000
Financial Aid	2110	Records	2792
Housing	3745	TAC	4822

When calling from off campus, extensions can be called by using the prefix 231-591-_____.

Biology and Turf grass Maintence

Summer 2015

Instructor: Anna Rizzo

Office: Science 141a

Office Hours: Monday & Wednesday 11:00am – 12:00pm.

Phone: 231 591 – 5841

Email: rizzoa@ferris.edu

- Course requirement lecture 3 hours per week.

Monday & Wednesday 9:00am – 10:35am in Science 126

- Lab requirement 2 hours per week.

Tuesday (section 211), Thursday (section 212) 8:00am – 9:55am Sci 232

Textbook (available at the University Center Bookstore)

Turf grass Management, ninth edition by A.J. Turgeon

Additional course Materials: three ring binder for semester turf analysis project and turf disease journal.

Course Description

The study of the biology of plants and soils as they relate to the turf grass environment. Includes the growth, care, and management of turf and turf grass, used on golf courses. Intended for professional golf management majors. Laboratory exercise is designed to reinforce the lecture material with hands-on experiences.

Course Objectives

This course is designed to prepare the Professional Golf Student for the PGA Professional Golf Management certification test.

At the completion of this course, the student will:

- Demonstrate by examination the plant anatomy and physiology, knowledge of cellular organelles, function of organelles, tissues, and internal and external structures of grasses.
- Demonstrate the ability to analyze soil composition, obtain soil samples, determine soil content of sand, clay, topsoil, and loam, test soil pH, and how to improve soil composition.

- Demonstrate the ability to determine different turf grass by examining external turf anatomy.
- Demonstrate the knowledge of climate and turf grass grown in different climates (warm vs. cool)
- Recognize turf grass abnormalities and causes lack of nutrients, acid or basic pH, salinity. And pathogens.
- Show an ability to utilize equipment (such as a microscope, pH meter) safely and effectively to complete lab assignments.
- Understand golf course construction, maintenance, mowing, seeding, fertilization, herbicide and pesticide administration
- Use the scientific method to formulate hypotheses, design an experiment, collect samples, analyze/test samples and make conclusions.

BLACKBOARD: Lecture outlines, announcement, supplemental resources and grades will be available.

Tests and Quizzes:

No makeup: lecture quizzes, exams and classroom work. Without a valid documented excuse.

4 lecture Exams 100 pts. Each

Weekly lecture quizzes 10 pts. Each

Lecture activities 5 to 10pt.

Lecture Portions 70% of total grade

Final exam Optional TBD

Lab Weekly Quizzes and Assignments: 30% of total grade

100 pt. Turf grass analysis report 100pts. Turf grass disease Journal 50 pts.

Grading Scale:

A = 93 – 100%	A- = 90 -92%	B+ = 87- 89	B = 83 -86%	B- = 80 – 82%
C+ = 77 – 79%	C = 73 – 76%	C- = 70 – 72%		
D+ 65 – 69%	D = 60 – 64%	D- = 57-59%	F= Below 57%	

EXAM FORMAT

- Exam questions will be true/false, multiple choices and will come from lecture notes, handouts, and lecture quizzes. STUDENTS ARE REQUIRED AND EXPECTED TO TAKE EXAMS AT THE

SCHEDULED TIME. Failure to take exams at the scheduled time will result in a grade of zero on that exam.

- In the case of documented illness or extenuating circumstances, a make-up exam will be given, after a written explanation or valid documentation (such as a letter from a physician, evidence of funeral, etc.) has been submitted to the instructor. The documentation or explanation must be submitted within 2 weeks of the missed exam. An explanation submitted after the two week period is considered late, and unacceptable, resulting in a grade of zero for that exam.

Attendance:

Attendance to all lectures is required and expected. Come to class on time and prepared. If you miss a lecture, you are responsible for the lecture contents and any assignments given during the lecture. YOU CANNOT MAKEUP A LECTURE QUIZ

Disruptive Behavior:

End conversations once instructor starts class. Please **turn off your cell phone** and put it in your backpack. If I see you texting during lecture or lab the phone is mine for the duration of class.

Biology 114 Turf grass Lecture Schedule Summer 2014

Unit	Date	Topic/chapter
Turf grass Intro	May 20	Chapter 1
Grass Anatomy	May 25	Chapter 2 and 3
Plant cells	May 27	Chapter 2 pg. 38 - 48
Plant physiology	June 1	Chapter 2 pgs. 49 - 46
Plant Nutrition	June 3	Chapter 5 pgs. 169 - 185
Soil Chemical Properties	June 8 and 10	Chapter 4
EXAM 1	Monday June 15, 2015	
Turf grass Diseases	June 17 Assignment	
Turf grass Insects/nematodes	June 22	
Turf grass Weeds	June 24	
EXAM 2	Monday June 29, 2015	
Irrigation	July 1	Chapter 5 pgs. 189 - 207
IPM	July 6	Chapter 7 pgs. 231 -304
Cultural systems	July 8	
Golf Course Construction	July 13	Chapter 8 pg. 332 - 340
Field trip	*TBA*	
EXAM 3	Wednesday July 15	
Use of Pesticides	July 20	
Fertilizers	July 22 and July 27	
Sprayers and Spreader	July 29 and August 3	
Budgets	August 5	
Exam 4	Wednesday ,August 12	

Turf Grass Lab Schedule

DATE(wk. of)	LAB
Week 1 May 18 (Rizzo)	Soil composition and Grass Characteristics
Week 2 May 25 (Rizzo)	The Microscope and Cell structure
Week 3 June 1 (Rizzo)	Monocot Anatomy and Transpiration
Week 4 June 8 (Rizzo)	Membrane Permeability, Photosynthesis, cellular respiration
Week 5 June 15 (Rizzo)	Turf Soils
Week 6 June 22 (Rizzo)	Turf Grass

Week of June 29 to the end of the Semester lab will be at Katke golf course

Instructor: Tony Geib

Lab Schedule is Tentative and subject to change.

Attendance: Attendance to all lab classes is mandatory. If you miss your assigned lab session for a valid reason, you may arrange with the lab instructor to attend another lab session the same week or a zero grade is given for a missed quiz. The Biology Department's policy states that more than two unexcused lab absences are grounds for failing grade in the course.

Lab quizzes occur each week covering the previous week's material. Make-up quizzes are not given without a legitimate excuse.

BIOL 116 Nature Study (4 credits) – FALL Semester 2013 ***SYLLABUS***

Course Description: Great Lakes flora and fauna are studied, with emphasis on ecological relationships and environmental impacts. Fisheries and wildlife management principles are also discussed. Open to recreation and outdoor activities directors, teachers needing updating in natural science, lifelong learning adults and others interested in the out-of-doors. Not applicable to the applied biology major. Some hiking required. This course meets General Education requirements: Scientific Understanding, Lab.

Course Outcomes:

(1) *General Education*. This course may be used to help fulfill the general education requirement for Scientific Understanding. A student succeeding in this course should:

- Have a working knowledge of the fundamental principles of a natural science discipline.
- Be able to use appropriate scientific reasoning skills to interpret and analyze content in the natural sciences.
- Have a basic understanding of the scientific method, scientific concepts, and the evolution of scientific ideas.
- Have a more positive attitude toward science and an increased confidence in their ability to understand science.

(2) *Specific Course Outcomes*. **Through the *knowledge acquired in lecture, daily material assessments, performing laboratory activities, application of journaling exercises, and a community service project*, students will be able to:**

- **Explain the interconnectedness among living and non-living things within a habitat.**
- **Identify basic flora, fauna, and habitats of Michigan by using field guides effectively.**
- **Predict the potential consequences of a habitat being altered in terms of species populations and interactions.**
- **Discuss many of the positive and negative impacts humans have on Michigan habitats.**
- **Develop an appreciation of the natural world through direct experience with local habitats.**

Instructor: *Cindy Fitzwilliams-Heck*

Office	**Office Hours**	**Laboratory**
Science Building (SCI) 141-E Phone: Office: (231) 591-5843 Cell : (231) 349-7495 (texts okay) Home: (231) 592-4067 No calls 9pm - 6am E-mail: fitzwilc@ferris.edu	Tue - Wed 8 – 9:00 a.m. Wed & Fri 1 – 2:00 p.m. Or call/email for an appointment. **Lecture** M W F at 2 – 2:50 p.m. All lectures meet in SCI 126.	Mon 9 – 10:50 a.m. (211) 11 – 12:50 p.m. (212) Tue 9 – 10:50 a.m. (213) 12 - 1:50 p.m. (214) All labs meet in **SCI 208** unless otherwise stated on our lab schedule, in class, or on Ferris Connect.

Grading Scale:

A = 100- 94%	**B = 86.9-83%**	**C = 76.9-73%**	**D = 66.9-63%**
A- = 93.9-90%	**B- = 82.9-80%**	**C- = 72.9-70%**	**D- = 62.9-60%**
B+ = 89.9-87%	**C+ = 79.9-77%**	**D+ = 69.9-67%**	**F = below 60%**

***REQUIRED* Materials for the Course:**

(1) ***Reference books*** **(7)**:
- Trees of Michigan (Kershaw)
- Golden Guide: Pond Life (Reid)
- Insects of the Northwoods (Hahn)
- Fish of Michigan Field Guide (Bosanko)
- Amphibians & Reptiles of the North Woods (Sheldon)
- Birds of Michigan (Black & Kennedy)
- Mammals of Michigan Field Guide (Tekiela)

(2) **FerrisCONNECT (FC) access** (for printing notes/assignments, reading emails, turning in papers, and taking quizzes)
(3) **Nature Journal folder with tab dividers** (ACCEPTABLE OPTIONS: folder with fasteners or ½ " binder)
(4) **Three-ring binder (1") for lecture notes** (with pockets)
(5) **MISCELANNEOUS**: camera, line paper, #2 pencil, eraser, basic calculator, hole punch, stapler
(6) COMFORTABLE **WALKING SHOES (do not wear flip-flops or open-toed sandals to outside labs)!**

★ ATTENDANCE POLICY:

(a) ***Prompt attendance to all lectures and labs is expected & critical to your grade***.

(b) If you miss lecture, you are responsible for its content & any assignments given during class. Notes & assignments will be available on FerrisCONNECT.

(c) You will sit in the same seat every lecture, but I won't take actual roll (**seating chart** will be passed around the second lecture so I can learn names … remember, I have the right to change your seat).

(d) **Attendance in all lab sessions is required (note: LAB QUIZ most days)** … there will be no make-up labs (see 'Grading Policy: Labs' section for more information). According to the FSU Biology Department's policy, **missing more than two lab periods may result in failure of the class**.

★ GRADING: (Cheating will result in a zero & other disruptive behavior like using electronic devices or excessive talking may result in a grade reduction and will be reported to the Dean).

(a) To figure out grades, **compare your total number of points to the number of points possible** in the course. Keep all your papers & start your own grade sheet. **Current grades will be updated regularly on FerrisCONNECT**.

(b) ***Labs***.....***10-50 points each***
Laboratory attendance is mandatory! More than two unexcused absences will result in failure of the course. **Labs cannot be made up.** You must notify me prior to missing lab in order for me to determine which of the other lab times you can attend *that* week. The lab quiz points may vary each week depending on the material. Arriving late, leaving early, not doing your own work, not fully participating, or not being prepared for class (i.e. no field guide, no pencil, etc.) will result in a deduction of your lab points.

(c) ***Nature Journal (NJ).***.....***+/-/= 300 points***
You will select an outside location of your choice (some place convenient - near where you *currently* live) to complete your requirements for this project. To help earn a good grade: pay close attention to assignment details, grading criteria, and due dates. The assignment sheets will be available throughout the semester on FerrisCONNECT for you to print, or may also be distributed in class. The final due date of the project is: **WEDNESDAY, NOVEMBER 27, 2013 @ 2:00 p.m.**

(d) ***Community Service Project*** .....***TBA***
The academic service-learning project is yet to be determined. You will take an active role in our community doing things to improve the environment. Stay tuned for more details!

(e) ***Daily Assessments*** .....<,>,= ***12 points***
We will have an assessment (quiz) everyday in **lecture and/ online**. Questions will come from lecture material, homework assignments, and lab. The number and type of questions will vary depending on the material.

(f) ***In-Class Assignments*** .....***up to 10 points***
There may be unannounced/announced activities given during class.

(g) ***Homework*** .....***10 - ? points***
Take-home/online assignments given periodically throughout the course. Assigned in lecture or online.

(h) ***Final Exam***.....***100 points***
Save all class notes, labs, books, homework, etc. to help you review.

(i) ***Make-Up Work*** … If you have a documented excuse (i.e. a doctor's note, an excused university absence, funeral verification, or extenuating circumstances) you may complete the missed work for full credit. Stipulations: **you must contact me *before* class** to discuss your issue. Only **two excuses** allowed. Any missed assignment is **due upon return to class**. If you missed two classes, you have two days (not just class days) to turn in your work (I accept assignments online, or bring it to my office). If you do not have a legitimate excuse, and you missed an assignment or quiz, you may complete it for **half credit within 24 hours** of missing the work (contact me if you don't see anything new posted on FC).

(j) ***Losing Points*** … **Using electronic devices** (i.e. phone, computer, mp3, etc.) during an assessment, at an inappropriate time, or if it is disruptive to those around you.

(k) ***Extra Credit***... There WILL be some. Advice: come to class, check FerrisCONNECT often, & take advantage of every extra credit opportunity! No extra credit can be made up (no matter what). Opportunities are offered to the entire class not on an individual basis (so don't ask).

BIOL 116: Lecture Schedule FALL 2013

Fitzwilliams-Heck

- ★ ***Check FerrisCONNECT often ... especially before class!***
- ★ ***PRINT NOTES OUTLINE PRIOR TO LECTURE [and lab] (posted by 6 pm the day before class).***
- ★ ***Be prepared for class:*** ***You must bring your CPS****, notes, pencil, book, completed homework*
- ★ ***This schedule is only tentative****. I reserve the right for slight variations to accommodate our rate of progress, a topic revamping, or to address a pressing issue or interest the class may have.*

Date	***Lecture Topic***	***What Books to Bring to Class (ALWAYS Check Website Before Class)***
8/26 M	Class Introduction, Syllabus Discussion, FerrisCONNECT, BRAINSTORMING	
8/28 W	**Seating Chart** (check FerrisCONNECT), Notes: Scientific Method, Making Observations, Taxonomy + **SPECIES OBSERVATIONS charts**	
8/30 F	**1ST Quiz** Pre-read & print notes: 'Landscape Shapers of the Northwoods (NW)'	
9/2 M	**NO CLASSES**	**Study**
9/4 W	QUIZ NW Landscape + Ecology Basics	
9/6 F	Ecology: Populations	
9/9 M	Ecology: Communities	
9/11 W	Ecology: Species Interactions	
9/13 F	Ecology: Evolution I	
9/16 M	Ecology: Evolution II	
9/18 W	The Basics of Plants [& Trees] I	**'Trees of Michigan'**
9/20 F	The Basics of Plants [& Trees] II	**'Trees of Michigan'**
9/23 M	Ecology: The 4 Spheres	
9/25 W	Ecology: Energy Flow	
9/27 F	Ecology: Biogeochemical Cycles	
9/30 M	Ecology: Biodiversity	
10/2 W	Ecology: Biodiversity II & Conservation	
10/4 F	Ecology: Wildlife Management	
10/7 M	Terrestrial Habitats I: MI Habitats Defined	
10/9 W	Terrestrial Habitats II: Succession, Soils	
10/11 F	Terrestrial Habitats III: Field & Forest Communities	
10/14 M	MI Aquatic Habitats I: Water Prop. & Lakes	**'Pond Life'**
10/16 W	MI Aquatic Habitats II: Lakes II	**'Pond Life'**
10/18 F	MI Aquatic Habitats III: Rivers	**'Pond Life'**
10/21 M	MI Aquatic Habitats IV: Rivers II	**'Pond Life'**
10/23 W	MI Aquatic Habitats V: Wetlands	**'Pond Life'**
10/25 F	Insects (Arthropods)	**'Insects'**

10/28 M	Insects	**'Insects'**
10/30 W	**Last day for "W" grade is 10/31!** Please talk to me about withdrawing from this class before you do it. Lecture Topic: Insects	**'Insects'**
11/1 F	Fish	**'Fish of Michigan Field Guide'**
11/4 M	Fish	**'Fish of Michigan Field Guide'**
11/6 W	Fish	**'Fish of Michigan Field Guide'**
11/8 F	Amphibians	**'Amphibians & Reptiles of the North Woods'**
11/11 M	Amphibians	**'Amphibians & Reptiles of the North Woods'**
11/13 W	Reptiles	**'Amphibians & Reptiles of the North Woods'**
11/15 F	Reptiles	**'Amphibians & Reptiles of the North Woods'**
11/18 M	Birds	**'Birds of Michigan'**
11/20 W	Birds	**'Birds of Michigan'**
11/22 F	Birds	**'Birds of Michigan'**
11/25 M	Mammals	**'Mammals of Michigan Field Guide'**
11/27 W	Mammals	**'Mammals of Michigan Field Guide'**
11/29 F	**NO CLASSES**	**STUDY**
12/2 M	Mammals (ICA)	**'Mammals of Michigan Field Guide'**
12/4 W	**Mammal ID Quiz (20 pts) –** subject to change due to lab schedule	**'Mammals of Michigan Field Guide'**
12/6 F	**Class Summary**	**All Class Notes**
12/12 R	**Comprehensive Final Exam 2-3:40 p.m. in SCI 126**	

Fitzwilliams-Heck

BIOL 116: Lab Schedule FALL 2013

- ★ **All labs will meet in SCI 208, unless stated otherwise on the schedule, in lecture, or on FerrisConnect.**
- ★ **Any announcements about lab will be posted on FerrisConnect the day before your lab meets before 6:00 p.m. Outside for lab? Weather "iffy"? Check FC or call/text me!!!**
- ★ This schedule is **tentative** & may change due to whim or weather … stay tuned in.
- ★ Always **come prepared** with book(s), pencil, paper, class binder, & appropriate clothing/footwear for going outdoors.
- ★ Come to class! **Two lab absences** may result in **failure** of course.
- ★ If you must miss lab, please contact me prior to your absence in order to make arrangements for a different lab time.
- ★ Each lab has 10-50 points possible. (See **'Grading Policy'** for more information).
- ★ Quizzes cover previous week's lab material.
- ★ **Nature Journal Assignments will be due at the beginning of lab periods (dates below are tentative).**

Week	***Date***	***Topic***	***Quiz***	***~Pts***
1	8/27-28	**NO LABS – Take-Home Lab Homework: Choosing your Nature Spot & Making Observations**	-	-
2	9/3-4	**NO LABS**	-	-
3	9/10-11	**Meeting Place TBA in Lecture (Check FC): OUTSIDE (be prepared to get your feet wet):** Aquatic/Terrestrial Collections **(Books: 'Pond Life', 'Insects')**	-	10
4	9/17-18	**Meeting Place TBA in Lecture (Check FC): OUTSIDE -** Tree Identification **(Book: 'Identifying Trees')**	-	10
5	**9/24-25**	**Meeting Place TBA in Lecture (Check FC): OUTSIDE -** Tree Identification **QUIZ (Book: 'Identifying Trees' + Tree ID Notes)**	Q1	20, 5
6	**10/1-2**	**NJ 1 Due!** Food Chain/Web **(Books: Insects, Birds, Mammals)**	-	10
7	10/8-9	**Meeting Place TBA in Lecture (Check FC): OUTSIDE -** Habitats & Orienteering OR ASL Project	-	-
8	10/15-16	**SCI 208 + Outside** Maps & Watersheds	-	-
9	10/22-23	Pond Life **(Book: 'Pond Life')**	-	10
10	**10/29-10/30**	**NJ 2 Due!** Insects **(Books: 'Pond Life', 'Insects') + Pond Life ID Quiz**	Q2	10, 20
11	**11/5-6**	Fish **(Books: "Fish', 'Insects') + Insects ID Quiz**	Q3	10, 20
12	**11/12-13**	Amphibians **(Books: 'Amphibians/Reptiles', 'Fish') + Fish ID Quiz**	Q4	10, 20
13	**11/19-20**	Reptiles **(Books: 'Amphibians/Reptiles') + Amphibian ID Quiz**	Q5	10, 20
14	**11/26-27**	**NATURE JOURNAL DUE [in its entirety – see FC]!** Birds **(Books: 'Birds', 'Amphibians/Reptiles') + Reptile ID Quiz**	Q6	10, 20
15	**12/3-4**	Mammals **(Books: 'Mammals', 'Birds') + Bird ID Quiz Mammal ID quiz will *likely* be given in lecture**	Q7	10, 20
16	12/10-11	**NO LABS**	-	-

Keep Track of Your Grades!!! (All graded assignments need to be kept as a record of your progress)

Assignment Title	*Total Possible Points*	*Points Earned*

Syllabus for BIOL 121: General Biology 1, Fall 2014
Credits: 4, Prerequisite: CHEM 121 (co-req with departmental permission).
Sections 231 – 233. Lecture (all sections): MWF 1:00 – 1:50 PM in Sci. 126.
Labs, by section (lab instructor, room) start time:
251 (Roger Mitchell, Sci. 216) Tu 3:00 PM
252 (Roger Mitchell, Sci. 212) M 3:00 PM
253 (David Griffith, Sci. 216) W 9:00 AM

Instructor: Dr. Roger Mitchell. **Office hours**: ASC (Commons) room 2007: Monday, Wednesday, and Friday 12:00 noon – 1:00 PM, Monday 2:00 – 3:00 PM. Make an appointment, or drop by to see if I am available at some other time. Knock if the door is closed! You may call my office at any time: 591-5879. My email is: mitchelr@ferris.edu

Lab instructor for section 253: David Griffith. Contact: x5855, fitzwilc@ferris.edu. Office hours: SCI 141C: TW 8-9, W 1-2, F 1-2.

Materials you are required to have:

text: Campbell's Biology, 9th ed., Reece *et al.*
lab manual at Great Lakes Bookstore
lecture notes at Great Lakes Bookstore
#2 pencils for the lecture exams
your student ID for each exam
appropriate attire for lab safety. For labs involving chemical use students should not wear contacts without some form of eye protection. Full coverage of legs and feet (no sandals) is also recommended. Chemicals may damage clothing. You may bring lab coats if you wish. Gloves will be provided, if needed.

How to get to Great Lakes Book and Supply, 840 Clark, Big Rapids, (231) 796-1112: It is 1 street behind (west of) the Rite-Aid drugstore, which is across State Street from Williams Auditorium and the Starr building.

Outcomes:

General Education Outcomes: This course may be used to help fulfill the general education requirement for Scientific Understanding. A student succeeding in this course should:

1) have a working knowledge of the fundamental principles of a natural science discipline;
2) be able to use appropriate scientific reasoning skills to interpret and analyze content in the natural sciences;
3) have a basic understanding of the scientific method, scientific concepts, and the evolution of scientific ideas;
4) have a more positive attitude toward science and an increased confidence in their ability to understand science.

Specific Course Outcomes: This course is the first of a two part introductory biology sequence, thus it will lay the foundation for further study in biology. A student succeeding in this course should be able to:

1) demonstrate by examination a majors-level introductory knowledge in ecology, cell division, Mendelian genetics, evolution, the diversity of the biological kingdoms (bacteria, Protista, Fungi, and Plantae), and plant structure and function.

2) demonstrate the ability to use mathematics to solve problems in Biology and utilize graphs or tables to present data effectively.
3) use the scientific method to formulate hypotheses, design experiments, collect and analyze data, and draw conclusions.
4) show an ability to utilize equipment (such as a microscope) safely and effectively to complete lab assignments.

Course Description: The first semester of a year-long sequence in introductory biology designed for the science major and as a prerequisite for advanced biology courses. The topics include an introduction to scientific thinking, ecology, cell division, Mendelian genetics, evolution, the diversity of the biological kingdoms (bacteria, Protista, Fungi, and Plantae), and plant structure and function. Laboratory exercises are designed to enhance the lecture material with hands-on experiences. Designed for students in science baccalaureate degree programs. This course meets General Education requirements: Scientific Understanding, Lab.

Policies and Course Requirements:

Exams and the total percentage. 25% lab grade, 75% for lecture exams, including the final exam. Part of the final will be based on the lectures after the third exam, and the remainder will be comprehensive. The three lecture exams 50 points each, and the final 75. Exams can only be made up at my discretion and with a legitimate excuse, with a 5% deduction per day (starting with exams taken on exam day at a different time). Students who schedule makeup exams in advance will normally take the same test as the rest of the class, or something similar. Late make-ups, if allowed, may either be essay tests or use the student's grade on the corresponding part of the final. I reserve the right to make additional assignments as a condition of giving makeup exams. Labs will be graded in part on attendance (with deductions for tardiness, failure to complete the assignments, and unsafe or excessively messy behavior), in part on lab worksheets, and in part on lab quizzes. There is no "extra credit." All of these components will be added to get a final total percentage, which will not be adjusted in any way.

Grades. The final total percentages will be curved against a normal grade distribution or modified normal grade distribution at the end of the course.

Dropping with the "W" grade must be done on or before **October 30**. Students receiving a grade of "F," "D-," or "D" at mid-term should plan to drop. Students with a grade of "D+" or "C-" should carefully consider their plans.

Incompletes will be given only at my discretion and will require proof of exceptional need. Consistent with university policy, the student must have passed 75% of the class prior to being forced to stop attending due to circumstances beyond their control. The "I" grade must be cleared or it will become an "F."

Attendance policy: Attendance will be taken in lab. If you miss a lab, you may get a "0" for that day's score. Labs cannot be made up for any reason. Missing more than two labs for <u>any</u> <u>reason</u> will result in failing the class. Excessive tardiness may count as an absence. Attendance may sometimes be taken in lecture, although it will not count directly for grading. Excused absences are on a case-by-case basis at my discretion. I generally only accept medical excuses when they are confirmed by a college or university counselor by email. Assigned seating will be used to aid in attendance taking in both lab and lecture.

Attending a different lab. Since you must attend a lab to receive a grade, you may be allowed to attend a different lab section with a legitimate excuse. Among other factors, you may be allowed to attend a different lab if you first obtain your lecture instructor's permission (in advance, except for medical emergencies), then the permission of the instructor of the lab you wish to attend, and then make sure that the lab-substitution form is filled out to route your lab materials to your regular instructor. You may only obtain permission to change a lab one lab at a time.

Cheating will result in course failure. Additional action may be taken by the university.

Disruption of class. I will take whatever action is necessary to maintain a lecture atmosphere conducive to learning. I reserve the right to force involuntary withdrawal or make additional assignments in response to tardiness or disruptive behavior. Lab instructors have the same authority, and may deduct points from the quizzes or choose not to administer a quiz to a tardy student.

Studying is the responsibility of each student, and strategies differ. The following is a minimal approach:

1) Read the text material for both lab and lecture before attending.
2) Attend every lecture and take careful notes.
3) Within a day of each lecture and lab, review your notes to make sure you understand everything.
4) If you have trouble understanding anything, get help at once. I am always happy to help students, and the university also has a tutoring service.
5) Review the material again before each exam. You should plan to have done all of the things listed above before you study for the exam.
6) If you still have difficulties, you may need to take notes from your book before lecture, and/or rewrite your lecture notes to improve your understanding. Answering the questions at the end of each chapter may also help.

The keys to doing well are to do all of the reading, go to every lecture, and not fall behind on studying.

Exam material will come from both the text and lecture, and may not be covered in both. Questions will test both your retention of the material presented, as well as your understanding of underlying concepts.

Your most important resource will be yourself. You will choose your own grade, by choosing how hard you work in the course, and how effectively you study. The actual grades assigned by the instructor is just a reflection of your performance.

Performance of past sections. The following table shows the final distribution of grades in this class at the end of the Fall 2009, 2012, and 2013 semesters.

	F '09	F '12	F '13
A	3	12	4
A-	2	6	2
B+	1	4	2
B	6	18	7
B-	6	4	7
C+	3	9	1
C	14	10	8
C-	3	3	2
D+	4	3	4
D	4	4	5
D-	1	0	1
F	3	13	7
W	14	5	14
total	64	91	64

I reserve the right to make needed and appropriate adjustments in the syllabus.

TENTATIVE LECTURE SCHEDULE:

Date	Lecture topic	Chapter
Aug. 25	biology and science	1
27		
29		
Sep. 3	ecology intro	52
5		
8	populations	53
10		
12	communities	54
15		
17	**exam 1**	
19		
22	ecosystems	55
23		
25	cell division	13
29		
Oct. 1	genes	14
3		
6		
8	chromosomes	15
10	Darwin and evolution	22
13		
15	**exam 2**	
17	population genetics	23
20	speciation	24
22	history of life	25
24		
27	systematics	26
29		
31	Bacteria and Archaea	27
Nov. 3		
5	Protista	28
7	Fungi	31
10	plant kingdom	29, 30
12	**exam 3**	
14		
17	plant anatomy	35
19	plant transport	
21		
24	plant nutrition	36
Dec. 1		
3		
5	if time permits: plant reproduction, plant responses and viruses	38, 39, 19

TENTATIVE LAB SCHEDULE

#	week of	subject
1	Aug 25	Using the Scientific Method: Pill Bug Behavior
2	Sept 1	LABOR DAY: NO LABS
3	Sept 8	Population Growth
4	Sept 15	Field Trip
5	Sept 22	Microscope, Cell Division
6	Sept 29	Mendelian Genetics I
7	Oct 6	Mendelian Genetics II
8	Oct 13	Biochemical Evidence of Evolution, Mendelian Genetics III, Adaptive Mutants in Yeast
9	Oct 20	Survey of Bacteria
10	Oct 27	Survey of Protists
11	Nov 3	Survey of Fungi
12	Nov 10	Survey of Plants
13	Nov 17	Plant Anatomy
14	Nov 24	THANKSGIVING: NO LAB
15	Dec 1	Plant Physiology

As always with living organisms, we may have to make adjustments.

BIOL 122 General Biology II **2015**

Lecture: SCI 126 MWF 1:00-1:50PM
Lab section 241, SCI 216 Tuesday (T) 8:00AM – 11:50AM
Lab section 242, SCI 216 Tuesday (T) 12:00PM – 2:50PM
Lab section 243, SCI 216 Thursday (R) 12:00PM – 2:50PM

Instructor: Dr. Karen Barkel
Office hours: MW 11:00-11:50AM, 2:00-2:50PM, or by appointment
Contact info: Phone: 591-2544 email: karenbarkel@ferris.edu Office: 2116 ASC

Required Materials:
Lecture Materials: Biology, 9th edition by Campbell, 3 ringed binder
Laboratory Materials: General Biology 2 Laboratory Manual (Available at the Great Lakes Bookstore), notebook, calculator, 3 ringed binder
Required test materials:, #2 pencils, student ID, Pack of scantron sheets(Form 882-E)

Notes and Recording: Class material will be presented during the lectures. It is your responsibility to attend class, take notes, and become informed of any announcements made during your absence. GET TO KNOW OTHER STUDENTS IN THE CLASS! The questions for the exams will be taken from the material presented in class and the chapters assigned in the textbook. You may use a tape recorder for the lectures.

Attendance: Attendance in lecture is expected. Please BE ON TIME!!!! Random bonus quizzes may be given during the semester, you must be present to get these points! Attendance in lab is MANDATORY. Labs can not be made up. More than 2 missed laboratories (for any reason) will result in a failing grade in the class.

Course objectives:
As this course is the second of a two-part introductory biology sequence, it will continue to lay the foundation for further study in biology. See the lecture schedule for a list of topics covered.

General Education Outcomes: This course may be used to help fulfill the general education requirement for Scientific Understanding. A student succeeding in this course should:
1) have a working knowledge of the fundamental principles of a natural science discipline;
2) be able to use appropriate scientific reasoning skills to interpret and analyze content in the natural sciences;
3) have a basic understanding of the scientific method, scientific concepts, and the evolution of scientific ideas;
4) have a more positive attitude toward science and an increased confidence in their ability to understand science.

Specific Course outcomes: This course is the first of a two part introductory biology sequence, thus it will lay the foundation for further study in biology. A student succeeding in this course should be able to:
1) demonstrate by examination a majors-level introductory knowledge in molecular biology, cell biology (including bioenergetics and metabolism), molecular genetics, the diversity of Kingdom Animalia, and animal structure and function.
2) demonstrate the ability to use mathematics to solve problems in Biology and utilize graphs or tables to present data effectively.
3) use the scientific method to formulate hypotheses, design experiments, collect and analyze data, and draw conclusions.
4) show an ability to utilize equipment (such as a microscope) safely and effectively to complete lab assignments.

Exams: Examinations will be given during the normal lecture period on the dates are listed on the class schedule. Exams will include material covered in lecture and assigned readings in the textbook. Failure to take an exam at the scheduled time (see class schedule) will result in a grade of 0 for the exam. If you have a valid excuse, inform me ahead of time (except for hospitalization etc.), and provide written documentation within 2 weeks of the missed exam (proof of funeral, hospitalization, etc) the points missed will be added to the cumulative final exam. For example, if you missed exam 2 (with a valid excuse), the comprehensive final would be worth 300 points instead of 200 points. If given at least 2 weeks notice, you may be able to take an exam early if you have a school sponsored activity (with documentation).You will not receive your exams back but you may stop by my office (during my office hours/by appointment) to look them over. Exam grades will be posted on WebCT.
***Bring a scantron sheet (Form 882-E), 2 #2 pencils, and your student ID to each exam.

Grading: Final grades will be based on points earned in lecture (75%) and laboratory (25%). The Lecture grade (500 points) will be comprised of the average of 3 exams (100 points each) and a CUMULATIVE final (200 points) as well as any bonus quiz points earned during the semester. The final exam will include two parts, part one new material covered since the last exam (similar to a regular exam, 100 points) , and part 2 Cumulative material (material from the whole semester!: 100 points). Lab grades will be based on the score earned on lab quizzes (10-20 points each) and lab participation (assessed by your lab instructor). See lab section for more detail

Grading Scale:

A (≥94%)	C (73 - 76.9%)
A- (90 - 93.9%)	C- (70 - 72.9%)
B+ (87- 89.9%)	D+ (67 - 69.9%)
B (83-86.9%)	D (63 - 66.9%)
B- (80-82.9%)	D- (60 - 62.9%)
C+ (77 - 79.9%)	F (≤ 59.9%)

Academic Integrity: Any form of cheating will not be tolerated, and will result in failure of the course. Additional action may be taken by the University.

To do well in this course:

- Attend all lectures and labs, and BE ON TIME
- Exhibit professional behavior
- Take good notes, and organize them
- Read the assigned sections of the text book both before and after class
- Study your notes EVERY WEEK, not just before the exam
- Ask for help when you don't understand the material
- Do the weekly study questions posted on Ferris Connect (every week!) to make sure you really do understand!

Electronic Devices (Cell phones) must be turned off in the lecture hall.

Lecture Schedule: (subject to change)

Week		Dates	New Topic	Chapter reading
1	M	Jan 12	Intro / chemistry	2
	W	Jan 14	Water	3
	F	Jan 16	Organic molecules	4/5
2	M	Jan 19	**Martin Luther King Day (no class)**	
	W	Jan 21	Macromolecules	5
	F	Jan 23	Cells	6
3	M	Jan 26		6
	W	Jan 28	Membrane Structure and function	7
	F	Jan 30		7
4	M	Feb 2	Intro to the Metabolism	8
	W	Feb 5		8
	F	Feb 7	**Exam 1**	
5	M	Feb 9	Cellular Respiration	9
	W	Feb 19		9
	F	Feb 13		9
6	M	Feb 16	Photosynthesis	10
	W	Feb 18		10
	F	Feb 20	DNA structure	16
7	M	Feb 23		16
	W	Feb 25	Transcription and Translation	17
	F	Feb 27		17
8	M	Mar 2	Gene Regulation / Technology	18 (part)
	W	Mar 4		
	F	Mar 6	**Exam 2**	
9	M-F	Mar 9-13	SPRING BREAK	
10	M	Mar 16	Animal Evolution	32
	W	Mar 18	Invertebrate Diversity	33
	F	Mar 20		33
11	M	Mar 23		33
	W	Mar 25		33
	F	Mar 27	Chordate Diversity	34
12	M	Mar 30		34
	W	Apr 1		34
	F	Apr 3	No class – mid semester recess	
13	M	Apr 7	Animal Structure	40 / 34
	W	Apr 9		
	F	Apr 11		40
14	M	Apr 13	Animal Nutrition	40/41
	W	**Apr 15**	**Exam 3 – NEW DATE**	41
	F	Apr 17	Animal Nutrition	41
15	M	Apr 20		
	W	Apr 22	Circulation	42
	F	Apr 24	Gas Exchange	42
16	M	Apr 27		
	W	Apr 29	Reproduction	46
	F	May 1		46
17	W	**May 6 Wednesday 12:00-1:40pm**	2 Part Final (Part 1 new material, Part 2 cumulative)	

Lab information

Lab Grades: The points earned in lab will count for 25% of your final course grade.

Lab participation: You can earn up to 5 points each lab period for participation. You can lose these 5 points by being late to lab, leaving lab early, not participating in the activity, being disruptive in class. It is up to the discretion of your lab instructor to assign these points so make sure you know what he or she expects from you. (you are given one grace day). Lab books may be checked during any lab period.

Labs, and thus participation points earned, can not be made up for any reason. However, if you have a valid reason for missing your section (school – sponsored activity etc) you may request to attend another lab section in its place (within the same week) and still get credit for the lab. Bring a card with your name, section number (regular lab section), and lecture instructor (Dr. Barkel) to the instructor of the replacement lab and request their permission to attend that section. To get credit, you must provide written documentation (with explanation) within 2 weeks of the missed lab to Dr. Barkel. ***Missing more than 2 labs will result in a failing grade in the course**

Lab Quizzes: 150 points: Quizzes are worth 15 points each and will be given at the beginning of the lab period. Dates of each quiz are listed on the Lab schedule. The best 10 (of 11) quiz scores will count towards your lab grade. There are no make-ups for lab quizzes.

Lab Schedule: (subject to change)

Week of		Topic	
1)	Jan. 13/15	Macromolecules	
2)	Jan. 20/22	**No lab this week: Martin Luther King Day**	
3)	Jan. 27/29	Osmosis & Diffusion	Quiz 1 (macromolecules)
4)	Feb 3/5	Enzymes I	Quiz 2 (Osmosis)
5)	Feb. 10/12	Enzymes II	Quiz 3 (Enzymes)
6)	Feb. 17/19	Energy	Quiz 4 (Enzymes 2)
7)	Feb. 24/26	DNA I. Transformation 1, electrophoresis 1	Quiz 5 (energy)
8)	Mar. 3/5	DNA II: Transcription/translation, transformation 2, electrophoresis 2	Quiz 6 (DNA 1)
9)	Mar. 10/12	**No lab this week: Spring Break**	
10)	Mar. 17/19	Properties of DNA, transformation 3	
11)	Mar. 24/26	Invertebrate lab 1	Quiz 7(DNA 2 and 3)
12)	Mar. 31/Apr. 2	**No lab this week: Easter Break**	
13)	Apr. 7/9	Invertebrate lab 2	Quiz 8 (Invert 1 material)
14)	Apr 14/16	Histology	Quiz 9 (invert 2 material)
15)	Apr 21/23	Vertebrate Anatomy	Quiz 10 (Histology)
16)	Apr 28/30	Chordate Diversity	Quiz 11 (Vert anatomy)

BIOLOGY 205
HUMAN ANATOMY & PHYSIOLOGY
5 Credit Hours
Spring Semester 2015

Instructor: Dr. David Griffith
Office: 141C SCI
Phone: 591-5855
Office Hours: MTW: 1-2 PM, T: 10-11 AM; other hours by appointment
E-mail: griffida@ferris.edu; please do **NOT** use FerrisConnect for messages.

Course Web Site: **FerrisConnect**

Course Description

An integrated course in human anatomy and physiology which emphasizes structure and function as they relate to clinical considerations. Basic concepts of structure and function will be discussed at the cellular tissue and organ system levels. Laboratory will utilize cadavers in anatomical studies. Designed for students in allied health associate degree programs; and science education, medical technology and sports medicine baccalaureate degree programs. This course meets General Education requirements: Scientific Understanding, Lab.

Course Materials

1.Saladin 's Anatomy & Physiology, 4th Ed (2007); or
Saladin's Anatomy & Physiology, 3rd Ed (2003);
(To save money, look for 1st, 2nd, or 3rd Ed. online.)
READ YOUR TEXT DAILY. Assignments for 4th Ed are on Pages 5, 6, and 7 of this syllabus.
Chapters same in all Editions; pages different. Bring your text to LAB but not to lecture.
2. BIOL 205 Lab Manual, by Friar; at Rankin Bookstore.
3. #2 pencil

Class Schedule

Lecture:	MTWTh 12-12:50 SCI 126	Lab/Lecture Review: Th 1-3 SCI 222
Lab (SCI 222)	Sec. 211 – M : 3-5:50 PM	
	Sec. 212 – T: 3-5:50 PM	
	Sec. 213 – W : 8-10:50 AM	
	Sec. 214 – W : 3-5:50 PM	

General Education Outcomes:

This course may be used to help fulfill the general education requirement for Scientific Understanding. A student succeeding in this course should:

1) have a working knowledge of the fundamental principles of a natural science discipline;
2) be able to use appropriate scientific reasoning skills to interpret and analyze content in the natural sciences;
3) have a basic understanding of the scientific method, scientific concepts, and the evolution of scientific ideas;
4) have a more positive attitude toward science and an increased confidence in their ability to understand science.

Course Specific Outcomes: by the end of the semester, you will be able to demonstrate on lecture exams and quizzes, and laboratory quizzes:

1. knowledge of definitions of basic anatomical terminology.
2. an understanding of the relationship between structure (anatomy) and function (physiology)
3. an understanding of the concept of homeostasis, and how it applies to physiology.
4. the ability to describe the major anatomical features and functions of the 11 organ systems.
5. the ability to identify the major parts of the organ systems in the laboratory.
6. an understanding of physiological concepts learned in the laboratory.
7. the ability to describe and understand case examples of systems pathology.
8. the ability to explain, using specific examples, of how homeostatic mechanisms apply to your daily activities, including diet and exercise.
9. the ability to critically analyze reports in the news media about new developments in health and medicine.

Grading

Lecture Exam 1: 100 points
Lecture Exam 2: 100 points
Lecture Exam 3: 100 points
Lecture Exam 4: 100 points
Lecture Exam 5 (Final): 100 points
Lecture quizzes (these will be given most weeks of the semester; they may be unannounced)
Textbook reading guides (these may be given from time to time to encourage reading the text)
Lab quizzes (these will be given most weeks of the semester)
Journal entry in FerrisConnect: 20 points.
Your grade will be based on the total number of points in lecture and lab.
Source of lecture exam questions: Questions will be taken primarily from lecture and the text. Occasionally, articles may be assigned that may be used for questions as well. I reserve the right to ask questions from the assigned reading on every exam, even if the material **was not covered in class!** You are responsible for reading the text book. Each lecture exam will consist of approximately 50-100 multiple choice or matching questions. Short answer, definitions, and essays may be included. The comprehensive final exam will be 100 points, with approximately half the questions from the first 12 weeks, and half from the last 3 weeks. Your final exam average (%) may be used to replace your lowest score from the first four exams (unless your final has the worse average).
Note: There will be **no** opportunities for extra credit. All exams will count towards your final grade. Any students who have missed a lecture exam during the semester will have the average from the final exam replace the missing test score. If a student misses more than one exam, then a score of zero will be assigned to the second missed exam. NO EXCUSES WILL BE ACCEPTED FOR A MISSING EXAM! There are no make-ups for missed quizzes. All students must take the final exam, or else receive an 'F' for the course.

Grading Scale

A	93-100%	B-	80-82.9%	D+	67-69.5%
A-	90-92.9%	C+	77-79.9%	D	63-66.9%
B+	87-89.9%	C	73-76.9%	D-	60-62.9%
B	83-86.9%	C-	70-72.9%	F	Below 60%

Lecture Attendance Policy:

a. Attendance will **not** be taken in the classroom. Therefore, if you do not wish to be in the lecture hall, THEN DO NOT COME! Students talking in the classroom are very distracting to the students who want to learn. If you want to fail the course due to your poor attitude towards learning, then STAY HOME.

b. Tardiness. Do **not** be late. "[At Ferris], tardiness is an insult." (W.N Ferris, founder). Habitually late students (any time after class begins) may lose 2 points from their lecture grade. You are expected to be in your seat at least 30 seconds **BEFORE** class begins. I acknowledge that with attendance not being taken, that you may decide to skip class if you are running late. If this happens rarely, you should still come to class. However, if I encounter a situation where large numbers of students are showing up ten or fifteen minutes late to class, then I will put an end to tardiness. If you have a special situation which will cause you to be tardy, discuss the situation with me during the first week of class.

Electronic Devices

Electronic devices (cellular phones, walkmans, etc.) **must** be turned off in the lecture hall. **If your cell phone rings in class, you will be asked to leave.** If I see you texting during exams or quizzes, including the laboratory, you will automatically fail the exam.

Lab Assignments

If you miss a lab, you must make it up during the same week by arranging to attend another lab. There are four lab codes and most are full. Strive to avoid changing a lab. (The labs are listed above along with the day and time that each lab meets.) If you have a special event, e.g. a field trip in another course, PLAN AHEAD to attend another lab. Don't get caught short. (CALL or E-MAIL me IMMEDIATELY if you miss a lab.)

a. You MUST GET PERMISSION from me to attend another lab. **There will be a two point deduction from your quiz score whenever you attend a different lab.** No exceptions!

b. A lab that is missed and not made up by attending another lab will result in a "zero" grade for that lab. Lab attendance is mandatory. A quiz will be given each lab session. This quiz must be taken during your lab period. As per departmental policy, if you miss more than two labs during the semester, you will automatically receive an F for the course.

If you show up late to lab (anytime after lab is scheduled to begin) you will have 2 points deducted from your lab quiz for that day!

Academic Misconduct

"When any society loses faith in honesty, its disintegration is a certainty." W.N. Ferris, founder. Cheating will not be tolerated.

Students are referred to the section on **ACADEMIC MISCONDUCT** that is found on the final sheet attached to this syllabus. Note: you are not allowed to use cell phones during any exam or quiz in lecture or lab.

Disruptive Behaviors

Behaviors that are disruptive to learning will not be tolerated. Talking in class will **NOT** be tolerated. ANY STUDENT WHO HABITUALLY PERSISTS IN TALKING DURING LECTURE WILL BE ASKED TO LEAVE. (see syllabus attachment for further clarification). This applies to lab as well.

Children in the classroom

Students are strongly discouraged from bringing children to the lecture hall. Because of safety and liability reasons, under no circumstances will children be allowed in the laboratory.

Food and Beverages in the classroom

Water is acceptable, but food and beverages (e.g. pop) should not be consumed in class

TENTATIVE LECTURE SCHEDULE*

DATE	TOPIC	Reading Assignment
1-12	Introduction to the Human body	Ch 1
1-13	Introduction continued; The Chemistry of Life	Ch 2
1-14	The Chemistry of Life	Ch 2
1-15	Cell Structures and Their Functions	Ch 3
1-19	Martin Luther King Day: No Class	
1-20	Cell Structures and Their Functions	Ch 4 (126-142)
1-21	"	
1-22	Tissues, Glands, and Membranes	Ch 5
1-26	"	
1-27	Integumentary	Ch 6
1-28	"	
1-29	**EXAM 1**	
2-2	Skeletal	Ch 7
2-3	"	
2-4	Nervous system organization	Ch 12
2-5	Nervious system organization; Action Potentials	Ch 12
2-9	Nervous Tissue, Action Potentials	Ch 12
2-10	"	
2-11	Central Nervous System	Ch 14
2-12	"	Ch 14
2-16	"	
2-17	PNS	Ch 13
2-18	"	Ch 13
2-19	**EXAM 2**	
2-23	PNS	Ch 15
2-24	"	Ch 16
2-25	"	
2-26	"	
3-2	Sensory	Ch 16
3-3	"	
3-4	"	
3-5	"	
3-9	**Spring recess: no classes for the week!**	
3-16	Muscle Physiology	Ch 11
3-17	"	
3-18	"	
3-19	**EXAM 3**	

3-23	Endocrine	Ch 17
3-24	"	
3-25	Cardiovascular System: Blood; The Heart	Ch 18, 19
3-26	**Last day to drop!** "	
3-30	Cardiovascular System: Heart	Ch 19
3-31	"	
4-1	Cardiovascular System: Blood Vessels and Circulation	Ch 19
4-2	**Mid-semester recess: no classes today!**	
4-6	Digestion, Nutrition and Metabolism	Ch 25, 26
4-7	"	
4-8	"	
4-9	**EXAM 4**	
4-13	Lymphatic System	Ch 21
4-14	"	
4-15	Respiratory System	Ch 22
4-16	"	
4-20	Urinary System	Ch 23
4-21	"	
4-22		
4-23	Male Reproductive System	Ch 27
4-27	"	
4-28	Female Reproductive System	Ch 28
4-29	"	
4-30	"	

FINAL EXAM: Tuesday, May 5, at 12-1:40 PM
Note: you **cannot** take the final exam at a different time from your scheduled time without prior approval from the instructor

*Note: you will need to listen for announcements in class about changes to the schedule. If you miss class, then you are responsible for finding out about any changes that may have occurred.

BIOL-205 LABORATORY SCHEDULE SPRING 2015

Be sure to study lab assignments before coming to lab. Labs will begin with a pre-lab quiz over the material from the previous week's lab. Sometimes a quiz will be given on the current lab at the end.

ANATOMY LABS: Label and study all anatomy diagrams **before** coming to lab. **USE YOUR TEXT TO LABEL DIAGRAMS!**

PHYSIOLOGY LABS: Read entire lab and review the Review Questions (on yellow pages) **before** coming to lab.

Week/Date	Lab #	LECTURE TOPIC	INSTRUCTIONS and READING ASSIGNMENT (Review pages below in 4th Ed Saladin's A & P.)
1 1-12	Lab 3	Skeletal System Anatomy	See Text: pages 241-287. (Label diagrams in Lab 3.)
2 1-19		Martin Luther King Day: NO LABS THIS WEEK! (No class Monday, January 19)	
3 1-26	Lab 4	Cell Physiology	Read lab 4; Review Text: pages 102-105 (Diffusion)
4 2-2	Lab 2	Histology – Epithelium, Connective, Muscle, Nerve tissue	Read p.1-9 of Lab 2; Review Text: 156-173
6 2-9	Lab 7	Membrane Action Potential	Review Text pages 453-459; Read Lab # 7.
5 2-16	Lab 5	Neural Anatomy Bones of Skull	Review Text: 514-516, 519-521, Figs. 14.1, 14.2, 14.5, 14.6, 14.13 Review Text: 244-249, 254 (Label diagrams in Lab 5.)
7 2-23	Lab 6	Nervous System Function	Review Text pages 502-507; Read Lab # 6.
8 3-2	Lab 8	Contraction of Skel. Muscles	Review Text pages ; Read 412-425; Lab # 8.
3-9		SPRING BREAK!	
9 3-16	Lab 9	Muscle Anatomy	Text: 326-330, 342-348,352-358,368-377; (Label diagrams in Lab 9)
	Lab 10	CVS Anatomy: Blood Cells	Text: (Review WBC on pages 697-700 before coming to lab.)
10 3-23	Lab 10	CVS Anatomy	Text: 780-799; (Label diagrams in Lab 10)
	Lab 11	Respiration Anatomy	Text: 855, 857, 862-863 (Label Lab 11)
	Lab 11	Digestion Anatomy	Text: 955-957, 961, 967-968, 975-977, 980-982, 991; (Label diagrams in Lab 11)
11 3-30		Mid semester recess begins on Thursday, April 2!	
Lab 14		Cardiac Muscle Physiology: Turtle Heart:	Review Text 731-733 (Read Lab # 14.)
12 4-6	Lab 12	Circulatory System: Human ECG, Bld Pressure:	Review Text 762-765; 733-735 (Read Lab # 12.)
13 4-13	Lab 13	Urinary Anatomy	Text: 897-902 (Label diagrams in Lab 13)
	Lab 13	Reproductive Anatomy	Text: 1042-1048, 1067-1074 (Label diagrams in Lab 13)
14 4-20		Take Quiz over Lab 13; REVIEW for Lab Practical; Sign for 1.4-hour time-slot to take Lab Exam next week.	
15 4-27		LAB PRACTICAL EXAM OVER ALL LABS. Come on the day and time for which you signed.	

FOR YOUR SAFETY, PLEASE DO NOT BRING FOOD or BEVERAGES into LAB.

FOR THE SAFETY OF SMALL CHILDREN, THEY ARE NOT PERMITTED IN LAB.

207

Dr. P.L. Watson
2113 ASC
Phone 1-231-591-2558
email @ watsonp@ferris.edu

course web page
http://www.ferris.edu/htmls/academics/course.offerings/physbo/biology/watson/b307.htm

Texts
1. **Forensic Entomology by Byrd and Castner (not critical) (CRC Press)**
2. **Laboratory Notebook with duplicate canary carbon sheets. (required)**
3. **Lab book course pack (required)**
4. **Pocket data book (optional)**

Lecture 10 am in Starr 136 Monday and Wednesday
Lab Section 211 @ 8 am to 11 am Thursday in Science 227
Section 212 @ 1:30 pm to 4:20 pm Thursday in Science 227

Grading

3 Lecture exams @ 100 points each	300
lab assignments and lab book	150
1 optional final (replaces lowest score)	(100)
2 lab exams @ 50 pts each	100
4 to ? quizzes in lecture @ 5 pts each	20 + points (extra points)
Total points	550 points

A = 508 (92.5%)	**A-** = 493 (89.5%)	**B+** = 481 (87.5%)	**B** = 453 (82.5%)
B- = 437 (79.5%)	**C+** = 426 (77.5%)	**C** = 398 (72.5%)	**C-** = 382(69.5%)
D+ = 371 (67.5%)	**D** = 343 (62.5%)	**D-** = 327 (59.5%)	**F**= 326 & below (59.4% & below)

Grade postings will be posted outside of our lab (Science 227) by the last four digits of your student number **and on the web**

Attendance policy: __**Lecture--none**, but a missed quiz cannot be made up, **additional notes** given in class will also **be your** responsibility

_____**Lab is mandatory !---missed labs = missed lab points**

Excessive tardiness (5 minutes) will result in not being **able to start** an exam or lab exercise **Note** there are no make up exams except for documented excuses.

Questions Come to my office hours, **email me**, or call and leave a clear message as to the problem or question. I will take care of the problem or answer the question at our next meeting

Biol207
crime

Lecture notes on web

Lecture notes on web

Lecture Dates	Lecture topics	Readings
Aug. 28	Value and history of biology in forensics & scene investigations	Forensic Entomology pages 81-92+ notes
Aug 30	Ecology of the crime scene	Forensic Entomology pages 81-92 + notes
Sept.4	Labor day	No class
Sept. 6	Ecology of the crime scene (biological)	Forensic Entomology pages 81-92 + notes
Sept 11.	Forensic Botany	Notes & handouts
Sept. 13	Forensic Botany	Notes & handouts
Sept. 18	***Test 1***	
Sept. 20	Introduction to Invertebrates	Forensic Entomology pages 1-43 + notes
Sept. 25	Collection of entomological evidence	Forensic Entomology pages 1-43 + notes
Sept. 27	Procedures in the entomology laboratory	Forensic Entomology pages 121-142 + notes
Oct. 2	Principles of forensic entomology	Forensic Entomology pages 121-142 + notes
Oct. 4	Principles of forensic entomology	Forensic Entomology pages 121-142 + notes
Oct. 9	Insects and bloodstain evidence	Forensic Entomology pages 353-378 + notes
Oct 11	Insects and living humans	Forensic Entomology pages 121-142 + notes
Oct. 16	Natural History of carrion feeding invertebrates	Forensic Entomology pages 121-142 + notes
Oct. 18	Natural History of carrion feeding invertebrates	Forensic Entomology pages 43-79 + notes
Oct. 23	Flies/beetles	Forensic Entomology pages 43-79 + notes
Oct. 25	Aquatic fauna	Forensic Entomology pages 43-79 + notes
Oct. 30	Soil fauna	Forensic Entomology pages 177-122 + notes
Nov. 1	Estimation of post mortem interval	Forensic Entomology pages 223-262 + notes
Nov. 6	***Test 2***	Forensic Entomology pages 263-302 + notes
Nov 8	DNA and genetics	Notes- Inman & Rudin pgs 29-34
Nov. 13	DNA typing	Notes- Inman & Rudin pgs 29-34
Nov. 15	Collection of DNA evidence	Notes- Inman & Rudin pgs 29-34
Nov. 20	RFLP analysis and PCR amplification	Notes- Inman & Rudin pgs 11-15
Nov. 22	Procedures of DNA analysis	Notes- Inman & Rudin pgs 37 - 55
Nov. 27	Probability and significance	Notes- Inman & Rudin pgs 59- 83
Nov. 29	Admissibility/ case studies	Notes- Inman & Rudin pgs87-104
Dec. 4	***Test 3***	Notes- Inman & Rudin pgs 145-152
Dec. 6	[redacted] -TBA	
Dec 11-15	Exam week	

Personal record of class scores

TEST 1 _____ TEST 2_____ TEST 3_____		LABBOCK 1_____ LABBOOK 2_____		EXAM SCORES_____ LAB SCORES _____ QUIZ POINTS _____ TOTAL POINTS _____
TEST 4_____ TEST FINAL_____ TOP 4 TESTS_____		LAB quiz 1_____ LAB quiz 2 _____		

MICROBIAL ECOLOGY
BIOL 218, 3 Credit Hours
SPRING 2014

COURSE DESCRIPTION AND PREREQUISITES:
The course will cover an introduction to microbial cells; microbial interactions, both intraspecific and interspecific, including the roles of microbes in plant and animal ecology; microbial responses to abiotic environmental factors and their role in biogeochemical cycling and biodegradation; and the use of microbes in environmental applications, such as heavy metal and petroleum bioremediation, pest control, wastewater treatment, and the production of alternative energy sources. This course is designed for biology education, environmental biology, and environmental health students and meets General Education requirements: Scientific Understanding Lab. ***The prerequisite for this course is passing Biol 121 with a C- or better.***

CONTACT INFORMATION:
Professor: Dr. Anne M. Spain
Office: ASC 2118
Email: annespain@ferris.edu
Office phone: 231.591.3190

COURSE INFORMATION:
Lecture: Starr Rm. 136
TR 12:00-12:50

> ***You will be held responsible for all in-class announcements, assignments, handouts, etc., even if you are late or absent. See attendance policy for more detail.***

Lab: Science Building Rm. 215
Section 221: MW 9:30-10:45 a.m.

OFFICE HOURS
TR 1:00 – 3:00 p.m.
Or by appointment

All students are highly encouraged to primarily use office hours for any and all questions regarding class material and grades. These office hours are an opportunity where you can come and go over recent exams and quizzes, or ask questions regarding class material for which you may need further explanation or help understanding. You are encouraged to make appointments but walk-ins are welcome and will be accommodated whenever possible. If you score below 60% on any lecture exam, **you are required** to schedule and attend at least one office hours session to go over your results.

REQUIRED COURSE MATERIALS:
Textbook: *Microbial Ecology*. By Larry L. Barton and Diana E. Northup. Wiley-Blackwell, 2011.

Laboratory Manual: *Benson's Microbial Applications*, 12th edition. By Alfred E. Brown. McGraw-Hill Education, 2011.

Other supplies: Cloth lab coat, bound laboratory notebook, marking pen (sharpie), and a scientific calculator (needed for lecture exams and laboratory exercises and quizzes). A no. 2 pencil will also be required on exam days. Access to a computer and printer will also be highly important – Lecture outlines and some lab materials will also be available on the designated FerrisConnect site for this course. It is advised that you print off your lecture outlines prior to each lecture class.

GENERAL EDUCATION LEARNING OUTCOMES:
This course may be used to help fulfill the general education requirement for Scientific Understanding. A student succeeding in this course should: 1) have a working knowledge of the fundamental principles of a natural science discipline; 2) be able to use appropriate scientific reasoning skills to interpret and analyze content in the natural sciences; 3) have a basic understanding of the scientific method, scientific concepts, and the evolution of scientific ideas; and 4) have a more positive attitude toward science and an increased confidence in their ability to understand science.

SPECIFIC COURSE GOALS AND LEARNING OUTCOMES: Each of the general education outcomes listed above will be addressed and assessed over the course of the semester. Some will be dealt with in lecture, others in laboratory, and others in both. Listed below are several specific learning objectives for students in this course. By the end of this course, you should be able to:

1) Demonstrate a general majors-level knowledge and understanding in key areas of Microbial Ecology:

a) *The microbial cell and microbial ecology.* In this unit, you will give examples of and compare and contrast different types of microbial cells (including bacteria, archaea, and microeukaryotes); identify various cell structures and define their functions; and understand basic cellular processes, such as molecular genetics, metabolism, and growth. You will learn taxonomic vs. functional approaches to assessing microbial diversity, and learn about methods used to address questions in the field of microbial ecology.
b) *Microbial interactions:* In this unit, you will understand how environmental parameters affect microbial growth, and identify ways in which microbes interact with each other, their environment (e.g. soil, water, air), plants, and animals.
c) *Microbial applications:* In this unit, you will use your knowledge of microbial metabolism to understand how microbes can be used in various environmental and industrial applications, such as wastewater treatment, bioremediation of metals and petroleum, ethanol production, and food and beverage production.

Knowledge and understanding in these areas will be assessed via individual and group class quizzes and assignments, laboratory quizzes, lecture exams, and a comprehensive final exam.

2) Demonstrate proper laboratory skills and develop habits of good laboratory practices that extend to your everyday life and future careers. *This will be assessed via laboratory exercises, laboratory notebooks entries, laboratory quizzes, and the laboratory practical.*

3) Critically think about data collected upon observations from laboratory exercises and experiments. Plot data when appropriate and interpret any trends. Make inferences and predictions based upon the interpretations. *This will be assessed via laboratory quizzes, a written laboratory report, and the laboratory practical.*

4) Communicate effectively individually and in group settings and exchange ideas concerning course-related topics. Read, write, and speak about Microbiology with classmates and members of the community. *This will be assessed via short writing assignments, a written laboratory report, group quizzes and assignments, and short answer and essay questions on lecture exams.*

COURSE POLICIES:

Cheating and plagiarism: Any instance of cheating or failure to use one's own thoughts, words, or figures/tables (i.e. plagiarism) on a quiz, exam, or written assignment will result in a "0" for the entire graded item. Additional information regarding policies regarding academic misconduct can be found at: http://www.ferris.edu/HTMLS/administration/studentaffairs/studenthandbook/general/homepage.htm

Lecture Attendance: Students are expected to 1) attend lecture regularly and 2) read assigned chapter readings BEFORE each class. Lecture outlines will be provided on your FerrisConnect course site at least one day before each class and can be used as a tool to take notes from your assigned reading. Coming to class prepared in this way will greatly improve chances of success in this course, and will be reflected in individual and group quizzes and assignments. All graded materials must be completed and turned in on time, but you may turn in assignments early. Make up exams will be provided only in the case of an excused absence. You must contact me **within one day** of the missed exam and provide **written evidence** within one week to explain your absence. If you know in advance that you will be

absent for an exam, please contact me immediately. **For unexcused absences, there are no makeups for exams, in-class quizzes, and/or assignments.**

Lab Attendance: Because the lab is an essential component of this course, anyone with **more than two (2) unexcused absences from lab will receive an 'F' for the course**. There is only one lab section for this course, so there will not be lab make-up sessions available for either excused or unexcused absences.

The following are instances of excused absences:

1. Severe illness or hospitalization, with documentation from your physician
2. Jury duty, with a copy of your court summons
3. Bereavement, with a letter from a family member or obituary notice.
4. Ferris-sponsored sporting event, with a letter from your coach

The following are NOT instances of excused absences:

1. Oversleeping – get a better alarm clock
2. Work – You agreed to the class schedule when you signed up for the course
3. Appointments – see number two
4. Traveling – see number two
5. Other classes conflict – see number two
6. Jail or prison time – you have bigger problems than a missed deadline
7. Illness without documentation – you must have a physician's note
8. Forgot deadlines – they are your responsibility
9. Bad weather – if Ferris is open, our classes will meet as scheduled
10. Confusion – ask questions earlier rather than later!
11. Computer problems – there are over 100 computers available in the library alone

GRADING GUIDELINES: There is a total of 1000 points in this class; the distribution of these points is shown below

***Calculation of Final Grade*:** This course is designed to be out of a total of 1000 possible points. Your final grade is based on the number of points that you earn out of these 1000 points. Your midterm grade will be posted by March 10, 2014. For both your midterm and final grades, there will be no curves or adjustments given. As well, there will be no extra credit assignments given; however, there may be bonus questions available on quizzes and tests. The point range for each possible grade is shown below:

FINAL POINTS	FINAL PERCENT	GRADE
930-1000	93.0-100%	A
900-929	90.0-92.9%	A-
870-899	87.0-89.9%	B+
830-869	83.0-86.9%	B
800-829	80.0-82.9%	B-
770-799	77.0-79.9%	C+
730-769	73.0-76.9%	C
700-729	70.0-72.9%	C-
670-699	67.0-69.9%	D+
630-669	63.0-66.9%	D
600-629	60.0-62.9%	D-
<600	<60%	F

Description of Course Components and Distribution of Points:

Component	Description	Points	% of Final Grade
Lecture: The lecture portion of this class makes up 67% of your final grade (670 points). On the next page is a detailed lecture schedule; below is a description of the graded components of the lab.			
Lecture Exams	Each lecture exam will consist of a combination of multiple choice, T/F, matching, fill-in-the-blank, and short answer, and/or essay questions.	**500**	**50**
Exam 1	Unit 1 exam **(150 pts)**		
Exam 2	Unit 2 exam **(150 pts)**		
Exam 3	Comprehensive final exam, covering material from Units 1-3 **(200 pts)**		
Lecture quizzes	Individual and group quizzes and assignments will be given in class randomly; thus, you must be in attendance to receive pts.	**100**	**10**
Short writing assignments	One short writing assignment (1-2 pages) will be assigned during each unit in the class. Each writing assignment will involve reading a research article and discussing a current topic in microbial ecology. Specific instructions will be given with each assignment.	**45**	**4.5**
Group evaluations	At the end of the semester, each group member will evaluate oneself as well as each of his/her fellow group members. Your grade will be based on your evaluations from your peers, but will be assigned by myself.	**25**	**2.5**
Lab: The laboratory portion of this class makes up 33% of your final grade (330 points). On the last page, you will find a detailed schedule; below is a description of the graded components of the lab.			
Laboratory quizzes	There will be ten 10-point quizzes given on the Wednesday of each week, ***at the beginning of class***, covering any background/reading material covered, lab procedures performed, and/or data analyzed since the previous week's quiz. There will also be one bonus 10-point quiz given toward the end of the semester (Lab Quiz 11).	**100**	**10**
Lab Practical	At the end of the semester, there will be a 50-question laboratory practical. This will consist of twenty-five timed stations (two questions at each station) covering the materials seen and worked with over the course of the semester. The lab session held prior to the practical exam will be devoted to reviewing the materials for this exam.	**100**	**10**
Lab Notebook	You will be required to record ***in pen*** your methods and observations from all laboratory exercises and analyze these data in a bound lab notebook. A 40-point analytic rubric will be used to score your entries twice during the semester.	**80**	**8**
Lab Report	You will write a complete lab report (Abstract, Introduction, Materials and Methods, Results, and Discussion) for one lab experiment carried out this semester. Complete instructions will be provided in lab.	**50**	**5**
	Total	**1000**	**100**

LECTURE SCHEDULE:

Day	Date	Lecture Title	Reading Assignment
		Unit One: Introduction to Microbial Cells and Microbial Ecology	
T	Jan 14	Our Microbial Biosphere	1.1-1.2
R	Jan 16	The Microbial Cell	1.6-1.61
T	Jan 21		3.1-3.7.3
R	Jan 23	Microbial Metabolism and Energetics	1.6.2
T	Jan 28		3.9-3.10
R	Jan 30	Microbial Growth and Adaptation	1.6.3-1.6.4
T	Feb 4	Current Trend in Microbial Ecology	1.7-1.10
R	Feb 6	Microbial Evolution and Life on Early Earth	1.3-1.5.4
T	Feb 11	Microbial Diversity	2.1-2.4.2
R	Feb 13		2.6-2.10
T	**Feb 18**	**Unit One Exam – 150 pts**	
		Unit Two: Microbial Interactions	
	Feb 20	Microbe-Microbe Interactions	6.1-6.9
T	Feb 25	Microbes and the Environment	N/A
R	Feb 27		4.1-4.3.2
T	Mar 4		4.4-4.6.2
R	Mar 6		10.1-10.5.4
		No classes for the week of Mar 10-Mar 14: SPRING BREAK!	
T	Mar 18	Microbes and the Environment, cont	10.6-10.8.2
R	Mar 20	Plant-Microbe Interactions	7.1-7.7.3
T	Mar 25	Animal-Microbe Interactions	8.1-8.7.2
R	Mar 27	Microbial Communities	9.1-9.6.1
T	Apr 1		9.8-9.12
R	**Apr 3**	**Unit Two Exam – 150 pts**	
		Unit Three: Microbial Applications	
T	Apr 8	Biodegradation of Natural Compounds	12.1-12.7.4
R	Apr 10	Wastewater Treatment and Compost Microbiology	12.10-12.11
T	Apr 15	Bioremediation	13.1-13.7.4
R	Apr 17	***Mid-semester recess: No classes!***	
T	Apr 22	Bioremediation, cont	13.8-13.9.5
R	Apr 24	Microbiology of Fermented Foods	12.8
T	Apr 29	Microbial Energy Production	12.9-12.9.4
R	May 1	Microbial Production of Natural Products	N/A
Thursday, May 9; 12:00-1:40 p.m. Comprehensive Final Exam (200 points)			

*Dates and topics are subject to change – Announcements regarding changes will always be made in class. Thus, if you miss class, it is your responsibility to find out if there were any changes to the lecture schedule.

LAB SCHEDULE:

Day	Date	Titles of Lab Exercises (Exercise No.)
M	Jan. 13	Lab Safety; Introduction to Keeping a Laboratory Notebook
W	Jan. 15	Brightfield Microscopy (3); Smear Preparation (11); Simple Staining (12)
M	Jan. 20	***No Labs***
W	Jan. 22	Preparation of Soil/Sediment Slurries (Handout); Ubiquity of Bacteria (7)
M	Jan. 27	**Quiz 1**; Ubiquity Follow-Up (7); Aseptic Technique (9); Pure Cultures (10)
W	Jan. 29	Aseptic Techniques and Pure Cultures Follow-Ups (9, 10); Gram-Staining (15)
M	Feb. 3	**Quiz 2**; Endospore Stain (16) and Capsule Stain (14); Acid Fast Stain demo (17)
W	Feb. 5	Cultivation of Anaerobes (21); Set up Winogradski Columns (54)
M	Feb. 10	**Quiz 3**; Anaerobes Follow-Up (21); Enumeration of Bacteria (22)
W	Feb. 12	Enumeration Follow-Up (22); Diversity of Cyanobacteria and Protists (6)
M	Feb. 17	**Quiz 4**; Fungal Diversity (8)
W	Feb. 19	Microbial Interactions: Commensalism, Synergism, and Antagonism (57, 58, 59)
M	Feb. 24	**Quiz 5**; Microbial Interactions Follow-Up (57, 58, 59)
W	Feb. 26	Effects of Environmental Parameters on Microbial Growth (29, 31, 32)
M	Mar. 3	**Quiz 6**; Lethal Effects of UV Exposure (33)
W	Mar. 5	Environmental Parameters and UV Exposure Follow-Ups (29, 31, 32, 33)
SPRING BREAK (MAR. 10-14): NO LABS		
M	Mar. 17	Denitrification and Ammonia Oxidation (Handout)
W	Mar. 19	**Quiz 7**; Ammonification (50); Free-Living N_2 Fixation (52)
M	Mar. 24	Denitrification and Ammonia Oxidation Follow-Up (Handout)
W	Mar. 26	Ammonification Follow-Up (50); N_2 Fixation, Pt. 2 (52)
M	Mar. 31	**Quiz 8**; N_2 Fixation, Pt. 3 (52)
W	Apr. 2	Purple Non-Sulfur Phototrophs (55); Sulfate-Reducing Bacteria (56)
M	Apr. 7	**Quiz 9**; Isolation of an Antibiotic Producer (49)
W	Apr. 9	Phototrophs and SRB Follow-Ups (55, 56)
M	Apr. 14	**Quiz 10**; N_2 Fixation, Pt. 4 (52); Antibiotic Producer, Pt 2 (49)
W	Apr. 16	Antibiotic Producer, Pt 3 (49); Alcohol Fermentation (65)
M	Apr. 21	**Quiz 11**; Antibiotic Producer, Pt 4 (49); Alcohol Fermentation Follow-Up (65)
W	Apr. 23	Visit to the Big Rapids Wastewater Treatment Plant
M	Apr. 28	Lab Practical Review Session
W	Apr. 30	**Laboratory Practical Exam (*Lab Checkout)**

* All lab coats left in the laboratory after check out will be held until Friday, May 17. After that, they will be donated to area schools.

BIOL 272 Marine Biology **2015**
Lecture: SCI 137 MWF 10:00-10:50AM

Instructor: Dr. Karen Barkel
Office hours: MW 11:00-11:50AM, 2:00-2:50PM, or by appointment
Contact info: Phone: 591-2544 email: karenbarkel@ferris.edu Office: 2116 ASC

Required Materials:
Lecture Materials: **Marine** Biology, 9th edition by Castro and Huber, 3 ringed binder
Required test materials:, #2 pencils, student ID, Pack of scantron sheets(Form 882-E)

Marine Biology is intended for students from any program that have an interest in learning more about organisms, communities, and ecosystems found in the marine environment. Students will learn about the process of science and how it relates to what we know (and don't know) about the marine environment. An emphasis will be placed on connections to current economic and political issues such as over-harvest, pollution, climate change, and the conservation of species and habitats.

General Education Outcomes: This course may be used to help fulfill the general education requirement for Scientific Understanding. A student succeeding in this course should:
1) have a working knowledge of the fundamental principles of a natural science discipline;
2) be able to use appropriate scientific reasoning skills to interpret and analyze content in the natural sciences;
3) have a basic understanding of the scientific method, scientific concepts, and the evolution of scientific ideas;
4) have a more positive attitude toward science and an increased confidence in their ability to understand science.

Specific Course outcomes: A student succeeding in this course should be able to:
1) explain the physical features that make marine habitats unique, and how they influence the community of organisms that persist there;
2) interpret data from a scientific experiment, with an understanding of the limitations;
3) apply the concept of natural selection to examples of adaptations found in marine organisms.
4) distinguish different marine ecosystems, including the physical and biological features that make them unique;
5) identify examples of how the productivity and health of marine systems are linked to their every day lives.
6) connect the choices they make to the current and future status of marine organisms.

Notes: Class material will be presented during the lectures. It is your responsibility to attend class, take notes, and become informed of any announcements made during your absence. GET TO KNOW OTHER STUDENTS IN THE CLASS! The questions for the exams will be taken from the material presented in class and the chapters assigned in the textbook.

Attendance in lecture is expected. Please BE ON TIME!!!! Random quizzes will be given during lecture, you must be present to get these points!

Academic Integrity: Any form of cheating will not be tolerated, and will result in a zero for the exam, quiz or assignment and possible failure of the course. Additional action may be taken by the University.

Exams: Examinations will be given during the normal lecture period on the dates are listed on the class schedule (any changes will be discussed in class). Exams will include material covered in lecture and assigned readings in the textbook. Failure to take an exam at the scheduled time (see class schedule) will result in a grade of 0 for the exam. If you have a valid excuse, inform me ahead of time (except for hospitalization etc.), and provide written documentation within 2 weeks of the missed exam (proof of funeral, hospitalization, etc) the cumulative final exam may be used to replace the missed exam. If given at least 2 weeks notice, you may be able to take an exam early if you have a school-sponsored activity (with documentation). You will not receive your exams back but you may stop by my office (during my office hours/by appointment) to look them over. Exam grades will be posted on Ferris Connect.
***Bring a scantron sheet (Form 882-E), 2 #2 pencils, and your student ID to each exam.

Grading: Final grades will be based on points earned in lecture will be comprised of the average of 5 exams (100 points each) as well as any quiz points earned during the semester (given on a regular basis). The CUMULATIVE final (100) may replace an exam score, or may be used as a make up for an **excused** missed exam.

Grading Scale:

A (≥94%)	C (73 - 76.9%)
A- (90 - 93.9%)	C- (70 - 72.9%)
B+ (87- 89.9%)	D+ (67 - 69.9%)
B (83-86.9%)	D (63 - 66.9%)
B- (80-82.9%)	D- (60 - 62.9%)
C+ (77 - 79.9%)	F (≤ 59.9%)

To do well in this course:

- Attend all lectures and labs, and BE ON TIME
- Exhibit professional behavior
- Take good notes, and organize them
- Read the assigned sections of the text book both before class
- Study your notes EVERY WEEK, not just before the exam
- Ask for help when you don't understand the material
- Do the weekly study questions posted on Ferris Connect (every week!) to make sure you really do understand!
- Test yourself before the exams

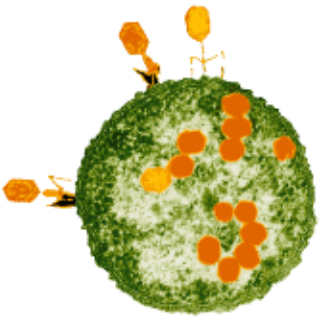
Electronic Devices (Cell phones) must be turned off in the lecture room.

Lecture Schedule: (subject to change)

Week		Dates	New Topic	Chapter reading
1	M	Jan 12	Marine Biology, basic history of the discipline	1
	W	Jan 14		1
	F	Jan 16	Sea Floor	2
2	M	Jan 19	**Martin Luther King Day (no class)**	
	W	Jan 21	Sea Floor	2
	F	Jan 23	Seawater	3
3	M	Jan 26		3
	W	Jan 28	Basic concepts of Biology	4
	F	Jan 30		4
4	M	Feb 2	**Exam 1**	
	W	Feb 5	Microorganisms - from bacteria to zoo plankton	5
	F	Feb 7		5
5	M	Feb 9	Seaweed and Marine plants	6
	W	Feb 19		6
	F	Feb 13	Invertebrates	7
6	M	Feb 16		7
	W	Feb 18		7
	F	Feb 20		7
7	M	Feb 23	**Exam 2**	
	W	Feb 25	Lower Chordates and Fishes	8
	F	Feb 27		8
8	M	Mar 2	Marine Birds, Reptiles, and Mammals	9
	W	Mar 4		9
	F	Mar 6	Marine Ecology - An introduction to ecological concepts	10
9	M-F	Mar 9-13	SPRING BREAK	
10	M	Mar 16		10
	W	Mar 18		10
	F	Mar 20	**Exam 3**	
11	M	Mar 23	Intertidal zone	11
	W	Mar 25		11
	F	Mar 27	Estuaries	12

12	M	Mar 30		12
	W	Apr 1	Continental shelf	13
	F	Apr 3	No class – mid semester recess	
13	M	Apr 6	Continental shelf	13
	W	Apr 8	Coral Reefs	14
	F	Apr 10		14
14	M	Apr 13	**Exam 4**	
	W	Apr 15	Surface waters	15
	F	Apr 17	Deep Sea	16
15	M	Apr 20	Resources	17
	W	Apr 22		17
	F	Apr 24	Impact of Humans	18
16	M	Apr 27		18
	W	Apr 29	Policy	19
	F	May 1	**Exam 5**	
17	T	**May 5, Tuesday 10:00-11:40pm**	FINAL EXAM	

BIOL 286: General Microbiology
Course Syllabus, Spring 2015



In order to optimize student learning, the standards and requirements set forth in this syllabus may be modified during the semester. Notice of any such changes will be announced in class and posted on our FerrisConnect course homepage.

Class location and meeting time

Lectures will be held on Mondays and Wednesdays from **4:00 to 4:50 pm** in **IRC-120**. The laboratory sessions will meet on Tuesdays and Thursdays at either **12:00 to 1:15 pm**, **1:30 to 2:45 pm**, or **3:00 to 4:15 pm** in **SCI-215**. You are responsible for all announcements, assignments, handouts, etc., even if you are late or absent (see the attendance policy for more details).

Contact information

Instructor name:	Dr. Clifton Franklund	Ms. Kim Andrus
Office:	ASC 2011	ASC 2015E
Telephone:	(231) 591-2552	(231) 591-3678
Email:	franklc@ferris.edu	KimberlyAndrus@ferris.edu
Twitter:	@Dr_Franklund	
Web site:	http://franklund-micro.com	

Contacting Dr. Franklund

Office hours: [M | W | F] from 1:00 to 2:00 pm

I will maintain official office hours as indicated above. These are first come, first served – you are encouraged to make appointments but walk-ins are welcome and will be accommodated whenever possible. You can sign up times online at http://cliftonfranklund.youcanbook.me. In addition, I have posted my schedule outside of my office door. **All** of my "free" time is available to you as office hours. Simply find the day that works for you and sign up for a meeting (in 15-minute increments).

Email: You can expect me to reply to your email questions within 24 hours during the work week and within 48 hours on weekends and holidays.

If you score below 60% on any exam, I will **require** you to briefly meeting with me to discuss your performance. Bring your completed feedback email report, your exam, and your notes. We will work together to try to find strategies to improve your performance over time.

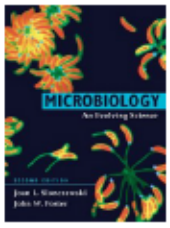
Prerequisites

CHEM 122: General Chemistry 2 or consent of the instructor

Course description

Introduction to the microbial world including microbial structure, function, metabolism, classification, genetics, control of microbial growth and immunity. The laboratory provides practical experience with fundamental concepts, techniques and instrumentation. This course is designed for students in the clinical laboratory science program and is open to other students by permission of the professor.

Required texts and materials



Textbook: *Microbiology: An Evolving Science 2nd edition by Slonczewski and Foster. 2011* (ISBN 0-393-93447-0)

Lab notebook: We will be using the hardcover *Student Laboratory Notebook* published by the American Society for Microbiology Press, 2005. (ISBN 1-55581-358-5)

Required materials: We will be using Turning Technologies ResponseCard NXT clickers in class this semester. These will be required for in-class review questions, bonus quizzes and for taking lecture and lab exams.

A cloth lab coat, a Sharpie™, access to a digital camera (e.g. iPhone, android phone), and colored pencils (pink, red, green, blue, yellow, and black are needed) will be required for lab.

Optional materials*:* You should seriously consider getting a 3-inch D-ring binder for your class notes. Other optional materials include a scientific calculator, a USB flash drive, and a wax pencil for the laboratory. A copy of ***A Student Handbook for Writing in Biology 3rd edition by Knisely. 2009*** is potentially useful, but completely optional.

Learning outcomes

I have several specific learning objectives for you in this course and they are listed below. Some of these will be covered in lab, others in lecture, and many in both. By the conclusion of this course, you should be able to:

A. ***Microbial Diversity*** - Give examples of and compare and contrast different types of microbial cells (including viruses, bacteria, fungi, and protozoa). Identify cell structures and define their functions.
Assessed via laboratory and online quizzes or reports, questions from lecture exams 1, 2 and 3, the laboratory practical, and the comprehensive final exam.

B. ***Microbial Metabolism*** - Explain the various metabolic strategies employed by microbes. Provide specific examples of how metabolism is linked to environmental cycling of elements and pathogenesis.
Assessed via laboratory and online quizzes or reports, questions from lecture exams 2, and 3, the laboratory practical, and the comprehensive final exam.

C. ***Microbial Genetics*** - Describe basic concepts involving how genetic information flows in microbial cells. Detail the importance of mutation, recombination, and lateral genetic exchange in virulence.
Assessed laboratory and online quizzes or reports, questions from lecture exam 3, the laboratory practical, and the comprehensive final exam.

D. ***Host-Microbe Interactions*** - Differentiate between the innate, humoral, and cellular defenses and identify points of interaction. Explain how inappropriate immune responses can result in host damage. Compare the different interactions possible between host and microbial cells. Describe several different molecular strategies employed by microbial pathogens and give several specific examples of each.
Assessed via laboratory and online quizzes or reports, the laboratory practical, and the comprehensive final exam.

E. ***Laboratory Techniques*** - Correctly perform proper laboratory skills and display a habit of good laboratory practices that extend to your everyday life. Perform simple and differential stains on isolates and properly use compound light microscopes to visualize and describe microbial cell morphologies.
Assessed via laboratory quizzes and notebook entries, and the laboratory practical.

F. ***Critical Thinking*** - Accurately follow instructions and collect data based upon observations from laboratory exercises or clinical case studies. Plot data when appropriate and interpret any trends. Make inferences and predictions based upon the interpretations.
Assessed via laboratory and online quizzes, laboratory notebook entries, and the laboratory practical.

G. ***Communication*** - Demonstrate an ability to work in group settings and exchange ideas concerning course-related topics. Read, write, and speak about Microbiology with classmates and members of the community.
Assessed via laboratory notebook entries.

H. ***Metacognition*** - Articulate preferences and dislikes (strengths and weaknesses) for learning new and complex information. Adopt new learning strategies to improve retention of information and comprehension of the course materials.
Assessed via post-exam bonus assignments and occasional class surveys.

A taxonomy of Microbiology skills

Each of the graded course activities will correspond to one or more of our six course outcomes. In addition, these activities can be involved different levels of cognitive skill or ability. These skills and their relative contribution to course assignments are described below.

Content Knowledge

IDENTIFYING – You will be expected to remember and correctly use appropriate scientific terms and concepts. This skill is assessed by measuring the ability to recall information in the same context in which it was presented during instruction. Approximately 15% of the course points will correspond to this skill.

CATEGORIZING – You will be expected to classify or provide examples of specific scientific concepts or constructs. This skill is assessed by measuring the ability to conceptually organize information in contexts different from those presented during instruction. Approximately 30% of the course points will correspond to this skill.

Critical Thinking

CALCULATING – You will be expected to correctly solve a variety of problems using mathematical reasoning. This skill is assessed by measuring the ability to select and apply appropriate formulae to solve novel problems. Approximately 10% of the course points will correspond to this skill.

INTERPRETING – You will be expected to analyze data provided in tables, images, or case studies to answer specific questions. This skill is assessed by measuring the ability to identify relevant facts and interpret them to address specific scientific problems or case studies. Approximately 15% of the course points will correspond to this skill.

PREDICTING – You will be expected to make sound inferences based upon their understanding of the interactions that make up a natural system. This skill is assessed by measuring the ability to make reasonable forecasts of the behavior of a specified system following a specified perturbation. Approximately 10% of the course points will correspond to this skill.

JUDGING – You will be expected to evaluate the validity of scientific statements or potential courses of action. This skill is assessed by measuring the ability to detect errors or inconsistencies in such statements. Approximately 5% of the course points will correspond to this skill.

Lab Skills

PERFORMING – You will be expected to use the scientific method to safely and correctly execute scientific exercises in the laboratory or field. This skill is assessed by measuring the ability to execute the exercises, record and interpret the observations, and report the results in an appropriate manner. Approximately 15% of the course points will correspond to this skill.

Instructional methods

BIOL 286: General Microbiology will be taught as a blended delivery class. The primary form of instruction for this course will be most likely be lecture. The material covered in lecture will be amplified and applied in a variety of required laboratory exercises. In addition, a number of important and required materials will be presented online via our FerrisConnect site. A complete online laboratory manual will be assembled during this semester. Your input will be important in its development. A small amount of out-of-class work will be required for this class. You will be expected to bring your clicker to every class session and participate in group discussions (both in class and online). We will regularly use the clickers to gather feedback, take concept check quizzes, and work collaboratively on case studies or problems. Your clicker responses amy be included as part of your course score in the form of occasional bonus points.

Grading policies

I use an objective point-based system to grade all assigned work. The nature and relative point values of all assignments are explained in the following section. I have designed this course to be worth a total of **1,200 points**. Mid-term grades will be posted by **March 9, 2015** so that you may assess your class standing. Final grades for the course will be assigned based upon your total earned score as indicated in this table. ***These breakpoints are not negotiable***. The bonus points should give you more than adequate buffer against any poor assignment performances.

Point Range	Grade	Percent
1,116 to 1,200 points	A	93-100%
1,080 to 1,115 points	A-	90-92.9%
1,044 to 1,079 points	B+	87-89.9%
996 to 1,043 points	B	83-86.9%
960 to 995 points	B-	80-82.9%
924 to 959 points	C+	77-79.9%
876 to 923 points	C	73-76.9%
840 to 875 points	C-	70-72.9%
804 to 839 points	D+	67-69.9%
756 to 803 points	D	63-66.9%
720 to 755 points	D-	60-62.9%
0 to 719 points	F	0-59.9%

Graded assignments

Lecture exams – There will be three 150-point comprehensive lecture exams (see the lecture schedule for dates). They will consist of multiple choice (four options) questions. The exam items will assess your comprehension of course materials at several different cognitive levels. They may be based upon diagrams, problems, data sets, or material drawn from the textbook or assigned readings.

- *450 points (37.5% of your final grade)*

Laboratory quizzes – There will also be twelve 10-point laboratory quizzes (see the lab syllabus for dates). These will cover the prior lab's material as well as the assigned readings for the current lab period. Questions may include matching, multiple-choice, and problem solving.
• *120 points (10.0% of your final grade)*

Laboratory notebook – You will be required to record your observations from laboratory exercises and analyze these data in a bound lab notebook. Your notebook entries will be periodically evaluated using a simple rubric (plus/check/minus/zero). Your notebook scores will be entered into the Blackboard grade book at two times during the semester. Keep up-to-date in your notebooks to ensure that you score all of these points!
• *60 points (5.0% of your final grade)*

Online Quizzes – A series on online quizzes will be made available on FerrisConnect. There will be one 10-point quiz for each lecture in the course. You may take these as often as you wish – your highest score will count toward your final course grade. This is meant to be a form of review and covers the textbook readings. Don't procrastinate; they take time to complete and you will not benefit as much from one marathon session as you would from a "slow and steady" approach. There is no good reason not to score all of these points!
• *240 points (20.0% of your final grade)*

Reflective Learning Journal – Over the course of the semester, you will make periodic entries into an online learning journal. You will be reflecting about your progress in the course and responding to specific prompts. More precise instructions about this assignment, a grading rubric, and assignment deadlines can be found on our Blackboard site.
• *30 points 2.5% of your final grade)*

Laboratory Practical – At the end of the semester, there will be one 150-point laboratory practical. This will consist of twenty-five timed stations covering the materials seen and worked with over the course of the semester. Each station will have three multiple-choice questions. The penultimate lab session will be devoted to reviewing the materials for this exam.
• *150 points 12.5% of your final grade)*

Final Exam – There will be a comprehensive lecture exam. Its content drawn from material on in our four lecture modules (approximately half new material and half review questions). Like the lecture exams, it will consist of multiple-choice (four options) questions.
• *150 points (12.5% of your final grade)*

Bonus – At various points during the semester, bonus assignments may be given. The nature of the assignments, their due dates, and point values will be announced during the semester.
• *60 points (up to an extra 5% added back onto your final grade)*

Due dates for graded work

Your grade will be based upon many different assignments this semester. The following is a chronological compilation of the due dates (last acceptable date) for each assessment.

Assignment	Due Date	Points	Percent	Cumulative
Lab quiz 1	1/20/15	10	0.83%	0.83%
Lab quiz 2	1/27/15	10	0.83%	1.66%
Lab quiz 3	2/3/15	10	0.83%	2.50%
Online quizzes #1	2/8/15	60	5.00%	7.50%
Exam 1	2/9/15	150	12.50%	20.00%
Lab quiz 4	2/10/15	10	0.83%	20.83%
Lab quiz 5	2/17/15	10	0.83%	21.66%
Lab quiz 6	2/24/15	10	0.83%	22.50%
Lab quiz 7	3/3/15	10	0.83%	23.33%
Online quizzes #2	3/3/15	60	5.00%	28.33%
Exam 2	3/4/15	150	12.50%	40.83%
Notebook 1 posted	3/5/15	20	2.50%	43.33%
Lab quiz 8	3/24/15	10	0.83%	44.16%
Lab quiz 9	3/31/15	10	0.83%	45.00%
Online quizzes #3	4/5/15	60	5.00%	50.00%
Exam 3	4/6/15	150	12.50%	62.50%
Lab quiz 10	4/7/15	10	0.83%	63.33%
Lab quiz 11	4/14/15	10	0.83%	64.16%
Lab quiz 12	4/21/15	10	0.83%	65.00%
Notebook 2 posted	4/23/15	30	2.50%	67.50%
Laboratory practical	4/30/15	150	12.50%	80.00%
Journal posted	5/1/15	30	2.50%	82.50%
Online quizzes #4	5/3/15	60	5.00%	87.50%
Final exam	5/4/15	150	12.50%	100.00%
Total		**1,200**	**100.00%**	**100.00%**

Class attendance, late assignments, and make-up policies

You are expected to attend class regularly. I have noted a direct correlation in my prior classes between student attendance and class performance. However, it is ultimately up to you to show up for class. You will be responsible for all reading, discussions, and lecture materials. The

lab is an essential component of this course. **Therefore, anyone with more than two (2) unexcused absences from lab will receive an 'F' for the course.**

All graded materials must be completed on time. Make up exams will be provided only in the case of an excused absence. You must contact me within one week of the missed exam and provide written evidence to explain your absence. If you know in advance that you will be absent for an exam, please contact me immediately. I will attempt to arrange to accommodate you (within reason) with no penalty. You may always turn in assignments before their due dates. If you miss a lab, you may attend a different section in order to participate in graded work.

The following are instances of excused absences:

1. Hospitalization, with documentation from your physician
2. Severe illness, with documentation from your physician
3. Jury duty, with a copy of your court summons
4. Bereavement, with a letter from a family member
5. Ferris-sponsored sporting event, with a letter from your coach

The following are NOT instances of excused absences:

1. Oversleeping – get a better alarm clock
2. Work – You agreed to the class schedule when you signed up for the course
3. Appointments – see number two
4. Traveling – see number two
5. Other classes conflict – see number two
6. Jail or prison time – you have bigger problems than a missed deadline
7. Illness without documentation – you must have a physician's note
8. Forgot deadlines – they are your responsibility
9. Bad weather – if Ferris is open, our classes will meet as scheduled
10. Confusion – ask questions earlier rather than later!
11. Computer problems – there are over 100 computers available in the library alone

FerrisConnect

This semester, we will be extensively using Blackboard Learn 9.1 (branded FerrisConnect at FSU). This site will contain a variety of materials to supplement, but not replace, class attendance and reading. I am always interested in comments, corrections, or suggestions with regard to the electronically delivered course content! This semester, the site will contain the following:

1. A PDF copy of this syllabus.
2. Links to many different resources to help you to succeed in this class.
3. All course announcements pertaining to this class.

4. A calendar of all course assignments and deadlines.
5. Online communication tools for you to contact me or your classmates.
6. On-line access to your course grades.
7. Ancillary lecture materials including: 1) assigned readings with links to the e-textbook, 2) PDF copies of the lecture slides for your note-taking convenience, 3) a link to a Tegrity recording of the lecture (if Tegrity actually works that day), 4) a PDF "Microcast" of any worksheets covered in lecture using my Livescribe pen, 5) the daily clicker questions re-posted as an online quiz (for practice and review only), and 6) links to additional information on the internet offered by our textbook publisher (for review only).
8. Online quizzes and bonus materials – these **do count** toward your final grade in the course.
9. A completely online laboratory manual. This will consist of about 30 modules – one for each laboratory activity this semester.
10. Additional information about me, my background, and my interests.

I hope that you find this material to be helpful in preparing for exams and pursuing your interests. Please feel free to offer constructive criticism.

Registering your Turning Technologies clicker

To complete this process, you will need the following: a Turning Technologies clicker (NXT) and a computer with Internet access.

1. Turn on your computer.
2. Connect to the Internet using your favorite browser.
3. Go to the MyFSU website and log in. (http://myfsu.ferris.edu/)
4. Click on "FerrisConnect" icon at the top of the screen.
5. Click on the "Courses" icon at the top of the page.
6. Select "BIOL286: General Microbiology, Spring 2014" from the list of online courses.
7. Click on "Start Here (please) in the left navigation menu
8. Click on the link called "Register Clicker"
9. Enter your clicker's serial number.

If you are experiencing difficulty registering your clicker, please come to my office hours.

Statement of disability services at FSU

Ferris State University is committed to following the requirements of the Americans with Disabilities Act Amendments Act and Section 504 of the Rehabilitation Act. If you are a student with a disability or think you may have a disability, contact the Disabilities Services office at 231.591.3057 (voice), or email mailto:ecds@ferris.eduto discuss your request further. More

information can be found on the web at
http://www.ferris.edu/htmls/colleges/university/disability/.

Any student registered with Disabilities Services should contact the instructor as soon as possible for assistance with classroom accommodations.

Academic misconduct policies at FSU

The university may discipline a student for academic misconduct, which is defined as any activity that tends to undermine the academic integrity of the institution. Academic misconduct includes, but is not limited to, the following:

Cheating - A student may not use unauthorized assistance, materials, information, or study aids in any academic exercise, nor should a student give assistance, materials, information, or study aids to another student in any academic exercise.

Fabrication - A student must not falsify or invent any information or data in an academic exercise including, but not limited to, records or reports, laboratory results, and citations of the sources of information.

Facilitating Academic Dishonesty - A student must not intentionally or knowingly help or attempt to help another student to commit an act of academic misconduct. A student is responsible for taking reasonable precautions to ensure his or her work is not accessed by or transferred to another individual wherein it may then be used to commit an act of academic misconduct.

Interference - A student must not steal, change, destroy, or impede another student's work. Impeding another student's work includes, but is not limited to, the theft, defacement, or mutilation of resources so as to deprive others of the information they contain. A student must not give or offer a bribe, promise favors, or make threats with the intention of affecting a grade or the evaluation of academic performance.

Plagiarism - A student must not adopt or reproduce ideas, words, or statements of another person without appropriate acknowledgment. A student must give credit to the originality of others and acknowledge indebtedness whenever he or she quotes or paraphrases another person's words, either oral or written and whenever he or she borrows facts, statistics, or other illustrative material, unless the information is common knowledge.

Violation of Course Rules - A student must not violate course rules as contained in a course syllabus which are rationally related to the content of the course or to the enhancement of the learning process in the course.

Violation of Professional Standards and Ethics - A student must not violate the professional standards or ethical code related to one's intended profession as defined by the academic program or department.

Communication courtesy policy

All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions and other online communication. If I deem any of them to be inappropriate or offensive, I will first contact the persons involved. For chronic problems, I will forward the messages to the chair of the department and appropriate action will be taken, not excluding expulsion from the course. The same rules apply online as they do in person. Be respectful of other students. Foul or inappropriate discourse will not be tolerated. Please take a moment and read the following link concerning the four hallmarks of "FerrisConnetiquette". http://www.ferris.edu/HTMLS/administration/academicaffairs/online/FerrisConnetiquette.pdf

Preparing for this course

This course will cover a diverse range of topics and will require you to possess some fundamental skills and knowledge. These will include a basic background in biology, chemistry, and math. In addition, you will need to have a working understanding of the metric system, common laboratory practices, and good study skills. Because of these demands, many students claim that this is a challenging class. I want you to succeed this semester! Take a little time right now to find out if your background in these fundamental topics is sufficient. Simply go to this site: http://www.mhhe.com/micro_prep/ and complete the online quizzes there. This site will help you to identify any weaknesses early on and will also give you some study suggestions as you begin the class. In addition, go to our Bonus Work folder and complete the pre-course test. I want to see what your preexisting knowledge of microbiology is like. Thanks.

Lecture Schedule

		Date	Topic	Chapters	Pages
	M	*Jan 12*	*Course introduction and orientation*	*see syllabus*	
Microbial Diversity	W	Jan 14	Scope and History of Microbiology	1	2-38
	M	Jan 19	***Martin Luther King Holiday - No classes!***		
	W	Jan 21	Observing Microbes	2	39-72
	M	Jan 26	Microbial Cells	3	73-114
	W	Jan 28	Prokaryotic Diversity	18,19	675-754
	M	Feb 02	Eukaryotic Diversity	20	755-792
	W	Feb 04	Virus Structure and Function	6	181-217
	M	**Feb 09**	**LECTURE EXAM ONE**		
Microbial Metabolism	W	Feb 11	Bacterial Growth	4	115-148
	M	Feb 16	Environmental Influences on Growth	5	149-180
	W	Feb 18	Catabolism	13	458-504
	M	Feb 23	Respiration, Lithotrophy, and Photolysis	14	505-546
	W	Feb 25	Food and Industrial Microbiology	16	583-619
	M	Mar 02	Microbial Ecology	21,22	793-859
	W	**Mar 04**	**LECTURE EXAM TWO**	**16% OLD MATERIAL**	
	M	***Mar 09***	***Spring Break - No classes!***		
	W	***Mar 11***	***Spring Break - No classes!***		
Microbial Genetics	M	Mar 16	Microbial Genomes	7	218-256
	W	Mar 18	Gene Expression	8	257-302
	M	Mar 23	Molecular Regulation 1	10	341-384
	W	Mar 25	Molecular Regulation 2	10	341-384
	M	Mar 30	Gene Transfer and Mutagenesis	9	301-340
	W	Apr 01	Viruses and the Mobilome	11	385-426
	M	**Apr 06**	**LECTURE EXAM THREE**	**32% OLD MATERIAL**	
Host-Microbe	W	Apr 08	Chemotherapy	27	1029-1062
	M	Apr 13	Innate Immune Defenses	23	860-894
	W	Apr 15	Adaptive Immune Defenses	24	895-936
	M	Apr 20	Hypersensitivities and Vaccines	24	893-934
	W	Apr 22	Microbial Pathogenesis	25	937-978
	M	Apr 27	Microbial Diseases	26	979-1028
	W	Apr 29	Course Wrap-Up and Review	*This is also snow day insurance*	
	M	**May 04**	**COMPREHENSIVE FINAL EXAM**	**48% PRIOR MATERIAL**	

Laboratory Schedule

	Date	Graded Work	Topic
T	Jan 13		(1) Laboratory safety
R	Jan 15		(2) Microscopy
T	Jan 20	**Quiz 1**	(3) Cell morphology & (4) Aseptic technique <*continuing*>
R	Jan 22		(5) Gram stain & Complete aseptic technique
T	Jan 27	**Quiz 2**	(6) Capsule stain & (7) Endospore stain
R	Jan 29		(8) Acid-fast stain & (9) Bacterial motility
T	Feb 03	**Quiz 3**	(10) Protozoa & (11) Fungal slide culture <*continuing*>
R	Feb 05		(12) Viable bacteria counts <*continuing*>
T	Feb 10	**Quiz 4**	(13) Bacteriophage & Complete viable bacteria counts & Fungal slide culture
R	Feb 12		(14) Bacterial growth curve & Complete bacteriophage
T	Feb 17	**Quiz 5**	(15) Environmental conditions <*continuing*> & (16) Anaerobes <*continuing*>
R	Feb 19		(17) Antimicrobial compounds <*continuing*> & Complete anaerobes
T	Feb 24	**Quiz 6**	Complete antimicrobial compounds & Environmental conditions
R	Feb 26		(18) Thermal death curves <*continuing*>
T	Mar 03	**Quiz 7**	(19) Ultraviolet light & Complete thermal death curves
R	Mar 05	**Notebook 1 (1-18)**	(20) Biochemical characterization demos & Complete ultraviolet light
T	***Mar 10***		***Spring Recess - No Class!***
R	***Mar 12***		***Spring Recess - No Class!***
T	Mar 17		(21) Transformation <*continuing*> & (22) Hfr conjugation <*continuing*>
R	Mar 19		(23) Lactose regulation <*continuing*> & Complete Hfr conjugation & Continue transformation <*continuing*>
T	Mar 24	**Quiz 8**	Complete lactose regulation & Transformation
R	Mar 26		(24) Symbioses <*continuing*> & (25) Bacterial unknown streaking <*continuing*>
T	Mar 31	**Quiz 9**	(26) Exoenzymes <*continuing*> & Complete symbioses & Bacterial unknown staining <*continuing*>
R	Apr 02		Complete exoenzymes & Bacterial unknown characterization <*continuing*>
T	Apr 07	**Quiz 10**	Complete bacterial unknown identification
R	Apr 09		(27) Wastewater treatment plant tour < -- *field trip* -- >
T	Apr 14	**Quiz 11**	(28) Water quality testing <*continuing*>
R	***Apr 16***		***Mid-Semester Recess - No Class!***
T	Apr 21	**Quiz 12**	(29) Lysozyme <*continuing*> & Complete water quality testing
R	Apr 23	**Notebook 2 (19-30)**	(30) White blood cells & Complete lysozyme
T	Apr 28		Laboratory practical review session
R	**Apr 30**		**LABORATORY PRACTICAL EXAM**

SYLLABUS ATTACHMENT
FERRIS STATE UNIVERSITY – COLLEGE OF ARTS AND SCIENCES
Spring 2015

ARE YOU CONSIDERING ADDING A MINOR OR MAJOR TO YOUR CURRENT PROGRAM?
Use **My Degree** to see what classes may already apply.
For more information, stop by the Arts and Sciences Dean's Office!

IMPORTANT DATES		
Late registration	Wed. – Fri	Jan 7 – 9
First day of classes	Monday	Jan 12
Last day for Drop/Add	Thursday	Jan 15
Martin Luther King Day (no classes)	Monday	Jan 19
Last Day for Online Grad Application	Friday	Mar 6
Mid-term grades due	Monday	Mar 9
Spring recess (no classes)	Sat, Mar 7 – Sun, Mar 15	Mar 7 – Mar 15
Last day for "W" grades (full semester)	Friday	Mar 26
Mid-term recess (no classes)	Thurs - Sun	April 2 - 5
Last day of classes	Friday	May 1
Examination Week	Mon – Fri	May 4 – May 8
Commencement	Friday, Saturday	May 8, 9
Final grades due by 1:00 pm	Monday	May 11

DEPARTMENT OFFICES		
Biology	ASC 2004	591-2550
Humanities	JOH 119	591-3675
Lang/Lit	ASC 3080	591-3988
Mathematics	ASC 2021	591-2565
Physical Sciences	ASC 3021	591-2580
Social Sciences	ASC 2108	591-2735
Dean's Office	ASC 3052	591-3660

Sessions	Dates	Last Day to Withdraw
Full Session	Jan 12 – May 1	Mar 26
Session A	Jan 12 – Mar 3	Feb 12
Session B	Mar 4 – May 1	Apr 14
Session D	Jan 12 – Feb 13	Feb 2
Session E	Feb 16 – Mar 26	Mar 6
Session F	Mar 27 – May 1	Apr 20

WHAT YOU NEED TO KNOW

E-MAIL
All registered FSU students have a Ferris Gmail account. This is the only email to which all official University information about registration, financial aid, student activities, and class cancellations will be sent. Please check your account at least once a week. E-mail is our primary communication resource for students.

CLASS ATTENDANCE IS IMPORTANT!
Attendance usually has a high correlation with how well you do in a course. Many instructors have mandatory attendance policies by which your grade will be affected by absences. Some instructors also have policies about class tardiness to encourage students to be present for the full class period. Check your course syllabus or talk to your instructor about his/her policies.

HOW TO CONTACT A FACULTY MEMBER OR ADVISOR
If you have questions or need help, talk to your instructor. Faculty office locations, phone numbers, and office hours may be obtained from the class syllabus or department office, through the College of Arts and Sciences web page at http://www.ferris.edu/htmls/colleges/artsands/, or through the Directories & Maps link on the FSU home page.

DROPPING CLASSES OR WITHDRAWING
Dropping and adding only occurs during the first four days of the term. You can adjust your schedule **online during the first four days** or in person at the Timme Center (from 8-5 except for the last day when it is 12-5). *If you add a class you must pay for your additional charges by the fourth day or your schedule will be dropped.*

If you need to withdraw from a class after the official drop/add period, you must do so **OFFICIALLY**, through your dean's office, in order to avoid receiving an "F" grade in the course. **You may not withdraw online after the first four days of the term.** You will receive a "W" for the course. *You will not receive a refund.* If you need to totally withdraw from the University, you must do so **officially** at Admissions and Records in CSS 101. The last day to withdraw or drop a class may be different for different classes. **CHECK THE SESSIONS DATES SECTION ABOVE OR THE REGISTRATION AND ACADEMIC GUIDE FOR THE WITHDRAWAL DEADLINES FOR THE SEMESTER.** In cases of extenuating circumstances (e.g., a serious illness requiring you to withdraw from school), contact Birkam Health Center at 591-2614.

INCOMPLETES
The "I" is only considered for extenuating circumstances that have led to a student missing a portion of the course. The intent and appropriate use of the "I" grade is NOT to avoid student probation, dismissal, or unacceptable grades, nor should it be considered as an extended alternative to withdraw from a class (W). Extenuating circumstances are generally defined as those situations over which a student has little or no control—e.g., illness, birth, jury duty, death of a parent, serious injury. Instructors may require suitable documentation.

Students must have completed at least 75% of the coursework at passing levels before an "I" will be considered, and they may be required to sign an agreement regarding course completion. An "I" grade automatically changes to an "F" after one semester (not counting summer) unless the faculty member files another grade or extends the incomplete.

GRADUATION – ONLINE APPLICATION DEADLINE for participation in Spring Commencement Ceremony: MARCH 6, 2015 Students should apply for their degree the semester prior to the degree completion term. To obtain a degree audit for either associate in arts degree, contact Dr. Roxanne Cullen (cullenr@ferris.edu), or associate in science degree, contact Jenice Winowiecki (wino2@ferris.edu). For a degree audit and clearance for bachelor degrees, contact your program coordinator. Online graduation application is REQUIRED and deadlines will be ENFORCED per the Provost's' Office and Records Office. Apply for your degree by logging into your MyFSU (Academics & Services Tab, Student Records channel, Apply to Graduate link). For more information, contact the Dean's Office.

INCLEMENT WEATHER CONDITIONS

Only during the most severe weather conditions – which could potentially endanger the safety of students or staff – will the Big Rapids campus consider cancelling classes. The decision to cancel classes due to weather conditions at the Big Rapids site will be made as early as possible. In the event it is necessary to cancel classes, periodic announcements will be made on area radio and television stations. It is the student's responsibility to listen for these announcements. A student may also call the Ferris Information Line at 231-591-5602 to obtain information or check the Ferris website.

ACADEMIC MISCONDUCT

Academic misconduct refers to dishonesty or misrepresentation with respect to assignments, tests, quizzes, written work, oral presentations, class projects, internship experience, or computer usage; violation of computer licenses, programs, or data bases; or unauthorized acquisition or distribution of tests or other academic material belonging to someone else. It includes such behaviors as cheating, copying materials from the internet without documentation, presenting another person's ideas or work as your own, taking someone else's exam for them, violating computer software licenses or program/data ownership, etc. It is the expectation of the College of Arts and Sciences that all work you turn in is your own and is original for the course in which it is being submitted. If you are uncertain about whether a particular behavior might represent academic misconduct, be sure to ask your professor for clarification.

Penalties for academic misconduct can include FAILURE of the assignment or the course, and/or disciplinary action up to and including probation or dismissal from the University.

DISRUPTIVE BEHAVIOR

The College of Arts and Sciences strives to maintain a positive learning environment and educational opportunity for all students. Consequently, patterns of behaviors which obstruct or disrupt the teaching/learning environment will be addressed. The instructor is in charge of his or her course (e.g., assignments, due dates, attendance policy) and classroom (e.g., behaviors allowed, tardiness). Harassment, in any form, will not be tolerated.

Penalties for disruptive behavior can include involuntary withdrawal from the course and/or disciplinary action up to and including probation or dismissal from the University. The full Disruptive Behavior Policy is available on the College of Arts and Sciences website at http://www.ferris.edu/HTMLS/colleges/artsands/student-resources/CAS-disruptive-behavior-policy-final.pdf

WHERE TO GO FOR HELP

The following services are available to any Ferris student, free of charge. They are designed to help you succeed in your courses, in your career planning, and in meeting the challenges of university life. Don't hesitate to explore and use these services at Ferris

ACADEMIC ADVISING

All students have an assigned advisor and should confer with that advisor regularly. Students who have declared a major should see an advisor in that major. To find out who your advisor is, login to MyFSU and click on the Academics and Services tab, then Registration Status/Advisor Information link.

ACADEMIC SUPPORT CENTER.....ASC 1017 – 591-3543
THE WRITING CENTER.....ASC 1017 – 591-2534

The Academic Support Center, Tutoring Services, and Writing Center join together to offer FSU students an array of academic support services. Tutors are available to answer questions for many courses. The Writing Center helps writers individually and in workshops with skills and assignments. There is also study skills assistance to help with note-taking, test-taking, memory and reading strategies, and time management.

DISABILITIES SERVICES.....STR 313 591-3057

According to the Americans with Disabilities Act, each student with a disability is responsible for notifying the University of his/her disability and requesting accommodations. Students requiring a classroom accommodation due to a physical, learning, mental or emotional disability should contact the Disabilities Services Office.

SCHOLAR PROGRAM.....ASC 1021 591-5976

SCHOLAR is an academic support program that aids in the student's successful progression by offering a Peer Mentor Program, a Student Retention Program, and an Academic Student Advisory Committee.

PERSONAL COUNSELING, SEXUAL ASSAULT, SUBSTANCE ABUSE BIRKAM HEALTH CENTER ..... 2nd Floor - 591-5968

Personal counseling is available confidentially and free of charge. Counselors are available to assist with personal and stress-related problems, family and relationship issues, substance abuse, sexual assault, depression, or other similar problems. Call or stop by to obtain an appointment. ***If you or a friend is in immediate crisis, call 911.***

EDUCATIONAL & CAREER COUNSELING.....STR 313 591-3057

Students wanting to examine their choice of major or career choice, learning styles or strategies can make one-on-one appointments with licensed counselors.

SAFETY

Please observe the posted shelter and evacuation routes in the hallway nearest your classroom.

OTHER RESOURCES

BIRKAM HEALTH CENTER.....1st Floor 231-.591-2614

The Birkam Health Center provides fee-for-service medical care including evaluation and treatment for illness and injury anytime during the year. Patients are seen on a walk-in and by appointment basis.

FLITE LIBRARY.....231-591-2669

Regular hours for FLITE:

Monday – Thursday . . . . . 7:30 am – Midnight
Friday . . . . . 7:30 am – 6:00 pm
Saturday . . . . . NOON – 5:00 pm
Sunday . . . . . 1:00 pm – Midnight

Extended Studies Court will begin late night hours January 20, 2015

*Sunday-Thursday/MIDNIGHT to 7:30 a.m.
*Friday/6 p.m. to MIDNIGHT *Saturday/5 p.m. to MIDNIGHT

FSU BOOKSTORE.....UNIVERSITY CENTER 231 - 591-2607

Regular hours for Bookstore *(subject to change)*:

Monday – Thursday . . . . . 9:00 am – 6:00 pm
Friday . . . . . 9:00 am – 5:00 pm
Saturday . . . . . NOON – 4:00 pm
Sunday . . . . . CLOSED

Now located at the University Center

HELPFUL NUMBERS

Admissions	2100	Inst. Testing	3628
Business Office	2125	Public Safety	5000
Financial Aid	2110	Records	2792
Housing	3745	TAC	4822

When calling from off campus, extensions can be called by using the prefix 231-591-_____.

Biology 300
Pathophysiology
Course Syllabus for BR Class
Spring 2015

Course Description: A study of general principles and causes of disease and resultant abnormal physiological functions of the organ systems. Included are discussions on cancer, aging, inflammation, stress, cardiovascular, nervous, respiratory, endocrine, excretory, digestive and musculoskeletal system dysfunction.

Instructor:	Dr. Daisy Daubert
Office:	2012 Arts and Science Commons
Phone:	(231) 591-2554
Email:	dauberd@ferris.edu (best way to contact me)

Office hours:	Monday	2:15-3:15 pm	Outside the FSU offices in ATC	Grand Rapids
	Tuesday	1:30-2:30 pm	ASC 2012	Big Rapids
	Thursday	10:00-11:00 am	ASC 2012	Big Rapids
	Thursday	1:30-2:30 pm	ASC 2012	Big Rapids
	By appointment			
Lectures:	Tu, Th	3:00-4:15 pm	STR 136	

Course Prerequisites: BIOL 205 or 322 with a grade of C- or better and CHEM 124, 214 or 321 with a grade of C- or better.

Texts (optional):

Berkowitz. 2007. Clinical Pathophysiology Made Ridiculously Simple, MedMaster, Inc. ISBN# 978-0-940780-80-4

Zaher. 2007. Pathology Made Ridiculously Simple, MedMaster, Inc. ISBN# 978-0-940780-77-4

McPhee and Hammer. 2010. Pathophysiology of Disease: An Introduction to Clinical Medicine. McGraw-Hill Companies, Inc. ISBN# 978-0-07-162167-0 (Available to you free online; access the book through our library database for Access Pharmacy.)

Longo, Fauci, Kasper, Hauser, Jameson, and Loscalzo. 2012. Harrison's Principles of Internal Medicine. 18th edition McGraw-Hill Companies, Inc. ISBN# 978-0-07174889-6 (Available to you free online; access the book through our library database for Access Pharmacy.)

Course Outcomes:

1. Describe the general mechanisms of disease in humans.
2. Predict effects of disease on normal physiology.
3. Describe the disease process for some of the leading causes of death in the US.

Lecture and Lab NOTES - FerrisConnect and the Internet:

Lecture PowerPoint files will be posted to FerrisConnect. Files may be posted before or after the lecture. Most lectures will be recorded on Tegrety for later viewing/listening through Ferris Connect. Do not count of Tegrety to work for every class. There are often technical difficulties with the program. You are responsible for all class material whether or not the class is recorded and available on Tegrety.

Although the internet has become a major source of scientific information, one should remember that, unlike scientific papers or textbooks, web sites do not undergo the process of peer review. Consequently, never assume that absolutely everything posted on the web is correct, actually assume the opposite. When surfing the net, choose web sites that belong to well-established institutions such as colleges and universities. I may post some sites on Ferris Connect that may become useful for study. If you find any sites that you'd like to share, please let me know and we can attach the links to the course site.

Evaluation (700 points total):

- Four exams – 100pts each
- Final exam – 200pts (comprehensive)
- Quizzes and activities – 100 pts total

Exams: will be given according to the attached schedule. The exams will test your mastery of material covered since the previous exam, with a portion that will be cumulative. Exams will be multiple choice/short answer/fill in the blank. Exam 5 will be given at the same time as the comprehensive final.

Final Exam: A comprehensive exam covering all of the material taught throughout the semester will be given.

Quizzes and activities: In each lecture there will either be a 5 point quiz or in-class activities worth 5 points. On some days there may be both a quiz and in-class activities. The quizzes will can cover anything we have discussed in lecture since the previous exam. There will be more than 100 points worth of quizzes and activities. Your lowest individual scores will be dropped to give a total of 100 points. Because several quizzes/activities will be dropped, there will be no ability to make them up, even if you have an excused absence.

Course Policies

Grading:

93 – 100 = A	73 – 76.99 = C
90 – 92.99 = A-	70 – 72.99 = C-
87 - 89.99 = B+	67 – 69.99 = D+
83 – 86.99 = B	63 – 66.99 = D
80 – 82.99 = B-	60 – 62.99 = D-
77 – 79.99 = C+	Below 60 = F

This is a set scale and will NOT be changed.

Your grade is a reflection of what you have demonstrated learning. It is my responsibility to anyone who will see your transcript in the future to report what knowledge you have demonstrated learning from this class.

Class Attendance Policy: You must be present for the entire lecture in order for a quiz and/or activity grade to be recorded. If you leave early your quiz and/or assignment will not be graded and you will receive a zero on that quiz/activity unless you have made prior arrangements with me and have a valid reason for leaving early.

Anyone who misses a lecture exam must notify me in person, by phone, or email prior to that class and must arrange with me to take a make-up exam.

Since persons who take exams late have additional time to prepare for the exam, to be fair to the rest of the class, I will deduct 10% from the total points available on the test for each day the exam is delayed.

Responding in class: I will often ask questions of the class in an effort to get you to think about concepts and recall previously covered material. If there is little class involvement I may call on students. This is not to embarrass you, but to help you in thinking about the material covered. If you have a question about anything covered during class, please raise your hand and I will try to answer your question. Please refrain from talking to each other during class as it can be very

distracting to other students who are trying to follow the lecture. I reserve the right to ask you to leave the classroom if you are being disruptive to student learning.

Academic Integrity: Cheating of any kind will NOT be tolerated. Any reports of cheating or plagiarism will be forwarded to the Office of Student Conduct and may result in failure on the exam or quiz and/or the course.

I reserve the right to make needed and appropriate adjustments in this syllabus.

It is easy to succeed in Biology 300 as long as you approach this course with a certain degree of maturity and proper attitude. The few points below suggest some strategies that you may find helpful in your study of the lecture material.

1. Always read chapter material before coming to lecture. You are responsible for the entire content of lecture material. Because there is not enough time to discuss everything in detail, we will concentrate on those concepts that are either more difficult or critically important for the comprehension of the entire topic. Therefore, you must read the material ahead of time in order to place each lecture in proper context.

2. Study consistently. DO NOT wait with studying until the last 48 hours before the exam! The amount of information will overwhelm you! It is much more effective to spend a short amount of time (even 15-20 minutes) in the evening following each lecture trying to *understand* the material. This way you should establish good comprehension of each individual concept and can concentrate on "putting the pieces together" during week before the exam.

3. Ask questions. Many aspects of pathophysiology are complex - DO NOT HESITATE TO ASK QUESTIONS each time you run into a problem. You can see me in my office hours or make an appointment to see me. Or simply ask other student in the class or your study group.

4. A note on study groups. Research has shown that students who study in groups do not learn as the material as well as those who study on their own. Part of this is likely due to the lack of focus and the distractions that arise in study groups. If you do study in groups, one person should be responsible for keeping the focus on the studying. You should go into the meeting having arranged beforehand what you will study.

BIOLOGY 300 Pathophysiology
Lecture Schedule
Spring 2015

(Subject to change)

Day		Topic
Tu	Jan 13	Introduction to pathophysiology and cellular pathophysiology
Th	Jan 15	Cellular pathophysiology continued
Tu	Jan 20	Inflammation
Th	Jan 22	Inflammation continued and tissue repair
Tu	Jan 27	The immune system
Th	Jan 29	Altered immunity
Tu	Feb 3	**EXAM 1**
Th	Feb 5	Infection
Tu	Feb 10	Genetic and developmental disorders
Th	Feb 12	Genetic and developmental disorders continued
Tu	Feb 17	Neoplasia
Th	Feb 19	Neoplasia continued
Tu	Feb 24	**EXAM 2**
Th	Feb 26	Altered ventilation and diffusion
Tu	Mar 3	Altered perfusion
Th	Mar 5	Altered perfusion continued
Tu	Mar 10	**HOLIDAY**
Th	Mar 12	**HOLIDAY**
Tu	Mar 17	Altered hormonal and metabolic regulation
Th	Mar 19	Altered hormonal and metabolic regulation continued
Tu	Mar 24	**EXAM 3**
Th	Mar 26	Altered fluid, electrolyte and acid-base balance
Tu	Mar 31	Altered fluid, electrolyte and acid-base balance continued
Th	Apr 2	**HOLIDAY**
Tu	Apr 7	Altered neuronal transmission
Th	Apr 9	Altered neuronal transmission continued
Tu	Apr 14	Altered somatic and sensory function
Th	Apr 16	Altered elimination
Tu	Apr 21	Altered elimination continued
Th	Apr 23	**EXAM 4**
Tu	Apr 28	Altered nutrition and reproductive function
Th	Apr 30	Aging

Final Exam Monday May 4th 2:00-3:40pm

EXERCISE PHYSIOLOGY
BIO 301 – WINTER SEMESTER 2000

Instructor: Rich Canole
115G – Ewigleben Sports Complex (Asst. Track Office)
Office Hours: M-R 1:30-2:30 (may vary depending of meetings)
591-5255

Class Time/Location: T & R 8:00 – 9:15 a.m.
SCI 120 ** (could move to SRC 2)

Course Description: The study, scientific basis, and theory of how the body, and its systems, functions and adapts to physical activity. Also, an examination at the applications of such knowledge.

Objectives:
1) Gain an understanding of major principles, theories, and models of exercise physiology.
2) Gain an understanding of the biological systems involved in exercise phyisiology.
3) Gain an understanding of the application of the major concepts in #1 & 2.

Text: McArdle, W.D., Katch, F.I, Katch, V.I., Exercise Physiology: Energy, Nutrition, and Human Performance, 4th edition, Rand McNally, 1996.

Grading Criteria:

Tests (4, each 100)	400
Final	150
Research Paper or ACSM Objectives	50
Homework	≈150
Total	**750**

Grading Scale:

A	93%	C	73%
A-	90%	C-	70%
B+	87%	D+	67%
B	83%	D	63%
B-	80 %	D-	60%
C+	77%		

Research Paper: Paper will be a literature research on a specific topic of applied exercise science. Paper should include an intro to the topic, explanation of the topic, current research findings on the topic, and conclusions on the topic. Also, included as part of the research paper will be a mini presentation. Additional and more detailed instructions will be handed out at a later date.

ACSM Objectives: These are essay questions designed to aid in your preparation to become certified. This may replace the research paper (to be decided by instructor). Each question will have to be thoroughly answered with references. Each student will present on question in class.

Tentative Class Schedule:

Week 1-2:	Introduction Nutrition **No Class Monday, Jan. 17**	 Ch. 1-3
Week 4-5:	Energy & Energy Systems **Test #1 Thursday, Feb 10.**	Ch. 4-8
Week 6 - 8:	Cardiovascular & Pulmonary Systems **Test #2 Thursday, March 2.**	Ch. 12-17
Week 9:	Spring Break	
Week 10-13:	NeuroMuscular & Endocrine systems Training: Aerobic, Anaerobic, & Muscular Strength Aids to Performance and Conditioning **Test #3 Thursday, April 6.**	Ch. 18-20 Ch 21-22 Ch. 23
Week 14-15	Body Composition, Weight Management, Health aspects of Exercise Environmental Stress on Exercise Performance **Test # 4 Thurs. April 20.**	 Ch. 27-30 Ch. 24-25
Week 16:	Overflow Day Presentations Review for final	
Week 17:	**Final Thursday, May 4, 8:00 am**	

Biology 321
Human Physiology – Anatomy 1
Course Syllabus
Fall Semester 2014

Course Description: First of two semesters of a comprehensive, integrated course in anatomy-physiology, developing logical correlations between structures and their functions with emphasis on the molecular and cellular basis of organ system structure and function. Topics: cell physiology; control mechanisms; nervous, muscle, and endocrine systems. Laboratories include cadavers in anatomical studies and animal experimentation demonstrating physiological principles. Designed for students in science baccalaureate degree programs.

Instructor: Dr. Daisy Daubert

Office: 2012 Arts and Science Commons

Phone: (231) 591-2554

Email: dauberd@ferris.edu (best way to contact me)

Office hours:	Mondays, Tuesdays and Thursdays	10:00am-11:00am	ASC 2012
	Wednesdays	4:00-5:00pm	ASC 2012
	By appointment		

Lectures:	221-224, 325	Tuesdays and Thursdays 12:00-1:15pm	IRC 120
		or	
	211-214	Tuesdays and Thursdays 1:30-2:45pm	IRC 120

Labs:	211	Monday 12:00-2:50pm	SCI 228	Johnson
	212	Monday 6:00-8:50pm	SCI 228	Daubert
	213	Wednesday 3:00-5:50pm	SCI 228	Johnson
	214	Wednesday 6:00-8:50pm	SCI 228	Daubert
	221	Monday 3:00-5:50pm	SCI 228	Daubert
	222	Tuesday 6:00-8:50pm	SCI 228	Scott
	223	Wednesday 12:00-2:50pm	SCI 228	Johnson
	224	Thursday 6:00-8:50pm	SCI 228	Johnson
	325	Tuesday 3:00-5:50pm	SCI 228	Johnson

Course Prerequisites: BIOL 122 and CHEM 122 with a C- or better.

Required Texts:

Lecture Material

1. Connect Plus access for Vander's Vander's Human Physiology, 13^{h} Edition, Eds., Widmaier EP, Raff H, Strang KT, McGraw-Hill, Boston, MA
2. Turning Technologies clicker

Lab Material:

3. Laboratory Manual Anatomy and Physiology, 7th Edition, Wise E, McGraw-Hill, Boston, MA

OR

4. A Photographic Atlas for the Anatomy & Physiology Laboratory, 7th Edition, Van De Graaff KM, Morton DA, Crawley JL, Morton Publishing, Englewood, Colorado

Course Learning Outcomes: By the end of this course, students will be able to meet the following learning outcomes:

1. Students will be able to use a microscope effectively to identify the 4 tissue types (epithelial, connective, nervous, and muscular) within any human tissue.
2. Students will be able to identify and name designated anatomical structures (both histological and gross) within the following organ systems: integumentary system, the muscular system, the nervous system, the skeletal system, and the endocrine system.
3. Students will be able to explain physiological functions and mechanisms within the following organ systems: integumentary system, the muscular system, the nervous system, the skeletal system, and the endocrine system.
4. Students will be able to carry out experimental procedures, evaluate experimental data and interpret their data based on the anatomy and physiology that they have learned.

Lecture and Lab NOTES - FerrisConnect and the Internet:

All lecture and lab notes will be made available via FerrisConnect either before or after the class period. Most lectures will also be recorded via Tegrety for later viewing/listening through FerrisConnect.

Some lectures or lab lectures will be online only. On these days you will be responsible for watching the lectures before attending lecture. In class we will do activities that require you to have read the book and/or watched the lectures online.

Although the internet has become a major source of scientific information, one should remember that, unlike scientific papers or textbooks, web sites do not undergo the process of peer review. Consequently, never assume that absolutely everything posted on the web is correct, actually assume the opposite. When surfing the net, choose web sites that belong to well-established institutions such as colleges and universities. I will attach some sites that may become useful for study. If you find any sites that you'd like to share, please let me know and we can attach the links to the course site.

Evaluation:

- Four lecture exams – 100 pts each
- Final cumulative lecture exam – 100 pts
- LearnSmart modules – 100 points total
- In class activities, lecture quizzes, pre-labs and post-labs – 90 points
- Lab Quizzes – 6 @ 35 pts each
- Lab Final exam – 100 pts

Total points for class: 1000

Lecture exams: will be given according to the attached schedule. The exams will test your mastery of material covered since the previous exam. Exams will be multiple choice and taken with clickers and may include some short answer, fill in the blank questions. Exam 4 will be given at the same time as the comprehensive final.

Final Lecture Exam: A Comprehensive exam covering all of the material taught throughout the semester will be given.

McGraw Hill Connect LearnSmart Assignments: A LearnSmart module will be assigned before each lecture. The module is due at 11am the day of the lecture. The module will cover the material we will go over in class that day. By doing the reading and assignment before class you will be much better prepared for lecture. You will be aware of what you don't understand and can ask questions in class. Students who take this active learning step have been shown to perform much better on exams. Each LearnSmart module is worth 5 points. These assignments are worth 10% of your final course grade and could mean the difference between a C and a B. There will be more than 100 points worth of LearnSmart modules. Your lowest individual scores will be dropped to give a total of 100 points. Because several assignments will be dropped, there will be no ability to make them up due to technology or other issues. It would be in your best interest to complete the assignments early so you can contact McGraw Hill or TAC with any technology issues that may arise. Remember there are computers in FLITE that are available 24 hours a day.

You can contact McGraw Hill at 1-800-331-5094. You can also chat with them at http://mpss.mhhe.com/ Their hours are:
Sunday 1pm-midnight
Monday-Thursday 9am-midnight
Friday 9am-7pm
Saturday 11am-5pm

Lecture Quizzes: There will be a quizzes or questions asked during most lecture periods. These quizzes/questions will cover material from previous lectures as well as topics we may have just covered in class. The goal of these questions is to help you to stay up on your studying and check your understanding. These are a good for you to gauge how well you are doing in the course and in your understanding of the material.

In Class Assignments: There may be activities to do in lab or lecture for credit. These activities may include worksheets designed to get you to think about a complex physiological topic, or may involve labeling anatomical diagrams and histological photomicrographs.

Pre-Labs and Post-Labs: There will be online post-lab assignments in Ferris Connect for each of the physiology labs. These will be due the Monday following the lab at 11am. For some labs there may also be pre-lab assignments in Ferris Connect. These will be due the Monday of the week of that lab at 11am.

About Lecture Quizzes, In Class Assignments Pre-labs and Post-labs: There will be more than 90 points worth of quizzes, in class assignments and post-labs. Your lowest individual scores will be

dropped to give a total of 90 points. Because several quizzes/assignments/post-labs will be dropped, there will be no ability to make them up, even if you have an excused absence.

Lab Quizzes: a quiz will be given at the beginning of lab as marked on the attached schedule. These quizzes will be over the anatomy cover in the previous lab

Lab Final: a comprehensive lab final will be given. Material from all anatomy labs will be covered on this exam. This exam will consist of between 150 and 200 questions. This exam is required and will count toward 10% of your grade. If you do better on this lab final exam than on the other lab quizzes, this final exam grade can replace your lab grade.

Course Policies

Grading:

93 – 100 = A	73 – 76.99 = C
90 – 92.99 = A-	70 – 72.99 = C-
87 - 89.99 = B+	67 – 69.99 = D+
83 – 86.99 = B	63 – 66.99 = D
80 – 82.99 = B-	60 – 62.99 = D-
77 – 79.99 = C+	Below 60 = F

This scale is final.

Your grade is a reflection of what you have demonstrated learning. It is my responsibility to anyone who will see your transcript in the future to report what knowledge you have demonstrated learning from this class.

Intelligence comes from constant inquiry and refinement of what you know. You must be an active participant in this process.

Class Attendance Policy: There will be quizzes or questions in lecture on most days. In order to get the points for these questions you must be present.

Anyone who misses a lecture exam must notify me in person, by phone, or email prior to that class and must arrange with me to take a make-up exam.

Since persons who take exams late have additional time to prepare for the exam, to be fair to the rest of the class, I will deduct 5% of the total points available from the score for each day the exam is delayed.

Lab attendance is MANDATORY. There will be no make-up labs. If you have a valid excuse for missing lab, please see me ***immediately***. Otherwise, you may not take the quiz for that lab and thus the missed lab will be recorded as a "0". Two missed labs for ANY reason will result in a failing grade.

Academic Integrity: Cheating of any kind will NOT be tolerated. Any reports of cheating or plagiarism will be forwarded to the Office of Student Conduct and may result in failing the assignment/exam or the course.

I reserve the right to make needed and appropriate adjustments in this syllabus.

It is not hard to succeed in Biology 321/322 as long as you approach this course with a certain degree of maturity and proper attitude. The few points suggest some strategies that you may find helpful in your study of the lecture material.

1. Always read chapter material BEFORE coming to lecture. You are responsible for the entire content of lecture material. Because there is not enough time to discuss everything in detail, we will concentrate on those concepts that are either more difficult or critically important for the comprehension of the entire topic. Therefore, you must read the material ahead of time in order to place each lecture in proper context. Also since lecture quizzes may contain questions related to the reading you must do the reading in order to do well on the quizzes.

2. Study consistently. DO NOT wait with studying until the last 48 hours before the exam! The amount of information will overwhelm you! It is much more effective to spend a short amount of time (even 15-20 minutes) in the evening following each lecture trying to *understand* the material. This way you should establish good comprehension of each individual concept and can concentrate on "putting the pieces together" during week before the exam.

3. Ask questions. Many aspects of physiology are complex - DO NOT HESITATE TO ASK QUESTIONS each time you run into a problem. You can see me in my office hours or make an appointment to see me. Also there is often extra time in lab that you can ask. Or simply ask other student in the class.

BIOLOGY 321 Human Anatomy and Physiology
Lecture Schedule
Fall Semester 2014

(Subject to change)

Week	Day		Lecture	Reading
1	T	Aug 26	Introduction to Anatomy and Physiology	Chap 1 pg 1-16
	R	Aug 28	Membranes, Proteins and Ligands, Enzymes	Chap 3 pg 48-51, 68-78
2	T	Sep 2	Diffusion, Mediated Transport, Osmosis	Chap 4, pg 96-110
	R	Sep 4	Endocytosis, Exocytosis, Epithelial Transport	Chap 4, pg 110-115
3	T	Sep 9	Control of Cells	Chap 5, pg 120-133
	R	Sep 11	Neural Tissue, Electricity, Resting Membrane Potent.	Chap 6, pg 138-150
4	T	Sep 16	Action Potentials, Anatomy of Synapses, NT release	Chap 6, pg 152-162
	R	Sep 18	Post-Synaptic cell, Synaptic Integration and Strength	Chap 6, pg 162-167
5	T	Sep 23	**EXAM 1**	
	R	Sep 25	Neurotransmitters, Neuroeffector Communication	Chap 6, pg 167-172
6	T	Sep 30	Brain, Spinal Cord, Peripheral and Autonomic NS	Chap 6, pg 173-184
	R	Oct 2	Blood Supply, BBB, CSF	Chap 6, pg 184-186
7	T	Oct 7	Sensory physiology General Principles	Chap 7, pg 191-201
	R	Oct 9	Somatic Sensation	Chap 7, pg 203-207
8	T	Oct 14	Vision	Chap 7, pg 207-217
	R	Oct 16	Hearing	Chap 7, pg 217-223
9	T	Oct 21	**EXAM 2**	
	R	Oct 23	Vestibular System, Chemical Senses	Chap 7, pg 223-228
10	T	Oct 28	Skeletal Muscle structure and the NMJ	Chap 9, pg 257-265
	R	Oct 30	Excitation-Contraction, Sliding Filament, Twitches	Chap 9, pg 265-272
11	T	Nov 4	Load, Frequency, Length, Metabolism, Fibers, Whole	Chap 9, pg 272-281
	R	Nov 6	Smooth and Cardiac Muscle	Chap 9, pg 286-294
12	T	Nov 11	Motor Control Hierarchy and Local Control	Chap 10, pg 300-307
	R	Nov 13	Brain Motor Centers, Descending Pathways, Tone, Posture	Chap 10, pg 308-312
13	T	Nov 18	**EXAM 3**	
	R	Nov 20	Endocrine System – general principles	Chap 11, pg 319-332
14	T	Nov 25	Hypothalamus and Pituitary	Chap 11, pg 333-339
	R	Nov 27	**Thanksgiving Holiday**	
15	T	Dec 2	Endocrine and Neural Control of Nutrient Utilization	Chap 16, pg 578-585
	R	Dec 4	Thyroid Hormone and Calcium Homeostasis	Chap 11, pg 340-344, 353-357

Final Exam – Sections 221-224, 325 - Tuesday December 9, 2014 12:00-1:40pm in IRC 120

Sections 211-214 – Wednesday December 10, 2014 2:00-3:40pm in IRC 120

BIOLOGY 321 Human Anatomy and Physiology

LAB Schedule
Fall Semester 2013

Week	Dates	Subject
1	Aug 25-28	Human Anatomy Tissues – Epithelial, Connective
2	Sep 1-4	**NO LABS**
3 Quiz	Sep 8-11	Tissues –Muscle, Nerve, Integumentary System
4 Quiz	Sep 15-18	**Cell membrane permeability
5	Sep 22-25	Spinal cord and spinal nerves and neural histology
6 Quiz	Sep 29-Oct 2	Brain and cranial nerves
7 Quiz	Oct 6-9	**Compound action potential
8	Oct 13-16	**Special senses – Anatomy and Physiology Sensory Taste Vision Hearing
9	Oct 20-23	Skeletal system - Bones
10 Quiz	Oct 27-30	Skeletal muscle anatomy
11 Quiz	Nov 3-6	**Skeletal muscle physiology
12	Nov 10-13	**Neural – Smooth muscle physiology
13	Nov 17-20	Open Lab for Review
14	Nov 24-25	Open Lab on Monday and Tuesday
15	Dec 1-4	**Comprehensive lab final**

** - Physiology labs

Biology 322 - Human Anatomy and Physiology
Course Syllabus
Spring Semester 2013

Course Description: Second of two semesters of a comprehensive, integrated course in anatomy-physiology developing logical correlations between structures and their function. Topics: respiratory, digestive, metabolic, cardiovascular, excretory and reproductive systems. Designed for students in science baccalaureate degree programs.

Instructor:		Dr. M. Beth Zimmer, PhD	
Office:		2120 Arts and Science Commons	
Phone:		(231) 591-5022	
Email:		MaryZimmer@ferris.edu	
Office hours:		Monday 12:00pm – 2:00pm	
		Tuesday 9 – 11:00am	
		By appointment	
Lectures:		M, W, F 11:00-11:50pm	SCI 126
Labs:	211	Tuesday 12:00-2:50pm	SCI 228
	212	Tuesday 3:00-5:50pm	SCI 228
	213	Wednesday 12:00-2:50pm	SCI 228

Course Prerequisites: BIOL 122, 321 and CHEM 122

Required Texts:

1. ***Lecture Material:*** Vander's Human Physiology, 11th or 12th Edition, Eds., Widmaier EP, Raff H, Strang KT, McGraw-Hill, Boston, MA (any recent edition will do)
2. ***Lab Material:*** Seeley's Anatomy and Physiology, 9th edition Laboratory Manual, Ed., Wise, McGraw-Hill, Boston, MA

Course Outcomes:

1. Students will be able to identify and name designated anatomical structures (both histological and gross) within the following organ systems: the digestive system, the respiratory system, the cardiovascular system, the male and female reproductive system, and the renal system.
2. Students will be able to explain physiological functions and mechanisms within the following organ systems: the digestive system, the respiratory system, the cardiovascular system, the male and female reproductive system, and the renal system.
3. Students will be able to apply their knowledge of anatomy and physiology to think critically about the application of anatomical and physiologic concepts to case studies: analyze the specific situation and predict the outcome and the possible consequences of additional changes.
4. Students will be able to carry out experimental procedures, evaluate experimental data and form an understanding of the process that comes from the results of the experiment. Students will also be able to write reports based on their results using the scientific method.

Lecture and Lab NOTES - FerrisConnect and the Internet:

All lecture and lab notes will be made available via FerrisConnect.

Although the internet has become a major source of scientific information, one should remember that, unlike scientific papers or textbooks, web sites do not undergo the process of peer review. Consequently, never assume that absolutely everything posted on the web is correct, actually assume the opposite. When surfing the net, choose web sites that belong to well-established institutions such as colleges and universities. I will attach

some sites that may become useful for study. If you find any sites that you'd like to share, please let me know and we can attach the links to the course site.

Evaluation:

The lecture mark is based on: (500 pts total)

- Three lecture exams – 100pts each
- Final exam – 200pts total (100pts cumulative material and 100pts Last 4 weeks of material)

The lab mark is based on: (200 pts total)

- Quizzes – 6 at 20 pts each (100 pts total)
- Lab Final Comprehensive exam – 100 pts

There will also be occasional extra credit points available throughout the semester.

Lecture exams: will be given approximately every 4 weeks. They will consist of questions that pertain to the previous ~4 week's information (you will be told which subject areas are on a particular exam). Specific details will be given out prior to each exam.
Final Exam: A comprehensive final exam covering all of the material taught throughout the semester will be given. Along with this will be another exam that will cover the material from the previous ~4 week's information.
Lab Quizzes: will be given at the start of lab sections and consist primarily of anatomical identification, short answer, fill-in-the-blank type questions designed to test students' comprehension of lab material.
Comprehensive Lab Exam: A comprehensive lab exam will be given on the last day of scheduled lab. This will include both anatomy and physiology labs covered in the lab section only. More details will be provided later in the course.

Course Policies

Grading:

93 – 100 = A	73 – 76.9 = C
90 – 92.9 = A-	70 – 72.9 = C-
87 - 89.9 = B+	67 – 69.9 = D+
83 – 86.9 = B	63 – 66.9 = D
80 – 82.9 = B-	60 – 62.9 = D-
77 – 79.9 = C+	Below 60 = F

Attendance: Attendance at lectures is expected. There is a positive correlation between students who attend lecture regularly and good grades. I will not take attendance, but it is in your best interest to attend lecture. I will on occasion assign some extra credit points to those people that attend lecture. If you need to miss lecture and it is a valid excuse, please email me a quick note to be excused and not lose any extra credit points.

Lab attendance is MANDATORY. There will be no make-up labs. If you have a valid excuse for missing lab, please ***see me or contact me immediately (phone, email)***. Otherwise, any missed lab will be recorded as a "0" (no make-up tests or quizzes without valid excuse). Any 2 missed labs for ANY reason will result in a failing grade.

Academic Integrity: Cheating of any kind will NOT be tolerated. Any reports of cheating or plagiarism will be forwarded to the Office of Student Conduct and be treated accordingly.

It is easy to succeed in Biology 321/322 as long as you approach this course with a certain degree of maturity and proper attitude. The few points suggest some strategies that you may find helpful in your study of the lecture material.

1. Always read chapter material before coming to lecture. You are responsible for the entire content of lecture material. Because there is not enough time to discuss everything in detail, we will concentrate on those concepts that are either more difficult or critically important for the comprehension of the entire topic. Therefore, you must read the material ahead of time in order to place each lecture in proper context.

2. Study consistently. DO NOT wait with studying until the last 48 hours before the exam! The amount of information will overwhelm you! It is much more effective to spend a short amount of time (even 15-20 minutes) in the evening following each lecture trying to *understand* the material. This way you should establish good comprehension of each individual concept and can concentrate on "putting the pieces together" during week before the exam.

3. Ask questions. Many aspects of physiology are complex - DO NOT HESITATE TO ASK QUESTIONS each time you run into a problem. You can see me in my office hours or make an appointment to see me. Or simply ask other student in the class or your study group. This can be done in small study groups (see #4) or over the Internet.

4. Study in small groups. I strongly encourage students to study in small groups. It won't be long before you will get to know other students in the class, you may know some already. Try to establish a small study group and try to get together once a week to reinforce each other's comprehension of the material. Ask and answer questions aloud. If you can explain a concept aloud then you will have mastered the concept, try it! Such interactions will help you to assess your knowledge and point the areas that you overlooked in studying on your own.

BIOLOGY 322 Human Physiology and Anatomy-2
Lecture Schedule
Spring Semester 2013

(Subject to change)

Week	Day		Lecture	Vander's Physiology Reading Version 11 (Red)	Version 12 (Blue)
1	M	Jan 13	Course Introduction - Introduction to cardiovascular system	Chap 12, pg 365-366	Chap 12, pg 359-360
	W	Jan 15	Cardiac physiology	Chap 12, pg 366-371	Chap 12, pg 360-364
	F	Jan 17	Cardiac physiology	Chap 12, pg 371-373	Chap 12, pg 364-367
2	M	Jan 20	**Martin Luther King Day – No class**		
	W	Jan 22	Cardiac physiology	Chap 12, pg 373-377	Chap 12, pg 367-370
	F	Jan 24	Cardiac physiology	Chap 12, pg 377- 380	Chap 12, pg 370-373
3	M	Jan 27	Cardiac physiology	Chap 12, pg 380-382	Chap 12, pg 373-375
	W	Jan 29	Heart and homeostasis	Chap 12, pg 380-382	Chap 12, pg 373-375
	F	Jan 31	Blood vessel anatomy	Chap 12, pg 384-389	Chap 12, pg 377-382
4	M	Feb 3	Dynamics of blood circulation	Chap 12, pg 389-394	Chap 12, pg 382-385
	W	Feb 5	Control of blood flow and pressure	Chap 12, pg 405-410	Chap 12, pg 397-402
	F	Feb 7	**EXAM 1**		
5	M	Feb 10	Control of blood flow and pressure	Chap 12, pg 410-412 and pg 394-399	Chap 12, pg 402-404 and pg 385-392
	W	Feb 12	Blood	Chap 12, pg 425-431	Chap 12, pg 417-422
	F	Feb 14	Blood	Chap 12, pg 431-437	Chap 12, pg 422-429
6	M	Feb 17	Respiratory system anatomy	Chap 13, pg 443-446	Chap 13, pg 435-438
	W	Feb 19	Ventilation	Chap 13, pg 446-454	Chap 13, pg 438-446
	F	Feb 21	Lung function – lung volumes	Chap 13, pg 454-457	Chap 13, pg 446-448
7	M	Feb 24	Principles of gas exchange	Chap 13, pg 457-462	Chap 13, pg 448-454
	W	Feb 26	Oxygen and CO_2 transport	Chap 13, pg 463-469	Chap 13, pg 454-460
	F	Feb 28	Control of ventilation	Chap 13, pg 469-476	Chap 13, pg 460-467
8	M	Mar 3	Exercise physiology	Chap 9, pg 277-278	Chap 9, pg 273-274
	W	Mar 5	Exercise physiology	Chap 12, pg 415-419 Chap 13, pg 474-475	Chap 12, pg 407-410 Chap 13, pg 464-465
	F	Mar 7	**EXAM 2**		
9	M	Mar 10	**SPRING RECESS – NO CLASS**		
	W	Mar 12	**NO CLASS**		
	F	Mar 14	**NO CLASS**		
10	M	Mar 17	Renal anatomy	Chap 14, pg 486-489	Chap 14, pg 476-480
	W	Mar 19	Renal physiology	Chap 14, pg 489-497	Chap 14, pg 480-486
	F	Mar 21	Renal physiology	Chap 14, pg 500-506	Chap 14, pg 490-495
11	M	Mar 24	Renal physiology	Chap 14, pg506 -514	Chap 14, pg 495-504
	W	Mar 26	Water, electrolytes, acid-base	Chap 14, pg 517-522	Chap 14, pg 506-511
	F	Mar 28	Water, electrolytes, acid-base		
12	M	Mar 31	Digestive system physiology	Chap 14, pg 498-499	Chap 14, pg 487-488
	W	Apr 2	Digestive system physiology	Chap 15, pg 528-534	Chap 15, pg 516-521
	F	Apr 4	Digestive system physiology	Chap 15, pg 540-543	Chap 15, pg 528-530
13	M	Apr 7	Digestive system physiology	Chap 15, pg 543-548	Chap 15, pg 530-536
	W	Apr 9	Digestive system physiology	Chap 15, pg 554-557	Chap 15, pg 541-544
	F	Apr 11	**EXAM 3**		

14	M	Apr 14	Digestive system physiology	Chap 15, pg 536-540	Chap 15, pg 523-528
	W	Apr 16	Digestive system physiology	Chap 15, pg 553-554	Chap 15, pg 539-541
	F	Apr 18	**NO CLASS – mid semester break**	Chap 15, pg 551-552	Chap 15, pg 538-539
15	M	Apr 21	Digestive system physiology	Chap 15, pg 557-561	Chap 15, pg 544-550
	W	Apr 23	Male Reproductive Physiology	Chap 17, pg 602-610	Chap 17, pg 590-599
	F	Apr 25	Male Reproductive Anatomy	Chap 17, pg 611-613	Chap 17, pg 599-602
16	M	Apr 28	Female Reproductive Anatomy	Chap 17, pg 615-619	Chap 17, pg 603-609
	W	Apr 30	Female Reproductive Physiology	Chap 17, pg 619-627	Chap 17, pg 609-616
	F	May 2	Female Reproductive Physiology	Chap 17, pg 627-634	Chap 17, pg 616-621

Exam 4 and Final Cumulative Exam - Thursday, May 8 - 10:00am 11:40am

LAB Schedule
Spring Semester 2014

Week	Dates	Quizzes	Subject	Reading
1	Jan 14-15		Heart Anatomy	Exercise 27 pg 359-371
2	Jan 21-22		**NO LABS**	
3	Jan 28-29	Quiz	** Cardiac Physiology **	Handout
4	Feb 4-5	*(Lecture Exam 1)*	** Functions of the heart ** ** ECG and Blood pressure **	Handout
5	Feb 11-12		Blood vessels of the upper and lower body Lymphatic System	Exercise 30 – 33 Pg 391-440
6	Feb 18-19	Quiz	Respiratory Anatomy	Exercise 35 Pg 447-458
7	Feb 25-26	Quiz	**Respiratory Function**	Handout Exercise 36
8	Mar 4-5	*(Lecture Exam 2)*	**NO LABS**	Exercise 40 Pg 507-516
9	Mar 11-12		**Spring Break - NO LABS**	
10	Mar 18-19		Renal Anatomy	Exercise 38 Pg 447-497
11	Mar 25-26	Quiz	Digestion Anatomy	Exercise 42-43 Pg 523-546
12	Apr 1-2	Quiz	** Digestion Physiology **	
13	Apr 8-9	*(Lecture Exam 3)*	Open Lab for Review	Handout
14	Apr 15-16		Reproductive Anatomy/Open Lab	
15	Apr 22-23		**Comprehensive lab final**	
16	Apr 29-30		**NO LABS**	

ZOOLOGY
BIOL 330
COURSE SYLLABUS
SPRING SEMESTER 2015

Instructor: Dr James Scott
Office: 2013 Arts and Science Commons
Telephone: FSU Office: 591-2620 If no ans. leave message on phone mail.
Clinic 796-3507 Only in case of emergency.
Home: 796-7583 evenings
Cell 250-7531
E-Mail: James_Scott@ferris.edu

Office Hours: Tuesday and Thursday 8-8:50AM MCO 331
Wednesday 10:00AM – 11:50AM ASC2013
All other office hours by appointment*
*It is my desire to be available to you at all times and therefore I have offered several ways for you to contact me if necessary. If you need to meet with me I will be happy to work something out will my schedule and yours

Required Materials:
Text:
Animal Diversity, Hickman, Roberts, Keen, Larson and Eisenhour, 6th Edition, 2011, ISBN 978-0-07-302806-4.
Laboratory Manual:
Laboratory Studies in Animal Diversity, Hickman and Kats, 6th Edition, 2011, ISBN 978-0-07-34597-6.

Ferris Connect:
During the semester you will be required to log on to FerrisConnect for many purposes such as to download and copy lecture outline materials, read notes from your instructor, retrieve exam and quiz scores and to check current course grades. Please check the FerrisConnect BIOL330 home page often so that you will not miss any of this important material. If you have any difficulty logging on and retrieving materials please let me know as soon as possible so that I or someone on our computer support staff can help you.

Class Schedule:

Lecture:	STR 136	M,W,F	12:00 noon - 12:50PM
Laboratory	SCI 231	R	3:00 – 5:50 PM

Course Description:
Zoology is the study of the diversity of invertebrate and vertebrate animals. The goals of this course are: (1) to examine the evolutionary mechanisms that lead to the diversity of animals on our planet; (2) to survey the animal kingdom by comparing the unique structures and functions that are used to classify organisms into major phylogenetic groups; and (3) to gain experience with these organisms in the laboratory. The laboratory portion of the course includes examination of representative organisms using slides, specimens and dissections.

Course Outcomes:
- Identify the major taxonomic groups from protista to the mammals
- Develop skills to successfully utilize taxonomic keys
- Recognize the anatomical structural changes associated with evolutionary development of major organ systems
- Develop skills in dissection and identification of major anatomical structures across all major taxonomic groups.
- Develop the ability to identify, isolate and describe the function of major organ structures across taxonomic groups.

Outcome Assessment Plans:
I will assess the learning outcomes of this material by giving periodic Lecture exams and quizzes and Laboratory practical examinations.
Students will undertake weekly dissection exercises in the Laboratory portion of the course. During these dissection exercises the students will demonstrate that they can access major anatomical structures via dissection techniques. Success of this outcome will be determined by the students ability to demonstrate the necessary skills to access these structures.
Written exams will contain graphics associated with the major anatomical structures discussed in lecture materials and isolated during laboratory activities.
The administration of a pre-exam covering all of the material that will be presented during this semester will occur at the beginning of the semester. At the end of the course during the comprehensive final exam the students will be asked similar questions that were given in this pre-exam. With the statistics that I receive from presenting these questions pre and post I will be able to assess your ability to accomplish your learning objectives and will be able to adjust the course to better meet these objectives.

Grading Policies:
Exams
There will be 3 scheduled lecture exams during the semester each worth 100 points and a 200 point final exam given during final exam week. This exam given during final exam week will consist of two parts; one half will include new material since the previous exam and the other half, all material since the beginning of the semester.
Quizzes
I anticipate giving periodic, unannounced, lecture quizzes covering material from the previous two lectures. Knowing that these quizzes can be given at any time will require you to keep current on your text reading and lecture note review.
Lecture exams and quizzes will be based on material presented in lecture, Blackboard Learn and required reading and will consist of multiple choice, true and false, short answer, and essay questions
Laboratory Assessment
In addition to lecture examinations there will be weekly 10 point laboratory quizzes plus an approximately 75 point lab practical examination at the conclusion of the laboratory period.

Lecture and laboratory exams and quizzes will account for approximately 650 points in the course

GRADING SCALE:

The total points achieved by the student in this course will be converted into a percent total and the final grade will be determined according to the following scale:

93 - 100 = A	73 - 76.9 = C
90 - 92.9 = A-	70 - 72.9 = C-
87 - 89.9 = B+	67 - 69.9 = D+
83 - 86.9 = B	63 - 66.9 = D
80 - 82.9 = B-	60 - 62.9 = D-
77 - 79.9 = C+	Below 60 = F

Attendance:

Lecture attendance is not mandatory (i.e. roll will not be taken) although you must be aware that there is a direct link between good attendance and good grades. Do not depend on others to take good notes. If you hear the lecture, take good notes, and study your own notes you will be much more successful in this course.
Lecture period attendance on exam days is mandatory. If you miss a lecture exam, you must contact me within 24 hours with an acceptable, verifiable excuse. Only then will a make up exam be considered.
Attendance during Laboratory periods is required. The Biology Department policy states: Unexcused absence in two or more laboratory periods during the semester is grounds for failure of the course.

Biology 330
Zoology
Tentative Lecture Schedule Spring 2015

Date	Topic	Required Reading
1-12	Introduction to Zoology	Chapter 1
1-14	The Theories of Evolution and Heredity	Chapter 1
1-16	Origin of Living Systems - **Tegrity**	
1-19	MLK Day – No Lecture	
1-21	Principles of Development - **Tegrity**	
1-23	Architectural Patterns of an Animal	Chapter 3
1-26	Taxonomy and Phylogeny of Animals	Chapter 4
1-28	Unicellular Eukaryotes: Protozoan Groups	Chapter 5
1-30	Unicellular Eukaryotes: Protozoan Groups	Chapter 5
2-2	Sponges and Radiate Animals	Chapter 6
2-4	Sponges and Radiate Animals	Chapter 7
2-6	Acoelomate Bilateral Animals	Chapter 8
2-9	Acoelomate Bilateral Animals	Chapter 8
2-11	**Exam 1**	
2-13	Gnathiferans and Smaller Lophotrchozoans	Chapter 9
2-16	Mollusks	Chapter 10
2-18	Mollusks	Chapter 10
2-20	Annelids	Chapter 11
2-23	Smaller Ecdysozoans	Chapter 12
2-25	Arthropods	Chapter 13
2-27	Arthropods	Chapter 13
3-2	Hemichordates and Echinoderms	Chapter 14
3-4	Hemichordates and Echinoderms	Chapter 14
3-6	**Exam 2**	

3-7 through 3-15 SPRING BREAK

Biology 330
Zoology
Tentative Lecture Schedule Spring 2015

Date	Topic	Required Reading
3-16	Vertebrate Beginnings - Chordates	Chapter 15
3-18	Fishes	Chapter 16
3-20	Fishes	Chapter 16
3-23	Early Tetrapods	Chapter 17
3-25	Early Tetrapods and modern Amphibians	Chapter 17
3-27	Early Tetrapods and modern Amphibians	
3-30	Amniote Origins and Nonavian Reptiles	Chapter 18
4-1	Amniote Origins and Nonavian Reptiles	Chapter 18
4-3	**Easter Recess**	
4-6	Birds	Chapter 19
4-8	Birds	Chapter 19
4-10	Mammals	Chapter 20
4-13	**Exam 3**	
4-15	Mammals Continued	Chapter 20
4-17	Support, Protection and Movement	Handout
4-20	Homeostasis: Osmotic Regulation, excretion and Temperature Regulation	Handout
4-22	Homeostasis: Osmotic Regulation, excretion and Temperature Regulation	Handout
4-24	Homeostasis: Internal Fluids and Respiration	Handout
4-27	Digestion and Nutrition	Handout
4-29	Nervous Coordination: Nervous System and Sense Organs	Handout
5-1	Chemical Coordination: The Endocrine System	Handout

Final Exam Date, Time and Location TBA

Biology 330
Zoology
Laboratory Schedule Spring 2015

Date	Topic	Lab Book Exercise
Jan 15	Introduction, Lab Rules, Use of Taxonomic Keys and Microscope	1 & 3
Jan 22	**MLK week – no Lab**	
Jan 29	Protozoan Groups	4
Feb 5	The Sponges, The Radiate Animals	5 & 6
Feb 12	The Flatworms, Five Protostome Phyla	7 & 8
Feb 19	The Molluscs, The Annelids	9 & 10
Feb 26	The Arthropod	11, 12 & 13
Mar 5	The Echinoderms, Phylum Chordata	14 & 15
Mar 12	**Spring Break Week – No Lab**	
Mar 19	The Cartilaginous Fishes	16
Mar 26	The Boney Fishes	16
Apr 2	Class Amphibia	17
Apr 9	Non-Avian Reptiles	18
Apr 16	The Birds	19
Apr 23	The Mammals	20
April 30	**Final Laboratory Practical Exam**	

BIOL 340 Evolution
Spring 2015

Instructor: Dr. Mary R. Murnik Office: ASC 2117
Telephone: 231-591-2546 e-mail: murnikm@ferris.edu
Office Hours: TR 8:20-9:10 am, 3:00-3:50 pm

BIOL 340 Evolution 3 credits,

The study of the process of evolution, including the origin of species and fossil evidence in the geological record. Considers evidence of evolutionary relationships, including molecular homologies recently discovered by genome projects, the evolution of metabolic pathways, symbiotic relationships and the evolution of eukaryotes. Designed for science and non-science students and is applicable toward the Biology major. This is a Writing Intensive Course. **Prerequisite: BIOL 122**

Course Objectives:

BIOL 340 involves the study of the process of evolution, including the origin of species, fossil evidence in the geological record, and molecular evidence of evolutionary relationships. The purpose of this course is to increase your understanding of the evidence for organic evolution, the theories that have been offered to explain how evolution has occurred, and the fundamental principles in the study of evolution. You will analyze the relationships between biological organisms and consider the evidence of evolutionary relationships, including molecular homologies that have been recently discovered by genome projects, the evolution of metabolic pathways, symbiotic relationships and the evolution of eukaryotes. You will gain a broader understanding of how biologists think, and you will develop your skills in critical thinking, reasoning, and expressing yourself orally and in writing. This course meets requirements as a Writing Intensive course.

Core Course Objective: Students who complete BIOL 340 will understand and be able to discuss clearly the basic concepts of and evidence for biological evolution.

Texts:

Evolution, 5th edition, B. Hall & B. Hallgrimsson, Jones and Bartlett, 2013
Evolution Lecture Guide, Mary R. Murnik, Great Lakes Books, 2013-2014
The Miniature Guide to Critical Thinking, Richard Paul & Linda Elder, Foundation for Critical Thinking, any edition

Additional course materials and information will be distributed in class. Internet references are given in class and in the text, and you are encouraged to seek other references both in print and on the internet, ascertaining whether the source employs peer review and is recognized as a credible scientific reference.

Learning Outcomes **A student succeeding in this course should be able to…**	**Measurable Outcome Assessment** (items pertain to all outcomes, not just to that in the same row)
demonstrate understanding of the evidence for organic evolution, the theories that have been offered to explain how evolution has occurred, and the fundamental principles in the study of evolution	Comparison of class responses to specific questions on **pre- and post-tests**
analyze the relationships between biological organisms and consider the evidence of evolutionary relationships, including molecular homologies that have been recently discovered by genome projects, the evolution of metabolic pathways, symbiotic relationships and the evolution of eukaryotes	Student performance on **daily assignments** provides timely assessment of their mastery of the concepts. Student responses to the **regular questioning in class** indicate whether students understand the concepts being considered at that time, and provide the opportunity to re-visit the concepts right then if they are not.
Demonstrate understanding of how biologists think, and **demonstrate skills** in critical thinking, reasoning, and expressing their reasoning orally and in writing.	**Writing assignments**, both papers and daily assignments, allow assessment of students' reasoning through biological concepts. Students assess their own work on a **rubric** indicating the objectives of writing their papers, and instructor assessment is given on the same form.

Attendance and Participation

Attendance and participation at all scheduled class sessions is expected. Your participation in class discussions is very important. We all have different backgrounds and interests that can contribute to this course. At times we will work in groups when considering evolutionary topics.

Absences will result in lowering your grade, because graded in-class writing assignments and/or take-home assignments are submitted on most class days. You may be asked to respond in class concerning concepts that we have considered. You may relate the current material to topics that you considered in previous courses, you may question the ideas being discussed, or you may critically review a video segment that was presented. Ideas and questions may also be submitted in writing to be reviewed at the beginning of the next class. **Take-home assignments must be turned in at the beginning of the next class session.**

Moreover, during lecture periods, randomly-selected students will be asked to analyze an evolutionary situation, concept or controversy. Responses will be assessed and 100 pts

of the final grade total will be based on your participation. (This is clearly related to the core course objective.)

Participation grades will be determined by the **average of your responses** when called upon in class. **Questions** will be asked first, and all students may discuss their interpretations, responses, etc. After the short discussion period, one student will be called upon based on the random drawing of their name from the "deck" of name cards. The student may again briefly talk to other students about the response, or ask me questions for clarification. Responses will be graded on a scale, eg.

10 -excellent, exhibiting sound comprehension of the concept being considered,
9 -very good, showing good understanding,
8 -shows understanding,
7 -does not exhibit comprehension,
6 -non-responsive, not attempting to deal with the question, or
0 -not present, no valid excuse presented prior to lecture. (*This could significantly affect your participation grade, since most students are called on 4-6 times in a semester.)*

Cell phones must be turned off, and interpersonal conversations cease, during the class period. Students should not read or send text messages nor use iPods, iPads, nor other electronic devices during any class period. Those who do may be asked to leave the classroom.

"In the Ferris Institute, tardiness is an insult." Woodbridge Ferris Please make every effort to arrive in class before 1:30 pm. Tardy arrivals disturb other students, and miss any announcements at the beginning of class. If you are late, please enter as quietly as possible.

Tests:
Most of your grade in this course will be determined by assignments, papers and participation. The mid-term and cumulative final examinations are objective tests that assess evolutionary understanding; they contribute 200 points to the course grade.

Students may not use calculators, iPods, cell phones, etc., while taking tests. Students may not leave the classroom during an examination.

Cheating:
The FSU policy on cheating is described in the Student Handbook on the Ferris website. Cheating or plagiarism usually results in automatic failure in the course.

Grades:

Grades in this course will be based on the assigned papers, the class writing assignments, your participation grade, and the two objective examinations.

	Maximum Points
Papers (Sci. Rev. 100 pts, Pop. Sci. 50 pts)	150
Class writing assignments	150, approximately
Participation grade	100
Midterm & Final, 100 pt. Ea.	200
Possible pop Quizzes	50

The grading scale is:

A	93-100%	B-	80-82%%	D+	67-69%
A-	90-92%	C+	77-79%	D	63-66%
B+	87-89%	C	73-76%	D-	60-62%
B	83-86%	C-	70-72%	F	below 60%

Papers:

You will write two edited, typewritten papers. One paper will be in the format of a science review article *(described below, worth 100 points), and the other paper will be a* popular science article *(worth 50 points) with headlines, attention-getting introductory paragraphs and informal references within the articles. Writing your papers should increase your understanding of evolutionary topics.* **Remember to attach a Writing Assessment Form to each paper submitted, with your assessments.**

If you turn a paper in after the due date, there is a penalty of 5 pts per week day (e.g. a paper due on Tuesday and turned in at the beginning of class on Thursday will lose 10 pts.) If you turn the paper in at another time at the Biological Sciences department office, be sure to have the secretary mark the time of receipt on your paper.

Paper Topics:

Topics may be assigned for each paper. Let the instructor know if you have a particular interest. If topics are not assigned, your chosen topic should be approved by the instructor at least two weeks before the paper is due. The paper must primarily consider evolutionary aspects of a biological topic. *Later papers may continue and expand upon topics presented in the earlier paper, or a new topic may be selected.*

Meetings with the instructor:
You may talk with the instructor to discuss your interests and ideas, strategies for writing for different audiences, writing styles, etc. The instructor may be able to provide information about references about the topic of your paper which you might find useful.

Drafts:

You are encouraged to submit drafts of your papers, no later than two class *days before the paper is due so that the instructor can review your drafts and give suggestions by the class day before the paper is due.*

References:

At least ***two science-peer-reviewed references*** *should be cited for each paper. References should be articles in scientific journals or magazines (or their web sites, and those of science museums.). In some cases a science book may be chosen (usually not a text.) Internet research is encouraged, but* you must be careful to only use material which has been reviewed by other scientists *(articles in scientific journals and magazines are reviewed.) Material can be placed on the internet which is misleading, false or incomplete, out of context, etc. For that reason, you need to use judgment in using internet sites. If you wish to include a non-peer-reviewed article (from the internet or general press), you should have reviewed articles that also present supportive, relevant information on that topic. Consider the scientific viewpoint in your paper, in some cases contrasting the information from the non-peer-reviewed source.* Caution: Wikipedia is not a scientifically reviewed site. You may look into this source, but you cannot rely on this information.

You should attach copies of your reference materials to your paper. *No credit will be given for a paper lacking reference citations* and *copies of references. Copies of cited pages should be submitted, with pertinent material highlighted.*

Reference materials borrowed from the instructor must be returned by the date the paper or assignment is due for which the materials were provided. Unreturned materials may result in a hold on registration activity.

Paper Formats:

1. *Popular article format*

This paper should be in the format of a science article in a newspaper or popular science magazine. This should be typewritten and contain:

a. A **headline**, with your name underneath
b. A body consisting of approximately 1000 words, with an introductory paragraph which introduces the content in an interesting way, and with more specific information in the following paragraphs. If you have access to software that will format your article in **newspaper-like columns**, you *may* use that format.
c. General **acknowledgement of references** should be done informally within the text of the paper (*e.g.* "According to Cavalli Sforza, an internationally recognized population geneticist from Stanford,…")
d. A **list of your references** should be included (as well as copies of the pages with pertinent information highlighted).

2. Scientific review paper

The review paper should be typewritten, double spaced, and contain:

a. a **title page**, with title, course, name and date

b. **a body** of at least five pages (approximately 1250 words) with three parts: 1) introduction, 2) discussion section, and 3) summary

c. a reference list

a. List by number, with the first article being cited as # 1

eg.

1. Cavalli-Sforza, L. L., Paolo Menozzi and Alberto Piazza, 1994. **The History and Geography of Human Genes, *Princeton University Press, Princeton***
2. Carroll, S. B., 2005. *Endless Forms Most Beautiful*, W.W. Norton, New York
3. Gilad, Y., G. K. Oshlack, T.P. Speed, and K.P. White, 2006. Expression profiling in primates reveals a rapid evolution of human transcription factors *Nature* 440:242-245

b. Cite your references by their numbers within the body of the paper, with the first reference being (1), *e.g.*, Comparisons of banded metaphase chromosomes of man, chimpanzee, gorilla and orangutan have revealed a general homology of chromosomal bands in the four species and suggested a common ancestor for the chimpanzee, gorilla and man. (1)

Lecture Schedule

Reading & writing assignments will be assigned daily
(assignments below refer to chapters or pages in Strickberger text)

1/13 Introduction to BIOL 340

1. **The Emergence of Evolutionary Thought**
Great Chain of Being, Growing awareness of change: Lyell and earth change, Cuvier's catastrophism, Kelvin and the age of the earth, Lamarck. Questions from biogeography, comparative anatomy, fossils, geologic time, Darwin and the Theory of Natural Selection. (Chapters 1, 10, pages 20-24)

1/15 2. **Science and Critical Thinking**
All theories are "flat earth models", scientific criteria, all theories have problems and puzzles. How do we think? Are there different levels?

	What constitutes "good thinking" or critical thinking? (Paul & Elder booklet.)
1/20	3. **Considering some arguments which have been presented against the theory of evolution** Old earth evidence, the second law of thermodynamics, the Creation vs Evolution continuum. (Chapter 28)
1/22	4. **Plate Tectonics, continental drift; Fossil formation** Plate tectonics, continental drift and its impact on evolution. Geological dating, sedimentary environments; Formation of fossils, trace fossils. (Chapter 5)
1/27	5. **Origin of the solar system** Evidence for the Big Bang, nature of the universe, origin of the earth. (Chapter 4)
1/29,2/3	6. **Origin of Life and the Precambrian Fossil Record** Conditions on early Earth, fossilization, the oldest known fossils, chemical indicators, banded iron formations. synthesis of biological molecules, self-replicating molecules, evolution of metabolic pathways, evolution of photosynthesis, oxygen toxicity. What *is* life? (Chapters 6, 7, 8)
2/5	7. **Emergence of Eukaryotes** Symbiosis, endosymbiosis, organelles, evolution of sexual reproduction, Eukaryotic themes (Chapter 9)
2/10	**Eukaryotic Themes** and 8. **The Organization of Life** The "kingdoms" (Chapters 2,3,17)
2/12	**Paper I due** (popular science article)
2/12,17	9. **Genetics and Evolution** Variation, sources of variation, genetic equilibrium, gene flow and drift, natural selection: stabilizing, disruptive or directional, group selection, K vs r strategists, mimicry, neutral alleles (Chapters 11,12,14, 15, 18,19)
2/19,24	10. **Adaptation and Speciation** Reproductive isolating mechanisms, origin of species, evolutionary patterns and trends, homologous *vs* analogous structure, punctuated equilibrium vs phyletic gradualism , adaptive radiation (Chapters 3, 16, 22, 23)
2/26	**Mid-Term Examination**
3/3	11. **Evolution of Animals**

	Protists, metazoans, Ediacaran fauna, evolution of skeletons, the Cambrian Event, Burgess Shale animals (Chapters 17, including pp 349-357)
3/5	12. **Evolution of early vertebrates** The evolution of the Chordata, amphioxus, osteostrachans, evolution of jaws, cartilaginous fishes, placoderms, bony fishes, lobefins and lungfish, coelacanths, hox genes and duplications (Chapter 17)
3/19,24	13. **Leaving the Water** First land animals, amphibians and reptiles
3/26	**Paper 2 due** (Science review article)
3/26,31	14. **Origin of Land Plants** The first land plants, the primeval landscape (Chapter 21)
	15. **The Dinosaurian World** Late Triassic: The Beginning of the Age of Dinosaurs Jurassic: Dinosaurs Dominate Cretaceous: Transition, then hard times (480-483)
4/2	16. **Evolution of Flight and Warm-Blooded Dinosaurs; Ratites** Preadaptation for flight, flying insects, early gliding vertebrates, pterosaurs, birds, flightless birds (483-485)
4/7,9	17. **Extinction** (pp 471-478, 492-493) Is there an extinction cycle? Do species get old? What about asteroids?
	18. **Evolution of Mammals** Cynodonts, mammalian reproduction, (pp 478-480, 490-491)
4/14	19. **Evolution of Primates and Hominoids** Prosimians, anthropoids, emergence of hominoids, Ardipithecus (Chapter 20 to p. 500)
4/16-30	12. **Becoming Human** Australopiths, the genus *Homo: habilis, erectus, sapiens*; Neadertals, When did we emerge from Africa? Out-of-Africa *vs* Multiregional theories, Why did we leave the trees? (Chapter 20: 500-536)

5/6 (Wednesday) Comprehensive Final Examination, <u>2-3:40 pm</u>, SCI 137

Note: Changes may be made in the lecture schedule depending on student progress and interest. It is your responsibility to attend class, do assigned work, and be informed about assignments, deadlines and schedules.

Additional internet assignments are required.

BIOL 340
Abbreviated
Lecture Schedule

Spring 2015
(For assignments, see full schedule)

Date(s)	Topics (see details in syllabus)
1/13	1. **The Emergence of Evolutionary Thought**
1/15	2. **Science and Critical Thinking**
1/20	3. **Considering some arguments which have been presented against the theory of evolution**
1/22	4. **Plate Tectonics, continental drift; fossil formation**
	5. **Origin of the solar system**
1/27,29	6. **Origin of Life and the Precambrian Fossil Record**
2/3,10	7. **Emergence of Eukaryotes**
	8. **The Organization of Life, and Eukaryotic Themes**
2/12	**Paper I due** (popular science article)
2/12,17	9. **Genetics and Evolution**
2/19,24	10. **Adaptation and Speciation**
2/26	**Mid-Term Examination**
3/3	11. **Evolution of Animals**
3/5	12. **Evolution of early vertebrates**
3/19,24	13. **Leaving the Water**
3/26	**Paper 2 due** (Science review article)
3/26,31	14. **Origin of Land Plants**
	15. **The Dinosaurian World**
4/2	16. **Evolution of Flight and Warm-Blooded Dinosaurs**
4/7,9	17. **Extinction, 18. Evolution of Mammals**
4//14	19. **Evolution of Primates and Hominoids**
4/16-30	19. **Becoming Human**

5/6 (Wednesday) Comprehensive Final Examination, 2-3:40 pm, SCI 137

Note: Changes may be made in the lecture schedule depending on student progress and interest. It is your responsibility to attend class, do assigned work, and be informed about assignments, deadlines and schedules.

Ornithology

Biology 343 Fall 2014

Paul H. Klatt
2114 ACS Building
591-2671
PaulKlatt@ferris.edu

Texts: Ornithology, Gill (3rd ed), 2007.
The Kirtland's Warbler, Rapai, 2012.
The Sibley Field Guide to Birds of Eastern North America, 2003.
Office hours: Thursday and Friday 3:00-5:00 pm
Class: **Lect** - SCI 137, 2:00 pm, MW
Lab - SCI 208, 8 R

Grading Scale:

A (94% and up)	C (73-76.9%)
A- (90-93.9%)	C- (70-72.9%)
B+ (87-89.9%)	D+ (67-69.9%)
B (83-86.9%)	D (63-66.9%)
B- (80-82.9%)	D- (60-62.9%)
C+ (77-79.9%)	F (59.9% and below)

Exam I	100
Exam II	100
Exam III	100
Lab Points	100
Total	400

Course Description: The purpose of this course is to gain an understanding of and an appreciation for the biology of birds. Lectures will address various aspects of avian biology, including evolution, behavior, anatomy, physiology, ecology, and biodiversity. Labs will involve examination of preserved specimens, dissections, and field trips for development of field identification skills. Three credit course that requires BIOL 122 with C- or better.

Specific Course Outcomes: A student succeeding in this course should be able to:

1) demonstrate by examination understanding and depth of knowledge in the biology of birds.
2) demonstrate through active discussion awareness of current topics in west Michigan Ornithology and conservation, specifically The Kirtland's Warbler.
3) identify some of the more common birds by sight and sound.

Exams: Lecture Exams cannot be made up. Students who are absent on exam day, and do not have a legitimate excuse, will receive a zero on that exam. **Cheating** will result in failure of the course. Additional action may be taken by the University.
Electronic Devices must be turned off in the lecture hall.

Tentative Schedule:

Date		Lecture	Chapter
Aug.	25	Introduction and the Diversity of Birds	01
__	27	History	02
Sept.	01	[Labor Day Holiday]	
__	03	cont.	
	08	Systematics	03
__	10	Feathers	04
	15	cont.	
__	17	Annual cycles of Birds	09
	22	Migration and Navigation	10
__	24	**Exam I** - 100 points	
	29	Social Behavior	11
Oct.	01	Mates	12
	06	Breeding Systems	13
__	08	Bird Sex	14
	13	Nests and Incubation	15
__	15	Parents and their Offspring	16
	20	Lifetime Reproductive Success	17
__	22	Populations	18
	27	Species	19
__	29	**Exam II** - 100 points	
Nov.	03	Communities	20
__	05	Conservation	21
	10	Flight	05
__	12	cont.	
	17	Physiology	06
__	19	cont.	
	24	Brain, Senses, and Intelligence	07
__	26	[Thanksgiving Holiday]	
Dec.	01	cont.	
__	03	Vocalizations	08
	11	**Exam III** - 100 points, 2:00-3:40 pm	

Special Needs: Any student that needs special accommodations for learning or has special needs is invited to discuss these matters with the instructor as soon as possible.

Final Note: Enjoy the course and take pride in your work. The University experience is what you make it. This syllabus is subject to change at any time.

"Birds connect people with nature because they are beautiful, have fascinating lives, and in many ways remind us of ourselves." -- *The Private Lives of Birds*, Bridget Stutchbury

Lab Information

Lab: Lab will consist of exercises to be turned in and quizzes over some reading material.

Tentative Schedule:

Date	Topic
1) 28 Aug.	Forest
2) 04 Sept.	Field
3) 11 Sept.	Wetland
4) 18 Sept.	Feathers
5) 25 Sept.	Topography
6) 02 Oct.	Gaviiformes, Podicepidiformes, Pelecaniformes, Ciconiiformes, Galliformes, Cuculiformes
7) 09 Oct.	Falconiformes, Anseriformes
8) 16 Oct.	Charadriiformes, Columbiformes, Cuculiformes, Strigiformes *The Kirtland's Warbler* Part One, pages 0-95.
9) 23 Oct.	Caprimulgiformes, Apodiformes, Coraciiformes, Piciformes, Passeriformes
10) 30 Oct.	Passeriformes cont. *The Kirtland's Warbler* Parts Two and Three, pages 96-192.
11) 06 Nov.	Skeleton
12) 13 Nov.	Internal Anatomy I (Muscles, Digestive)
13) 20 Nov.	Internal Anatomy II (Circulatory, Respiratory)
14) 27 Nov.	[Thanksgiving Holiday]
15) 04 Dec.	Internal Anatomy III (Urogenital, Nervous)

BIOLOGY 344
ENTOMOLOGY
4 Credit Hours
SUMMER Semester 2011

Instructor: Dr. David Griffith
Office: 141C SCI
Phone: 591-5855
Office Hours: Hours by appointment
E-mail: griffida@ferris.edu; please do **NOT** use FerrisConnect for e-mails.

Course Web Site: http://myhomepage.ferris.edu/~griffida/

Course Description

Morphology, ecology, natural history and identification of the largest group of invertebrates, the insects. Emphasis on ecological, medical and economically important species. Designed for students in baccalaureate degree programs in science education and applied biology. This course meets General Education requirements: Scientific Understanding, Lab. Pre-Requisites: BIOL 122 with a grade of C- or better.

Course Materials

1. How to Know the Insects, 3rd Ed., by Bland and Jaques
2. #2 pencil

Class Schedule

Lecture:	TR:	11-1:05	SCI 137
Lab :	TR :	2-5:20	SCI 227

Grading Scale

A	93-100%	B-	80-82.9%	D+	67-69.5%
A-	90-93.9%	C+	77-79.9%	D	63-66.9%
B+	87-89.9%	C	73-76.9%	D-	60-62.9%
B	83-86.9%	C-	70-72.9%	F	Below 60%

Grading

Lecture Exam 1: 100 points
Lecture Exam 2: 100 points
Lecture Exam 3: 100 points
Lecture quizzes: approximately 20-30 points, depending on how many are given.
Lab quiz: 50 points
Collection: 150 points
Your grade will be based on your total number of points (see grading scale above).
Source of lecture exam questions: Questions will be taken primarily from the lecture. Occasionally, articles may be assigned that may be used for questions as well. Each lecture exam will consist of approximately 50-100 multiple choice or matching questions. Short answer, definitions, and essays may be included. Note: There will be **no** opportunities for extra credit. All exams will count towards your final grade. Any students who have missed a lecture exam during the semester will have the average from the final exam replace the missing test score. If a student misses more than one exam, then a score of zero will be assigned to the second missed exam. NO EXCUSES WILL BE ACCEPTED FOR A MISSING EXAM! There are no make-ups for missed quizzes unless prior arrangements have been made.

General Education Outcomes:

This course may be used to help fulfill the general education requirement for Scientific Understanding. A student succeeding in this course should:

1) have a working knowledge of the fundamental principles of a natural science discipline;
2) be able to use appropriate scientific reasoning skills to interpret and analyze content in the natural sciences;
3) have a basic understanding of the scientific method, scientific concepts, and the evolution of scientific ideas;
4) have a more positive attitude toward science and an increased confidence in their ability to understand science.

Course Specific Outcomes: by the end of the semester, you will be able to demonstrate on lecture exams and quizzes, and laboratory quizzes a majors-level knowledge in:

1. the correct terminology associated with Entomology
2. Identification of orders and important families
3. morphological and physiological adaptations of insects
4. evolution and ecology of insects
5. the economic and medical impact of insects

Lecture Attendance Policy:

a. Attendance will **not** be taken in the classroom. Therefore, if you do not wish to be in the lecture hall, THEN DO NOT COME! Students talking in the classroom are very distracting to the students who want to learn. If you want to fail the course due to your poor attitude towards learning, then STAY HOME.
b. Tardiness. Do **not** be late. "[At Ferris], tardiness is an insult." (W.N. Ferris, founder). Habitually late students (any time after class begins) may lose 2 points from their lecture grade. You are expected to be in your seat at least 30 seconds **BEFORE** class begins. I acknowledge that with attendance not being taken, that you may decide to skip class if you are running late. If this happens rarely, you should still come to class. However, if I encounter a situation where large numbers of students are showing up ten or fifteen minutes late to class, then I will put an end to tardiness. If you have a special situation which will cause you to be tardy, discuss the situation with me during the first week of class.

Electronic Devices

Electronic devices (cellular phones, walkmans, etc.) **must** be turned off in the lecture hall. **If your cell phone rings in class, you will be asked to leave**. If I see you texting during exams or quizzes, including the laboratory, you will automatically fail the exam or quiz.

Lab Assignments

Your lab grade will come from your insect collections and a single lab quiz. The lab quiz will be worth 50 points, and will cover the major orders of insects. The rest of your lab grade will come from your collections. Each of you will be responsible for collecting and correctly identifying 50 different species of insects to the family level of classification. You will need a minimum of 30 different families. The collection will be worth 150 points, with 50 points coming from the presentation style of your collection. Points will be deducted anytime an insect is incorrectly pinned, labeled, or identified. Your collection is due **Thursday, August 4**

Disruptive Behaviors

Behaviors that are disruptive to learning will not be tolerated. Talking in class will **NOT** be tolerated. ANY STUDENT WHO HABITUALLY PERSISTS IN TALKING DURING LECTURE WILL BE ASKED TO LEAVE. (see syllabus attachment for further clarification). This applies to lab as well.

Academic Misconduct

"When any society loses faith in honesty, its disintegration is a certainty." W.N. Ferris, founder. Cheating will not be tolerated. Students are referred to the section on **ACADEMIC MISCONDUCT** that is found on the final sheet attached to this syllabus. Note: you are not allowed to use cell phones during any exam or quiz in lecture or lab.

Children in the classroom

Students are strongly discouraged from bringing children to the lecture hall. Because of safety and liability reasons, under no circumstances will children be allowed in the laboratory.

Food and Beverages in the classroom

Water is acceptable, but food and beverages (e.g. pop) should not be consumed in class

Note: you will need to listen for announcements in class about changes to the schedule or the syllabus. If you miss class, then you are responsible for finding out about any changes that may have occurred

FINAL EXAM: TUESDAY, AUGUST 9 at 11 AM IN SCI 137
Note: you cannot take the final exam at a different time from your scheduled time without prior approval from the instructor

TENTATIVE LECTURE SCHEDULE*

DATE	TOPIC
6-30	1-Introduction &Survey of Arthropoda; 2-External Anatomy of Insects
7-5	2-External Anatomy (continued); 3-Internal Anatomy and Physiology
7-7	3-Internal Anatomy (continued)
7-12	**EXAM 1**; 4-Insect Diversity
7-14	5-Sensory Systems and Behavior; 6-Reproduction, Diapause, and Dispersal;
7-19	7-Development and Life Histories; 8-Systematics & Evolution of Insects;
7-21	8-Systematics & Evolution of Insects (continued); **Lab quiz on insect orders @ 2 PM in SCI 227**
7-26	**EXAM 2**; 9-Insect Ecology; 10-Biological control: Predation and Parasitism
7-28	10-Biological control: Predation and Parasitism (continued) 11-Insect Societies
8-2	12-Medical Entomology
8-4	13-Pest Management; **INSECT COLLECTIONS ARE DUE TODAY!**
8-9	**EXAM 3**

*Subject to change

BIOL 346

Ecological Assessment

Syllabus

Fall 2013

Dr. Gary Rodabaugh, CHMM
Ferris State University
College of Arts & Sciences
820 Campus Drive
Biology Department
ASC 2016
Big Rapids, Michigan 49307

Phone: 231-591-2308
FAX: 231-591-2540
rodabaugh@ferris.edu

BIOL 346: Ecological Assessment

This is a course that studies the ecological impact of environmental issues through sampling and measurement of environmental indicators. Students will study sensitive ecological systems, then measure, investigate and evaluate the impacts of human and natural events on those ecosystems. In addition to the typical and common human impacts on ecosystems, the hazards of human introduction of invasive species will also be studied.

Textbook: Out of print. None required this year, but you must purchase the lab field notebook from the bookstore.
Auxiliary Readings: Handouts posted on FerrisConnect

Required Supplies:
- Michigan Fishing License (Resident restricted license at $15). You can purchase the fishing license online at http://www.mdnr-elicense.com/welcome.asp
You must have your fishing license for the lab during the second week of the Fall semester.
- You are required to purchase a GOOD dissecting kit with scalpel, hemostat, probe, scissors, etc..
- An excellent kit is available at Sportsmans Guide at this link: http:// www.sportsmansguide.com/net/cb/elite-first-aid-surgical-set.aspx?a=679754

Labs

All labs, until November 15, are held in the field. For the first month we are on the water collecting fish, plankton, benthic and water samples.

The second month is spent collecting samples of trees, soils and animal species.

The third month is generally spent in the lab working on the samples and data collected in the first two months.

Safety

Safety is the primary concern while in the field. Students MUST follow safety rules or they will be removed from the field.

Rules:
1. Always use the buddy system and know where your partner is.
2. No horseplay!
3. Only the Professor or those who have completed a First Aid course are allowed to work on injured students.

Course Objectives

Upon completion of the course, the student will be able to:

- Evaluate the impact of chemicals on the environment
- Assess the ecological impacts of human development/ construction activities
- Identify the ecological impact of chemical movement in the environment
- Assess the ecological impacts of natural events/disasters
- Assess the ecological impacts of highly populated areas
- Assess the ecological impacts of water pollution
- Determine the proper sampling methodology for ecological studies
- Complete basic statistical analysis of environmental data
- Conduct proper handling/preservation of ecological samples
- Complete laboratory exercises in the following areas:
    - > Water sampling and data analysis
    - > Plankton sampling and identification
    - > Fish sampling, identification, aging, preservation
    - > Benthos sampling, identification, preservation
    - > Creating museum specimen mounts
    - > Identification of invasive species
- Recognize anthropogenic ecological issues
- Collect data in a manner that meets regulatory and legal requirements
- Utilize recognized and experimental techniques for collecting ecological samples
- Utilize appropriate statistical analysis for ecological samples
- Recognize and follow state, local and federal regulations related to collection of environmental samples
- Create and maintain proper field logbooks
- Utilize chain of custody documents
- Collect and properly preserve specimens in a manner suitable for museum and/or classroom use
- Follow recognized environmental, health and safety rules associated with environmental sampling
- Produce quality reports associated with ecological assessments

Grades

THE FOLLOWING GRADING SCALE WILL BE USED. WATCH FERRISCONNECT FOR YOUR WEEKLY GRADES. NOTE: I ROUND UP WHEN WE GET TO THE FINAL GRADES.

A	94-100
A-	90-93
B+	87-89
B	84-86
B-	80-83
C+	77-79
C	74-76
C-	70-73
D+	67-69
D	64-66
D-	60-63
F	59 OR LESS

NOTE: THE NUMBER OF TESTS AND FIELD PROJECTS ARE VARIABLE, SO THE TOTAL POINTS AVAILABLE DEPENDS ON THE NUMBER OF PROJECTS WE CAN COMPLETE OVER THE SEMESTER.

FALL 2012 IS THE FIRST SEMESTER WHERE STUDENTS ARE REQUIRED TO TAKE WEEKLY ONLINE QUIZZES BEFORE ATTENDING FIELD LAB SESSIONS. IF YOU DON'T COMPLETE AND PASS THE QUIZ, YOU DON'T GET TO PARTICIPATE IN LAB.

Lecture & Lab Tentative Schedule

Weekly schedule: Note that the schedule outlined here is somewhat dependent upon weather conditions. Although the student must be prepared to sample in adverse conditions, weather conditions that present a hazard to the students (such as lightning storms) will result in alteration of scheduled labs. These readings are from the free lab manual you received at the first class meeting.

Week	Date	Online and/or Lecture	Lab
1	8/30	Syllabus discussion	Jellyfish if available
2	9/6	Intro & Safety & Aquatic Vertebrates (Ch 1&4)	Fish collection
3	9/13	Ecology & Aquatic Invertebrates (Ch 2&5)	Plankton collection
4	9/20	Regulations & Benthos(Ch 3&6)	Benthos collection
5	9/27	Water sampling & analysis techniques (Ch 8)	Water sampling
6	10/4	Stream flow rate calculation (Ch 8)	Stream sampling
7	10/11	Terrestrial Invertebrates (Ch 7)	Water analysis
8	10/18	Soils & Groundwater (Ch 8&9)	Soil collection & classification
9	10/25	Forests (Ch 11)	Forest/tree sampling
10	11/1	Terrestrial Vertebrates (Ch 10)	Optional weekend trapping lab
11	11/8	**(Lectures Begin)** Contaminant Movement	Buffer lab for weather delays
12	11/15	Specimen mounting techniques (Ch 13)	Museum mounts
13	11/22	Information & semester wrap-up	Museum mounts
14	11/29	Thanksgiving recess - no lecture	No lab
15	12/6	Last exam covering last 5 weeks of lecture	Museum mounts
16	12/12-15	Final exam time is used to wrap up course, paper returns, mounts	

Field labs are very important in this class. If you miss more than 2 field labs, you will receive a failing grade for the course. Even if you miss a lab, you will be responsible for the data collected during that lab and the respective laboratory paper.

Papers

You will do a lot of writing in this course. Essentially you are acting as consultants by collecting data, interpreting the information and writing a consulting report. You will have the following papers due during the semester:

Paper 1: A major paper on your aquatic sampling. Aquatic report containing information from the fish, plankton, benthos and water labs. This information will all come from a specific local lake. SEE THE NOTE BELOW/RIGHT FOR MORE INFORMATION ON THIS PAPER!

Paper 2: A short paper on measuring stream velocity.

Paper 3: A short paper on soil and forest measurements.

Paper 1 is your major paper for the semester. Your first draft is optional and will be due at midterm, the professor will edit the paper and return it to the student for a final edit and submission. This paper is due in its final form on November 16. It must contain the appropriate data, graphics, photographs and statistics for the best grade. A detailed description of the paper requirements will be handed out during the third week of class.

Important Stuff!

Here is some critical information that you need to pay close attention to:

- You are required to take an online test each week before you come to lab. The online materials cover the activities in the lab, so if you don't complete the online test before the lab, you will not be allowed to participate in lab activities that week. However, you are still responsible for gathering the data from your fellow students.

- Attendance is taken for labs. You should have no doubt that if you are unexcused for two labs, you will fail the course.

- Other than the online tests, you will have a single essay test on the last day of class that covers the last 5 weeks of lecture material. No final exam during exam week.

- Paper #1 covers all of the data you collect during your first 4 weeks on the lake. The average student has produced papers that range from 20-40 pages over the past couple of years. More info will be posted on FerrisConnect.

- Papers 2 & 3 are short papers due earlier in the semester that discuss both forest sampling and stream sampling activities.

- The prof wrote a textbook for the course that is dedicated to the field activities you will experience. Since this is an early draft, you will each receive a copy at no charge. However, you still have to purchase the field log book and the dissecting kit.

- You must meet in the laboratory on time each week! We take vans to the locations and we are usually gone within a few minutes after the starting time of the lab.

- No sandals in the lab. You must wear closed-toed shoes, sneakers, slipons or something you don't mind getting wet. We do supply boots for field work if needed.

Consensual Relationships Between University Employees and Students:

Consensual relationships of an amorous or sexual nature that might be appropriate in other circumstances are deemed inappropriate when they occur between an employee of the University and a student for whom he or she has a professional responsibility. For example, such a relationship would be inappropriate between a faculty member, administrator, supervisor, advisor, coach, or residential staff member and a student for whom he or she has professional responsibility. Even when both parties have consented to the development of such a relationship, the relationship can raise serious concerns about the validity of consent, conflicts of interest, and unfair treatment for others and may result in serious consequences. Employees and students of the University are expected to make responsible choice.

It is the policy of Ferris State University that any University employee who has professional responsibility for students shall not assume or maintain professional responsibility for any student with whom the University employee has engaged in an amorous or sexual relationship. Whether the relationship predated the assumption of professional responsibility or arose out of the professional association, the University employee will immediately disclose the relationship to the relevant unit administrator. The unit administrator will immediately arrange a meeting of the parties to the relationship to discuss alternative oversight of the student, and attempt to cooperatively agree to changes that will move professional responsibility of the student to another University employee. If no agreement is reached, the unit administrator will determine and direct the best method to deal with the situation.

SYLLABUS ATTACHMENT
COLLEGE OF ARTS AND SCIENCES – FERRIS STATE UNIVERSITY
FALL 2013

ARE YOU CONSIDERING ADDING A MINOR OR MAJOR TO YOUR CURRENT PROGRAM?
Use **My Degree** to see what classes may already apply.
For more information, stop by the Arts and Sciences Dean's Office!

IMPORTANT DATES		
Late registration	Wed. – Fri.	Aug. 21 – 23
First day of classes	Monday	Aug. 26
Last day for Drop/Add	Thursday	Aug. 29
Labor Day (no classes)	Monday	Sept. 2
Mid-term grades due	Monday	Oct. 21
Last day for "W" grades	Thursday	Oct. 31
Thanksgiving recess begins (no classes)	Wed (noon)	Nov. 27
Thanksgiving recess ends (classes resume)	Monday	Dec. 2
Last day of classes	Friday	Dec. 6
Examination Week	Mon – Fri	Dec. 9 - 13
Commencement	Saturday	Dec. 14
Final grades due by 1:00 pm	Monday	Dec. 16
Grades available to students on MyFSU	Tuesday (after 8AM)	Dec. 17

Sessions	Dates	Last Day to Withdraw
Full Session	Aug. 26 – Dec. 6	Oct. 31
Session A	Aug. 26 – Oct. 15	Sept. 26
Session B	Oct. 16 – Dec. 6	Nov. 15
Session D	Aug. 26 – Sept. 27	Sept. 16
Session E	Sept. 30 – Oct. 31	Oct. 18
Session F	Nov. 1 – Dec. 6	Nov. 21

DEPARTMENT OFFICES

Biology	ASC 2004	591-2550
Humanities	JOH 119	591-3675
Languages & Literature	ASC 3080	591-3988
Mathematics	ASC 2021	591-2565
Physical Sciences	ASC 3021	591-2580
Social Sciences	ASC 2108	591-2735
Dean's Office	ASC 3052	591-3660

WHAT YOU NEED TO KNOW

E-MAIL
All registered FSU students have a Ferris Gmail account. This is the only e-mail to which all official University information about registration, financial aid, student activities, and class cancellations will be sent. Please check your account at least once a week. E-mail is our primary communication resource for students.

CLASS ATTENDANCE IS IMPORTANT!
Attendance usually has a high correlation with how well you do in a course. Many instructors have mandatory attendance policies by which your grade will be affected by absences. Some instructors also have policies about class tardiness to encourage students to be present for the full class period. Check your course syllabus or talk to your instructor about his/her policies.

HOW TO CONTACT A FACULTY MEMBER OR ADVISOR
If you have questions or need help, talk to your instructor. Faculty office locations, phone numbers, and office hours may be obtained from the class syllabus or department office, through the College of Arts and Sciences web page at http://www.ferris.edu/htmls/colleges/artsands/, or through the Directories & Maps link on the FSU home page.

DROPPING CLASSES OR WITHDRAWING */**
Dropping and adding only occurs during the first four days of the term. You can adjust your schedule **online during the first four days** or in person at the Timme Center (from 8-5 except for the last day when it is 12-5). *If you add a class you must pay for your additional charges by the fourth day or your schedule will be dropped.*

If you need to withdraw from a class after the official drop/add period, you must do so **OFFICIALLY**, through your dean's office, in order to avoid receiving an "F" grade in the course. **You may not withdraw online after the first four days of the term.** You will receive a "W" for the course. *You will not receive a refund.* If you need to totally withdraw from the University, you must do so **officially** at Admissions and Records in CSS 101. The last day to withdraw or drop a class may be different for different classes. **CHECK THE SESSIONS DATES SECTION ABOVE OR THE REGISTRATION AND ACADEMIC GUIDE FOR THE WITHDRAWAL DEADLINES FOR THE SEMESTER.**

In cases of extenuating circumstances (e.g., a serious illness requiring you to withdraw from school), contact Birkam Health Center at 591-2614.

INCOMPLETES
The "I" is only considered for extenuating circumstances that have led to a student missing a portion of the course. The intent and appropriate use of the "I" grade is NOT to avoid student probation, dismissal, or unacceptable grades, nor should it be considered as an extended alternative to withdraw from a class (W). Extenuating circumstances are generally defined as those situations over which a student has little or no control—e.g., illness, birth, jury duty, death of a parent, serious injury. Instructors may require suitable documentation.

Students must have completed at least 75% of the coursework at passing levels before an "I" will be considered, and they may be required to sign an agreement regarding course completion. An "I" grade automatically changes to an "F" after one semester (not counting summer) unless the faculty member files another grade or extends the incomplete.

GRADUATION
Students should apply for graduation the semester prior to their last semester of completion. For associates in arts or associates in science degrees, this needs to be completed at the Dean's Office. For bachelor degrees, this needs to be completed with your program coordinator. Be aware of deadlines for participation in commencement.

INCLEMENT WEATHER CONDITIONS
Only during the most severe weather conditions – which could potentially endanger the safety of students or staff – will the Big Rapids campus consider cancelling classes. The decision to cancel classes due to weather conditions at the Big Rapids site will be made as early as possible. In the event it is necessary to cancel classes, periodic announcements will be made on area radio and television stations. It is the student's responsibility to listen for these announcements. A student may also call the Ferris Information Line at 231-591-5602 to obtain information or check the Ferris website.

ACADEMIC MISCONDUCT

Academic misconduct refers to dishonesty or misrepresentation with respect to assignments, tests, quizzes, written work, oral presentations, class projects, internship experience, or computer usage; violation of computer licenses, programs, or data bases; or unauthorized acquisition or distribution of tests or other academic material belonging to someone else. It includes such behaviors as cheating, copying materials from the internet without documentation, presenting another person's ideas or work as your own, taking someone else's exam for them, violating computer software licenses or program/data ownership, etc. It is the expectation of the College of Arts and Sciences that all work you turn in is your own and is original for the course in which it is being submitted. If you are uncertain about whether a particular behavior might represent academic misconduct, be sure to ask your professor for clarification.

Penalties for academic misconduct can include **FAILURE** of the assignment or the course, and/or disciplinary action up to and including probation or dismissal from the University.

DISRUPTIVE BEHAVIOR
The College of Arts and Sciences strives to maintain a positive learning environment and educational opportunity for all students. Consequently, patterns of behaviors which obstruct or disrupt the teaching/learning environment will be addressed. The instructor is in charge of his or her course (e.g., assignments, due dates, attendance policy) and classroom (e.g., behaviors allowed, tardiness). Harassment, in any form, will not be tolerated.

Penalties for disruptive behavior can include involuntary withdrawal from the course and/or disciplinary action up to and including probation or dismissal from the University. The full Disruptive Behavior Policy is available on the College of Arts and Sciences website at http://www.ferris.edu/htmls/colleges/artsands/student-resources/disruptive-behavior.htm

For additional policies and helpful information, check out the College of Arts & Sciences Student Resources page at http://www.ferris.edu/HTMLS/colleges/artsands/student-resources/

WHERE TO GO FOR HELP

The following services are available to any Ferris student, free of charge. They are designed to help you succeed in your courses, in your career planning, and in meeting the challenges of university life. Don't hesitate to explore and use these services at Ferris.

ACADEMIC ADVISING
All students have an assigned advisor and should confer with that advisor regularly. Students who have declared a major should see an advisor in that major. To find out who your advisor is, login to MyFSU and click on the Academics and Services tab, then Registration Status / Advisor Information link.

ACADEMIC SUPPORT CENTER.....**ASC 1017 – 591-3543**
THE WRITING CENTER.....**ASC 1017 – 591-2534**
The Academic Support Center, Tutoring Services, and Writing Center join together to offer FSU students an array of academic support services. Tutors are available to answer questions for many courses. The Writing Center helps writers individually and in workshops with skills and assignments. There is also study skills assistance to help with note-taking, test-taking, memory and reading strategies, and time management.

DISABILITIES SERVICES.....**STR 313 – 591-3057**
According to the Americans with Disabilities Act, each student with a disability is responsible for notifying the University of his/her disability and requesting accommodations. Students requiring a classroom accommodation due to a physical, learning, mental or emotional disability should contact the Disabilities Services Office.

SCHOLAR PROGRAM.....**ASC 1021 – 591-5976**
SCHOLAR is an academic support program that aids in the student's successful progression by offering a Peer Mentor Program, a Student Retention Program, and an Academic Student Advisory Committee.

PERSONAL COUNSELING, SEXUAL ASSAULT, SUBSTANCE ABUSE BIRKAM HEALTH CENTER ..... **2nd Floor - 591-5968** Personal counseling is available confidentially and free of charge. Counselors are available to assist with personal and stress-related problems, family and relationship issues, substance abuse, sexual assault, depression, or other similar problems. Call or stop by to obtain an appointment.

If you or a friend is in immediate crisis, call 911.

EDUCATIONAL & CAREER COUNSELING .....**STR 313 – 591-3057**
Students wanting to examine their choice of major or career choice, learning styles or strategies can make one-on-one appointments with licensed counselors.

SAFETY
Please observe the posted shelter and evacuation routes in the hallway nearest your classroom.

OTHER RESOURCES

BIRKAM HEALTH CENTER.....**1st Floor - 591-2614**
The Birkam Health Center provides fee-for-service medical care including evaluation and treatment for illness and injury anytime during the year. Patients are seen on a walk-in and by appointment basis.

FLITE LIBRARY.....**591-2669**
Regular hours for FLITE:
Monday – Thursday . . . . . 7:30 a.m. – MIDNIGHT
Friday . . . . . 7:30 a.m. – 6:00 p.m.
Saturday . . . . . NOON – 4:00 p.m.
Sunday . . . . . 1:00 p.m. – MIDNIGHT
(Extended Studies Court will begin late night hours September 17, 2013
*Sunday-Thursday/MIDNIGHT to 7:30 a.m. *Friday/6 p.m. to MIDNIGHT
*Saturday/5 p.m. to MIDNIGHT)

FSU BOOKSTORE.....**14265 NORTHLAND DR. 231 591-2607**
Regular on-campus hours for the Bookstore **:
Monday – Thursday . . . . . 9:00 a.m. – 6:00 p.m.
Friday . . . . . 9:00 a.m. – 5:00 p.m.
Saturday. . . . . 12:00 p.m. – 4:00 p.m.
Sunday . . . . . CLOSED

New location is at the Save-A-Lot Shopping Center Plaza.

HELPFUL NUMBERS

Admissions	2100	Inst. Testing	3628
Business Office	2125	Public Safety	5000
Financial Aid	2110	Records	2792
Housing	3745	TAC	4822

When calling from off campus, extensions can be called by using the prefix 231-591-_____.

BIO 347 Environmental Conservation **Fall 2014**

Lecture TR 12-12:50 in STR 136 Lab: M 12-2:50PM, T 8-10:50AM, W 12-2:50PM in SCI 235

Instructor: Dr. Karen Barkel
Office hours: MW 9-11am or by appointment
Office: 2116 ASC Phone: 591-2544 **email: karenbarkel@ferris.edu**

Required Materials:

Lecture Text: Essentials of Conservation Biology 6rd edition, Primack
Lab Manual: Environmental Conservation Lab Manual (at Great Lakes Bookstore)
Calculator, Flash drive, 1 Packet of SCANTRON cards (form 882-E)

Course objectives:
To introduce you to the major factors contributing to the current extinction crisis and encourage you to think critically about these issues. To demonstrate how disciplines such as taxonomy, ecology, genetics, population biology, economics and sociology interact to shape the future of healthy ecosystems.

Outcomes:
1) Demonstrate by examination an understanding and in-depth knowledge of the major issues in the discipline of Conservation Biology.
2) Demonstrate through active discussion, an awareness of current conservation issues.
3) Use the scientific method to collect, analyze, interpret, display experimental data, and draw conclusions based on the analysis.

Notes and Recording: Class material will be presented during the lectures. It is your responsibility to attend class, take notes, and become informed of any announcements made during your absence. GET TO KNOW OTHER STUDENTS IN THE CLASS! The questions for the exams will be taken from the material presented in class and the chapters assigned in the textbook. You may use a tape recorder for the lectures.

Attendance: Attendance in lecture is expected. Please BE ON TIME!!!! Attendance in lab is MANDATORY. >2 missed laboratories will result in a failing grade in the class.

Exams: Examinations will be given during the normal lecture period on the dates are listed on the class schedule. There are **NO MAKEUP EXAMS**. Failure to take an exam at the scheduled time (see class schedule) will result in a grade of 0 for the exam. If you have a valid excuse, inform me ahead of time, and provide documentation within 2 weeks of the missed exam (proof of funeral, hospitalization, etc), you may replace the missed exam with the grade on the final (which is comprehensive. Thus instead of being worth 100 points, the final would be worth 200 points). If given at least 2 weeks notice, you may be able to take an exam early if you have a school-sponsored activity (with documentation). Exams will cover material covered in lecture and lab (films and papers discussed). You will not receive your exams back but you may stop by my office (during my office hours) to look them over. Exam grades will be posted on Ferris Connect.

Grading: Final grades will be based on points earned in lecture and laboratory (total = 660). Lecture grade (500 points) will be based on the average of 3 exams (100 points each) and a 2 part final (200 points). Part 1 of the final will cover new material since exam 3(100 points), while part 2 is CUMMULATIVE (100points). Quizzes may be given in lecture if deemed necessary. Lab grades (160 points) will be based on the score earned on a lab exam (100 points) and participation (60 points).

Grading Scale:

A (≥94%)	C (73 - 76.9%)
A- (90 - 93.9%)	C- (70 - 72.9%)
B+ (87- 89.9%)	D+ (67 - 69.9%)
B (83-86.9%)	D (63 - 66.9%)
B- (80-82.9%)	D- (60 - 62.9%)
C+ (77 - 79.9%)	F (≤ 59.9%)

Academic Integrity: Any form of cheating will not be tolerated, and will result in a 0 for the assignment or exam in question. Additional action may be taken by the University.

To do well in this course:

Attend all lectures and labs, and BE ON TIME
Exhibit professional behavior (you may be asked to leave if you don't)
Take good notes, and organize them
Read the assigned sections of the text book before class
Study your notes EVERY WEEK, not just before the exam
Ask questions when there is something you don't understand

Lecture Schedule: (subject to change)

Week	Dates	New Topic	Chapter reading **
1	Aug 26 Aug 28	Intro Conservation Biology Biological diversity	1 (6) 2
2	Sept 2 Sept 4	Location of diversity	2-3
3	Sept 9 Sept 11	Ecological economics Indirect Use Value	4 5
4	Sept 16 Sept 18	Indirect Use Value Extinction Patterns	5 7
5	Sept 23 Sept 25	Extinction Patterns **Exam 1**	7
6	Sept 30 Oct 2	Causes of extinction Destruction, degradation, fragmentation	9
7	Oct 7 Oct 9	Causes of extinction overexploitation , exotics and disease	9/10
8	Oct 14 Oct 16	Causes of extinction overexploitation , exotics and disease	10
9	Oct 21 Oct 23	Vulnerability Small populations	8 11
10	Oct 28 Oct 30	Small populations **Exam 2**	11
11	Nov 4 Nov 6	Applied Population Biology Establishing new populations	12 13
12	Nov 11 Nov 13	Ex situ strategies Protected areas	14 15
13	Nov 18 Nov 20	Reserve design	16 17/18
14	Nov 25 Nov 27	Management (time permitting) Thanksgiving Holiday (no class)	17/18 --
15	Dec 2 Dec 4	Restoration cont	19
16	**Dec. 9** **12-1:40pm**	**Exam 3 /Final**	

** Additional reading assignments will be given out during the semester

Lab Schedule: (subject to change)

All labs will meet in SCI 235 unless noted below

	Week of	Topic
1)	Aug 25	Intro to hypothesis testing / Lab intro
2)	Sept 1	No lab (Labor Day)
3)	Sept 8	Set up plant experiment, Set up Island Biogeography exps
4)	Sept 15	Sample collection for Biodiversity, Water testing
5)	Sept 22	Process Biodiversity samples, water data
6)	Sept 29	**Computer Lab (FLITE 110)** Intro to data analysis, Biodiversity data / Water quality data
7)	Oct 6	Finish plant experiment SCI 235 / Film
8)	Oct 13	**Computer lab (FLITE 110)**: Reserve Size exercise, Data analysis of Plant experiment/
9)	Oct 20	Collect samples for Biogeography study SCI 235 / MSY exercise
10)	Oct 27	Human population exercise / Cemetery trip meet in SCI 235
11)	Nov 3	Process samples for Island Biogeography exp SCI 235
12)	Nov 10	Toxicology experiment SCI 235
13)	Nov. 17	**Computer lab** (FLITE 110) Toxicology exp data, Data analysis Biogeography exercise
14)	Nov 24	No lab (Thanksgiving)
15)	Dec 1	Lab exam **(FLITE 110)**

Animal Behavior

Biology 348 Fall 2014

Paul H. Klatt
2114 ASC Building
591-2671
PaulKlatt@ferris.edu

Text: Perspectives on Animal Behavior, 3rd ed and King Solomon's Ring.
Class: Starr 136, 10:00 am, MWF
Office hours: Thursday and Friday 3:00-5:00 pm

Grading Scale:

A (94% and up)	C (73-76.9%)
A- (90-93.9%)	C- (70-72.9%)
B+ (87-89.9%)	D+ (67-69.9%)
B (83-86.9%)	D (63-66.9%)
B- (80-82.9%)	D- (60-62.9%)
C+ (77-79.9%)	F (59.9% and below)

Exam I	100
Exam II	100
Exam III	100
Exam IV	100
Total	400

Course Description: In this course, we explore the diversity of animal behavior in order to understand how behavior is organized and controlled, how it develops, why it is performed, and why it takes a particular form. The theme of the course is that behavior is the product of natural selection. The emphases are on viewing behavior as a species attribute, following the approach of comparative ethology, and as an individual attribute, interpreting behavior to be a "strategy" that contributes to an organism's fitness.

Specific Course Outcomes: A student succeeding in this course should be able to:

1) Demonstrate understanding and depth of knowledge in Animal Behavior (learning, spatial distribution, foraging, sexual selection, parental care, mating systems, conflict, altruism, and communication).
2) Demonstrate the ability to understand and apply the scientific methods and techniques used by researchers in the field.
3) Demonstrate effective written communication skills.

Exams: Lecture Exams cannot be made up. Students who are absent on exam day, and do not have a legitimate excuse, will receive a zero on that exam. **Cheating** will result in failure of the course. Additional action may be taken by the University.

Tentative Schedule:

Date		Lecture	Chapter
Aug.	25	Introduction	01
	27	History of the Study of Behavior	02
	29	cont.	
Sept.	01	[Labor Day Holiday]	
	03	cont.	
	05	Genetic Analysis of Behavior	03
	08	cont.	

	10	Natural Selection and Behavior	04
__	12	Learning and Cognition	05
	15	Physiological Analysis - Nerves	06
	17	cont.	
__	19	**Exam I** - 100 points	
	22	Physiological Analysis - Hormones	07
	24	cont.	
__	26	Development of Behavior	08
	29	cont.	
Oct.	01	Biological Clocks	09
__	03	cont.	
	06	Mechanisms of Orientation and Navigation	10
	08	cont.	
__	10	cont.	
	13	Ecology and Evolution of Spatial Distribution	11
	15	cont.	
__	17	**Exam II** - 100 points	
	20	Foraging Behavior	12
	22	cont.	
__	24	Antipredator Behavior	13
	27	Sexual Selection	14
	29	cont.	
__	31	cont.	
Nov.	03	cont.	
	05	Parental Care and Mating Systems	15
__	07	cont.	
	10	**Exam III** - 100 points	
	12	Conflict	18
__	14	cont.	
	17	cont.	
	19	Group Living, Altruism, and Cooperation	19
__	21	cont.	
	24	cont.	
	26	Communication: Channels and Functions	16
__	28	[Thanksgiving Holiday]	
Dec.	01	cont.	
	03	Evolution of Communication	17
__	05	cont.	
	09	**Exam IV** - 100 points, 10:00 am - 11:40 am	

"The evolution for the capacity to simulate seems to have culminated in subjective consciousness. Why this should have happened is, to me, the most profound mystery facing modern biology. Perhaps consciousness arises when the brain's simulation of the world becomes so complete that it must include a model of itself." -- *The Selfish Gene*, Richard Dawkins

BIOL 349: MEDICAL PARASITOLOGY
T 1:00 – 2:00, STR. 136
Dr. Fadayomi Spring 2010

Office: ASC 2009 **Phone:** 591-5628 (o); 591-5638 (lab)
Email: fadayok@ferris.edu

Office Hours: M 10:00 – 12:00; T 8:30 – 9:00; W 10:00 – 11:00

Prerequisite: One year of college biology

Course Objectives

At the completion of this course, students will be able to:

1. Describe basic concepts of parasitology including parasite relationship with various hosts.
2. Describe the life cycles of medically important parasites (protozoan, helminthes and arthropods).
3. Describe key concepts in epidemiology, geographical distribution, prevention and control of medically important parasites.
4. Identify common parasites of humans especially stages that are used in diagnosis.
5. Describe the major pathology and symptoms associated with the infection of medically important parasites.

Textbook: Markell and Voge's Medical Parasitology by Markell, John and Krotoski, 9th ed.
Lecture Guide by Fadayomi (available at Great Lakes book store).

Assessment:
Four (4) lecture exams

- *Examination questions will be taken from the contents of the lecture notes and text and class handout materials. Some lab information may also be included on your test.*
- *Examination will cover memory, comprehension and application of the subject matter.*
- *Exam dates will be announced at a later date and students are required and expected to take the exams at the scheduled time otherwise; a grade of zero will be awarded for missed exams.*
- *Make-up exams will be given only after a valid excuse has been provided; these exams may be more difficult.*

Four (4) lab quizzes
Clinical findings and description of many parasites in the form of case studies will be *posted on Ferris Connect.*

- *All students are required to identify the parasites on time.* ***Late entries will not be graded.***

Presentation

- Each student or a pair of student will prepare and present detailed well-rounded discussion on a parasite. Your presentation may be oral, poster or in the form of an informative brochure. A list of parasite to pick from will be provided on FerrisConnect

Grading Scale

A = 95-100%	B = 80-85%	C = 70 – 74%	D = 60 – 64%
A^- = 90 – 94%	B^- = 78-79%	C^- = 68 – 69%	D^- = 57 – 59%
B^+ = 86 – 89%	C^+ = 75 – 77%	D^+ = 65 – 67%	F = Below 57%

Attendance:

Prompt attendance to all lectures is required and expected. If you miss a lecture, you are responsible for the lecture contents and any assignments given during the lecture.

Disruptive Behaviors:

Behaviors that are disruptive to learning will not be tolerated (see attached handout for further clarification).

Electronic Devices:

Electronic devices (cellular phones, walkmans, etc.) **must** be turned off in the lecture hall.

Cheating:

Cheating will result in a grade of zero on the exam. The case may also be reported to the Dean for further action.

FerrisConnect:

Review questions, assignments and grades will be available on FerrisConnect.

Lecture Schedule **Spring 2010**

Chapter	Topic
2	The Nature of Parasitism
8	Intestinal Nematodes Infective in the Egg Stage
8	Intestinal Nematodes Infective in the Larval Stage
9	Blood and Tissue-Dwelling Nematodes
	Exam 1
7	Intestinal Cestodes
7	Tissue Cestodes
6	Trematodes Infective in Metacercarial Stage
6	Trematodes Infective in Cercarial Stage
	Exam 2
3	Lumen-Dwelling Protozoa Amebae The Flagellates The Ciliate The Apicomplexa (Sporozoa)
4	Blood and Tissue-Dwelling Protozoa *Plasmodium* sp
	Exam 3
5	Blood and Tissue-Dwelling Protozoa Hemoflagellates
3, 5	Emerging Parasitic Diseases Tissue Coccidia
10	Emerging Parasitic Diseases Myiasis
	Final Exam (Cummulative) **May 6, 12:00 – 1-40pm**

Laboratory Schedule **Spring 2010**

Each pair of student will be assigned a slide box containing permanently preserved specimen. Once assigned, please check your slides for cracks, chips and missing slides. Complete, sign and return the attached form to me. Keep a record of the box number for future reference since this will be your slide box for the entire semester. Students will be responsible for missing or broken slides at the end of the semester. Occasional accidentally slide breakage is budgeted for but please be careful in handling slides so as to minimize breakages since each slide averages about $5.00. BE SURE TO OPEN SLIDE BOXES SO THAT THE LID IS FACING UPRIGHT.
One common way of misplacing slides is to accidentally leave them on the stage of your microscope at the end of the laboratory period, so please check microscope stages before you leave the lab. Your lab manual provides a step-by-step instruction on what to look for on each slide and the CD provides an opportunity to study the parasites away from the lab. Sometime, demonstrations may be set up to supplement the slide collections. These demonstrations will be set up for ONE laboratory period only and may be included on your test so it is important that you examine them carefully during the laboratory period.

Attendance: Attendance in lab is mandatory.

Exams: Lab quizzes will include identification of specimen, morphology, pathology, the life cycles, sites of infection, intermediate and definitive hosts. This information can be found in the lab manual, handouts, assigned text and lecture notes. Laboratory quizzes will be mostly identification and life cycles. You must take the quiz at the designated time since there will be no make-up lab quizzes.

Text: Laboratory manual by Fadayomi (available at Great Lakes book store).

Laboratory Schedule **Spring 2010**

Date	Topic
January 14	**Lecture (Sci 120)**
January 21, 28	*Enterobius vermicularis* *Trichuris trichiura* *Necator americanus and A. caninun* *Strongyloides stercoralis* *Trichinella spiralis* *Wuchereria bancrofti*
February 4	**Quiz 1 (nematodes)** **Lecture**
February 11, 18	*Hymenolepis nana* *Hymenolepis diminuta* *Dipylidium caninum* *Taenia solium* *Taenia saginata* *Diphyllobothrium latum* *Echinococcus granulosus*
February 25	**Quiz #2 (cestodes)** Fecal Examination
March 6-14	**Mid semester recess (no class)**
March 18, 25	*Schistosoma japonicum, S. mansoni,* *S. haematobium* *Fasciola hepatica* *Clonorchis sinensis* *Paragonimus westermani*
April 1-4	**Spring recess (no class)**
April 8	**Quiz #3 (trematodes)**
April 8, 15, 22	*Entamoeba histolytica* *Entamoeba coli* *Iodamoeba bushlii* *Endolimax nana* *Balantidium coli* *Giardia lamblia* *Chilomastix mesnili* *Trichomonas vaginalis* *Trypanosoma cruzi* African trypanosomes *Leishmania spp* *Plasmodium falciparum* *Plasmodium vivax*
April 29	**Quiz #4 (protozoans)**

Hibiscus in flower: Malvaceae

PLANTS AND FUNGI
BIOLOGY 350
COURSE SYLLABUS

Peziza fungus cup: Ascomycota

Instructor: Dr. Scott Herron
Office: 2017 ASC and SCI 233 (Wild Rice Research Lab)
Telephone: 231-591-2087
Email: herrons@ferris.edu
Office Hours: Monday: 2:00-2:50 pm ASC 2017
Tuesday: 1:30-2:00 pm SCI 235
Wednesday: 2:00-2:50; 4:15-4:45 pm ASC 2017
Thursday 1:30-2:00 pm SCI 235
All other meetings by appointment only

Course Description:
This course will examine the biology of plants and fungi from a systematic perspective. Lectures will address essential aspects of plant and fungal biology, including evolution, morphology, anatomy, physiology, and ecology. Labs will utilize a hands-on approach to taxonomy, plant propagation and microscopy, and field trips will be utilized to demonstrate plant community structure and field identification of Michigan's plants and macro-fungi. 4.000 Credit hours. Typically offered Spring Semester. This is a Web-enhanced course. **Prerequisites:** BIOL 122 C- or better. Credits for course completion: 4

Class Schedule:	Lecture: **Section 211**	M & W	3:00-4:15 PM
CRN: 11811	Lecture Room: STR 136		
	Lab: **Section 211**	Thurs	8:00-10:50 AM
	Lab Room: SCI 235		

Course Specific Outcomes:

Outcome #1 - Students will demonstrate an understanding of basic botanical knowledge.
Assessment for Outcome #1 - Quizzes and examinations and the oral presentation will be used to evaluate student understanding of the material.

Outcome #2 - Students will demonstrate skill in identification of plants and macrofungi.
Assessment for Outcome #2 – A lab practicum ID exam, using living or preserved specimens, along with lab exercise worksheets will be used to evaluate identification skills.

Outcome #3 – Students will apply the fundamental botanical concepts to propagate plants sexually and asexually in the greenhouse.
Assessment for Outcome #3 – Instructor observation of propagation techniques along with lab reports will be evaluated on the techniques and ability to successfully learn growing/propagating techniques.

Outcome #4 - Students will demonstrate knowledge of fundamental similarities and differences of fungi from plants, and the ecological connections of fungi to plants and their ecosystems.
Assessment for Outcome #4 – Quizzes, lab worksheets, and examinations will be used to evaluate students' abilities to differentiate key features, functions and interactions of fungi and plants.

Textbooks:

Lecture book (Required)- ***Biology of Plants*** by Peter H. Raven, Ray F. Evert, and Susan E. Eichhorn, Seventh Edition, 2005, W. H. Freeman Press.
Laboratory (Required)- Exercises for the Botany Laboratory, by Joel A. Kazmierski, 1999, Morton Publishing Company.
Laboratory (Required)-A Photographic Atlas for the Botany Laboratory by Rushforth, Robbins, Crawley & Van De Graaff, 6th ed., Morton Publishing Comp.

Lectures Grades:

There will be three 100 point lecture exams (see lecture schedule for dates). Exam questions may be a combination of multiple-choice, true/false, labeling and/or short essay questions. Exams will be taken from the lectures, textbook and class handouts. **A Comprehensive Final Exam may be given at a date/time determined by the professor and agreed to by the students, if deemed necessary to evaluate course outcomes.**

Students are required and expected to take the exams and quizzes at scheduled times. Failure to take exams and quizzes at the scheduled time will result in a grade of zero.

Online quizzes will be assigned throughout the semester, to assess your effort to keep up with the assigned readings. These quizzes will be out of 5 points per chapter assigned.

Student Presentations:

Each student will be required to prepare and deliver **one oral presentation/ activity** on the topic as defined by the instructor. This **presentation** will be **worth 30 points** and will be done in lecture, but the **style of presentation** will be the choice of the student. The goal is to enhance the learning of the material from the defined chapter. It is your responsibility to read the chapter assigned, compile notes and information from whatever sources will enhance the delivery of your presentation. Instructor feedback will be provided to the student.

Lab Grades:

Each of lab exercise question sections will be worth 5 points, and will due by the end of the lab period assigned. Lab quizzes (10 points each) in the beginning of lab will account for additional points. A **lab practical on March 5** will be worth **50 points** and will assess the **first seven weeks of identification** of plants and fungi.

Grade Calculation:

Grades will be determined by comparing the students' total number of points to the number of points possible in the course. I expect that there will be **approximately** 330 points possible in lecture and 245 points in laboratory, totaling ~575 points.

Communicating Results:

Lab reports are assignments where you are required to demonstrate your writing, analyzing, and reflection capabilities. You will work in a small group to explore the **scientific method** and type up a lab report **worth 30 points** as assigned in lab (Tentatively **Due April 16**).

Letter grades will be assigned according to the following scale:

A = 94-100%	B = 83-86.9%	C = 73-76.9%	D = 63-66.9%
A- = 90-93.9%	B- = 80-82.9%	C- =70-72.9%	D- = 60-62.9%
B+ = 87-89.9%	C+ = 77-79.9%	D+ = 67-69.9%	F = Below 60%

Cheating: Cheating on exams or quizzes will result in a grade of zero on the assignment. The case may also be reported to the Dean for further action.

Attendance Policy: Prompt attendance to all classes is required and expected. If you miss lecture, you are responsible for the lecture contents and any assignments given out during the lecture. **Attendance in all lab sessions is required as there will be no make up lab period.** If you have a valid reason for an absence, see Dr. Herron with your documentation as soon as you return. *Failure to attend more than two lab periods is grounds for class failure (F) as stated in Biology Departmental policies, and yes I have exercised my use of this policy in the past.*

Study Suggestions: Come to class regularly and be on time. Show your classmates and me respect in the classroom. **Organize your notes clearly, remembering that you are responsible for your own learning. Read your class handouts, lab book and lecture readings** and fill in missing information. Ask questions regularly, during lecture, lab, or office hours. Study with classmates. Use student development services for tutoring if needed, but see me first. Make sure to check Ferris Connect weekly for new lecture material as well as grades and emails that I may send you. You must login thru My FSU (https://myfsu.ferris.edu), where you will be shown a list of the classes you are registered for (be sure it shows the current semester), and select the Plants and Fungi link, which will take you to the Ferris Connect/Blackboard portal.

BIOLOGY 350 (Plants and Fungi)
TENTATIVE LECTURE SCHEDULE

Date	Subject	Chapter	Student Activity
1/12	Introduction to Botany	1	
1/14	Evolution and Systematics of Plants	12	
1/19	**No Class <MLK Holiday>**		
1/21	Evolution and Systematics of Plants & Fungi	12	1
1/26	Diversity of Fungi	14	2
1/28	Diversity of Fungi	14	3
2/2	Bryophyte Diversity: Mosses & Relatives	16	4
2/4	Bryophyte Diversity: Mosses & Relatives	16	5
2/9	Seedless Vascular Plants: Ferns & Relatives	17	6
2/11	Seedless Vascular Plants: Ferns & Relatives	17	7
2/16	**Review for Exam 1 (Study Guide)**		
2/18	**Exam # 1**		
2/23	Gymnosperms: Including Conifers	18	8
2/25	Introduction to Angiosperms: Flowering Plants	19	9
3/2	Introduction to Angiosperms: Flowering Plants; Evolution of Angiosperms	20	10
3/4	Regulating Growth and Development: Plant Hormones	27	11
3/9 & 3/11	**No Class <Spring Recess 3/7-3/15>**		
3/16	Regulating Growth and Development: Plant Hormones; External Factors and Plant Growth	28	12
3/18	Structure & Development of Early Plant Body	22	13
3/23	Structure & Development of Early Plant Body	22	14
3/25 (W-DATE)	Cells and Tissues of the Plant Body	23	15
3/30	Cells and Tissues of the Plant & Fungal Body	23	16
4/1	Root Structure & Development	24	17
4/6	**Exam # 2**		
4/8	Root Structure & Development; Fungal Mycelium & Mycorrhizae-Root Interface	24	18
4/13	Shoot Structure and Development	25	19
4/15	Shoot Structure and Development; Secondary Growth in Stems	26	20
4/20	Plants & People: Culturally Significant Plants	21	21
4/22	Plants & People: Culturally Significant Plants	21	22
4/27	Dynamics of Plant and Fungal Communities and Ecosystems	31	23
4/29	Dynamics of Plant and Fungal Communities and Ecosystems; Global Ecology	32	24
5/5	**Exam # 3 2:00-3:40 pm**		

LABORATORY SCHEDULE

Week	Week of (date)	Subject	Exercise in Lab Book
1	Jan. 12 (15)	Lab Safety; Microscope Review Some aspects of classification	1 (p.2-10) p. 63-66
2	Jan. 19 (22)	Evolution and Systematics of Plants Evolution and Systematics of Fungi	Handouts Handouts
3	Jan. 26 (29)	Fungi Part 1 Fungi Part 2	8 (p.77-84) 9 (p.86-96)
4	Feb. 2 (5)	Mosses and Liverworts Fungal Experiments	10 (p.98-108) Handouts
5	Feb. 9 (12)	Primitive Vascular Plants Division Pterophyta: Ferns	11 (p.110-118) 12 (p.120-128)
6	Feb. 16 (19)	Division Coniferophyta: Conifers Gymnosperm Classification	13 (p.130-138) Handouts
7	Feb. 23 (26)	Divison Anthophyta: Flowers Co-Evolution of Angiosperms & Animals **(Movie: First Flower, PBS NOVA)**	14 (p.140-152) Handouts www.pbs.org/wgbh/nova/flower
8	March 2 (5)	Asexual and Sexual Propagation: Hormones in action **Lab Practical: Identification Exam 3/5**	Handouts
9	March 9 (12)	**No lab <Spring Recess>**	
10	March 16 (19)	Propagation 2: Sexual and Asexual Divison Anthophyta: Fruits and Seeds	Handouts 15 (p.154-162)
11	March 23 (26)	Seed adaptations and dispersal features Cell Division and Plant Tissues	Handouts 2 (p.12-23)
12	April 1 (2)	**No lab <Midterm/Easter Break>**	
13	April 6 (9)	Roots **Stems: Herbaceous Plants**	5 (p.44-52) 3 (p.26-33)
14	April 13 (16)	Stems: Woody Plants Leaves **Lab Reports Due 4/16**	4 (p.36-41) 6 (p.54-62)
15	April 20 (23)	**Plants & People Fieldtrip: Pharmacy Greenhouse & Native American Garden**	Handouts
16	April 26 (29)	**Ecology of Plant and Fungal Communities-fieldtrip**	Handouts

BIOL 370 Developmental Biology **Spring_2014**

Lecture: SCI120 MWF 11 – 11:50 am
Lab of section 211: SCI 207 M 3:00 pm – 5:50 pm
Lab of section 212: SCI 207 T 12 pm – 2:50 pm

Instructor: Dr. Changqi C. Zhu
Office hours: T 9:00 am – 11:00 am F 9:00 am – 11:00 am or by appointment Office: ASC 2015
Contact: Phone: 231-591-3196 email: zhuc@ferris.edu
Required Materials:

Textbook: Developmental Biology, 9th edition by Gilbert
Laboratory Materials: will be provided by the instructor
Required test materials: Packet of SCANTRON cards (form 882-E), 2 #2 pencils,

Course objectives:
Lecture:
Demonstrate how the developmental biology field progressed over time in history, the main knowledge of the major developmental mechanisms guiding the development of vertebrate and invertebrate animals, and the medical implications of developmental biology research.

LAB:
Utilize the scientific method to address questions in Developmental Biology
Gain experience in production and use of micro-dissection tools and use of light microscopy
Demonstrate the knowledge of the basic stages of gametogenesis, fertilization and early development in model invertebrate and vertebrate organisms
Become familiar with how to interpret serial sections and whole mounts of embryos to determine positions of structures throughout the embryo

Exams: Exams will be given during the normal lecture period on the dates as listed on the class schedule, which will include materials covered in lecture and assigned readings in the textbook. Failure to take an exam at the scheduled time (see class schedule) will result in a grade of 0 for the exam. If you have a valid excuse, inform your instructor ahead of time (except for hospitalization etc.), and provide written documentation within a week of the missed exam (proof of funeral, hospitalization, etc), you may take a makeup exam. If there is a conflict between school-sponsored activity and the exam, those who participate in the activity (with documentation) can take the exam during my office hours after the activity is done. All the exams can be reviewed in my office during my office hours after they are graded and your grades are posted. Your grades will be posted on Grade Center of FerrisConnect.

***Scantron sheets (Form 882-E) may be needed for some of the exams.

Grading: Final grades will be based on the points earned in lecture (75%) and laboratory (25%).
The Lecture grade (500 points) will be comprised of the total of 4 exams (100 points each) and various in-class and/or homework assignments and quizzes (100 points). Four exams include three unit exams and a final comprehensive exam. Each has 100 points. The exam questions include multiple choice, filling-in blanks, and essay questions. Lab grades will be based on the score earned on a final lab exam, lab participation, and lab reports and/or quizzes.
Grading Scale:

A (≥93%)	C (73 - 76.9%)
A- (90 - 92.9%)	C- (70 - 72.9%)
B+ (87- 89.9%)	D+ (67 - 69.9%)
B (83-86.9%)	D (63 - 66.9%)
B- (80-82.9%)	D- (60 - 62.9%)
C+ (77 - 79.9%)	F (≤ 59.9%)

Academic Integrity: Any form of cheating will not be tolerated, and will result in a 0 for the assignment or exam in question.

Taking Notes and Reading the Textbook: Lecture materials will be presented in class. It is your responsibility to attend class, take notes, and become informed of any announcements made during your absence. It is important to get to know other students in the class! The questions for the exams will be

taken from the materials presented in class and the chapters assigned in the textbook. To ensure your success in this course, you are advised to read the textbook well, familiarize yourself with the course content, and get to know the detailed developmental processes of the key developmental events.

Attendance: Attendance in lecture is essential for your success in this course. Attendance in each lab is required. Labs can not be made up. More than 2 missed laboratories (for any reason) will result in a failing grade in the class.

To do well in this course:

Attend all lectures and labs, and BE ON TIME
Exhibit professional behavior
Take good notes, and organize them
Read the assigned sections of the text book before class
Study your notes EVERY WEEK, not just before the exam
Ask questions when there is something you don't understand
Enjoy yourself and have a good time

Lecture Schedule: (Subject to change)

Week		Dates	New Topic	Chapter reading
1	M	Jan 13	Developmental Anatomy	1
	W	Jan 15	Developmental Genetics	2
	F	Jan 17		2
2	M	Jan 20	**Martin Luther King Day (no class)**	
	W	Jan 22	Cell-Cell Communication in Development	3
	F	Jan 24		3
3	M	Jan 27	The Saga of the Germ Line (Gametogenesis)	16
	W	Jan 29		16
	F	Jan 31	Fertilization	4
4	M	Feb 3		4
	W	Feb 5	Early invertebrate development	5
	F	Feb 7		5
5	M	Feb 10	Drosophila development	6
	W	Feb 12		6
	F	Feb 14		6
6	M	Feb 17	**Exam 1**	
	W	Feb 19		
	F	Feb 21	Early Development of Amphibians and Fish	7
7	M	Feb 24		7
	W	Feb 26	Early Development of Birds and Mammals	8
	F	Feb 28		8
8	M	Mar 3	Central Nervous System and Epidermis Development (Ectoderm Development)	9
	W	Mar 5		9
	F	Mar 7		9
9	M-F	Mar 10 – 14	**.....SPRING BREAK.....**	
10	M	Mar 17	Neural Crest cells	10
	W	Mar 19		10
	F	Mar 21		10
11	M	Mar 24	Paraxial and Intermediate Mesoderm (Muscle, bones, and Kidney Development)	11
	W	Mar 26		11

	F	Mar 28	**Mid-term recess (no class)**	11
12	M	Mar 31	**Exam 2**	
	W	Apr 2	Lateral Plate Mesoderm (Heart Development) and Endoderm (Development of Lung, Pharynx, Gut, Thyroid Glands, Liver, Stomach, Gallbladder, and Pancreas)	12
	F	Apr 4		12
13	M	Apr 7		12
	W	Apr 9	Tetrapod limb development	13
	F	Apr 11		13
14	M	Apr 14	Sex Determination	14
	W	Apr 16		14
	F	Apr 18	**Mid-semester recess (No class)**	
15	M	Apr 21	Metamorphosis	15
	W	Apr 23		15
	F	Apr 25	Medical Aspects of Developmental Biology	17
16	M	Apr 28		17
	W	Apr 30	Review	
	F	May 2	**Exam 3**	
17	R	May 8 10 am – 11:40 am	**Final Exam** (Materials from the whole semester)	

LAB Schedule (Subject to Change)

Week	Date	Exercise and Training	Assignment
1	Jan 13, 14	• Culture of fruit flies (*Drosophila melanogaster*) • *Drosophila* dissection (testis and ovary) • Introduction to Gal4/UAS inducible gene expression system	Learn the life cycle of fruit flies. Write a lab report about how Gal4/UAS system works
2	Jan 20, 21	**No lab (Martin Luther King Day)**	
3	Jan 27, 28	• Zebrafish lab (lab visit and culture of zebrafish embryos) • Set up fruit fly crosses for ectopic eye induction	Observe and document Zebrafish embryonic development
4	Feb 3, 4	• Immunostaining (fruit fly ovarioles) • Florescence microscope (ActivinGal4-UASnclGFP/Cyo ovaries)	
5	Feb 10, 11	• *Planaria* regeneration	
6	Feb 17, 18	Gametogenesis	
7	Feb 24, 25	• Sea Urchin Fertilization • *Planaria* (end) Observation of ectopic eyes in fruit flies	
8	Mar 3, 4	Frog development I	
9	Mar 10, 11	**Spring Recess (No lab)**	
10	Mar 17, 18	Frog development II	
11	Mar 24, 25	Avian Development (stage 5, 18, and 24 hours of incubation)	
12	Mar 31, April 1	Avian Development (33 hour) cross and sagittal sections	
13	Apr 7, 8	Avian Development (48 hour)	
14	Apr 14, 15	Avian Development (72 hour)	
15	Apr 21, 22	Chick recovery and culture	
16	Apr 28, 29	**Lab exam on chicken embryos**	

BIOL 373: CELL BIOLOGY
TR 9:30 – 10:45, SCI 137
Spring 2014

Instructor: Dr. Olukemi Fadayomi ASC 2009 Phone: 591-5628 (o); 591-5638 (lab)
Email: fadayok@ferris.edu

Office Hrs: M 10:00 – 11:30; W 10:00 – 11:00; F 10:00 – 11:30

Course Description:

This upper-level cell biology course examines many of the coordinated mechanisms by which cellular components interact with each other in other for a cell to function properly. Major topics that will be covered include structure, function, and biosynthesis of biological membranes; cytoskeletal systems and cellular movements; cell communication and growth; and cancer.

Prerequisites: Biol. 122 and Chem. 214, 322 or equivalents. This class is taught with the assumption that the student has a basic knowledge of the information covered in Chapters 1-4 and 18 of *The World of the Cell 8th edition*. Students are encouraged to review these chapters before the first exam.

Textbook: *The World of the Cell, 8th Edition* by Wayne M. Becker, Lewis J. Kleinsmith, Jeff Hardin and Gregory Paul Bertoni

Course Objectives: At the completion of this course students will be able to:	**Means of assessing students**
• Describe the biological membranes and other eukaryotic cell components and their major functions of the cell.	**Written exams** that utilize short answers and fill in the blanks; complete written analysis of **case studies**.
• Demonstrate an understanding of the mechanisms by which the various cellular components interact and how the interactions are regulated.	**Written exams** that utilize short answers and fill in the blanks; complete written analysis and **oral presentations.**
• Apply key concepts of cell biology to analyze contemporary issues.	Complete written analysis utilizing **in class group discussions, oral presentation** and written analysis of **case studies**.
• Describe and apply knowledge of selected techniques used in cell and molecular biology research.	**Written exams** that utilize long answers, multiple choice, matching and fill in the blanks.

FerrisConnect:
Review questions, selected lecture slides, announcements, assignments and grades will be available electronically in FerrisConnect.

Disabilities:
If you have a disability which requires classroom or test accommodations please register with the Office of Educational Counseling and Disability Services (Starr 113 x3057) if you have not already done so. Information on disability accommodations is available at http://www.ferris.edu/htmls/colleges/university/disability/homepage.htm.
No accommodations will be granted in this course without notification from the office.

Examinations and Assignments:

Weight	
3 exams	60%
Cumulative final exam	20%
Group paper and presentation	15%
Class participation †	5%

Grading Scale			
A = 93 -100%	B = 83-86%	C = 73-76%	D = 60-64%
A- = 90-92%	B- = 80-82%	C-= 70 - 72%	D- = 57-59%
B+ = 87-89%	C+= 77-79%	D+ = 65-69%	F= Below 57%

- Examination questions will be taken from the content of the textbook, the lectures and class handout material and will cover memory, comprehension and application of the subject matter. Students are required and expected to take the exams at the scheduled time otherwise; a grade of zero will be awarded for missed exams. A make-up exam may be given in the case of documented illness or extenuating circumstances but only after a written explanation or valid documentation (such as a letter from a physician, evidence of funeral, etc) has been submitted to the instructor. The documentation or explanation must be submitted within 2 weeks of the missed exam, otherwise a grade of zero awarded.

- All examinations are the properties of the instructor and must be returned after each exam. However, students may review their examinations up to two (2) weeks after the exam was given. After this period, the exams will no longer be available for viewing.

† Students **must** participate in all discussions and presentations to receive full credit.

Attendance:
Although roll will not be taken, prompt attendance to all lectures is required and expected. Students are responsible for missed lecture contents and any assignments given during the lecture.

Disruptive Behaviors:
Behaviors that are disruptive to learning will not be tolerated (see attached handout for further clarification). Electronic devices (cellular phones, walkmans, etc.) **must** be turned off in the lecture hall.

Academic Honesty
Plagiarism, cheating or any other form of academic dishonesty will result in a grade of zero on the exam/assignment. More information is available at
http://www.ferris.edu/colleges/artsands/stuinfo/dishonesty.html

Group Tutoring:
A dedicated tutor is available to answer questions you have concerning class materials and provide extra assistance with concepts covered in class. I encourage you to use the service weekly and keep up with class readings. Tutoring hours and rooms are as follows: T: 11:00 – 11:50 (SCI 136), M, W: 4:30 – 5:30 (SCI 137).

BIOL 373: CELL BIOLOGY **Dr. Fadayomi** **Spring 2014**

Date	Prerequisite	Chapter	Topic
January 14		Video and activity*	Introduction to Cell Biology- syllabus, etc
16	p. 25-34	Chapter 7 Video and activity**	Membrane Structure, Function and Chemistry
21	p. 41-54	Chapter 7 Chapter 8	Membrane Structure, Function and Chemistry Transport Across Membranes
23		Chapter 8	Transport Across Membranes
28, 30	P 89-93	Chapter 12	The Endomembrane System and Peroxisomes
February 4		Chapter 22	Protein Targeting and Sorting
6			**Class presentations**
11			**EXAM 1**
13, 18	p. 131-150	Chapter 9	Glycolysis, Fermentation and Gluconeogenesis
20, 25	p. 84-86, 91-94	Chapter 10	Aerobic Respiration
27 March 4	p. 86-88	Chapter 11	Photosynthesis
6			**Class presentations**
10-14			**NO CLASS** **Spring Recess**
18			**EXAM 2**
20, 25		Chapters 13 and 14	Signal Transduction Mechanisms
27	p. 95-98	Chapters 15	Cytoskeletal Systems
28		**Last Day for "W"**	
April 1		Chapter 16	Cellular Movement
3, 8		Chapter 17	Cell Adhesions, Cell Junctions, and Extracellular Structures
8, 10	DNA replication, stages of mitosis and cytokinesis †	Chapter 19	The Cell Cycle
15			**Class presentations**
17- 20			**NO CLASS** **Mid-semester recess**
22			**EXAM 3**
24, 29		Chapter 24	Cancer Cells
May 1			**Class presentations**
5 **(Monday)**		**10:00 – 11:40 AM**	**CUMULATIVE FINAL EXAM**

*Complete eukaryotic cell activity at:
http://media.pearsoncmg.com/bc/bc_becker_woc_6/medialib/activities/ch04/act07/st01/frame.html

**Videos and Animations *from the chapters* are available at
http://wps.aw.com/bc_becker_woc_8/179/46027/11783113.cw/index.html

† Biol 121textbook or equivalent

This schedule is a tentative one. The instructor reserves the right to alter the sequence as need arises.

Biology 375, PRINCIPLES OF GENETICS, Spring 2015

Credits: 3, prerequisite: BIOL 122 (C- or better). 1 semester of organic chemistry recommended.

Section: 001, Lecture: M, W, F 9:00 – 9:50 AM in Starr 136, no lab.

Instructor: Dr. Roger Mitchell. **Office hours**: ASC (Commons) 2007: Wednesday 11:00 AM – 11:50 AM and 1:00 - 2:50 PM, and Friday 10:00 - 10:50 AM. Make an appointment, or drop by to see if I am available at some other time. Knock if the door is closed! You may call my office: 591-5879, but email is preferred. email: mitchelr@ferris.edu

Materials you are required to have:

text: '**Genetics**', Pierce, 4th ed.

Course Outcomes: A student succeeding in this course should be able to:

1) demonstrate by examination and other methods an understanding of factual knowledge about genetics, and utilize this knowledge to think critically in the major subjects of modern genetics, including Inheritance patterns in individuals, the structure and function of bacterial and eukaryotic genomes, gene expression, the basis of phenotype, and inheritance patterns in populations and their evolutionary implications.
2) demonstrate the ability analyze genetic data to deduce mechanisms of inheritance or to use hypothesized patterns to predict the outcome of inheritance.

Course Description: A comprehensive course in genetics including molecular aspects of gene structure, function, and control in prokaryotes and eukaryotes, transmission genetics and genes in populations. Designed for students in science baccalaureate programs. This course meets General Education requirements: Scientific Understanding.

Policies and Course Requirements:

Exams and the total percentage. 75% of the grade will be based on lecture exams, including the final exam. The remaining 25% will be made up of a variety of items, including homework, quizzes, and other assignments. Lecture attendance will be included in this 25%.

Exams can only be made up at my discretion and with a legitimate excuse, with a 5% deduction per day, starting with the day of the test. Students who schedule makeup exams in advance will normally take the same test as the rest of the class, or something similar. Exams that are not taken before the test is turned back, or are missed without an acceptable excuse, may receive a "0." Some make-ups may be essay tests or use the student's grade on the corresponding part of the final. I reserve the right to make additional assignments as a condition of giving makeup exams. There is no "extra credit."

Grades. The final total percentages will be curved against a normal grade distribution or modified normal grade distribution at the end of the course.

Dropping with the "W" grade must be done on or before **March 26**.

Incompletes will be given only at my discretion and will require proof of exceptional need. Consistent with university policy, the student must have passed 75% of the class prior to being forced to stop attending due to

circumstances beyond their control. The "I" grade must be cleared or it will become an "F."

Attendance will be taken during most or all lectures, and will affect your grade. Tardiness will reduce your attendance score, and may result in a "0" on any quizzes. Assigned seating will be used.

Cheating will result in course failure. Additional action may be taken by the university.

Disruption of class. I will take whatever action is necessary to maintain a lecture atmosphere conducive to learning. I reserve the right to force involuntary withdrawal or make additional assignments in response to tardiness or disruptive behavior.

Studying is the responsibility of each student, and strategies differ. The following is a minimal approach:

1. Read the text material for lecture before attending.
2. Attend every lecture and take careful notes.
3. Within a day of each lecture, review your notes to make sure you understand everything.
4. If you have trouble understanding anything, get help at once. I am always happy to help students, and the university also has a tutoring service.
5. Review the material again before each exam. You should plan to have done all of the things listed above before you study for the exam.
6. If you still have difficulties, you may need to take notes from your book before lecture, and/or rewrite your lecture notes to improve your understanding. Answering the questions at the end of each chapter may also help.

The keys to doing well are to do all of the reading, go to every lecture, and not fall behind on studying.

Exam material will come from both the text and lecture, and may not be covered in both. Questions will test both your retention of the material presented, as well as your understanding of underlying concepts.

Your most important resource will be yourself. You will choose your own grade, by choosing how hard you work in the course, and how effectively you study. The actual grades assigned by the instructor is just a reflection of your performance.

LECTURE SCHEDULE. Highly tentative!

	TOPIC	Chapter
Jan 12	intro	1
14	cell division	2
16		
19	**NO CLASS: King day**	
21	heredity	3
23		
26	sex linkage	4
28		
30		
Feb 2	modified inheritance	5
4		
6	pedigrees and testing	6
9	**EXAM 1**	
11	linkage	7
13		
16	bacterial genetics	8
18		
20	chromosome variation	9
23	quantitative genetics	24
25		
27	population genetics	25
March 2		
4	**EXAM 2**	
6	evolution	26
9	**NO CLASS: spring break**	
11	**NO CLASS: spring break**	
13	**NO CLASS: spring break**	
16	DNA	10
18		
20	chromosomes and transposons	11
23	DNA replication and recombination	12
25		
27	RNA	14
30		
April 1	translation	15
3	**NO CLASS: mysterious holiday**	
6		
8	**EXAM 3**	
10	prokaryotic gene expression	16
13		
15	eukaryotic gene expression	17
17		
20		
22	DNA mutation and repair	18
24		

27	other chapters if time permits	
29		
May 1		

GENERAL MICROBIOLOGY AND IMMUNOLOGY

BIOL 386 (5 CR: 4+1) **SPRING 2015**

PREREQUISITES: BIOL 232 AND BIOCHEMISTRY/
CONCURRENT BIOCHEMISTRY
OR INSTRUCTOR PERMISSION

COURSE SYLLABUS

	DATE:	**TOPIC:**	**REFERENCE:**
1.	TUE 1/13	Introduction and History	**Brock** ch.: 1,2
2.	THU 1/15	Prokaryotic & Eukaryotic Cells	B ch. 3,20
3.	TUE 1/20	Bacterial Structure & Function	B. ch: 3
4.	THU 1/22	Bacterial Structure & Function	B. ch: 3
5.	TUE 1/27	Bacterial Growth/ Sporulation/ Taxonomy	B. ch: 5,
6.	THU 1/29	Viral Structure & Replication	B. ch.: 9
7.	TUE 2/3	Viral Structure & Replication	B. ch.: 9
8.	THU 2/5	Fungal Structure & Taxonomy	B. ch.:20
9.	**TUE 2/10**	**EXAM I**	
10.	THU 2/12	Microbial Metabolism	B. ch. 13, 14
11.	**TUE** 2/17	Microbial Metabolism	B. ch. 13, 14
12.	THU 2/19	Microbial Genetics	B. ch.: 10, 11, 12
13.	TUE 2/24	Microbial Genetics	B. ch.: 10, 11, 12
14.	THU 2/26	Micro Control: Antimicrobial/Disinfectants	B. ch.: 15, 26
15.	**TUE 3/3**	**EXAM II**	
16.	THU 3/5	Mech. of Microbial Pathogenesis	S. ch. 8.9.10,31
	TUE 3/10	**SPRING BREAK**	
	THU 3/12	**SPRING BREAK**	
17.	TUE 3/17	Respiratory Tract/ Oral cavity	S. ch. 13,19,21,23,57,58,59
18.	THU 3/19	CNS/Skin and Mucosal Membrane Infect.	S..ch.: 36,39,58,48, 61
19.	TUE 3/24	GI Tract Infections/ Intoxications	S. ch. 16,17,22,32,37,42,73
20 .	THU 3/26	Wound Infections	S. ch.: 11,15,20,35
21.	TUE 3/31	STD	S. ch.:14,24,27,66
22.	**THU 4/2**	**Spring Recess**	

22.	TUE 4/7	Immune System Innate Immunity, Phagocytosis	Kuby ch,.: 1,2, 3,4,5,6,18,
23.	THU 4/9	**EXAM III**	
24.	THU 4/14	Humoral Immunity Complement/ Acute Inflammation	K. ch.: 4-6,7,11,13
25.	TUE 4/16	Cellular Immunity	K. ch.: 8,.9,10,12,13,14,20,21
27.	TUE 4/21	Chronic Inflammation	K Appendix: A1,A27
28.	**THU 4/23**	**EXAM IV**	
29.	TUE 4/28	Hypersensitivity / Autoimmunity	K. ch. :15
30	THU 4/30	Hypersensitivity / Immune Based Disease	K. ch.: 16,17
	TUE **5/5**	**FINAL EXAM (4 - 5:40 PM)**	

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SUGGESTED
TEXTS: 1) **Brock: Biology of Microorganisms**, 13TH Edition, 2011 or more recent edition by Madigan et al., Benjamin Cummings. (N.B.: Working glossary at the end of each chapter and G1-G17 at the back of the text.)
2) **Schaechter's Mechanisms of Microbial Disease**, 4th Edition, 2007 or a more recent edition, by Engleberg et.al, Lippincott Williams and Wilkins)
3) **Kuby Immunology**, 6th EDITION, 2007or a more recent edition, by Kindt, Goldsby, Osborne (Glossary/Chapter Question & Answers

EXAMS: There will be 4 scheduled exams plus a comprehensive final. Each of these exams are worth 100 points and **will be individually curved**, if necessary, to 75%. **In addition laboratory will be worth 100 points for a total of 600 points** for the course. Exam format may include multiple choice, matching, essay, and problem solving case studies. **Make up exams**, for valid and documented absences, are essay in format and are graded without a curve.

SCALE: 100-93 = A, 92-90 = A-, 89-87 = B+, 86-83 = B, 82-80 = B-, 79-77= C+, 76-73 = C, 72-70 = C-, 69-67 = D+, 66-63 = D, 62-60 = D, 59- = F

ATTENDANCE: You are **EXPECTED** to attend every lecture and to explain any absence.

INSTRUCTOR: M. Ryan, Ph.D., ASC2115, Voice mail: 231-591-5892. FAX: 231-591-2540, Email: ryanm@ferris.edu
Office hours: MTWR 3-4 PM and by appointment. If I am not available, please leave a message via voice mail or e-mail.

LEARNING OBJECTIVES:
1) To learn how professionals in microbiology use the scientific method to gain new knowledge and to modify/eliminate existing paradigms.
2) To learn collaborative skills by working in groups for some assignments.
3) To learn how to apply certain course material to develop problem solving and critical thinking skills in microbiology.
4) To learn the language/terminology of microbiology.
5) To learn the fundamental principles of microbial structure and function, microbial metabolism, microbial growth and reproduction, microbial genetics, and the use of antimicrobial drugs.
6) To learn the principles, mechanisms, and theories of microbial pathogenicity in humans.
7) To learn the structure, function, and control of the immune system and the mechanisms of hypersensitivity.

LECTURE LEARNING OUTCOMES :

GOAL	CLASSROOM ACTIVITY	MEASUREABLE OUTCOME/ASSESSMENT
1. The student will learn the scientific method as it applies to medical microbiology – BIOL 386	Instruction in the Koch's Postulates which have been used historically and contemporarily to establish the microbial etiology of diseases	Student will demonstrate knowledge of the Koch's Postulates. Assessed by examination questions.
2. The student will learn problem solving/critical thinking skills as they apply to medical microbiology – BIOL 386	Instruction in both lecture and laboratory in the analysis of clinical case studies, bacterial generation time problems, and dilution problems	Student will demonstrate knowledge solving case studies, generation time and dilution problems. Assessed by lecture and laboratory examination questions.
3. The student will learn the structures and functions of bacteria, viruses and fungi studied in BIOL 386	Instruction from lectures, study guide and textbook assignments on microbial structure and function	Student will demonstrate knowledge of microbial structure and function. Assessed by lecture and laboratory examination questions.
4. The student will learn how to analyze scientific data generated during BIOL 386 laboratories	Instruction in the graphing and charting of scientific data generated in laboratory sessions	Student will demonstrate knowledge constructing graphs and/or charts. Assessed by completion of lab assignments requiring graphs/charts and examination questions.
5. The student will learn how to use scientific instruments such as the compound light microscope	Instruction in the preparing and visualization of stained microorganisms using all levels of magnification of the compound light microscope, including oil immersion,	.Student will demonstrate knowledge of microscopy. Assessed by laboratory examinations.

GENERAL EDUCATION OUTCOMES: This course may be used to help fulfill the general education requirement for Scientific Understanding. A student succeeding in this course should:

1) have a working knowledge of the fundamental principles of a natural science discipline;
2) be able to use appropriate scientific reasoning skills to interpret and analyze content in the natural sciences;
3) have a basic understanding of the scientific method, scientific concepts, and the evolution of scientific ideas;
4) have a more positive attitude toward science and an increased confidence in their ability to understand science .

Biology 407, FORENSIC DNA ANALYSIS, Spring 2015

Credits: 4, prerequisite: BIOL 207 and BIOL 375

Section: 211, Lecture: M and W 10:00 – 10:50 AM in Starr. 136, lab: F 12:00 – 2:50 PM in Sci. 337.

Instructor: Dr. Roger Mitchell. **Office hours**: ASC (Commons) 2007: Wednesday 11:00 AM – 11:50 AM and 1:00 - 2:50 PM, and Friday 10:00 - 10:50 AM. Make an appointment, or drop by to see if I am available at some other time. Knock if the door is closed! You may call my office: 591-5879, but email is preferred. email: mitchelr@ferris.edu

Materials you are required to have:

text: **'Fundamentals of Forensic DNA Typing'**, Butler
NOTE: This is not the same as 'Forensic DNA Typing,' 2nd ed., Butler
lab notebook with self-copying pages
3-ring binder for lab handouts
#2 pencils for the lecture exams
safety gear for lab, including a lab coat and eye protection
additional materials for lab, and lecture as announced

Course outcomes: A student succeeding in this course should be able to:

1) demonstrate by examination a theoretical background to the properties of DNA and genetics that are relevant to forensic DNA identification.
2) demonstrate by examination an understanding of the essentials of DNA-based forensic identification at a professional level, including:
    - Historically significant procedures.
    - Current procedures:
        - Autosomal STR profiles.
        - Y chromosome STR profiles.
        - Mitochondrial DNA profiles.
    - Emerging and possible future procedures.
3) demonstrate by examination an understanding of the relationship between forensic science and bioterrorism.
4) demonstrate by examination an understanding of how the scientific method and evolutionary theory relate to these specific topics.
5) perform, in a laboratory setting, a variety of techniques representing the methods of forensic DNA analysis.

Course Description: In depth analysis of forensic biology, molecular biology, statistics, forensic DNA typing and the advantages and limitations of DNA analysis. The laboratory will cover the concepts and techniques of DNA tests currently used in forensic laboratories to solve questions of paternity, maternity, identity of humans, and animal and plant remains resulting from disasters and/or criminal activities.

Policies and Course Requirements:

Exams and the total percentage. 25% lab grade, 75% for lecture grade, including the final exam. The exam grade will mainly include lecture exams, while both lab and lecture grades may include quizzes, reports, and computer assignments. The lab grade will also include a notebook and attendance component.

Exams can only be made up at my discretion and with a legitimate excuse, with a 5% deduction per day, starting with the day of the test. Students who schedule makeup exams in advance will normally take the same test as the rest of the class, or something similar. Exams that are not taken before the test is turned back, or are missed without an acceptable excuse, may receive a "0." Some make-ups may be essay tests or use the student's grade on the corresponding part of the final. I reserve the right to make additional assignments as a condition of giving makeup exams. There is no "extra credit."

Grades. The final total percentages will be curved against a normal grade distribution or modified normal grade distribution at the end of the course.

Dropping with the "W" grade must be done on or before **March 26**.

Incompletes will be given only at my discretion and will require proof of exceptional need. Consistent with university policy, the student must have passed 75% of the class prior to being forced to stop attending due to circumstances beyond their control. The "I" grade must be cleared or it will become an "F."

Attendance will be taken in lab only. If you miss a lab, you may get a "0" for that day's score. Labs cannot be made up for any reason. Missing more than two labs for any reason will result in failing the class. Most labs will be graded on both attendance and quiz scores. Tardiness will reduce your attendance score, and may result in a "0" on your quiz. Assigned seating will be used in both lab and lecture.

Cheating will result in course failure. Additional action may be taken by the university.

Disruption of class. I will take whatever action is necessary to maintain a lecture atmosphere conducive to learning. I reserve the right to force involuntary withdrawal or make additional assignments in response to tardiness or disruptive behavior.

Studying is the responsibility of each student, and strategies differ. The following is a minimal approach:

1. Read the text material for both lab and lecture before attending.
2. Attend every lecture and take careful notes.
3. Within a day of each lecture and lab, review your notes to make sure you understand everything.
4. If you have trouble understanding anything, get help at once. I am always happy to help students, and the university also has a tutoring service.
5. Review the material again before each exam. You should plan to have done all of the things listed above before you study for the exam.
6. If you still have difficulties, you may need to take notes from your book before lecture, and/or rewrite your lecture notes to improve your understanding. Answering the questions at the end of each chapter may also help.

The keys to doing well are to do all of the reading, go to every lecture, and not fall behind on studying.

Exam material will come from both the text and lecture, and may not be covered in both. Questions will test both your retention of the material presented, as well as your understanding of underlying concepts.

Your most important resource will be yourself. You will choose your own grade, by choosing how hard you work in the course, and how effectively you study. The actual grades assigned by the instructor is just a reflection of your performance.

LECTURE SCHEDULE. Highly tentative!

	TOPIC	Chapter
Jan 12	lily DNA: A biologist's introduction	handout
14	DNA review	1
19	**NO CLASS: King day**	
21	overview and history	2
26	old methods, RFLP/VNTR	3
28	**EXAM 1**	
Feb 2		
4	samples	4
9	DNA extraction	5
11		
16	DNA quantification	6
18		
23	PCR	7
25		
March 2	**EXAM 2**	
4	STR markers	8
9	**NO CLASS: spring break**	
11	**NO CLASS: spring break**	
16	STR detection	9
18		
23	STR interpretation	10
25	statistics	11
30	challenges	14
April 1	Y-STR	16
6	**EXAM 3**	
8		
13	mtDNA sequencing	16 (cont.)
15	non-human DNA	15 (part)
20	emerging and future techniques	18
22	bioterrorism: agents	handout
27	bioterrorism: the forensic response	handout
29		

TENTATIVE LAB SCHEDULE. you should read your lab exercises before attending lab. This schedule is highly tentative!

DATE	TOPIC
Jan. 16	Pipettes, gels
23	DNA isolation 1
30	DNA isolation 2
Feb. 6	PCR/VNTR 1
13	PCR/VNTR 2, Photoshop
20	restriction mapping
27	PCR/mtDNA 1
March 6	PCR/mtDNA 2
13	**NO LAB: spring break**
20	STR 1
27	STR 2
April 3	**NO LAB: mysterious holiday**
10	STR 3
17	Sequencing 1
24	Sequencing 2
May 1	Sequencing 3

Course Syllabus – Endocrinology (BIO 421)
Fall 2014

Instructor:	Dr. Joseph Lipar
Office:	ASC 2004
Phone:	591-2660
E-mail:	liparj1@ferris.edu

Lecture:	Starr 136
	MWF: 9:00 – 9:50
Office Hours:	Monday: 10:00 – 12:00 (ASC 2004)
	Tuesday: 1:00 – 3:00 (ASC 2004)

Textbook: Goodman, H.M. 2009. *Basic Medical Endocrinology*, Fourth Edition, Academic Press.

Additional readings and/or information will be provided/assigned during the semester.

Course Description: An in-depth investigation of vertebrate (particularly human) endocrinology. Topics will include hormone structure, hormone synthesis, the mechanisms of hormone action, endocrine disruptors, and the roles of hormones in calcium metabolism, digestive physiology, reproduction, growth, and the stress and sympathetic responses. The hormones of the major endocrine glands will be investigated. This course includes the reading and understanding of primary scientific literature.

Course Goals: The learning outcomes for the students in this course are as follows:

1. Demonstrate an increased understanding and depth of knowledge regarding the field of endocrinology (hormone structure, mechanisms of hormone action, hormone/receptor interactions, specifics of mammalian hormone systems).
2. Demonstrate the ability to access, understand, and critique scientific literature.
3. Demonstrate (with necessary improvements) written communication skills of good quality.

My objective in teaching this course is to provide you with an in-depth introduction to vertebrate endocrinology. We will talk about hormone structure, hormone synthesis, and mechanisms of hormone action. We will investigate the hormones of the major endocrine glands: the pituitary, the hypothalamus, the pineal gland, the pancreas, the thyroid gland, the adrenal glands, and the gonads. We will look at the roles of hormones in calcium metabolism, digestive physiology, growth, and the stress/sympathetic response. In addition, we will investigate the topic of endocrine disruptors. We may also investigate some invertebrate hormone systems. There will be written assignments, the goals of which are to help you improve your writing skills and your ability to gain access to and understand scientific literature.

Exams and Grades: Your final grade will be determined from four exam scores and from the written assignments. I will not assign letter grades to individual exams or to the assignments; you will be assigned a final letter grade based on the total number of points you receive during the course. The final grades for the course will be curved, if necessary.

There will be 550 total points in the class. The points will be broken down as follows:

Exam #1	100 points
Exam #2	100 points
Exam #3	100 points
Final Exam	150 points
In-Class Quizzes	40 points
Bibliography	10 points
Written Assignments	50 points (25 points each)

Your total points will be converted into a percentage at the end of the semester. My grading scale is as follows:

A	93-100	C	73-76.9
A-	90-92.9	C-	70-72.9
B+	87-89.9	D+	67-69.9
B	83-86.9	D	63-66.9
B-	80-82.9	D-	60-62.9
C+	77-79.9	F	Below 60

Exams may contain multiple choice, short answer, essay, true-false, and/or matching questions. The majority of questions will be short answer and essay. Exam questions will be written from material covered in lecture; anything that is brought up in class is fair game for the exams. I will give several questions on every exam that will require you to integrate or apply knowledge in novel ways. Please see the lecture schedule for the dates of each exam. The first three exams will be held during our regular class time, while the cumulative final exam will be held during finals week at the time indicated on the lecture schedule.

If you miss an exam, **you will receive a score of 0** for that exam. If you have what **I** consider to be a legitimate excuse for missing an exam, and if you inform me of this **before** the exam, you will be allowed to take an essay make-up exam. You may **NOT** miss the final; no make-up for the final exam will be given. Cheating on an exam will result in a grade of F for the course.

If the point total on your exam was summed incorrectly, please see me immediately, and I will fix the problem. Ensure that your exam total is the sum of all the points you received on the exam. If you think that you supplied a correct answer for a question, but did not receive points for that answer, you have seven days after receiving your graded exam to see me about it.

The written assignments will each be worth 25 points. Please see the attached sheet of paper for details on these assignments and the associated bibliography (10 points).

How to Do Well: This course covers a great deal of complex and interrelated material, so it is essential that you keep current. You must understand topics covered early in the course to be able to comprehend information presented later in the course, and you will have to be able to integrate material that you learn throughout the course. In short, make sure that when you study a topic, you understand it well enough to be able to remember it and use it later in the course. Do not fall behind in your reading and studying; you will find it difficult or even impossible to catch up once you fall behind in a course of this type. Make sure you set aside regular times outside of class to work on the course material. Finally, don't wait until the night before an exam to study. This is a sure way to do poorly.

Your attendance and active participation in lecture are strongly recommended. I will not take attendance in lecture, but from personal experience and other documented sources I know that students that attend class regularly do better than those that do not.

You will find the learning experience to be much easier if you come to class prepared. Read the assigned materials before coming to class. Within 24 hours of a lecture, re-write your lecture notes. This will force you to review the material while it is fresh in your mind. This has been demonstrated to be an effective way to remember information. Once a given topic has been covered in lecture, answer the appropriate questions at the end of the chapter that cover that topic. The more times that you are exposed to the material (e.g., reading the text, listening to and thinking about the lecture material, and reviewing/rewriting your notes), the greater the likelihood that you will learn the material. Expect me to ask questions during the lecture to motivate you to prepare for class.

I encourage questions. If you have a question during class, please ask it. If something is unclear to you, it is likely that it is a complex topic and there are almost certainly others with the same question. I would like to think that this course can be an interaction among all of us instead of just me lecturing to you. Breaking up the lecture with questions will be beneficial to everyone involved.

Special Accommodations: If you have a learning disability and require special teaching or testing conditions, **please see me during the first week of class** so that we can make the necessary arrangements.

BIOLOGY 423 - NEUROBIOLOGY

Course Syllabus **Fall Semester 2013**

Course Description:

This course covers the relation of structure and function of the nervous system. Topics covered include the structure and properties of excitable cells, synaptic transmission, neurochemistry integration of information in simple systems, centrally programmed behavior, and learning and memory.

Instructor: Dr. M. Beth Zimmer, PhD
Office: 2120 Arts and Science Commons
Phone: (231) 591-5022
Email: MaryZimmer@ferris.edu
Office hours: T: 9:00 - 11:00am
T: 3:00 – 5:00am;
By appointment
Lectures: M, W, F 11:00-11:50pm STR 136

Course Prerequisites: BIOL 322

Course objectives:

By the end of the course students will be able to:

1) differentiate the structure and function of neurons and glia.
2) calculate an equilibrium potential, using the Nernst equation, and describe the events of an action potential.
3) discuss how neurotransmitters are released at a synapse.
4) discuss the anatomical, physiological, neurochemical bases of particular examples of neural behavior and learning and memory.
5) critically read and analyze classical scientific literature

Required Textbook:

Neuroscience, Fifth Edition, Purves, Augustine, Fitzpatrick, Hall, LaMantia, White, eds., Sinauer Associates Inc.

Lecture NOTES - FerrisConnect and the Internet:

Any powerpoint notes that I have will be made available AFTER lecture. Many notes will be given on the board or as handouts. Remember that the internet has a wide variety of sources of information. While researching for your poster presentations be sure to use appropriate references.

Evaluation:

The course will be evaluated based on the following:

Assignments (4 @ 25pts) – 100 pts
Poster presentation project (includes written paper) – 100 pts
4 Exams @100 each – 400 pts

Total points = 600 pts

Course Grading

93 – 100 = A	73 – 76.9 = C
90 – 92.9 = A-	70 – 72.9 = C-
87 - 89.9 = B+	67 – 69.9 = D+
83 – 86.9 = B	63 – 66.9 = D
80 – 82.9 = B-	60 – 62.9 = D-
77 – 79.9 = C+	Below 60 = F

Week	Day		Lecture	Chapter and page #'s
1	M	Aug 26	Introduction	Chapter 1 – pg 1-21
	W	Aug 28	Neuro-Review	
	F	Aug 30	Neuroanatomy – neurons and glia	***Get groups together***
2	M	Sep 2	**Labor Day – No class**	Chapter 2 – pg 25 – 32
	W	Sep 4	Neurophysiology 1 –	
	F	Sep 6	cable properties	
3	M	Sep 9	Neurophysiology 2 –	Chapter 2, 3 – pg 33 -55
	W	Sep 11	action potential	
	F	Sep 13	Neurophysiology 3 –Voltage clamp/	
			Patch clamp/ion channels	Chapter 3, 4
4	M	Sep 16	**EXAM 1**	***Decide on project idea***
	W	Sep 18	Synaptic transmission and chemistry	Chapter 5 – pg 78 – 107
	F	Sep 20		
5	M	Sep 23	Neurotransmitters and receptors	Chapter 6 – pg 109-140
	W	Sep 25	Molecular signaling	Chapter 7 – pg 141-161
	F	Sep 27		
6	M	Sep 30	Synaptic plasticity – Long Term	Chapter 7 – pg 141-161
	W	Oct 2	Depression, long term potentiation, …	Chapter 8 – 163-185
	F	Oct 4		
7	M	Oct 7	Behavior in Aplysia	Chapter 8 + handouts
	W	Oct 9	LTP at hippocampus	
	F	Oct 11	Silent synapses	
8	M	Oct 14	**EXAM 2**	
	W	Oct 16		
	F	Oct 18		
9	M	Oct 21		
	W	Oct 23		
	F	Oct 25		
10	M	Oct 28		
	W	Oct 30		
	F	Nov 1		
11	M	Nov 4	**EXAM 3**	
	W	Nov 6		
	F	Nov 8		
12	M	Nov 11		
	W	Nov 13		
	F	Nov 15		
13	M	Nov 18		
	W	Nov 20		
	F	Nov 22		
14	M	Nov 25		
	W	Nov 27	**Thanksgiving break**	
	F	Nov 29	**Thanksgiving break**	
15	M	Dec 2	***Poster presentations in class***	
	W	Dec 4	***Poster presentations in class***	
	F	Dec 6	**EXAM 4**	

WEEKS 8-14: Student "choice" of topics

I will be surveying the class about your interests regarding neuroscience topics. I will try to design the course curriculum around areas of student interest. I will talk more in class regarding the second half of the semester.

Possible ideas include but are not limited to: Pain, locomotion, central pattern generators, spinal cord injury and regeneration, critical periods …..

Poster Projects

Groups of 3 to 4 individuals will be assigned to a group.

Groups will work on a particular topic of Neuroscience

Group project ideas must be chosen by Sep 16th.

Posters and papers must be completed and turned in by Tuesday, Nov 26.

Posters will be presented in class during the last week – You will need to have two people at the poster at all times – and you will be required to observer each poster to grade each other's posters.

POSSIBLE **IDEAS FOR POSTER PROJECTS:**

Amytrophic lateral sclerosis
Huntington's disease
Spinal cord injury – regeneration, stem cell therapy…
Stroke
Multiple sclerosis
Traumatic brain injury
Parkinson's disease
Neural toxins/poisons
Drugs that affect the nervous system – opioids, anesthetics, etc…
Peripheral nerve neuropathies
Pain
Visual system, hearing system, cochlear implants, etc…
Rett syndrome
Sudden infant death syndrome
Central sleep apnea (not obstructive)

The list is endless - you are not limited at all by this list….please see me for final approval of idea.

MICROBIOLOGY FOR OPTOMETRY

BIOL 438 (4 CREDITS) **SPRING 2015**

PREREQUISITES: BIOL 286 /BIOL 331/332 OR EQUILIVANT MICROBIOLOGY / A&P COURSES, A BIOCHEMISTRY COURSE AND OPTOMETRY STUDENT STATUS OR INSTRUCTOR PERMISSION

COURSE SYLLABUS

	DATE:	**TOPIC:**	**REFERENCE:**
1.	MON 1/12	Introduction and PRE-REQ TEST	**Brock** ch.: 1,2
2.	TUE 1/13	Basic concepts: Review and application (R&A)	B. 5,6
3.	THU 1/15	Microbial Structure & Function (R&A)	B. ch: 4 ,17,18,19
	MON 1/19	**MLK DAY NO CLASS**	
4.	TUE 1/20	Bacterial Growth & Sporulation (R&A)	B ch. 5, 6
5.	THU 1/22	Viral Structure & Replication (R&A)	B. ch.: 9
6.	MON 1/26	Viral Structure & Replication	B. ch.: 9
7.	TUE 1/27	Microbial Metabolism	B. ch. 4,11,15
8.	**THU 1/29**	**EXAM I**	
9.	MON 2/2	Microbial Metabolism	B. ch. 4,13,14
10.	TUE 2/3	Microbial Genetics	B. ch.: 6, 7,8,10
11.	THU 2/5	Microbial Genetics	B. ch.: 6, 7,8,10
12.	MON 2/9	Microbe Control: Antimicrobial/Disinfectants	B. ch.: 26
13.	TUE 2/10	Mech. of Microbial Pathogenesis	**Schaechter** ch. 8-10,31 B.32-36
14.	**THU 2/12**	**EXAM II**	
15.	MON 2/16	Respiratory Tract/CNS Infections	S. ch. 13,19,21,23,57,58,59
16.	TUE 2/17	Respiratory Tract/CNS Infections	
17	THU 2/19	Ocular Infections	
18.	MON 2/23	Ocular Infections	
19 .	TUE 2/24	Oral cavity/ GI Tract Infect/ Intoxications	S. ch. 16,17,22,32,37,42,73
20.	THU 2/26	Oral cavity/ GI Tract Infect/ Intoxications	
21.	MON 3/2	Wound Infections / STD	S.ch.:11,15,20,35/14,24,27,66
22.	TUE 3/3	Immune System	**Kuby** ch,.: 1,2, 3,18,19,/B28-30
23.	**THU 3/5**	**EXAM III**	
	MON 3/9	**SPRING BREAK**	
	TUE 3/10	**SPRING BREAK**	
	THU 3/12	**SPRING BREAK**	
24.	MON 3/16	Immune System	**Kuby** ch,.: 1,2, 3,18,19,/B28-30
25.	TUE 3/17	Immune System	**Kuby** ch,.: 1,2, 3,18,19,/B28-30
26.	THU 3/19	Innate Immunity /Phagocytosis	Ku. ch.:4-6, 11

27.	MON 3/23	Innate Immunity /Phagocytosis	Ku. ch.:4-6, 11
28.	TUE 3/24	Humoral Immunity	Ku. ch.:4-6, 11
29.	THU 3/26	Complement/ Acute Inflammation	Ku. ch.: 7,13
30.	MON 3/30	Complement/ Acute Inflammation	Ku. ch.: 7,13
31.	TUE 3/31	Cellular Immunity	Ku. ch.: 8,9,10,12,13,14,20,21 32
32	THU 4/2+/-	Cellular Immunity	Ku. ch.: 8,9,10,12,13,14,20,21
33.	MON 4/6	Chronic Inflammation	Ku Appendix: A1,A27
34	TUE 4/7	Chronic Inflammation	Ku Appendix: A1,A27
35.	THU 4/9	Hypersensitivity / Autoimmunity	Ku. ch. :15
36.	MON 4/13	Hypersensitivity / Autoimmunity	Ku. ch. :15
37.	TUE 4/14	Hypersensitivity / Autoimmunity	Ku. ch. :15
38.	THU 4/16	Semester Recess	
39.	MON 4/20	Hypersensitivity / Immune Based Disease	Ku. ch.: 16,17
40.	TUE 4/21	Hypersensitivity / Immune Based Disease	Ku. ch.: 16,17
41	THU 4/23	*Atopic Diseases of the Eye	**Koevary** ch.: 4
42.	MON 4/27	*Ocular Based Immunopathologies	Ko ch. :5
41.	TUE 4/28	* Systemic Based Ocular Immunopathologies	Ko ch.: 5
43.	THU 4/30	* Ocular Allografts	Ko ch.: 7
43.	THU. 5/9	**FINAL EXAM (Wed., 6 May, Noon-1:40 PM)** ****(Subject to <u>Actual</u> MCO Exam Schedule)**	

* Topic for in-class "Focus Questions" Assignment

"**SUGGESTED" information sources:**

1) **Brock: Biology of Microorganisms**, 13TH Edition, 2011 or more recent edition by Madigan et al., Benjamin Cummings. (N.B.: Working glossary at the end of each chapter and G1-G17 at the back of the text.)

2) **Schaechter's Mechanisms of Microbial Disease**, 4th Edition, 2007, by Engleberg et.al, Lippincott Williams and Wilkins.(or most recent edition)

3) **Kuby Immunology**, 6th EDITION, 2007, by Kindt,Goldsby,Osborne (Glossary/Chapter Question & Answers) (or most recent edition)

4) **Ocular Immunology in Health and Disease**. Steven B. Koevary. Butterworth Heinemann Publishers.1999 (N.B.: "Available" but Out of Print!)

5) **Clinical Ocular Pharmacology**, Barlett and Jaanus, Butterworths Publishers. (or most recent edition).

6) **Johns Hopkins ABX Guide**. **http://www.hopkinsguides.com**

EXAMS: There will be 3 scheduled exams plus a comprehensive final. Each of these exams is worth 100 points for a total of 400 points. Each exam **will be individually curved**, if necessary, to 75%. Exam format may include multiple choice, matching, essay, and problem solving case studies. **Make up exams**, for valid and documented absences, are essay in format and are graded without a curve.

SCALE: 100-93 = A, 92-90 = A-, 89-87 = B+, 86-83 = B, 82-80 = B-, 79-77= C+, 76-73 = C, 72-70 = C-, 69-67 = D+, 66-63 = D, 62-60 = D, 59- = F

ATTENDANCE: You are **EXPECTED** to attend every lecture and to explain any absence.

INSTRUCTOR: M.Ryan, Ph.D.,
Office: ASC 2115, Voice mail: 231-591-5892, FAX: 231-591-2540, E-mail: ryanm@ferris.edu
Office hours: MTWR 3-4 PM and by appointment. Best to schedule an office visit at least 24 hours prior to appointment. If I am not available, please leave a message on voice mail or via e-mail.

LEARNING OBJECTIVES:

1) To learn how professionals in microbiology use the scientific method to gain new knowledge and to modify/eliminate existing paradigms.
2) To learn collaborative skills by working in groups for some assignments.
3) To learn how to apply certain course material to develop problem solving and critical thinking skills in microbiology
4) To learn the language/terminology of microbiology.
5) To learn the fundamental principles of microbial structure, function, metabolism, growth, reproduction, genetics, and controls and be employ these concepts in clinical problem solving situations
6) To learn the principles, mechanisms, and theories of microbial pathogenicity in humans.
7) To learn the fundamental principles of the structure, function, and control of the immune system and the mechanisms of hypersensitivity and be able to use these concepts in clinical problem solving situations.

LECTURE LEARNING OUTCOMES :

GOAL	CLASSROOM ACTIVITY	MEASUREABLE OUTCOME/ASSESSMENT
1. The student will learn the scientific method as it applies to medical microbiology and immunology.	Instruction in the Koch's Postulates which have been used historically and contemporarily to establish the microbial etiology of diseases	Student will demonstrate knowledge of the Koch's Postulates. Assessed by lecture examination questions.
2. The student will learn problem solving/critical thinking skills as they apply to medical microbiology and immunology.	Lecture instruction and in/out of class activities include the analysis of clinical case studies as a learning tool.	Student will demonstrate knowledge solving case studies, generation time and dilution problems. Assessed by lecture examination questions.
3. The student will learn the structures and functions of bacteria, viruses and fungi studied in BIOL 438 including those associated with ocular infections.	Instruction via lectures supplemented with power point, handouts and the discussion of specific case studies that reinforcing the clinical value of the understanding of microbial structure and function.	Student will demonstrate knowledge of microbial structure and function. Assessed by examination questions.
4. The student will learn the basic concepts of the human immune response as observed in both in the protective and hypersensitivity responses including those associated with ocular infections and allergic reactions.	Instruction via lectures supplemented with power point, handouts and the discussion of specific case studies that reinforcing the clinical value of the understanding the basic concepts of the human immune response.	Student will demonstrate knowledge of the basic concepts of the human immune response .Assessed by examination questions

Ecology

Biology 442 Spring 2015

Paul H. Klatt
2114 ACS Building
591-2671
PaulKlatt@ferris.edu

Texts: Ecology (6th ed), Krebs, 2009.
Never Cry Wolf, Mowat, 1963.
Lab Manual, Klatt, 2015.

Office hours: Monday and Thursday 3:00-5:00 pm

Class: **Lect** - STR 136, 2:00 pm, MW
Lab - SCI 227, 8 am T, and 12:00 pm T

Grading Scale:

A (94% and up)	C (73-76.9%)
A- (90-93.9%)	C- (70-72.9%)
B+ (87-89.9%)	D+ (67-69.9%)
B (83-86.9%)	D (63-66.9%)
B- (80-82.9%)	D- (60-62.9%)
C+ (77-79.9%)	F (59.9% and below)

Exam I	100
Exam II	100
Exam III	100
Lab Points	100
Total	400

Course Description: Study of the dynamic relationships between organisms (plant and animal) and their environment. This course is designed for students in baccalaureate programs in science education and applied biology.

General Education Outcomes

This course may be used to help fulfill the general education requirement for Scientific Understanding. A student succeeding in this course should:

1) have a working knowledge of the fundamental principles of a natural science discipline.
2) be able to use appropriate scientific reasoning skills to interpret and analyze content in the natural sciences.
3) have a basic understanding of the scientific method, scientific concepts, and the evolution of scientific ideas.
4) have a more positive attitude toward science and an increased confidence in their ability to understand science.

Specific Course Outcomes: A student succeeding in this course should be able to:

1) demonstrate a working knowledge of the fundamental principles of ecology (populations, ecosystem function, classification and life cycles, evolution and adaptation to environments, disease and nutrition, naturalized species, management of natural resources, and plant & animal pathogens).
2) scientifically identify the key organisms in their field settings and relate this to the life cycle, geography, climate, ecosystem, growth and niche requirements.

Exams: Lecture Exams cannot be made up. Students who are absent on exam day, and do not have a legitimate excuse, will receive a zero on that exam. **Cheating** will result in failure of the course. Additional action may be taken by the University.

Electronic Devices must be turned off in the lecture hall.

Tentative Schedule:

Date		Lecture	Chapter
Jan.	12	Introduction to Ecology as a Science	01
__	14	Evolution and Ecology	02
	19	[Martin Luther King Holiday]	
__	21	Behavioral Ecology and Geographic Distributions	03 and 04
	26	Biotic and Abiotic factors that Limit Distributions	05 and 06
__	28	Distribution and Abundance	07
Feb.	02	Populations Parameters and Demographic Tech.	08
__	04	cont.	
	09	cont.	
__	11	Population Growth	09
	16	**Exam I** - 100 points	
__	18	Competition	10
	23	cont.	
__	25	Predation	11
Mar.	02	Herbivory and Mutualism	12
__	05	Disease and Parasitism	13
__	[09-13	Spring Break Holiday]	
	16	Regulation of Population Size	14
__	18	cont.	
	23	Harvesting Populations	15
__	25	Pest Control	16
	30	**Exam II** - 100 points	
April	01	Conservation Biology	17
	06	Biodiversity	19
__	08	Succession	18
	13	Equilibrium Communities	20
__	15	Nonequilibrium Communities	21
	20	cont.	
__	22	Primary Production	22
	27	Secondary Production	23
	29	Nutrient Cycles	24
May	07	**Exam III** - 100 points, 2:00 pm - 3:40 pm	

Special Needs: Any student that needs special accommodations for learning or has special needs is invited to discuss these matters with the instructor as soon as possible.

Final Note: Enjoy the course and take pride in your work. The University experience is what you make it. This syllabus is subject to change at any time.

"We then try to justify what we do by trying to make it sound as if it has some useful application. But, really, we do it because it is fun. Nature is entertainment, the greatest show on earth. And that is not trivial because what is life, if it isn't fun? I think that the greatest contribution we could make would be to help make life more interesting."

-- *Ravens in Winter*, Bernd Heinrich

Lab Information

Lab: Lab will consist of exercises to be turned in and quizzes over some reading material. We will meet over in a Flite Computer Lab to complete the analyses of most exercises.

Tentative Schedule:

Week of	Topic
1) 12 Jan.	Introduction
2) 19 Jan.	Animal Behavior Lab
3) 26 Jan.	Plant Competition I
4) 02 Feb.	Pseudoreplication, Hurlbert Paper
5) 09 Feb.	Plant Competition II
6) 16 Feb.	*Never Cry Wolf* - pages 0-128.
7) 23 Feb.	Predation Lab
8) 02 March	*Never Cry Wolf*, pages 129-246.
9) 09 March	[Spring Break]
10) 16 March	Gall Maker
11) 23 March	Mark Recapture I
12) 30 March	Mark Recapture II
13) 06 April	Sampling Birds
14) 13 April	TBA
15) 20 April	Sampling a Field
16) 27 April	Sampling a Forest

Syllabus for Biology 453, plant physiology, Fall 2013
NOTE: Previously, this was BIOL 353.
Credits: 4, Completion of organic chemistry is recommended. Prerequisites: Earned Grades of C- or better in BIOL 122 and BIOL 350.
Section: 211, Lecture: MWF 2:00 – 2:50 PM in Sci. 137, lab: M 9:00 – 11:50 AM in Sci. 235.

lecture and lab Instructor: Dr. Roger Mitchell. **Office hours**: ASC (Commons) room 2007: Monday and Wednesday 12:00 noon – 1:00 PM, Friday 3:00 – 5:00 PM. Make an appointment, or drop by to see if I am available at some other time. Knock if the door is closed! You may call my office at any time: 591-5879.My email is: mitchelr@ferris.edu

Materials you are required to have:

texts: Plant Physiology, Taiz and Zeiger, 4th ed., and Plant Structure and Function, Starr and Taggart, 7th. (Generally, the botany section of any introductory majors' biology textbook should be able to substitute for Starr and Taggart, including Campbell's biology).

#2 pencils for the lecture exams

3H pencils, color pencils, and eraser for lab drawings

additional materials for lab safety. I will let you know in advance when we think that you should obtain such materials.

computer access to prepare lab reports

Course Outcomes: A student succeeding in this course should be able to:

1) demonstrate a reinforced understanding of the scientific method and how it applies to experiments.
2) demonstrate a reinforced understanding that biology is a living, evolutionary science.
3) demonstrate a reinforced understanding of cellular biology and biochemistry.
4) demonstrate a knowledge of the fundamentals of plant physiology, with particular emphasis on water relations, photosynthesis, and the control of plant development (including plant hormones).
5) carry out a variety of plant-related laboratories to reinforce these concepts, and to provide experience to those students who may need to prepare plant labs in the future.

Course Description: A study of the basic structure, function, and physiology of vascular plants. Topics include plant anatomy and cell biology, water relations (including water uptake, xylem transport, and transpiration), nutritional requirements, an in-depth look at photosynthesis, a review of other plant biochemistry, and a study of development and environmental responses, focusing on the detection of stimuli and hormonal and other messengers. Designed for students in baccalaureate programs in science education and biology.

Policies and Course Requirements:

Exams and the total percentage: 25% lab grade, 75% for lecture exams, including the final exam. Part of the final will be based on the lectures after the third exam, and the remainder will be comprehensive. The three lecture exams will be worth 50 points each, and the final 75. Some additional lecture points may be added for special projects. Exams can only be made up at my discretion and with a legitimate excuse, with a 5% deduction per day (starting with exams taken

on exam day at a different time). Students who schedule makeup exams in advance will normally take the same test as the rest of the class, or something similar. Late make-ups, if allowed, may either be essay tests or use the student's grade on the corresponding part of the final. I reserve the right to make additional assignments as a condition of giving makeup exams. Labs will be graded in part on attendance (with deductions for tardiness), in part on lab worksheets and quizes, and in part on lab reports. There is no "extra credit." All of these components will be added to get a final total percentage, which will not be adjusted in any way.

Grades. The final total percentages will be curved against a normal grade distribution or modified normal grade distribution at the end of the course.

Dropping with the "W" grade must be done on or before **October 31**.

Incompletes will be given only at my discretion and will require proof of exceptional need. Consistent with university policy, the student must have passed 75% of the class prior to being forced to stop attending due to circumstances beyond their control. The "I" grade must be cleared or it will become an "F."

Attendance policy: Attendance will be taken in lab. If you miss a lab, you may get a "0" for that day's score. Labs cannot be made up for any reason. Missing more than two labs for any reason will result in failing the class. Excessive tardiness may count as an absence. Attendance may sometimes be taken in lecture, although it will not count directly for grading. Assigned seating will be used to aid in attendance taking in both lab and lecture. Excused absences are on a case-by-case basis at my discretion.

Cheating will result in course failure. Additional action may be taken by the university.

Disruption of class. I will take whatever action is necessary to maintain a lecture atmosphere conducive to learning. I reserve the right to force involuntary withdrawal or make additional assignments in response to tardiness or disruptive behavior.

Studying is the responsibility of each student, and strategies differ. The following is a minimal approach:

1. Read the text material for both lab and lecture before attending.
2. Attend every lecture and take careful notes.
3. Within a day of each lecture and lab, review your notes to make sure you understand everything. Do the problems at the end of each chapter and lab.
4. If you have trouble understanding anything, get help at once. I am always happy to help students, and the university also has a tutoring service.
5. Review the material again before each exam. You should plan to have done all of the things listed above before you study for the exam.
6. If you still have difficulties, you may need to take notes from your book before lecture, and/or rewrite your lecture notes to improve your understanding.

The keys to doing well are to do all of the reading, go to every lecture, and not fall behind on studying.

Exam material will come from both the text and lecture, and may not be covered in both. Questions will test both your retention of the material presented, as well as your understanding of underlying concepts.

Your most important resource will be yourself. You will choose your own grade, by choosing how hard you work in the course, and how effectively you study. The actual grade assigned by the instructor is just a reflection of your performance.

I reserve the right to make needed and appropriate adjustments in the syllabus.

TENTATIVE LECTURE SCHEDULE:

Date	Lecture topic	Chapter Taiz	Chapter Starr
Aug. 26	plant cells, cell walls	1 and 15 (part)	
28			
30			
Sep. 4	chemistry review	1	
6	biofuels		
9			
11	basics of metabolism	2 (on web)	
13			
16	**exam 1**		
18	plant anatomy review		29
20	water in plant cells	3	30
23			
25			
27	water balance	4	
30			
Oct. 2			
4			
7	mineral nutrition	5	
9			
11	xylem transport	6	
14	**exam 2**		
16			
18	photosynthesis: light reactions	7	
21			
23			
25			
28	photosynthesis: carbon fixation	8	
30			
Nov. 1			
4			
6			
8	photosynthesis in the plant and environment	9	
11	**exam 3**		
13			
15	phloem transport	10	
18			
20			
22			
25			
Dec. 2	plant hormones, responses, and defense	selections	32
4			
6			

note: Starr chapters may vary with edition.

TENTATIVE LAB SCHEDULE

week	date	subject
1	Aug 26	mineral nutrition
2	Sept 2	**NO LAB**
3	Sept 9	cell wall substances
4	Sept 16	organelles
5	Sept 23	anatomy review
6	Sept 30	enzymes 1
7	Oct 7	enzymes 2
8	Oct 14	transpiration
9	Oct 21	water relations/root anatomy
10	Oct 28	soil lab 1
11	Nov 4	soil lab 2/chromatography
12	Nov 11	detecting photosynthesis/ chloroplast isolation
13	Nov 18	seed germination (hormones)/leaf anatomy
14	Nov 25	starch
15	Dec 2	final lab quiz

BIOL 460 - Current Topics in Biology
Course Syllabus
Fall 2014

Course Description: Students will use published literature to interpret and analyze current topics of biological interest. This is a capstone course for both the BA Biology and BS Biology programs as it requires students to draw on their knowledge acquired through previous Biology coursework to complete the major written and oral reports.

Instructor: Dr. Scott M. Herron
Office: ASC 2017
Phone: 591-2087
E-mail: herrons@ferris.edu

Lecture: Science 137
Monday and Wednesday: 12:00 – 12:50 pm

Office Hours: M: 10:00 - 10:45am, 1-1:50 pm
W: 10:00 - 10:45am, 1-1:50 pm
Others by appointment, Not available Thursdays, Labs all day.

Textbook: None required. **Optional book:** Gillen, C.M. 2007. *Reading Primary Literature: A Practical Guide to Evaluating Research Articles in Biology*, Pearson Benjamin Cummings.

Course Goals: The learning outcomes for the students in this course are as follows:
1. Demonstrate the ability to access, analyze, interpret, and discuss scientific literature.
2. Demonstrate oral communication skills of good quality in the context of biological research.
3. Demonstrate (with necessary improvements) written communication skills of good quality in the context of scientific writing.

This course will serve as the capstone course for your major. As such, the objective of this course is to provide a final enhancement of your analytical and communication skills in the biological sciences. To achieve this objective, you will be expected to A) read, analyze, and discuss examples of current scientific literature, B) improve your writing skills by providing detailed written summaries of the scientific papers you read this semester, and C) improve your oral communication skills through presentations of the scientific literature to your classmates.

Grades: There will be a total of 700 points in the course. Your final grade will be determined from written assignments, oral presentations, and class participation. Finally, you will also create a useful, impressive resume (hopefully to be used by you in the future). You will be assigned a final letter grade based on the total number of points you receive during the course.

The points for the class will be broken down as follows:

45 Minute Oral Presentation	**150 points** (students must meet with me to get feedback and grade)
Daily Write-ups	**280 points** (14 @ 20 points each)
Written Summaries	**80 points** (2@ 40 points each; 1 individual and 1 group paper)
Class Participation	**100 points** (20 points Group Peer Evaluation, 50 points Instructor Evaluation of Group, and 30 points Present and Participating in Discussions)
Resume	**50 points**
Assignments	**40 points** (1 & 2 @ 20 each)
Total points	**700**

Your total points will be converted into a percentage at the end of the semester. The grading scale in percentage is as follows:

A	93-100
A-	90-92.9
B+	87-89.9
B	83-86.9
B-	80-82.9
C+	77-79.9
C	73-76.9
C-	70-72.9
D+	67-69.9
D	63-66.9
D-	60-62.9
F	Below 60

Class Participation: Most of our classroom time will be spent ***discussing*** examples of scientific literature. For the first couple of lectures, I will supply the papers that we will be reading and discussing. The format will be such that I will give you a copy of the paper during class, and you will be responsible for the material in that paper for the next class period. We will then talk about that paper. I will expect each of you to contribute significantly to the conversation. DO NOT just sit back and listen. When I say that you have to earn these points, I mean it. I will keep track of how much each person contributes during each class session.

45 Minute Oral Presentation: After I demonstrate the expectations of the presentations during the first 3 weeks, the rest of the semester will be student lead. Each one of you will be the leader for a 50 minute class period. This means that you have to find an article (**NO Review papers**) for all of us to read, confirm I copy the article and pass it out to everyone **one week in advance**, prepare yourself to present the paper, and then guide our discussion on that paper. You will be expected to be prepared to keep the discussion going for the entire class period. Your grade will be determined by me and by your classmates through evaluation forms. **Note: Upon completion of your individual presentation, you MUST meet with Dr. Herron in his office to receive his feedback on your presentation and to discuss peer evaluation summaries. I will confirm your final scores and explain the breakdown of points.** This is an important part of the course. In order for this course to work, each of you must be

willing to participate, as outlined above. In addition, you must do a good job of leading the discussion about your particular paper. If you do not, the course (and your grade) will fall flat on its face. When choosing a scientific article, choose a topic that you are interested in and/or have some background in so that you can demonstrate to us your expertise. I expect that there will be a wide variety of papers to be presented. Your article must meet with my approval before it gets distributed to your classmates. Therefore, make sure you leave yourself enough time to get a copy to me so that I can read it and approve it (1-2 weeks ideally).

Daily Write-ups: You will be responsible for writing a one-page (double-spaced) summary the scientific articles that are presented to you this semester. Overall, I want you to demonstrate to me that you can read and understand these articles. In addition, writing these summaries will help you to prepare for the discussion that will take place on that article. **The summaries of the articles are due on the day that we discuss that article. No late summaries will be accepted. The write-up will be collected at the end of class, but must be written and printed before class.** For all of your summaries, please use a Times New Roman, 12-point font, double spaced, with one inch margins.

Written Summaries: You will write a two 3-4 page summaries (double spaced). One from the scientific article that you present to the class solo, the other from the article you co-present with a peer student. This assignment will also help you prepare for your presentation by forcing you to fully analyze your paper prior to your oral presentation. I will correct/edit your paper and return it to you ungraded. It will be your responsibility to rewrite the paper according to my comments (and learn more about scientific writing from my comments). You will then resubmit the revised paper for a grade. For all of your summaries, please use a Times New Roman, 12-point font, double spaced, with one inch margins.

Resume: You will be expected to prepare a resume as a requirement for the course. Once you turn in a first draft, I will make corrections and suggestions. After that, you will update and improve your resume and turn it in again. This process will be repeated until I think your resume is more than adequate. You will eventually receive the full 50 points for this assignment as long as you turn in a good final product. Some of you might receive all of the points after one try; for others we will have to work through several drafts.

Assignment #1 – Write out the full reference citation for two articles in the format for two different journals (your choice). Turn in hard copy according to date on Class Schedule (next page).

Assignment #2 – Download the PowerPoint files, Presentation of Toucan Paper and Zimmer Presentation Prenatal Nicotine Paper. Go thru each presentation and then explain how the presentations differ in their approach to helping a presenter discuss their paper. Reflect upon and then describe to me the PowerPoint style you are considering using along with your 45 oral presentation and why.

BIOL 460 – Class Schedule (subject to change)

Week	Day		Lecture	Assignments
1	M	Aug 25	Introduction to Course –	Read- Vision and Change Summary
	W	Aug 27	Lecture – How to Find Ideal Journal Articles	http://dx.doi.org/10.1187%2Fcbe.10-03-0044
2	M	Sept 1	**No Classes**	Read -Vision Change in Biology Final Report
	W	Sept 3	Learn to summarize – Vision and Change Case Study	http://visionandchange.org/files/2013/11/aaas-VISchange-web1113.pdf **Assignment #1 due** in class (print out)
3	M	Sept 8	Lecture – How to Write Scientifically	Read PowerPoints for Assignment 2
	W	Sept 10	How to write a Resume and CV Lecture	**Assignment #2 due** (print out)
4	M	Sept 15	Presentation by Dr. Herron	**Resume Due (print out)**
	W	Sept 17	Student 1	Daily write up due
5	M	Sept 22	Student 2	Daily write up due
	W	Sept 24	Student 3	Daily write up due
6	M	Sept 29	Student 4	Daily write up due
	W	Oct 1	Student 5	Daily write up due
7	M	Oct 6	Student 6	Daily write up due
	W	Oct 8	Student 7	Daily write up due
8	M	Oct 13	Student 8	Daily write up due
	W	Oct 15	Student 9	Daily write up due
9	M	Oct 20	Student 10	Daily write up due
	W	Oct 22	Student 11	Daily write up due
10	M	Oct 27	Student 12	Daily write up due
	W	Oct 29	Student 13	Daily write up due
11	M	Nov 3	Student 14	Daily write up due
	W	Nov 5	Student 15 or Group Prep	Daily write up due (if 15 students)
12	M	Nov 10	Group 1 & 2	

	W	Nov 12	Group 3 & 4	
13	M	Nov 17	Group 5 & 6	
	W	Nov 19	Group 7 & 8	
14	M	Nov 24	Make-up date for presentations	Resume Revisions
	W	Nov 26	**No Class-Holiday**	Due Monday 11/24
15	M	Dec 1	Last Day to turn in rewrites	
	W	Dec 3	**No Class**	Papers Returned Finals Week at my office

Biology 470

Molecular Genetics
Spring 2014
4 Credits

Instructor Office
Dr. Bradley Isler
ASC 2113
Phone: 591-2641
E-mail: islerb@ferris.edu

Class Hours
TR 9:00-10:50 AM
Starr 136

Office Hours
MWF 10-11 AM
T 12-1 PM

Course Description

An analysis of genetic phenomena at the molecular level. Topics include: structures of DNA, replication, recombination, mutation, repair, genomic sequences, chromatin structure, transcription, processing, translation, and the theory of selected techniques. Emphasis is on regulatory mechanisms. This course meets General Education requirements: Scientific Understanding. Pre-Requisites: BIOL 375 and CHEM 364 with a grade of C- or better. Typically Offered Spring Only Even Years

Course Outcomes and Assessment

Upon completion of the course, a student will be able to:

- **Demonstrate** a senior-level understanding of genetic phenomena at the molecular level, including: replication, recombination, mutation, repair mechanisms, DNA structure, chromatin, and the control of gene expression via transcription and RNA processing.
- **Interpret** scientific articles related to molecular genetics and apply this interpretation to the understanding of the experimental basis of scientific discovery.

Materials

- Lewin's Genes XI, J.E. Krebs, E.S. Goldstein, and S.T. Kilpatrick, Jones and Bartlett Learning, 2014.

Grading

Your final grade will be determined from the total of all points earned on exams and quizzes:

	Maximum possible points
Exams	450
Quizzes	50?

There will be three **exams** during the semester worth 100 points each and a final exam worth 150 points.

Quizzes will be either announced or unannounced. Quizzes will be administered during selected lecture sessions and will cover information discussed in previous lecture sessions.

Cheating

Cheating on exams, quizzes, or assignments will result in a zero on associated assignments and failure of the course. Additional action may be taken by the University.

Attendance Policy

Attendance will not be taken in lecture. However, since BIOL 470 is an upper level course, attendance is expected. If you are absent from class, it is your responsibility to obtain information that was presented.

Students arriving late for class on the days on which unannounced quizzes are administered will receive a zero for that quiz. No make-up quizzes will be given.

Students who are absent on the day of an announced quiz or exam and do not have a legitimate excuse will receive a zero for that quiz or exam. No exceptions are allowed.

Class Participation

Class participation is not mandatory but will be considered when your final grade is determined. A student that is actively involved in a course will always perform at a higher level than a student that spends lecture periods sleeping, chatting with their friends, playing with their cell phone or computer, or not paying attention.

Reading the Text

You should review the textbook following lecture. Your text is an important part of this course and was chosen because it is the best available for explanations, reasoning, illustrations, and connecting important topics.

Class Decorum

The College of Arts and Sciences strives to maintain a positive learning environment and educational opportunity for all students. Patterns of behavior which obstruct or disrupt the learning environment in the classroom will be dealt with under the College *Disruptive Behavior Policy*. Cell phones must be turned off and interpersonal conversations cease during the class period.

Help!

Dr. Isler will be happy to help you during office hours or during any other available time. Please contact Dr. Isler for help or to arrange an appointment.

Grading Scale

93 – 100%	A
90 – 92.9%	A-
87 – 89.9%	B+
83 – 86.9%	B
80 – 82.9%	B-
77 – 79.9%	C+
73 – 76.9%	C
70 – 72.9%	C-
67 – 69.9%	D+
62 – 67.9%	D
60 – 61.9%	D-
< 60%	F

The grading scale may be adjusted depending upon class performance

Tentative Lecture Schedule

	Topic	Reading
Jan 14	Genes are DNA Genes encode RNAs and polypeptides	*Chapter 1* *Chapter 2*
Jan 16	Genes encode RNAs and polypeptides The interrupted gene	*Chapter 2* *Chapter 4*
Jan 21	The interrupted gene The content of the gene	*Chapter 4* *Chapter 5*
Jan 23	The content of the gene Genome sequences and gene numbers	*Chapter 5* *Chapter 6*
Jan 28	Clusters and repeats	*Chapter 7*
Jan 30	Chromosomes Chromatin	*Chapter 9* *Chapter 10*
Feb 4	Chromatin	*Chapter 10*
Feb 6	**Exam 1**	-
Feb 11	The replicon: initiation of replication	*Chapter 12*
Feb 13	DNA replication	*Chapter 13*
Feb 18	DNA replication Homologous and site-specific recombination	*Chapter 13* *Chapter 15*
Feb 20	Homologous and site-specific recombination	*Chapter 15*
Feb 25	Repair systems	*Chapter 16*
Feb 27	Repair systems Transposable elements and retroviruses	*Chapter 16* *Chapter 17*
Mar 4	Transposable elements and retroviruses	*Chapter 17*
Mar 6	**Exam 2**	-
Mar 10-14	**NO CLASS**	-
Mar 18	Prokaryotic transcription	*Chapter 19*
Mar 20	Prokaryotic transcription Eukaryotic transcription	*Chapter 19* *Chapter 20*
Mar 25	Eukaryotic transcription	*Chapter 20*
Mar 27	RNA splicing and processing	*Chapter 21*
Apr 1	RNA splicing and processing mRNA stability and localization Catalytic RNA	*Chapter 21* *Chapter 22* *Chapter 23*
Apr 3	Translation	*Chapter 24*
Apr 8	Using the genetic code	*Chapter 25*
Apr 10	**Exam 3**	-
Apr 15	The operon	*Chapter 26*
Apr 17	**NO CLASS**	-
Apr 22	The operon Phage strategies	*Chapter 26* *Chapter 27*
Apr 24	Eukaryotic transcription regulation	*Chapter 28*
Apr 29	Eukaryotic transcription regulation Epigenetic effects are inherited	*Chapter 28* *Chapter 29*
May 1	Epigenetic effects are inherited	*Chapter 29*
Tuesday May 6	**Final Exam 8:00-9:40 AM Starr 136**	-

SYLLABUS ATTACHMENT
FERRIS STATE UNIVERSITY – COLLEGE OF ARTS AND SCIENCES
Spring 2014

ARE YOU CONSIDERING ADDING A MINOR OR MAJOR TO YOUR CURRENT PROGRAM?
Use **My Degree** to see what classes may already apply.
For more information, stop by the Arts and Sciences Dean's Office!

IMPORTANT DATES		
Late registration	Thurs – Fri	Jan 9 – 10
First day of classes	Monday	Jan 13
Last day for Drop/Add	Thursday	Jan 16
Martin Luther King Day (no classes)	Monday	Jan 20
Mid-term grades due	Monday	Mar 10
Spring recess (no classes)	Sat, Mar 8 – Sun, Mar 16	Mar 8 – Mar 16
Last day for "W" grades (full semester)	Friday	Mar 28
Mid-term recess (no classes)	Thurs - Sun	April 17 - 20
Last day of classes	Friday	May 2
Examination Week	Mon – Fri	May 5 – May 9
Commencement	Friday, Saturday	May 9, 10
Final grades due by 1:00 pm	Monday	May 12

DEPARTMENT OFFICES		
Biology	ASC 2004	591-2550
Humanities	JOH 119	591-3675
Lang/Lit	ASC 3080	591-3988
Mathematics	ASC 2021	591-2565
Physical Sciences	ASC 3021	591-2580
Social Sciences	ASC 2108	591-2735
Dean's Office	ASC 3052	591-3660

Sessions	Dates	Last Day to Withdraw
Full Session	Jan 13 – May 2	Mar 28
Session A	Jan 13 – Mar 4	Feb 13
Session B	Mar 5 – May 2	Apr 11
Session D	Jan 13 – Feb 14	Feb 3
Session E	Feb 17 – Mar 27	Mar 7
Session F	Mar 28 – May 2	Apr 21

WHAT YOU NEED TO KNOW

E-MAIL
All registered FSU students have a Ferris Gmail account. This is the only e-mail to which all official University information about registration, financial aid, student activities, and class cancellations will be sent. Please check your account at least once a week. E-mail is our primary communication resource for students.

CLASS ATTENDANCE IS IMPORTANT!
Attendance usually has a high correlation with how well you do in a course. Many instructors have mandatory attendance policies by which your grade will be affected by absences. Some instructors also have policies about class tardiness to encourage students to be present for the full class period. Check your course syllabus or talk to your instructor about his/her policies.

HOW TO CONTACT A FACULTY MEMBER OR ADVISOR
If you have questions or need help, talk to your instructor. Faculty office locations, phone numbers, and office hours may be obtained from the class syllabus or department office, through the College of Arts and Sciences web page at http://www.ferris.edu/htmls/colleges/artsands/, or through the Directories & Maps link on the FSU home page.

DROPPING CLASSES OR WITHDRAWING
Dropping and adding only occurs during the first four days of the term. You can adjust your schedule **online during the first four days** or in person at the Timme Center (from 8-5 except for the last day when it is 12-5). *If you add a class you must pay for your additional charges by the fourth day or your schedule will be dropped.*

If you need to withdraw from a class after the official drop/add period, you must do so **OFFICIALLY**, through your dean's office, in order to avoid receiving an "F" grade in the course. **You may not withdraw online after the first four days of the term.** You will receive a "W" for the course. *You will not receive a refund.* If you need to totally withdraw from the University, you must do so **officially** at Admissions and Records in CSS 101. The last day to withdraw or drop a class may be different for different classes. **CHECK THE SESSIONS DATES SECTION ABOVE OR THE REGISTRATION AND ACADEMIC GUIDE FOR THE WITHDRAWAL DEADLINES FOR THE SEMESTER.** In cases of extenuating circumstances (e.g., a serious illness requiring you to withdraw from school), contact Birkam Health Center at 591-2614.

INCOMPLETES
The "I" is only considered for extenuating circumstances that have led to a student missing a portion of the course. The intent and appropriate use of the "I" grade is NOT to avoid student probation, dismissal, or unacceptable grades, nor should it be considered as an extended alternative to withdraw from a class (W). Extenuating circumstances are generally defined as those situations over which a student has little or no control—e.g., illness, birth, jury duty, death of a parent, serious injury. Instructors may require suitable documentation.

Students must have completed at least 75% of the coursework at passing levels before an "I" will be considered, and they may be required to sign an agreement regarding course completion. An "I" grade automatically changes to an "F" after one semester (not counting summer) unless the faculty member files another grade or extends the incomplete.

GRADUATION
Students should apply for graduation the semester prior to their last semester of completion. For associate in arts or associate in science degrees, contact the Dean's Office for an audit and clearance. For bachelor degrees, contact your program coordinator for the audit and clearance. All graduates must also apply online through MyFSU (Academics and Services tab, Student Records channel, Apply to Graduate link). The online application will also reserve your seat for a commencement ceremony if you choose to participate, so be aware of those deadlines.

INCLEMENT WEATHER CONDITIONS
Only during the most severe weather conditions – which could potentially endanger the safety of students or staff – will the Big Rapids campus consider cancelling classes. The decision to cancel classes due to weather conditions at the Big Rapids site will be made as early as possible. In the event it is necessary to cancel classes, periodic announcements will be made on area radio and television stations. It is the student's responsibility to listen for these announcements. A student may also call the Ferris Information Line at 231-591-5602 to obtain information or check the Ferris website.

ACADEMIC MISCONDUCT

Academic misconduct refers to dishonesty or misrepresentation with respect to assignments, tests, quizzes, written work, oral presentations, class projects, internship experience, or computer usage; violation of computer licenses, programs, or data bases; or unauthorized acquisition or distribution of tests or other academic material belonging to someone else. It includes such behaviors as cheating, copying materials from the internet without documentation, presenting another person's ideas or work as your own, taking someone else's exam for them, violating computer software licenses or program/data ownership, etc. It is the expectation of the College of Arts and Sciences that all work you turn in is your own and is original for the course in which it is being submitted. If you are uncertain about whether a particular behavior might represent academic misconduct, be sure to ask your professor for clarification.

Penalties for academic misconduct can include FAILURE of the assignment or the course, and/or disciplinary action up to and including probation or dismissal from the University.

DISRUPTIVE BEHAVIOR
The College of Arts and Sciences strives to maintain a positive learning environment and educational opportunity for all students. Consequently, patterns of behaviors which obstruct or disrupt the teaching/learning environment will be addressed. The instructor is in charge of his or her course (e.g., assignments, due dates, attendance policy) and classroom (e.g., behaviors allowed, tardiness). Harassment, in any form, will not be tolerated.

Penalties for disruptive behavior can include involuntary withdrawal from the course and/or disciplinary action up to and including probation or dismissal from the University. The full Disruptive Behavior Policy is available on the College of Arts and Sciences website at http://www.ferris.edu/htmls/colleges/artsands/student-resources/disruptive-behavior.htm

WHERE TO GO FOR HELP

The following services are available to any Ferris student, free of charge. They are designed to help you succeed in your courses, in your career planning, and in meeting the challenges of university life. Don't hesitate to explore and use these services at Ferris

ACADEMIC ADVISING
All students have an assigned advisor and should confer with that advisor regularly. Students who have declared a major should see an advisor in that major. To find out who your advisor is, login to MyFSU and click on the Academics and Services tab, then Registration Status/Advisor Information link.

ACADEMIC SUPPORT CENTER.....ASC 1017 – 591-3543
THE WRITING CENTER.....ASC 1017 – 591-2534
The Academic Support Center, Tutoring Services, and Writing Center join together to offer FSU students an array of academic support services. Tutors are available to answer questions for many courses. The Writing Center helps writers individually and in workshops with skills and assignments. There is also study skills assistance to help with note-taking, test-taking, memory and reading strategies, and time management.

DISABILITIES SERVICES.....STR 313 591-3057
According to the Americans with Disabilities Act, each student with a disability is responsible for notifying the University of his/her disability and requesting accommodations. Students requiring a classroom accommodation due to a physical, learning, mental or emotional disability should contact the Disabilities Services Office.

SCHOLAR PROGRAM.....ASC 1021 591-5976
SCHOLAR is an academic support program that aids in the student's successful progression by offering a Peer Mentor Program, a Student Retention Program, and an Academic Student Advisory Committee.

PERSONAL COUNSELING, SEXUAL ASSAULT, SUBSTANCE ABUSE BIRKAM HEALTH CENTER ..... 2nd Floor - 591-5968
Personal counseling is available confidentially and free of charge. Counselors are available to assist with personal and stress-related problems, family and relationship issues, substance abuse, sexual assault, depression, or other similar problems. Call or stop by to obtain an appointment. ***If you or a friend is in immediate crisis, call 911.***

EDUCATIONAL & CAREER COUNSELING.....STR 313 591-3057
Students wanting to examine their choice of major or career choice, learning styles or strategies can make one-on-one appointments with licensed counselors.

SAFETY
Please observe the posted shelter and evacuation routes in the hallway nearest your classroom.

OTHER RESOURCES

BIRKAM HEALTH CENTER.....1st Floor 231-.591-2614
The Birkam Health Center provides fee-for-service medical care including evaluation and treatment for illness and injury anytime during the year. Patients are seen on a walk-in and by appointment basis.

FLITE LIBRARY.....231-591-2669
Regular hours for FLITE:
Monday – Thursday . . . . . 7:30 am – Midnight
Friday . . . . . 7:30 am – 6:00 pm
Saturday . . . . . NOON – 5:00 pm
Sunday . . . . . 1:00 pm – Midnight
Extended Studies Court will begin late night hours January 20, 2014
*Sunday-Thursday/MIDNIGHT to 7:30 a.m.
*Friday/6 p.m. to MIDNIGHT *Saturday/5 p.m. to MIDNIGHT

FSU BOOKSTORE.....14265 NORTHLAND DR. 231 - 591-2607
Regular hours for Bookstore *(subject to change)*:
Monday – Thursday . . . . . 9:00 am – 6:00 pm
Friday . . . . . 9:00 am – 5:00 pm
Saturday . . . . . NOON – 4:00 pm
Sunday . . . . . CLOSED
New location is at the Save-A-Lot Shopping Center Plaza.

HELPFUL NUMBERS

Admissions	2100	Inst. Testing	3628
Business Office	2125	Public Safety	5000
Financial Aid	2110	Records	2792
Housing	3745	TAC	4822

When calling from off campus, extensions can be called by using the prefix 231-591-_____.

BIOLOGY 471: BIOTECH 2: RECOMBINANT DNA LAB, SPRING 2014

Credits: 3, prerequisites: BIOL 375, CHEM 333.

Section: 211, Lecture: W 12:00 – 12:50 PM in Sci. 235, lab: T and W 12:00 – 3:50 PM in Sci. 337.

Instructor: Dr. Roger Mitchell. **Office hours**: ASC (Commons) 2007: Wednesday 11:00 AM – 11:50 AM and 1:00 - 2:50 PM, and Friday 10:00 - 10:50 AM. Make an appointment, or drop by to see if I am available at some other time. Knock if the door is closed! You may call my office: 591-5879, but email is preferred. email: mitchelr@ferris.edu

Materials you are required to have:

lab manual: "Laboratory DNA Science" by Bloom, Freyer, and Micklos.

additional materials: purchase a lab notebook, a three-ring binder, lab coat and other materials as necessary.

recommended: students should have a means of saving files from Dr. Mitchell's laptop computer. Possibilities include USB memory devices and recordable CD and DVD.

Course outcomes: A student succeeding in this course should be able to:

1) perform professional-quality, hands-on lab techniques in molecular genetics. These include the following:
   - Bacterial transformation.
   - DNA extraction.
   - Gel electrophoresis.
   - Restriction enzyme digests
   - Use of plasmids.
   - Southern blots and colony lifts.
   - Membrane hybridization and probe preparation.
   - PCR.
   - DNA sequencing.
   - Basic DNA bioinformatics.
2) demonstrate by examination, report preparation, and other methods, an understanding of the principals behind the techniques listed above.
3) prepare and organize lab documentation.
4) carry out lab work while maintaining a professional environment.
5) maintain proper lab safety procedures.

Course Description: Practical training in recombinant DNA techniques is provided to students. These include DNA isolation, restriction enzymes, production of recombinant DNA plasmids, bacterial transformation, polymerase chain reaction (PCR), Southern transfer, non-radioactive probe labeling, hybridization, and DNA sequencing. DNA sequence data from internet databases and the use of graphics files to record results are also introduced.

Policies and Course Requirements:

Final exam time and place will be announced

Lab reports will be assigned that will be prepared by computer.

Dropping with the "W" grade must be done on or before **March 28**.

Incompletes will be given only at my discretion and will require proof of exceptional need. Consistent with university policy, the student must have passed 75% of the class prior to being forced to stop attending due to circumstances beyond their control. The "I" grade must be cleared or it will become an "F."

Attendance policy. Attendance is mandatory. Missing more than 2 labs may result in course failure. I reserve the right to treat tardiness as an absence, or require additional work from tardy, disruptive, or absent students.

Due to the nature of these labs you will occasionally need to come in at additional times for brief periods.

Grades will be 25% from your lab notebooks, which may be checked at any time, 25% subjective (including following directions, time management, preparation, effort, lab safety, professional attitude, punctuality, etc.), and approximately 25% for reports and related assignments, and 25% on tests, quizzes, and worksheets. The test/quiz/worksheet category will include points for performance on the ETS Field exam in Biology. Poor lab safety will lead to lower grades.

THE FOLLOWING SCHEDULE IS HIGHLY TENTATIVE:

WEEK	DATE	TOPIC
1	Jan. 13	transformation 1, lecture: safety, overview
	14	transformation 2
	15	transformation 3, DNA purification lecture 1
2	20	**NO CLASS: MLK day**
	21	plant DNA 1
	22	plant DNA 2
3	27	plant DNA 2, plasmid prep 1
	28	plasmid prep 2
	29	DNA purification lecture 2
4	Feb. 3	plasmid prep 3, restriction enzymes 1
	4	restriction enzymes 2
	5	restriction enzymes lecture
5	10	restriction enzymes 3
	11	pKA recombination 1
	12	PhotoShop lecture
6	17	pKA recombination 2
	18	pKA recombination 3, RAPD 1
	19	PCR lecture
7	24	λ-library 1, RAPD 2
	25	λ-library 2
	26	Lecture: hybridization
8	March 3	λ-library 3
	4	λ-library 4
	5	Lecture: hybridization
9	10-12	NO CLASS: Spring break
10	17	λ-library 5
	18	λ-library 6, Southern 1
	19	Lecture: hybridization
11	24	Southern 2
	25	Southern 3
	26	Lecture: taxonomy methods
12	31	Southern 4
	April 1	Southern 5
	2	sequencing lecture 1
13	7	electrophoresis, other follow-up
	8	electrophoresis, other follow-up
	9	sequencing lecture 2
14	14	sequencing 1
	15	sequencing 2
	16	sequencing demo
15	21	sequencing 3
	22	sequencing 4
	23	Lecture: new technologies
16	28	RAPD 3
	29	complete labs, cleanup
	30	Review

Syllabus 2003

BIOLOGY 472
PROTEINS

INSTRUCTOR: Dr. C. Boogaard

OFFICE: ASC 2116; X 2544; hours: , or by appointment.

COURSE OBJECTIVES:

1. To increase the students understanding of the theoretical basis of various techniques used in protein purification and isolation, and
1. The basic structural elements of proteins.
2. To increase the students ability to interpret graphical representations of data
3. To increase the students ability to understand equations describing experimental phenomena

PRE-REQUISITES: completion of PHCH 320, or of CHEM 364.

TEXT: A lecture notes booklet and a study guide are available at Great Lakes Books and Supply. No text is required. However, students may find it helpful to reference Alberts et al, Molecular Biology of the Cell, 4th Ed, Garland Scientific, 2002. (This book is a required text for BIOL 474-Advanced Cell.).

MEETING TIME: This class is scheduled to meet Mondays, Wednesdays, and Fridays, from 9:00 to 10:00 am in STR 136. However, there may also be out-of-scheduled-class time activities such as seminars, which students will be required to attend.

GRADING:

Grading is based on four quizzes, worth 50 points each, and a final exam worth 100 points. The final exam will not be comprehensive. However, some topics apply to the entire course and can and will be represented on every quiz and exam. These topics include: calculating a purification table, interpreting a purification table, Beer's Law calculations, extinction coefficient calculations, buffer design, and enzyme kinetics. In addition, extra credit points may be given for especially insightful classroom participation and discussions. (This does not apply to simple "please clarify" type questions.) Optional extra credit quizzes may be given without warning.

At the end of the term, the students' total (out of 300 points) will be calculated, and grades will be assigned on a curve.

The following is a ***tentative*** outline. The instructor reserves the right to vary the outline, including the right to change the order of topics, and the right to insert new experiences.

WEEK	DAY	DATE	TOPIC	CHAPTER
1	M	1/13	Amino Acid Biochemistry	3
	W	1/15	pH; Henderson-Hasselbach, Buffers	
	F	1/17	Extinction Coefficients; General Considerations	
2	M	1/20	Martin Luther King Day	
	W	1/22	Basic Structure: α helices; β sheets; β turns	3
	F	1/24	Overview of Purification; Assays	
3	M	1/27	Enzyme Kinetics	3
	W	1/29	Purification Tables and Calculations	
	F	1/31	Buffer Design	
4	M	2/3	QUIZ	
	W	2/5	Cell Characteristics and Research Uses	8
	F	2/7	Cell Rupture: Liquid & Solid Shear; Sonication	
5	M	2/10	Chemical & Enzymatic Techniques; Results	
	W	2/12	Protein Concentration Techniques	
	F	2/14	Salting In and Salting Out; Ionic Strength Calc.	
6	M	2/17	Differential Solubility: pH, T and Salt changes	
	W	2/19	Precipitation Zones and Back Extractions	
	F	2/21	Calculating Salt Additions; Data	
7	M	2/24	Results and Troubleshooting	
	W	2/26	Ion Exchange Chromatography: Principles	
	F	2/28	QUIZ	
8	M	3/3	Gradient Ion Exchange Columns	
	W	3/5	Data and Troubleshooting	8
	F	3/7	Gel Permeation: Principles and Formulae	
9	MWF	3/10-14	SPRING RECESS	
10	M	3/17	Gel Permeation: Practical Techniques; Data	8
	W	3/19	Data Interpretation and Troubleshooting	
	Y	3/21	Ultracentrifugation: Principles and Formulae	
11	M	3/24	Sedimentation Coefficients; Rotor Conversions	8
	W	3/26	Density Gradients Ultracentrifugations	
	F	3/29	Data Interpretation and Troubleshooting	
12	M	3/31	Affinity Chromatography	8
	W	4/2	QUIZ	
	F	4/4	Hydrophobic and Covalent Chromatography	
13	M	4/7	Chromatofocusing	
	W	4/9	Electrophoresis: Principles, Rates of Movement	
	F	4/11	Buffer Systems; Discontinuous Gels; tryptic digests	
14	M	4/14	GOOD FRIDAY	
	W	4/16	Zonal, Denaturing, Isoelectricfocusing	
	F	4/18	Results and Troubleshooting	
15	M	4/21	Radioactivity and Radioisotopes	9
	W	4/23	Interactions of Radiation with Matter	
	F	4/25	Protein Synthesis	6
16	M	4/28	Protein Synthesis	
	W	4/30	Protein Folding	6
	F	5/2	Protein Degradation	
			2-hybrid system; phage display; in vitro mutagenesis	8
17	M	5/5	FINAL EXAM	

BIOL 473 Proteins Laboratory Fall '14 Wed 9:00-6:00 SCI 337

Dr. Kim Colvert
Office: ASC 3098 MTF 9:00-9:50 R 1-1:50 Other hours by appt.

Ext 5851

colvertk@ferris.edu

Text: *None Required.*

Supplies: Approved eye protection, notebook with carbon copies.

Learning Outcomes:

Successful students in this course will

1) *research methods in the biochemical literature*
2) *design and adapt purification and analysis protocols from the literature*
3) *perform methods of protein analysis and purification*
4) *maintain accurate and complete records of work*
5) *present the results of the isolation and analysis in a professional format*

Your task this semester is to isolate and purify a protein. You will be assigned a protein to be isolated from a bacteria. It may be a natural protein or it may have been engineered into a strain of *E. coli*. You must go to the literature and find one or more papers that discuss isolating your protein from a bacterial source. This may require searching for and adapting more than one paper. Be prepared to bring several sources to me for consultation. The process must be 'feasible' given the resources of the lab, the availability of source material and, unfortunately, the cost of isolation. The method should include a variety of techniques with useful stopping and starting points. Once a method has been **approved** you must develop a list of materials needed, check supplies and submit a list of materials to be purchased. The research portion of your work should take two to three weeks. Start immediately. You will then develop a procedure and carry out the isolation. In some cases you may explore alternate isolation procedures. If literature does not provide you with specifics for your protein you must develop your own procedure based on published general protocols. You will also wish to assay the protein and determine as much information about its physical properties as possible. This will probably require several more sources to complete your project. All facets of your work must be documented in an orderly and legible fashion in your notebook, including your sources, your exact actions, where you deviated from published methodology and why, etc. Since 60% of your grade will be based on this notebook you must be diligent and thorough. I will periodically check your notebook (**without warning**) and insufficiencies can result in significant reductions. I expect it will be current, complete and contain a table of contents.

The other 40% of your grade will be based on the 'final'. The final will be a semi-formal presentation of your work to the class that will be jointly presented by you and your partner. Your presentation will be by PowerPoint and is expected to include a flow chart, data and results tables where appropriate. You should also include a bibliography. A copy of your work must be submitted with your notebook. The 'semi-formal' part refers to the fact that it will be a discussion and you will be asked questions and encouraged to explain in detail or ask questions of your own. Your organization and ability to respond to questions about your work will be evaluated. This will take place during the last lab period (December 3, 2014) of the semester and constitutes the "final". You may invite guests. The final exam period will be devoted to lab clean-up.

Winter 2005

BIOL 474: Advanced Cell and Molecular Biology

Instructor: Dr. C. Boogaard
Office hours: M, W & F 10-11; M, 3-4 **or by appointment**
Office: ASC 2015; phone: 591-2544.

Course Objectives: To increase the students' knowledge and understanding of:

1. the basic principles of cellular processes, organization, and growth
2. the nature and genesis of cell structures and organelles
3. the means by which cells move, and interact with each other

Pre-requisite: a minimum grade of C- in PHCH 320 or CHEM 364, and BIOL 375, or consent of instructor.

Textbook: Molecular Biology of the Cell, fourth edition; Alberts et al., Garland, 2002

Optional Material: A lecture notes booklet with study guide included may be purchased at Great Lakes Book and Supply.

Examinations and grading:

1. There will be 3 exams, each covering one third of the material.

2. The exam format is usually short-answer essay. However, problems will be introduced where appropriate. Some problems may be handed out before the exams to be completed as a take-home assignment and turned in at the exam time. Work turned in late will be docked a certain percentage per day.

3. There may be unannounced pop quizzes. These may be given on an extra-credit basis. There will be no make-up quizzes.

4. Extra-credit points may be assigned for insightful classroom participation.

Lecture and Exam schedule:

The following is a tentative schedule of topics to be included in the lectures, and of the exams. This is a tentative schedule only. The instructor reserves the right to change the order or length of time spent on each topic, as need arises.

The dates of the exams may be changed according to the wishes of the class, subject to the approval of the instructor. However, no exam will be delayed longer than two weeks.

Date	Topic	Text
Cell Evolution:		
Tues. Jan. 11	Evolution of the Cell	
Thur. Jan. 13	Evolution and Cells and Genomes	Chapter 1
Tues. Jan. 18	Cells and Genomes	Chapter 1
Basic Genetic Mechanisms:		
Thur.Jan. 20	How Cells Read the Genome	Chapter 6
Tues. Jan. 25	How Cell Read the Genome	Chapter 6
Thur. Jan. 27	How Cells Read the Genome	Chapter 6
Tues Feb. 1	Control of Gene Expression	Chapter 7
Tues Feb. 3	Control of Gene Expression	Chapter 7
Tues. Feb. 8	Control of Gene Expression	Chapter 7
Membranes:		
Thur. Feb. 10	Membrane Lipids	Chapter 10
Tues. Feb 15	Exam (Chapters 1, 6,7)	
Thur. Feb 17	Membrane Proteins; Membrane sidedness, fluidity	Chapter 10
Tues. Feb. 22	Mechanisms of Membrane Transport	Chapter 10
Thur. Feb 24	Gated Channels and the Neuromuscular Junction	Chapter 11
Tues. Mar. 1	Grand Synaptic Potential &Long-Term Potentiation	Chapter 11
Identity and Maintenance of Cellular Compartments:		
Thur. Mar 3	Intracellular Sorting:	Chapter 12
Tues. Mar. 15	Nuclear Transport	Chapter 12
Thur. Mar. 17	Mitochondrial Transport	Chapter 12
Tues. Mar. 22	The Endoplasmic Reticulum	Chapter 12
Thur. Mar 24	Golgi, Lysosomes, and Cell Surface	Chapter 13
Tues. Mar. 29	Vesicle Targeting	Chapter 13
Cell Signaling and Signal Transduction:		
Thur. Mar. 31	Overview of Signaling Mechansims; Steroids	Chapter 15
Tues. Apr. 5	Exam 2: Chapters 10, 11, 12, 13	
Thur. Apr. 7	Second messenger-based signaling: cAMP, IP_3 and DG	Chapter 15
Tues. Apr. 12	Coordination of Signaling Mechanisms	Chapter 15
The Cytoskeleton:		
Thurs. Apr. 14	Actin-Based Filaments	Chapter 16
Tues. Apr. 19	Tubulin-based mictotubules	Chapter 16
Thurs. Apr. 21	Intermediate Filaments	Chapter 16
Energy Conversions:		
Tues. Apr. 26	Mitochondria & Chloroplasts	Chapter 14
The Cell Cycle and Oncogenes:		
Thurs. Apr. 28	CellCycle and Programmed Cell Death	Chapter 17
Tues. May 3	Final exam (Chapters 14, 15, 16, 17)	

BIOL 476 Advanced Techniques in Biotechnology Fall 2014

BIOL 476 (CRN 81912) is a 2 credit course. In this course you will: 1) gain practical experience in conducting animal-based research 2) practice safe, appropriate, and humane handling of laboratory animals 3) develop a research protocol that involves the use of animals 4) use immunological and other laboratory techniques to test hypotheses 5) assess proper laboratory design and safety 6) establish a primary cell culture 7) maintain a laboratory notebook

Attendance:

1. The class is scheduled to meet from 2 pm to 4:50 pm each Thursday of the term, except November 27 which is Thanksgiving Day.
2. Attendance is mandatory; for one unexcused absence 25 points will be deducted from your final point total. An additional unexcused absence may result in your receiving an F for the course.
3. Excused absences include those due to documented University-sponsored events (approval forms must be completed prior to the absence), jury duty, serious illness or death of an immediate family member, and personal illness. Upon your return to class you must provide your instructor, from a reputable and verifiable source, documentation for your absence.

Class will begin on time:

1. Due to the nature of the laboratory exercises, there will be no make-up labs.
2. Laboratory experience is an essential part of the learning process and may occasionally require you to stay over the allotted time or require you to come in at times other than the scheduled lab period.

Make-up quizzes:

1. Make-up quizzes will be available for excused absences only; they will be in the form of short essay questions.

Texts/Lab Materials:

1. The text required for this class is ***"Guide for the Care and Use of Laboratory Animals"**, eighth ed., National Research Council, National Academy Press, Washington, D.C., 2011.*
2. A laboratory notebook will be provided for you – it will be the property of the FSU Biology Department.
3. Lab exercise "Principles and Procedures" handouts and other information will be provided for you as paper copies and will also be posted to the course on FerrisConnect.
4. You must obtain a cloth laboratory coat, a pair of safety goggles, and a permanent marker (such as a Sharpie®).

FerrisConnect:

1. BIOL476 is a web-enhanced course. Most of the handouts, assignment rubrics, power point presentations, and internet links for this course will be posted on FerrisConnect *BIOL 476 Content*. Your scores for each graded item will appear on FerrisConnect *BIOL 476 Gradebook*. Course announcements made via email will also be posted to FerrisConnect *BIOL 476 Announcements*.

Grading:

1. There are **1035 points** possible in this course: a) Pre-course Assessment Quiz = **50pts** b) FSU Institutional Animal Care and Use Committee (IACUC) Collaborative Institutional Training Initiative (CITI) modules = **125pts** c) evaluation of your animal care & handling performance = **50pts** d) animal care & handling exam = **100pts** e) eight quizzes at **20pts each** = **160pts** f) ten notebook evaluations @ **25pts** each = **250pts** g) evaluation of your biotechnology lab performance = **50pts** h) completion of Cell Culture Lab Redesign = **25pts** i) completion of IACUC animal use protocol application = **75pts** j) a comprehensive final exam = **150pts**
2. Your Mid-term grade will be posted Monday, 20OCT2014. It will be based on your percentage of the total points possible prior to the class meeting on 23OCT2014. Barring any changes in the class schedule that total possible will be **465pts**.
3. Your percentage of the point total will be converted to a letter grade for both the Mid-term and the Final Grade as per the Ferris State University 12-point grading scale. These letter grades will be posted to your MyFSU page and FerrisConnect for this course.

BIOL 476 Advanced Techniques in Biotechnology Fall 2014

Course Outcomes:

Upon completion of this course you will have:

1. Learned and engaged in safe laboratory practices and procedures.
2. Gained an appreciation of the importance of appropriate animal care in research and demonstrated understanding of the role of an institutional animal care and use committee (IACUC).
3. Completed the assigned FSU IACUC CITI modules.
4. Collected blood from and immunized rabbits.
5. Redesigned a laboratory space to make it suitable for cell and tissue culture.
6. Immunized mice, harvested spleen cells from the immunized mice, and initiated a primary cell culture.
7. Performed a variety of laboratory procedures including: immunodiffusion, immunoelectrophoresis, enzyme-linked immunosorbant assay, Western blot, hemmagglutination, bacteriophage neutralization, and blood typing.
8. Maintained a laboratory notebook containing appropriately collected, analyzed, and interpreted data.
9. Demonstrated acquisition and retention of factual information pertinent to the course content.
10. Developed a research protocol that meets FSU IACUC animal care guidelines.

Assessment of Course Outcomes:

Assessment will be based upon the following:

1. Observation and evaluation of your performance in the laboratory and in the animal care facilities – these evaluations will be in accordance with clearly stated performance criteria (rubrics).
2. The extent to which your research protocol satisfies the associated rubrics.
3. The extent to which your laboratory notebook satisfies the associated rubrics.
4. The extent to which your redesign of the cell culture laboratory satisfies the associated rubrics.
5. Your performance on quizzes and exams – any of which may be entirely or include combinations of: multiple choice (including True/False), matching, fill-in-the blank, diagrams and graphs, interpretation of data, short answer, and essay.

Class Schedule

Thursdays

Follow-ups may be scheduled for additional days/times.

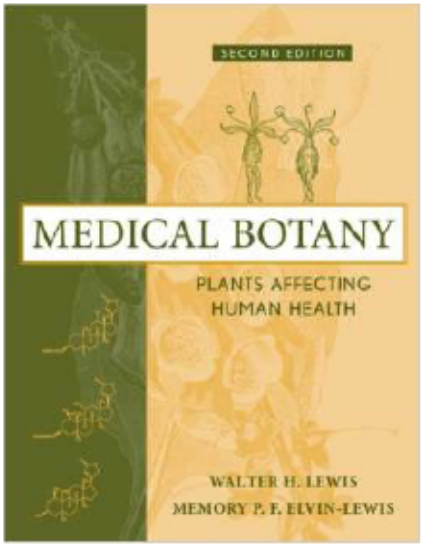
Lecture 2 pm-2:50 pm in Science 207 OR Pharmacy 314

Laboratory 3 pm-4:50 pm in Science 207 OR Pharmacy 314

Date	*Description (Content is subject to change at the instructors' discretions)*
8/28	**SCI 207 – Hartley/Marble** – Introduction to the Course and Laboratory Safety, Health Risk Assessment Form **Hartley** – Pre-course Assessment Quiz (you will be asked to recall important information presented during prerequisite courses-BIOL 386 & CHEM 333), Vocabulary List, Lab Notebook Rubrics, Animal Use Protocol Application Rubrics
9/4	**PHR 314 – Marble** – History and Origins of Laboratory Animal Care and Research, Terminology, Lab Safety, Zoonosis and Drug Dosage Calculation, IACUC CERTIFICATION QUIZZES
9/11	**PHR 314/SCI 144 – Marble** – Animal Rights Activism vs. Animal Welfare, Common Laboratory Species Husbandry Information, Animal Handling Videos, *Handling Animals housed in the Science Building* ***Notebook #1due in Biology Office-ASC 2004 by 12pm Friday, 9/12***
9/18	**PHR 314 – Marble/Hartley** – *Handling Animals housed in Pharmacy Building*, Pre-immunization Blood Collection from Rabbits, Careers in Laboratory Animal Research ***Notebook #2 due in Biology Office-ASC 2004 by 12pm Friday, 9/19***
9/25	**SCI 207 – Hartley** – Biotechnology/Immunology Review, Cell Culture Lab Redesign rubrics, Aseptic Technique **Marble** – Review Session for Animal Care & Handling Exam
10/2	**PHR 314 – Marble – Animal Care & Handling Exam (100pts)**, Immunizations of Rabbits ***Notebook #3 due in Biology Office-ASC 2004 by 12pm Friday, 10/3***
10/9	**SCI 207 – Hartley – Quiz #1,** Bacterial Transformation; cell culture lab redesign; overview of murine immunization, splenectomy, and primary cell culture; draft of animal use protocol application due ***Notebook #4 due in Biology Office-ASC 2004 by 12pm Friday, 10/10***
10/16	**PHR 314 – Hartley – Quiz #2**, Bacterial Transformation Follow-up, cell culture lab redesign due **PHR 314 – Marble** – Post-immunization Blood Collection from Rabbits, Murine Immunization with SRBC ***Notebook #5 due in Biology Office-ASC 2004 by 12pm Friday, 10/17***
10/23	**SCI 207 – Hartley – Quiz #3**, Murine Splenectomies & Primary Cell Culture ***Notebook #6 due in Biology Office-ASC 2004 by 12pm Friday, 10/24***
10/30	**SCI 207 – Hartley – Quiz #4**, Animal Use Protocol Application Full Draft Due; Hemagglutination, Immunoelectrophoresis ***Notebook #7 due in Biology Office-ASC 2004 by 12pm Friday, 10/31***
11/6	**SCI 207 – Hartley – Quiz #5**, Bacteriophage Sample Recovery & Bacteriophage Neutralization, Immunoelectrophoresis Follow-up ***Notebook #8 due in Biology Office-ASC 2004 by 12pm Friday, 11/7***

Class Schedule, Continued

11/13	**SCI 207 – Hartley – Quiz #6**, Blood Typing, Proteomics (SDS-PAGE), Western Blot ***Notebook #9 due in Biology Office-ASC 2004 by 12pm Friday, 11/14***
11/20	**SCI 207 – Hartley – Quiz #7**, Completed Animal Use Protocol Application Due; Enzyme-linked Immunosorbant Assay (ELISA) ***Notebook #10 due in Biology Office-ASC 2004 by 12pm Friday, 11/21***
11/27	**NO CLASS – THANKSGIVING BREAK**
12/4	**SCI 207 – Hartley – Quiz #8**, Animal Use Protocol Application Review, Final Exam Review
Week of 12/8	**TBA – Comprehensive Final Exam**



Medical Botany
BIOLOGY 490
COURSE SYLLABUS

Instructor: Dr. Scott Herron
Office: 2017 ASC and SCI 233
Telephone: 231-591-2087
Email: herrons@ferris.edu

Dr. Herron enjoying a glass of wine while observing a blue *Aquilegia (columbine)* in his yard.

Office Hours:
Monday: 2:00-2:50pm ASC 2017
Tuesday: 1:30-2:00 pm SCI 233
Wednesday: 2:00-2:50; 4:15-4:45 pm ASC 2017
Thursday 1:30-2:00 pm SCI 233
All other meetings by appointment only

Class Schedule:	**BIOL 490- Section 001**	T & R	12:00-1:15 PM
CRN: 11835	Lecture Room: SCI 235		

Course Description:
Medical Botany explores the intersection of medicine and botany, utilizing integrative and comparative approaches to critically analyze medical systems, understand how plants produce compounds of medical interest, how medicines work in the human body, and how diagnosticians view health and disease. Medical botany will help prepare students going into medical careers understand the benefits, dangers, and history of this fundamental basis for medicine by exploring past and present treatment options. 3.0 Credit hours. Typically offered Spring Semester. This is a Web-enhanced course. **Prerequisites: BIOL 122 (C-) & CHEM 214 (C-) or CHEM 322 (C-).**

Course Specific Outcomes:

Outcome #1 - Students understand the theoretical basis for modes of action, diagnosis, and treatment for each system (allopathic/pharmaceutical, naturopathic, homeopathic and traditional medicine).
Assessment for Outcome #1 - Written exams, classroom discussions, digital discussion board evaluation, individual paper and cumulative exam.
Outcome #2 - Students can use a medicinal plant guide, handbook of poisonous and injurious plants, or encyclopedia of natural medicine to understand how the classification, botanical, and chemical systems operate.
Assessment for Outcome #2 – Individual student paper on a medical plant case study from guides/handbook.
Outcome #3 – Students can distinguish between the strengths and limitations of each medical system (allopathic/pharmaceutical, naturopathic, homeopathic and traditional medicine).
Assessment for Outcome #3 – Written exams, ethical dilemma discussions, and presentation.
Outcome #4 - Students have explored the ethics and expectations of patients and providers in each medical system.
Assessment for Outcome #4 – Ethical dilemma discussions, individual paper, and cumulative exam.
Outcome #5 - Students can read original research and interpret the results correctly.

Assessment for Outcome #5 – Individual student paper on a medical plant case study from guides/handbook, and small group presentations on a stimulant, depressant or hallucinogenic plant.

Outcome #6 - Students understand how and why plants, fungi, minerals, and animals produce compounds that can be used to medically treat symptoms

Assessment for Outcome #6 – Written exams, classroom discussions, digital discussion board evaluation, and cumulative exam.

Textbooks:

Lecture book (Required)- ***Medical Botany*** by Walter H. Lewis and Memory P.F. Elvin-Lewis. Wiley, Second Edition, 2003. **ISBN-10:** 0471628824
FLITE: **RS164.L475 2003**

Resource Materials (Not required)- Materials not digital are in FLITE Reserve (can be checked out for 4 hours).

Encyclopedia of Natural Medicine. Michael Murray and Joseph Pizzorno. 1998. Second Edition. Prima Publishing. ISBN: 0-7615-1157-1. FLITE: **RZ433.M87 2012**

Plant Natural Products: Synthesis, Biological Functions and Practical Applications. H. O. Gutzeit and J. Ludwid-Muller. 2014. Wiley Blackwell. ISBN: 978-3-527-33230-4 **Electronic** http://library.ferris.edu/cgi-bin/ebrary.cgi?10865382

Handbook of Poisonous and Injurious Plants. L.S. Nelson, R.D. Shih, and M. J Balick. 2007. Second Edition. Springer. ISBN: 978-0-387-31268-2 **Electronic** http://library.ferris.edu/cgi-bin/springer.cgi?978-0-387-33817-0

Plants in our World. B. Simpson. 2013. 4th Edition. Mc-Graw-Hill. ISBN: 978-0073524245

Individual Papers:

Individual research papers will be assigned during the 4th week (Feb. 2-5), with first drafts due the 6th week (Feb. 19). These papers will be peer (student) reviewed by Feb. 24, and your final paper will be due March 3. The topic will be a **poisonous or injurious plant** of your choice. You will have to use the *Resource Materials* listed in textbook section of syllabus and other sources to produce a high quality paper (4-6 double spaced, TNR 12 font). The purpose of this assignment is to demonstrate through your writing that you understand the scientific classification, cultural, physical and chemical systems which underlie this poisonous/injurious plant. **50 points (peer review worth additional 10 points).**

Group Presentations:

You will work in a small group (4 students) to explore a **psychoactive plant, stimulant, depressant, or hallucinogen** as featured in the Textbook. The assignment will be introduced and groups assigned during 10th week (March 23-25). Groups are required to prepare and deliver **one oral digital presentation** on the topic agreed to by the instructor. This **presentation** will be **worth 50 points** and will occur during the 15th week (April 27-30). Three groups will present for ~15-20 minutes each on Tuesday and 3 more on Thursday. Supplemental handouts

will be required for groups to hand out to classmates for studying and learning retention. Instructor feedback will be provided to the groups.

Exams:

There will be three 50 point exams and one 100 point final. Exam questions may be a combination of multiple-choice, true/false, labeling and/or short essay questions. Exams will be taken from the lectures, textbook and class handouts, along with class activities. **The Comprehensive Final Exam will be given to evaluate course outcomes on Tuesday May 5th at 12:00-1:40 pm.**

Students are required and expected to take the exams and quizzes at scheduled times. Failure to take exams and quizzes at the scheduled time will result in a grade of zero.

Grade Calculation:

Grades will be determined by comparing the students' total number of points to the number of points possible in the course. I expect that there will be **approximately** 450 points.

Letter grades will be assigned according to the following scale:

A = 94-100%	B = 83-86.9%	C = 73-76.9%	D = 63-66.9%
A- = 90-93.9%	B- = 80-82.9%	C- =70-72.9%	D- = 60-62.9%
B+ = 87-89.9%	C+ = 77-79.9%	D+ = 67-69.9%	F = Below 60%

Cheating:

Cheating on exams or quizzes will result in a grade of zero on the assignment. The case may also be reported to the Dean for further action.

Attendance Policy:

Prompt attendance to all classes is required and expected. If you miss lecture, you are responsible for the lecture contents and any assignments given out during the lecture. If you have a valid reason for an absence, see Dr. Herron with your documentation as soon as you return. **Point deductions (4 per absence) will be in place for unexcused absences** due to the interactive nature of this course and your participation being essential to class success.

Study Suggestions:

Come to class regularly and be on time. Show your classmates and me respect in the classroom. **Organize your notes clearly, remembering that you are responsible for your own learning. Read your class handouts, textbook and lecture readings** and fill in missing information. Ask questions regularly, during lecture, lab, or office hours. Study with classmates. Make sure to check Ferris Connect and your Ferris email weekly for new lecture material as well as grades and emails that I may send you.

TENTATIVE CLASS SCHEDULE

Week:	Topic	Assignment
1	History of Medical Botany; Botanical Nomenclature and Glossary of Botanical Terms	Read Botanical Terms and Botanical Nomenclature handouts
2	Medical systems comparison (allopathic, naturopathic, homeopathic and traditional medicine) including exploration of ethics and principles underlying each system (expectations of providers and patients)	Ethical dilemma discussions and postings.
3	Medical Botany and Drug Discovery	Tour of Pharmacy Greenhouse on Thursday Jan. 29
4	Poisonous and Injurious Plants	Exam 1; Introduction of research paper into a medical plant
5	Natural Products Chemistry: major classes of medically relevant compounds	Organic Chemistry Review
6	Illnesses, ailments, and theories of their causes across the globe	Paper first draft due
7	Pathways to treatment of ailments and illnesses in the human body	Peer review of paper
8	Diagnosticians and their medical settings (including tours of local facilities)	Paper due March 3
9	Spices, foods, and their medical impacts (hands on activity)	Exam 2
10	Remedial Plants: Cancer	Introduction of group projects
11	Remedial Plants: Musculoskeletal system	Pick plant/instructor approval
12	Remedial Plants: Cardiovascular system	Read Textbook
13	Remedial Plants: Endocrine system	Group sources turned in
14	Remedial Plants: Gastrointestinal tract	Exam 3; Group meetings Tuesday
15	Psychoactive plants: Stimulants and depressants; hallucinogens	Small group project presentations
16	Final Comprehensive Exam	Tuesday May 5th 12:00-1:40 pm

ANATOMY AND PHYSIOLOGY FOR OPTOMETRY
OPTM 538
COURSE SYLLABUS
SPRING SEMESTER 2015

Instructor: Dr James Scott
Office: 2013 Arts and Science Commons
Telephone: FSU Office: 231-591-2620
Cell 231-250-7531
Clinic 231-796-3507

E-Mail: Scottj@ferris.edu

Office Hours: Tuesday and Thursday 8-8:50AM MCO331
Wednesday 9:00AM – 11:50AM ASC2013
All other office hours by appointment*
*It is my desire to be available to you at all times and therefore I have offered several ways for you to contact me if necessary. If you need to meet with me I will be happy to work something out will my schedule and yours.

Course Description:
This is the second of a two semester sequence that covers human structure and function and its clinical application. Topics in this course include organ systems including the gastrointestinal, cardiovascular, respiratory, lymphatic, renal and reproductive systems. Interaction and interdependency of various systems will also be explored, as well as clinical issues associated with systemic and ocular dysfunction.

Class Schedule:

Lecture:	MCO 212	All Sections	W	8:00AM - 8:50AM
			TR	9:00AM - 9:50AM
Laboratory	MCO 331	Sec 211	W	1:00PM – 3:50PM
		Sec 212	W	4:00PM – 6:50PM

Required Materials:
Lecture: Vander's Human Physiology, Widmaier, Raff and Strang, 12th edition, 2011, McGraw Hill, ISBN: 9780073378107
Laboratory: Laboratory Manual for Seeley's Anatomy and Physiology, Eric Wise, 9th edition, McGraw Hill, ISBN: 9780073250748
***Other upper level anatomy and physiology lecture books can be used in place of Vander's**
****It will be important for you to purchase the laboratory book as there will be assigned reading from this book in advance and during the laboratory period**.

Course Objectives:
It is my goal that by the end of the second semester in the sequence of Human Anatomy and Physiology (OPTM 537-538) the student would have a comprehensive understanding of the structures that make up the human body; their microscopic and gross anatomy, how each of them function and how each are interrelated and in particular their relationship to the eye and its adnexia. We will achieve these objectives by ensuring that lecture and laboratory subjects are interrelated and reinforce each other, and frequent evaluation by way of lecture quizzes, exams, laboratory quizzes and laboratory practical examinations.

Course Outcomes:
The students will be able to meet the following course outcomes by the end of this course:.

1. Students will be able to identify and name designated anatomical structures (both histological and gross) within the following organ systems: the gastrointestinal, cardiovascular, respiratory, lymphatic, renal and reproductive systems.
2. Students will be able to apply their knowledge of anatomy and physiology to think critically about the application of anatomical and physiologic concepts to case studies: identify the problem, analyze the specific situation and predict the outcome.
3. Students will be able to carry out experimental procedures, evaluate experimental data and interpret their data based on the anatomy and physiology that they have learned.

Ferris Connect:

During the semester you will be required to log on to **FerrisConnect** for many purposes such as to download and copy lecture outline materials, read notes from your instructor, retrieve exam and quiz scores, check current course grades and to take weekly quizzes. Please check the **FerrisConnect** OPTM 538 home page often so that you will not miss any of this important material. If you have any difficulty logging on and retrieving materials please let me know as soon as possible so that I or someone on our computer support staff can help you.

Grading Policies:

There will be 3 scheduled lecture exams each worth 100 points and a final exam which will include one portion, worth 100 points, covering new material since the previous exam and another portion, worth 100 points, that will be comprehensive covering material from the entire semester. I also anticipate giving periodic, unannounced, lecture quizzes covering material from the previous two lectures. Knowing that these quizzes can be given at any time will require you to keep current on your text reading and lecture note review.

Lab quizzes will be given weekly. Quizzes will be given on **FerrisConnect** following the lab session for labs that are more physiology based or at the beginning of the following lab session for those labs that are more related to anatomical studies. **You will be given the information about the time and place for lab quizzes during each lab session**. Each quiz will be worth approximately 20 points.

There will also be a comprehensive lab practical worth 100 points at the end of the semester (see schedule). **This comprehensive lab practical will cover all lab material (both identification and written) from week one up to the last lab period.** Lecture will account for approximately 550 points and laboratory will account for approximately 200 points of your final point total.

GRADING SCALE:

The total points achieved by the student in this course will be converted into a percent total and the final grade will be determined according to the following scale:

93 - 100 = A	73 - 76.9 = C
90 - 92.9 = A-	70 - 72.9 = C-
87 - 89.9 = B+	67 - 69.9 = D+
83 - 86.9 = B	63 - 66.9 = D
80 - 82.9 = B-	60 - 62.9 = D-
77 - 79.9 = C+	Below 60 = F

Attendance

According to MCO policy attendance is required in all classes. There will be no excused absences unless the student obtains an excuse from the Dean or Associate Dean of MCO. If you miss class you are required to obtain all materials through myself, your classmates or FerrisConnect. If you must change a lab period you can obtain advanced permission to attend the other lab section as long as there is space available. **There will be no make-up labs or lab quizzes.**

Lecture exams and Lab quizzes:

Lecture exams will be based on material presented in **lecture and lab** and will consist of multiple choice, true and false, short answer, and essay.

Lab quizzes will consist of short answer, essay and calculations that cover materials from the previous lab period. **Please log onto FerrisConnect often to look for quiz schedules and updates!**

OPTM 538 Human Anatomy and Physiology
Lecture Schedule
Spring Semester 2015

Week V)	Day	Date	Lecture Topic	Reading (Vander)
1	T	Jan 13	Introduction – Digestive System	Chapter 15
	W	Jan 14	Digestive System Anatomy	Chapter 15
	R	Jan 15	Digestive System Anatomy	Chapter 15
2	T	Jan 20	**No Lecture**	
	W	Jan 21	Digestive System Physiology	Chapter 15 Tegrity
	R	Jan 22	Digestive System Physiology	Chapter 15 Tegrity
3	T	Jan 27	Digestive System Physiology	Chapter 16
	W	Jan 28	Nutrition and Metabolism	Chapter 16
	R	Jan 29	Nutrition and Metabolism	Chapter 16
4	T	Feb 3	Respiratory System Anatomy	Chapter 13
	W	Feb 4	Ventilation	Chapter 13
	R	**Feb 5**	**Exam 1**	
5	T	Feb 10	Lung Function/volumes	Chapter 13
	W	Feb 11	Physical Principles of Gas Exchange	Chapter 13
	R	Feb 12	Oxygen and CO_2 Transport	Chapter 13
6	T	Feb 17	Control of Ventilation	Chapter 13
	W	Feb 18	Intro to the Cardiovascular System	Chapter 12
	R	Feb 19	Cardiac Anatomy	Chapter 12

Week	Day	Date	Lecture Topic	Reading (Vander)
7	T	Feb 24	Cardiac Physiology	Chapter 12
	W	Feb 25	Cardiac Physiology	Chapter 12
	R	Feb 26	Cardiac Physiology	Chapter 12
8	T	Mar 3	Regulation of the Heart	Chapter 12
	W	Mar 4	Heart and Homeostasis	Chapter 12
	R	**Mar 5**	**Exam 2**	
9			**Spring Break – No Classes**	
10	T	Mar 17	Blood Vessel Anatomy	Chapter 12
	W	Mar 18	Pulmonary / Systemic Circulation	Chapter 12
	R	Mar 19	Dynamics of Blood Circulation	Chapter 12
11	T	Mar 24	Control of Blood Flow / Pressure	Chapter 12
	W	Mar 25	Blood	Chapter 12
	R	Mar 26	Lymphatic System	Chapter 18
12	T	Mar 31	Lymphatic System	Chapter 18
	W	April 1	Lymphatic System	Chapter 18
	R	**April 2**	**Easter Recess**	
13	**T**	**Apr 7**	**Exam 3**	
	W	Apr 8	Renal Physiology	Chapter 14
	R	Apr 9	Renal Physiology	Chapter 14
14	T	Apr 14	Renal Physiology	Chapter 14
	W	Apr 15	Renal Physiology	Chapter 14
	R	Apr 16	Water, Electrolytes, Acid-Base	Chapter 14

Week	Day	Date	Lecture Topic	Reading (Vander)
14	T	Apr 21	Water, Electrolytes, Acid-Base	Chapter 14
	W	Apr 22	Male Reproductive Anatomy	Chapter 17
	R	Apr 23	Male Reproductive Physiology	Chapter 17
15	T	Apr 28	Female Reproductive Anatomy	Chapter 17
	W	Apr 29	Female Reproductive Physiology	Chapter 17
	R	Apr 30	Course Conclusion	

Final Examination Date and Time to be announced .

Laboratory Schedule

Week	Dates	Subject	Reading (Eric Wise lab Manual)
1	Jan14	Digestive System Anatomy	Lab 38
2	**Jan 21**	**no lab this week**	
3	Jan 28	Structures of the Respiratory System	Lab 35
4	Feb 4	Respiratory Function Breathing and Respiration	Lab 36
5	Feb 11	Structures of The Heart	Lab 27
6	Feb 18	Functions of the Heart, ECG, Blood Pressure	Lab 28
7	Feb 25	Blood	
8	Mar 4	Blood Vessels of the Body	Labs 30 and 31
9	**Mar 11**	**Spring Break**	
10	Mar 18	Renal Anatomy	Lab 40
11	Mar 25	Renal Physiology	Lab Handout
12	April 1	Reproductive Anatomy	Lab 42
13	April 8	Lab Practical Review	
14	April 17	Lab Practical Review	
15	**April 22**	**Final Comprehensive Lab Practical**	

***The content and schedule of this course may change at the discretion of the instructor. Changes may include lecture and laboratory content and examination/quiz dates. Announcements of these changes will be made during lecture and laboratory periods and on FerrisConnect to keep you informed.**

INBI 303 (Integrated Ecology)
Ecology: Interconnections between Disciplines
4 Credits, Fall Semester Only
Course Syllabus (Tentative)
Fall 2014

Instructor: Dr. Scott Herron
Office: 2017 Arts and Science Commons (ASC)
Telephone: 231-591-2087
Email: herrons@ferris.edu

Office Hours:
Monday: 10:00-10:45 am, 1-1:50 pm
Wednesday: 10:00-10:45 am, 1-1:50 pm
All other office hours by appointment only.

Required Materials: **Fundamentals of Ecology by Eugene P. Odum and Gary W. Barrett, Thompson/Brooks/Cole Publishers**; **Ecology Readings** [Handouts provided in class]; **3-Ring binder, water bottle; INBI 303 Lab Handouts** for Dr. Scott Herron [provided in lab].

Class Schedule

Lecture: All sections		M, W, F	9:00 AM-9:50 AM
	Lecture Room: SCI 137		
Lab:	Section 211	R	12:00 PM-2:50 PM
	Section 212	R	3:00 PM-5:50 PM
	Lab Room: SCI 235		

Course Description: Explores living organisms found in Michigan and the Great Lakes region through an ecological framework reflecting the Michigan Curriculum Framework. Each concept uses a model organism to illustrate one of the elementary life science standards and how to use these organisms to teach science in the elementary school classroom. Primary concepts include human ecology, ecosystem function, classification and life cycles, evolution & adaptation to environments, human disease & nutrition, populations, naturalized species, and plant & animal pathogens. The labs will entail significant time out-of-doors on & off FSU's campus learning about organisms in their natural environment. INBI 303 is a web-enhanced course. ***Prerequistes: BIOL 103, PHSC 110, & PHSC 115 or instructor approval.***

Course Outcomes:
1. Students will scientifically identify the key organisms in their field settings and relate this to the life cycle, geography, climate, ecosystem, growth and niche requirements.
2. Students will demonstrate a working knowledge of the fundamental principles of ecology (human ecology, ecosystem function, classification and life cycles, evolution & adaptation to environments, human disease & nutrition, populations, naturalized species, management of natural resources, and plant & animal pathogens).
3. Students will inquire, quantify, analyze, and investigate the properties of key organisms & concepts in a controlled lab setting

that meets & teaches the guidelines of the Council of State Science Supervisors. http://www.csss-science.org/safety

4. Students will integrate the applied laboratory and field components of the course with the scientific knowledge from lecture to demonstrate their ability to synthesize information and demonstrate scientific proficiency in the form of written laboratory notebook communicating the science effectively, which is instructor evaluated.

Grading Policies:

There will be three (3) scheduled exams. Exam questions will be short answer, essay, true/false and multiple choice. Exams will be taken from the lectures, class handouts, textbook readings, and lab materials.

Students are required and expected to take the exams and quizzes at scheduled times. Failure to take exams at the scheduled time will result in a grade of zero. Exam answers that appear to be copied or shared between students will result in a failure of that exam.

In case of documented illness or extenuating circumstances, you must inform me **before the exam** and schedule a time to complete the exam before I return the graded exams. A written explanation or valid documentation (such as a letter from a physician, evidence of funeral, etc.) must be submitted at the time of the make-up exam.

Unannounced quizzes will be given in lecture during the semester as an indicator of progress and to verify attendance. Each quiz will cover materials from the current and previous lectures. Unannounced quiz points are bonus points, and absolutely no unannounced quizzes can be taken after I have collected the quizzes in lecture.

Grades:

Grades will be determined by comparing your total number of points to the number of points possible in the course. There will be 300 points possible in lecture (Three 100 point exams) and **approximately** 150 points in laboratory, totaling 450 points.

Letter grades will be assigned according to the following scale:

A = 94-100%	B = 83-86.9%	C = 73-76.9%	D = 63-66.9%
A- = 90-93.9%	B- = 80-82.9%	C- =70-72.9%	D- = 60-62.9%
B+ = 87-89.9%	C+ = 77-79.9%	D+ = 67-69.9%	F = Below 60%

Cheating:

Cheating will result in a grade of zero on the assignment. The case will be reported to the Dean for further action.

Attendance Policy:

Prompt attendance to all lectures is required and expected. If you miss lecture, you are responsible for the lecture contents and any assignments given out during the lecture. Attendance will be taken **only** at the beginning of the class periods. **Attendance in all lab**

sessions is required as there will be no make up lab period. *Failure to attend more than two lab periods unexcused is grounds for failure resulting in an F on your transcript (Biology Departmental policy).*

Field Trips:

There will be one or more field trips that last much of Thursday, requiring your absence from other activities. University Excused Absence forms will be provided so you can make alternative arrangements with your other professors and supervisors during extended hour field trips required for INBI 303.

Study Suggestions:

Come to class every time and arrive early. Get enough sleep to be an active participant in class. Take notes on my lectures and diagrams on the board. Organize your notes clearly, remembering that my handouts and lectures are incomplete without your remaining current with readings. Ask questions regularly, before class, during lecture, lab, or office hours. Study with classmates, but DO NOT take the exams with classmates. Review your notes weekly to see where you need help. *Access FerrisConnect regularly to download files, submit tests and assignments, email me or classmates, and to check your grades.*

INBI 303 Integrated Ecology: Interconnections between Disciplines
Course Lecture Outline (Tentative):

Introduction to ecology (10 % of class time)

-What is ecology? How do you integrate material from multiple disciplines into a cohesive lesson? Why does chemistry, geology, & geography inform ecology? Michigan Academic State standards (http://www.michigan.gov/mde/0,4615,7-140-28753_64839_65510---,00.html) as a framework for teaching science; Lab Safety using the Council of State Science Supervisors guide for Elementary Students (http://www.csss-science.org/safety.shtml); National standards, including Next Generation Science Standards (http://www.nextgenscience.org/Michigan); Free Online Next Gen Sandards (http://www.nap.edu/openbook.php?record_id=18290)

1. Human Ecology (20 % of class time)

-Human adaptation to environments, cultural acquisition of natural resources, demographics of Michigan's ecotypes and habitats, geographic positioning and navigational technologies, distribution of human populations in Michigan compared to land use and management, Human impact on increasing species extinction rates, and displacement of species habitat for human use (including urban sprawl, recreation, parks); Plant, animal and human responses to climate change

2. Ecosystem Function (20 % of class time)

-Competitive exclusion and localized extinction, resource partitioning, food chains and food webs, photosynthesis as a ecosytem service (O_2 producer & CO_2 reducer), decompostion & recycling of nutrients, microbial ecology, naturalized species, adaptation and evolution to changing environments, management of the aquatic resources (hydrosphere) in Michigan.

3. Plant and Animal Pathogens (15 % of class time)

-Life cycles of plant pathogens (i.e. bronze birch borer, emerald ash borer, gypsy moths, beech bark disease, oak wilt), field identification and classification of pathogens, mechanisms of invasion & infection, pathogen & host population dynamics, adaptation and evolution to pathogens, impact of pathogens on availability of material resources, management of pathogen affected resources

-Ecology of animal pathogens (i.e. bovine tuberculosis, chronic wasting disease, mad cow disease, white-nose bat disease), management of animal pathogens, economic and human implications.

4. Human Disease & Health Habits (15 % of class time)

-Digestion of food, structure of human gastrointestinal tract, chemistry of digestion & food absoption, role of plants and photosynthesis in production of primary food calories

-Nutritional deficiencies and diseases, immunization and disease prevention, selection of healthy foods, nutritional chemisty of common foods, effects of diet, exercise, and sleep on human health, role of ecosystem health and greenspace (managing landscape for human health) to reducing physiological GI system stress, ulcers, GERD, and improving human health.

5. Management of Michigan's Natural Resources (20 % of class time)

-Classification of living verses non-living natural resources, questioning sustainability of removing Michigan water (hydosphere "mining") and sand by private for-profit companies, growth and development of selected Michigan plants, game animals, and invasive species, phenology of plant and fungal material resources, Hydrofracturing and fac-sand mining for fossil fuel exploitation

LAB INFORMATION: INBI 303 (Integrated Ecology)

Lab Grades: Each of 10 labs will be worth 5 participation points, for a total of 50 points. Student Fact Sheets (10 points), Lab quiz (10 points each); posters (10 points), lab worksheets (20 points) will be account for additional points. Lastly, 50 points from the Lab Notebook with supporting documents will make lab worth approximately 150 points. Approximately 35% of your total grade in this course will be derived from lab, so don't miss out or fail yourself by not participating or attending lab.

Laboratory attendance is mandatory! **More than two unexcused absences from lab will result in failure of the course.** It is expected that you read the Lab Handouts at the beginning of lab period. **Lab quizzes can NOT be made up the following week.** Arriving late, leaving early, or not participating will result in earning 0 out of the 5 participation points. **Lab Safety** http://www.csss-science.org/safety.shtml

Week	Dates	Topic	Assignment
1	*Aug. 28*	Research Lab Safety, State & National Standards	Lab Safety Sign-in; Fact Sheet Due
2	*Sept. 4*	Human Ecology 1-Field Lab	Collect Plants and Data
3	*Sept. 11*	Human Ecology 2-Analyze data in laboratory; Prepare plant vouchers	Quiz 1: Lab Safety **Lab Notebook**
4	*Sept. 18*	***No Lab-Assignment on Ferris Connect***	Human Ecology Lab Report
5	*Sept. 25*	Ecosystem Function 1-Field Lab	Collect Data
6	Oct. 2	Ecosystem Function 2-Analyze data in laboratory	Ecosystem Function Poster **Lab Notebook**
7	Oct. 9	Ecosystem Function 3-Field Lab	Collect Data
8	Oct. 16	Animal Pathogens (Field Trip to Wildlife Disease Lab- Lansing)	No Quiz
9	Oct. 23	Plant Pathogens-Field Lab Bog Camp Newaygo	**Lab Notebook**
10	Oct. 30	Human Disease & Health Habits 1 -In laboratory experiment	Human Disease & Health Worksheet
11	Nov. 6	Field Lab -TBD Fire ecology	Collect Data
12	Nov. 13	Michigan's Natural Resources 1 Field Lab Big Rapids Wastewater Treatment Plant (TBD)	Make Observations and Notes
13	Nov. 20	Michigan's Natural Resources 2 -Field Lab DNR Deer Check Station	**Lab Notebook**
14	Nov. 27	**No Labs-Holiday Recess**	
15	Dec. 4	**Final Exam Handed Out**	**Lab Notebooks Returned**

SYLLABUS ATTACHMENT
COLLEGE OF ARTS AND SCIENCES – FERRIS STATE UNIVERSITY

FALL 2014

IMPORTANT DATES

Late registration	Wed. – Fri.	Aug. 20 – 22
First day of classes	Monday	Aug. 25
Last day for Drop/Add	Thursday	Aug. 28
Labor Day (no classes)	Monday	Sept. 1
Mid-term grades due	Monday	Oct. 20
Last day for "W" grades	Thursday	Oct. 30
Thanksgiving recess begins (no classes)	Wed (noon)	Nov. 26
Thanksgiving recess ends (classes resume)	Monday	Dec. 1
Last day of classes	Friday	Dec. 5
Examination Week	Mon – Fri	Dec. 8 - 12
Commencement	Saturday	Dec. 13
Final grades due by 1:00 pm	Monday	Dec. 15
Grades available to students on MyFSU	Tuesday (after 8AM)	Dec. 16

Sessions	Dates	Last Day to Withdraw	Sessions	Dates
Full Session	Aug. 25 – Dec. 5	Oct. 30	Full Session	Aug. 25 – Dec. 5

FLITE LIBRARY.....591-2669
Regular hours for FLITE:
Monday – Thursday . . . . . 7:30 a.m. – MIDNIGHT
Friday . . . .7:30 a.m. – 6:00 p.m.
Saturday . . . . . NOON – 5:00 p.m.
Sunday . . . . . .1:00 p.m. – MIDNIGHT
Extended Studies Court will begin late night hours September 16, 2014
*Sunday-Thursday/MIDNIGHT to 7:30 a.m. *Friday/6 p.m. to MIDNIGHT
*Saturday/5 p.m. to MIDNIGHT)

CLASS ATTENDANCE IS IMPORTANT!
Many instructors have mandatory attendance policies by which your grade will be affected by absences. Some instructors also have policies about class tardiness, to encourage students to be present for the full class period. Check your course syllabus or talk to your instructor about his/her policies.

HOW TO CONTACT A FACULTY MEMBER
If you have questions or need help, talk to your instructor. Faculty office locations, phone numbers, and office hours may be obtained from the class syllabus or department office, or through the College of Arts and Sciences web page at http://www.ferris.edu/htmls/colleges/artsands/. A faculty directory notebook is also located in the dean's office (ASC 3052).

DROPPING CLASSES OR WITHDRAWING
If you need to drop a class, you must do so **OFFICIALLY**, through your dean's office, in order to avoid receiving an "F" grade in the course. If you need to totally withdraw from school, you must do so **OFFICIALLY** at Admissions and Records in CSS 101. The last day to withdraw or drop a class may be different for different classes. In case of extenuating circumstances (e.g., a serious illness requiring you to withdraw from school), contact Birkam Health Center at 591-2614.

INCOMPLETES
The intent and appropriate use of the "I" grade is NOT to avoid student probation, dismissal, or unacceptable grades, nor should it be considered as an extended alternative to withdraw from a class (W). The "I" is only considered for extenuating circumstances that have led to a student's missing a portion of the course. Extenuating circumstances are generally defined as those situations over which the student has little or no control—e.g., illness, birth, jury duty, death of a parent, serious injury. Instructors may require suitable documentation.

Students must have completed at least 75% of the coursework at passing levels before an "I" will be considered, and they may be required to sign an agreement regarding course completion. An "I" grade automatically changes to an "F" after one semester (not counting summer) unless the faculty member files another grade or extends the incomplete.

WHERE TO GO FOR HELP

The following services are available to any Ferris student, free of charge. They are designed to help you succeed in your courses, in your career planning, and in meeting the challenges of college life. Don't hesitate to explore and use these services at Ferris.

Academic Support Center...ASC 1017 – 591-3543
The Writing Center…….ASC 1017 – 591-2534

The Writing Center, Tutorial Services and Academic Skills Center join together to offer FSU students an array of academic support services, e.g.

- tutoring for many Ferris courses
- individual help and workshops with writing skills and writing assignments for English or other courses
- help in developing better reading and study strategies
- workshops to help you meet the challenges of college life

Scholar Program……..…..ASC 1025 – 591-5976

SCHOLAR is an academic support program that aids in the student's successful progression by offering a Peer Mentor Program, a Student Retention Program, and an Academic Student Advisory Committee.

Disabilities Services……....STR 313 – 591-3057

FSU provides special services and assistance for students with physical handicaps or learning disabilities. In order to take advantage of these services, stop by or call for an appointment with Deborah Cox.

Personal Counseling, Sexual Assault, Substance Abuse

Birkham Health Center - 2nd Floor……591-5968

Personal counseling is available confidentially and free of charge. Counselors are available to assist with personal and stress-related problems, family and relationship issues, substance abuse, sexual assault, depression, or other similar problems. Call or stop by to obtain an appointment.

Safety

Please observe the posted shelter and evacuation routes in the hallway nearest your classroom.

College of Arts & Sciences Department Offices

Biology	ASC 2004	591-2550
Humanities	JOH 119	591-3675
Lang/Lit	ASC 3080	591-2520
Mathematics	ASC 2021	591-2565
Physical Sciences	ASC 3021	591-2580
Social Sciences	ASC 2108	591-2735
Dean's Office	ASC 3052	591-3660

ACADEMIC MISCONDUCT

Academic misconduct refers to dishonesty or misrepresentation with respect to assignments, tests, quizzes, written work, oral presentations, class projects, internship experience, or computer usage; violation of computer licenses, programs, or data bases; or unauthorized acquisition or distribution of tests or other academic material belonging to someone else. It includes such behaviors as cheating, copying materials from the internet without documentation, presenting another person's ideas or work as your own, taking someone else's exam for them, violating computer software licenses or program/data ownership, etc. If you are uncertain about whether a particular behavior might represent academic misconduct, be sure to ask your professor for clarification.

Penalties for academic misconduct can include **FAILURE** of the assignment or the course, and/or disciplinary action up to and including probation or dismissal from the University.

DISRUPTIVE BEHAVIOR

The College of Arts and Sciences strives to maintain a positive learning environment and educational opportunity for all students. Consequently, patterns of behaviors which obstruct or disrupt the teaching/learning environment will be addressed. The instructor is in charge of his or her course (e.g., assignments, due dates, attendance policy) and classroom (e.g., behaviors allowed, tardiness). Harassment, in any form, will not be tolerated.

Penalties for disruptive behavior can include involuntary withdrawal from the course and/or disciplinary action up to and including probation or dismissal from the University.

Major Field Tests

DEPARTMENTAL SUMMARY OF TOTAL TEST AND SUBSCORES

Test: Biology
Form Code: 4BMF
Institution: Ferris State University
Cohort: 09F-Bio Sr-Lipar & Zhu
Closed on: November 13, 2009

TOTAL TEST		
Scaled Score Range	Number in Range	Percent Below
200	0	100
195-199	0	100
190-194	0	100
185-189	1	98
180-184	0	98
175-179	0	98
170-174	0	98
165-169	6	83
160-164	4	73
155-159	9	51
150-154	7	34
145-149	4	24
140-144	2	20
135-139	5	7
130-134	3	0
125-129	0	0
120-124	0	0

	Subscore 1		Subscore 2		Subscore 3		Subscore 4	
	Cell Biology		Molecular Biology and Genetics		Organismal Biology		Population Biology, Evolution, and Ecology	
Scaled Score Range	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below
100	0	100	0	100	0	100	0	100
95-99	0	100	0	100	0	100	0	100
90-94	0	100	1	98	0	100	0	100
85-89	0	100	0	98	0	100	0	100
80-84	0	100	0	98	1	98	0	100
75-79	0	100	0	98	0	98	2	95
70-74	2	95	0	98	2	93	4	85
65-69	3	88	1	95	4	83	5	73
60-64	6	73	1	93	7	66	10	49
55-59	5	61	9	71	7	49	5	37
50-54	6	46	5	59	3	41	4	27
45-49	9	24	10	34	5	29	3	20
40-44	3	17	7	17	4	20	2	15
35-39	4	7	4	7	6	5	3	7
30-34	1	5	1	5	2	0	1	5
25-29	2	0	2	0	0	0	2	0
20-24	0	0	0	0	0	0	0	0

	Mean	Standard Deviation
Total Test Scaled Score	153	12
Subscore 1	51	11
Subscore 2	48	11
Subscore 3	53	12
Subscore 4	56	13

Students responding to less than 50% of the questions: 0
Students in frequency distribution: 41
Students tested: 41

Major Field Tests

DEPARTMENTAL SUMMARY OF TOTAL TEST AND SUBSCORES

Test: Biology
Form Code: 4BMF
Institution: Ferris State University
Cohort: 10Sp Lipar & Zhu
Closed on: May 03, 2010

TOTAL TEST		
Scaled Score Range	Number in Range	Percent Below
200	0	100
195-199	0	100
190-194	0	100
185-189	0	100
180-184	0	100
175-179	2	97
170-174	1	95
165-169	5	88
160-164	6	79
155-159	14	58
150-154	16	33
145-149	8	21
140-144	7	11
135-139	4	5
130-134	2	2
125-129	1	0
120-124	0	0

	Subscore 1		Subscore 2		Subscore 3		Subscore 4	
	Cell Biology		Molecular Biology and Genetics		Organismal Biology		Population Biology, Evolution, and Ecology	
Scaled Score Range	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below
100	0	100	0	100	0	100	0	100
95-99	0	100	0	100	0	100	0	100
90-94	0	100	0	100	0	100	0	100
85-89	0	100	0	100	0	100	0	100
80-84	1	98	0	100	0	100	0	100
75-79	1	97	2	97	1	98	2	97
70-74	1	95	4	91	2	95	3	92
65-69	11	79	8	79	4	89	4	86
60-64	9	65	5	71	10	74	7	76
55-59	5	58	10	56	7	64	16	52
50-54	13	38	9	42	14	42	11	35
45-49	16	14	7	32	12	24	11	18
40-44	3	9	13	12	8	12	3	14
35-39	3	5	4	6	5	5	6	5
30-34	2	2	4	0	3	0	0	5
25-29	0	2	0	0	0	0	3	0
20-24	1	0	0	0	0	0	0	0

	Mean	Standard Deviation
Total Test Scaled Score	153	10
Subscore 1	54	11
Subscore 2	53	12
Subscore 3	52	11
Subscore 4	53	11

Students responding to less than 50% of the questions: 0
Students in frequency distribution: 66
Students tested: 66

Major Field Tests

DEPARTMENTAL SUMMARY OF TOTAL TEST AND SUBSCORES

Test: Biology
Form Code: 4BMF
Institution: Ferris State University
Cohort: 09FBIOL-Jenice
Closed on: October 12, 2011

TOTAL TEST		
Scaled Score Range	Number in Range	Percent Below
200	0	100
195-199	0	100
190-194	0	100
185-189	0	100
180-184	0	100
175-179	0	100
170-174	0	100
165-169	0	100
160-164	1	99
155-159	2	97
150-154	4	93
145-149	5	88
140-144	13	74
135-139	22	51
130-134	18	32
125-129	20	11
120-124	11	0

	Subscore 1		Subscore 2		Subscore 3		Subscore 4	
	Cell Biology		Molecular Biology and Genetics		Organismal Biology		Population Biology, Evolution, and Ecology	
Scaled Score Range	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below
100	0	100	0	100	0	100	0	100
95-99	0	100	0	100	0	100	0	100
90-94	0	100	0	100	0	100	0	100
85-89	0	100	0	100	0	100	0	100
80-84	0	100	0	100	0	100	0	100
75-79	0	100	0	100	0	100	0	100
70-74	2	98	0	100	0	100	1	99
65-69	0	98	1	99	0	100	0	99
60-64	0	98	1	98	1	99	2	97
55-59	1	97	3	95	3	96	7	90
50-54	1	96	3	92	7	89	9	80
45-49	4	92	16	75	8	80	20	59
40-44	7	84	24	50	10	70	16	43
35-39	17	67	11	39	22	47	8	34
30-34	23	43	30	7	22	24	17	17
25-29	16	26	3	4	5	19	9	7
20-24	25	0	4	0	18	0	7	0

	Mean	Standard Deviation
Total Test Scaled Score	135	9
Subscore 1	32	10
Subscore 2	39	9
Subscore 3	36	10
Subscore 4	41	10

Students responding to less than 50% of the questions: 0
Students in frequency distribution: 96
Students tested: 96

ETS protects the confidentiality of all test data.

Major Field Tests

DEPARTMENTAL SUMMARY OF TOTAL TEST AND SUBSCORES

Test: Biology
Form Code: 4GMF
Institution: Ferris State University
Cohort: Combined
Closed on: Combined

TOTAL TEST		
Scaled Score Range	Number in Range	Percent Below
200	0	100
195-199	0	100
190-194	0	100
185-189	0	100
180-184	0	100
175-179	0	100
170-174	0	100
165-169	2	99
160-164	5	97
155-159	8	95
150-154	14	90
145-149	27	80
140-144	30	69
135-139	23	61
130-134	45	45
125-129	73	19
120-124	52	0

	Subscore 1		Subscore 2		Subscore 3		Subscore 4	
	Cell Biology		Molecular Biology and Genetics		Organismal Biology		Population Biology, Evolution, and Ecology	
Scaled Score Range	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below
100	0	100	0	100	0	100	0	100
95-99	0	100	0	100	0	100	0	100
90-94	0	100	0	100	0	100	0	100
85-89	0	100	0	100	0	100	0	100
80-84	0	100	0	100	0	100	0	100
75-79	0	100	0	100	0	100	0	100
70-74	0	100	0	100	1	100	0	100
65-69	4	99	3	99	3	99	3	99
60-64	4	97	7	96	7	96	8	96
55-59	10	94	10	93	10	92	29	86
50-54	14	89	17	87	10	89	22	78
45-49	28	78	10	83	42	74	26	68
40-44	43	63	41	68	34	62	36	56
35-39	29	53	79	40	55	42	32	44
30-34	71	27	34	28	29	32	47	27
25-29	34	15	40	14	61	10	24	19
20-24	42	0	38	0	27	0	52	0

	Mean	Standard Deviation
Total Test Scaled Score	134	11
Subscore 1	36	11
Subscore 2	36	10
Subscore 3	37	11
Subscore 4	38	13

Students responding to less than 50% of the questions: 1
Students in frequency distribution: 279
Students tested: 280

Major Field Tests

DEPARTMENTAL SUMMARY OF TOTAL TEST AND SUBSCORES

Test: Biology
Form Code: 4GMF
Institution: Ferris State University
Cohort: Combined
Closed on: Combined

TOTAL TEST		
Scaled Score Range	Number in Range	Percent Below
200	0	100
195-199	0	100
190-194	0	100
185-189	1	99
180-184	1	99
175-179	3	97
170-174	8	93
165-169	20	83
160-164	25	71
155-159	30	55
150-154	45	32
145-149	26	19
140-144	16	11
135-139	14	4
130-134	6	1
125-129	2	0
120-124	0	0

	Subscore 1		Subscore 2		Subscore 3		Subscore 4	
	Cell Biology		Molecular Biology and Genetics		Organismal Biology		Population Biology, Evolution, and Ecology	
Scaled Score Range	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below
100	0	100	0	100	0	100	0	100
95-99	0	100	0	100	0	100	0	100
90-94	0	100	0	100	0	100	0	100
85-89	1	99	0	100	1	99	0	100
80-84	3	98	1	99	0	99	1	99
75-79	6	95	3	98	5	97	2	98
70-74	2	94	14	91	9	92	5	96
65-69	17	85	17	82	16	84	25	83
60-64	20	75	25	70	37	65	23	72
55-59	42	54	36	51	16	57	46	48
50-54	33	37	39	31	26	44	34	31
45-49	36	19	19	22	45	21	21	20
40-44	20	9	25	9	23	10	18	11
35-39	6	6	15	2	7	6	11	6
30-34	8	2	0	2	4	4	8	2
25-29	0	2	2	1	6	1	0	2
20-24	3	0	1	0	2	0	3	0

	Mean	Standard Deviation
Total Test Scaled Score	154	11
Subscore 1	54	12
Subscore 2	54	11
Subscore 3	53	12
Subscore 4	54	11

Students responding to less than 50% of the questions: 0
Students in frequency distribution: 197
Students tested: 197

ETS protects the confidentiality of all test data.

Evaluation of the Assessment of Student Learning in the Department of Biological Sciences

Prepared for

Dr. Joseph Lipar
Chair of the Department of Biological Sciences
Ferris State University

Prepared by

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May 2015

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Executive summary

- The assessment plan for the program is in relatively good shape.
  - Most of the program learning outcomes (4 out of 5) are simple, measurable, attainable, realistic, and time bounded.
  - The curriculum map for the project is adequate. One course (BIOL 206) is no longer offered and should be replaced. Appropriate assessment points are identified throughout the curriculum.
  - Many courses still do not have documented (form E or CAT) objectives. In addition, most of the courses that do have documented objectives have different objectives listed in their syllabi.
  - Although many courses include assessments of student performances or products, most (nearly 90%) of all student assessment in the program is performed using high-stakes summative examinations.
- There is very little systematic assessment of student learning in this program.
  - Assessment data, in the form of graded assignments and examinations, is regularly collected by all of our faculty.
  - Analysis of assessment data is rather idiosyncratic in this program. Each faculty member performs their own analyses on their data. These range from rather simplistic score tracking to elaborate databases of student assessment data over time.
  - Reporting of assessment findings is sporadic. There are only a few courses with assessment results in TracDat. There are not currently assessment data available in TracDat for all of the program outcomes.
  - There is currently not a formal process for disseminating and discussing assessment results within the Biology Department.
- Interestingly, faculty motivation for student assessment is relatively high.
  - The Biology faculty report high expectancy with regard to assessing student learning.
  - Most faculty value the process of assessment.
  - The time commitment involved in assessing student learning well remains problematic.
  - The faculty remain skeptical about how student assessment results may be used at our institution.
- Recommendations for improving programmatic assessment.
  - Recognize and utilize the wealth of assessment data that is already available.
  - Systematically update form Es for all Biology courses.
  - Increase assessment of student products and performances.
  - Standardize and automate entry of assessment data into TracDat.
  - Establish one department meeting per year that is dedicated to the analysis and discussion of programmatic assessment data.
  - Set up some faculty workshops to facilitate assessment training and instrument development.
  - Develop policies to clearly describe how assessment results will be used at Ferris.

Objective

The purpose of this report is to accurately describe the current state of assessment in the department of Biology at Ferris State University. This information is intended to inform the current academic program review process that the Biology BS program is currently undertaking. In addition, these data will be helpful for the ongoing discussions of curricular revisions in the program. The program's assessment processes and procedures can be reinforced and reinvigorated as new courses and pedagogical approaches are being considered.

Scope

The report is limited to the Biology BS program at Ferris State University. The primary emphasis of this report is placed upon the courses and assessment processes of that program. There is some unavoidable overlap with the Biology BA, Biotechnology BS, and General Education programs. However, the outcomes and assessment processes involved in these other programs are not dealt with in this report.

Approach

This project proceeded through four main phases. In the first, the assessment plan for the Biology BS program's plan was examined and critiqued. This included the location and review the of the program outcomes, course curriculum map, and overall instrument selection. In phase two, any program assessment activity since our last program review (2010) were analyzed, and evaluated. In the third phase, the current attitudes of Biology faculty toward the assessment of student learning were measured. The final phase (reporting) is the dissemination of these findings with the members of the Biology department. Strengths and opportunities for improvement have been identified and specific changes will be proposed to address any perceived deficiencies.

Detailed observations

1. Status of assessment plan

The first section of this report describes the current state of the assessment plan in the Biology BS program. The emphasis here is on the structure and balance of the proposed assessment process.

1.1. Program outcomes

The program learning outcomes were easily found both on the Biology shared drive and in the TracDat database. The five program outcomes are listed in the curriculum map provided in appendix A. The first four of these learning outcomes can be considered to be

SMART – simple, measurable, attainable, resource-limited, and time-limited (Doran, 1981). "Outcome 5" is actually more appropriately termed a program goal. As such, it should be eliminated from the curriculum map. The remaining four learning outcomes span a range of student abilities and lend themselves to a variety of assessment measures. This offers an excellent opportunity for obtaining a robust measure of student learning in the program.

1.2. Curriculum map

The program curriculum map was also easily found both on the Biology shared drive and in the TracDat database. The map indicates where each outcome will be introduced, reinforced, or mastered in the curriculum. In addition, multiple assessment points for each outcome are also shown. The only deficiency is that BIOL206 is no longer offered in the program. This course should be eliminated or replaced in the map.

1.3. Course objectives

The course learning objectives were very difficult to locate and verify. In theory, all courses at Ferris should have an assessment plan (form E). In practice, however, many courses were "grandfathered" into the system when Ferris switched from quarters to semesters nearly 20 years ago. As a consequence, only 18 out of 51 Biology courses (35.3%) currently have form Es (see appendix B).

When the university initiated TracDat five years ago, the provost offered departments a financial incentive to create CATs (course assessment techniques). These documents were supposed to be a substitute for form Es. Unfortunately, these were not universally adopted – only 18 out of 51 courses (35.3%) have CATs. Taken together, 31 out of 51 Biology courses (60.8%) have either a form E or a CAT. In addition, only 9 out of the 14 courses from the curriculum map (64.3%) have either a form E or a CAT (see appendix B).

Most of the remaining courses (39.2%) list their learning objectives only in their syllabi. The syllabi for all 51 courses were, with great difficulty, obtained. Unfortunately, there does not seem to be one coherent repository (or naming convention) for these documents. Once located , the syllabi were examined to identify all learning objectives. Distressingly, many times the syllabus objectives differed from the documented objectives for courses that possessed either form Es or CATs.

The learning objectives were next classified as either lower-ordered thinking (remembering, understanding, or applying) or higher-ordered thinking (analyzing, evaluating, or creating) using a common classification scheme (Anderson & Krathwohl, 2001). It might be expected that lower division courses (100- and 200-level) would tend to emphasize lower-ordered reasoning in their objectives while upper division (300- and 400-level) would focus upon higher ordered reasoning. This, however, does not seem to be the case in the Biology program. Both lower and upper division courses had an average of 4.1 total learning objectives. This is a very reasonable number. Likewise, both lower and upper division courses had an average of 2.4 objectives that required only a low-ordered thinking skills. Objectives requiring higher ordered thinking were less common – an average of 1.8 and 1.6 objectives per course for lower division courses and upper division courses, respectively.

1.4. Assessment instruments

The course syllabi were also examined to determine what sorts of assessment instruments were being used to measure student learning. Focus group discussions were also held with faculty from the General Biology, Microbiology, Anatomy and Physiology, Field Biology, and Molecular Biology faculty. In these groups, we discussed how each of the course objectives were measured and how these objectives align with the program outcomes.

The most common form of assessment measure used was exams (which includes quizzes). Less common were student products (papers) and performances (laboratory procedures). Upper division courses were less reliant upon exams than lower division courses (see figure 1).

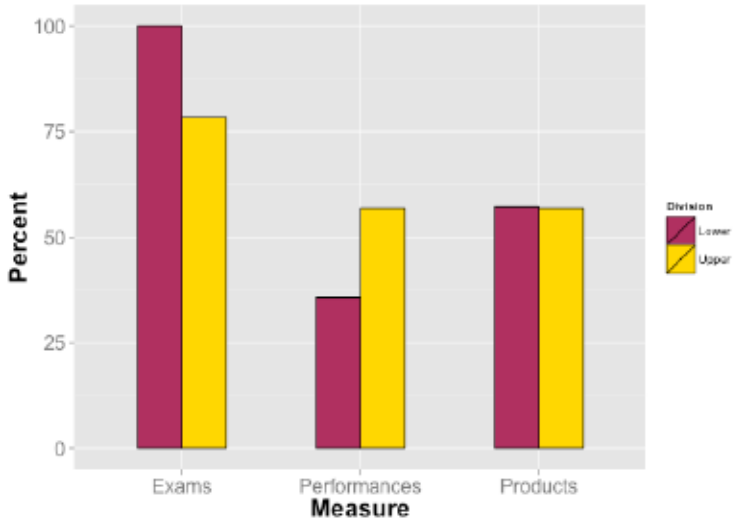

Figure 1 - Frequency of assessment measures used, by type.

This distribution, though, can be a little misleading. An examination of the course syllabi reveals that the distribution of assignments and course credit does not follow the same pattern as the objectives. On average, approximately 90% of all course points and assessments were completed using quizzes or exams. Moreover, the vast majority of these instruments were used to collect student learning data related only to program learning outcome number one. It is natural for biologists to emphasize the subject matter in their courses. However, more emphasis need to be place on the skills defined by program outcomes two an three.

1.5. External assessments

The ETS Biology field test has been used as an external measure of program effectiveness. This test was given to freshman and senior students for a period of four years. The results have been analyzed and recorded in TracDat. A marked improvement in scores was seen between the freshman and seniors. In addition, the senior cohort outperformed the national norms in all but the Botany section of the test.

2. Discernable assessment activities

The second section of this report describes the current state of the assessment process in the Biology BS program. The emphasis here is upon how assessment actually takes place in the program. The first attempt – based upon looking in TracDat for assessment activity – was unsuccessful. There is only assessment data recorded for five Biology courses in the past five years. In addition, the result reported only addressed three of the four true

program learning outcomes (1, 2, and 4). The second, and more time-consuming, attempt was to obtain this information by interviewing faculty in focus groups.

2.1. Collecting assessment data

Assessment data collection is very individualistic in the program. All faculty are collecting a variety of assessment data. The most common types of data were (in decreasing order of frequency) scores and exam or quiz questions that had been mapped to learning objectives, observations of laboratory procedures, student papers, and research experiences. These data were collected and maintained on the instructor's computers. Most commonly, these were a series of Excel spreadsheets of scores.

2.2. Analyzing assessment data

The analysis of assessment data in the program is quite idiosyncratic. Once again, any course-level program assessment is currently managed by individual faculty members. Many people are tracking student performance and breaking out scores by academic program, laboratory section number, incoming ACT scores or other parameters. On the other hand, others are simply calculating the average score on assessment items. Effect sizes, statistical significance, and trends over time are rarely addressed.

2.3. Reporting assessment findings

The systematic reporting of assessment findings is episodic (at best). There seems to have been a short flurry of activity near the time of the last accreditation visit. Since that time, however, very little assessment data has been entered into the Biology share drive or the TracDat database. A total of 14 entries have been made over the past five years for the entire program.

2.4. Using assessment findings

Faculty discussions of student performance in the program remain anecdotal today. In the absence of systematic reporting, the faculty use their "gut instincts" when proposing curricular changes and predicting the consequent results. Furthermore, there is not currently a regularly scheduled meeting to specifically address assessment findings. Instead, these discussions are usually informal and tangential to other topics in hallway meetings.

3. Faculty attitudes concerning assessment

The last section of this report describes the current state of the assessment attitudes in the Biology BS program. The emphasis here is upon the faculty view assessment and how motivated they are to improve its implementation in the future.

For this portion of the report, a 10-question online survey was created for all of our tenured and tenure track faculty (questions are listed below). This instrument was designed to conform to the expectancy-value theory of academic motivation (Eccles, 1983). Eccles proposed that the motivation to complete an academic task is affected by

three parameters: expectancy, value, and cost. She arranged these into a mathematical formula (formula 1 below).

1. Motivation = (Expectancy × Value) − Cost
2. Motivation = (Expectancy × Value × **Trust**) − Cost

Expectancy is the belief that a task is "doable". This is, how well prepared the faculty feel they are to successfully achieve the task if undertaken. The value of a task has several components. Intrinsic value is an indication of how much enjoyment or interest the faculty have with regard to the task. Attainment value is related to how important performing the task is to the faculty member's sense of professional self. Finally, utility value indicates the usefulness of the task to achieving some other purpose. To increase motivation, both expectancy and value should be maximized. The last parameter is cost (how difficult to expensive as task is to perform). To maximize motivation, cost needs to be minimized.

I believe that a fourth parameter should be considered when dealing with motivation to perform student assessment: trust. The faculty need to believe that any assessment data collected will be properly used by others. They need to know that they will not be punished for less-than-optimal findings. This factor is included in formula 2 above.

A total of 20 out of 22 tenured and tenure track faculty (90.9% response rate) completed this survey. The results are shown in figure 2.

Survey questions:

1. I can write effective learning objectives for my courses. [expectancy]
2. I have received adequate training in assessing student learning. [expectancy]
3. I am confident of my ability to accurately assess student learning. [expectancy]
4. Assessment of student learning is an important part of my job as a faculty member. [attainment value]
5. The data obtained from assessing student work helps me to improve my course. [utility value]
6. The data obtained from assessing student work helps students to learn better in my course. [utility value]
7. I enjoy investigating student learning using course assessment. [intrinsic value]
8. Assessing student work does not take too much of my time. [cost]
9. I am comfortable sharing my assessment data with others. [trust]
10. I am confident that my assessment data will be properly interpreted and used by others. [trust]

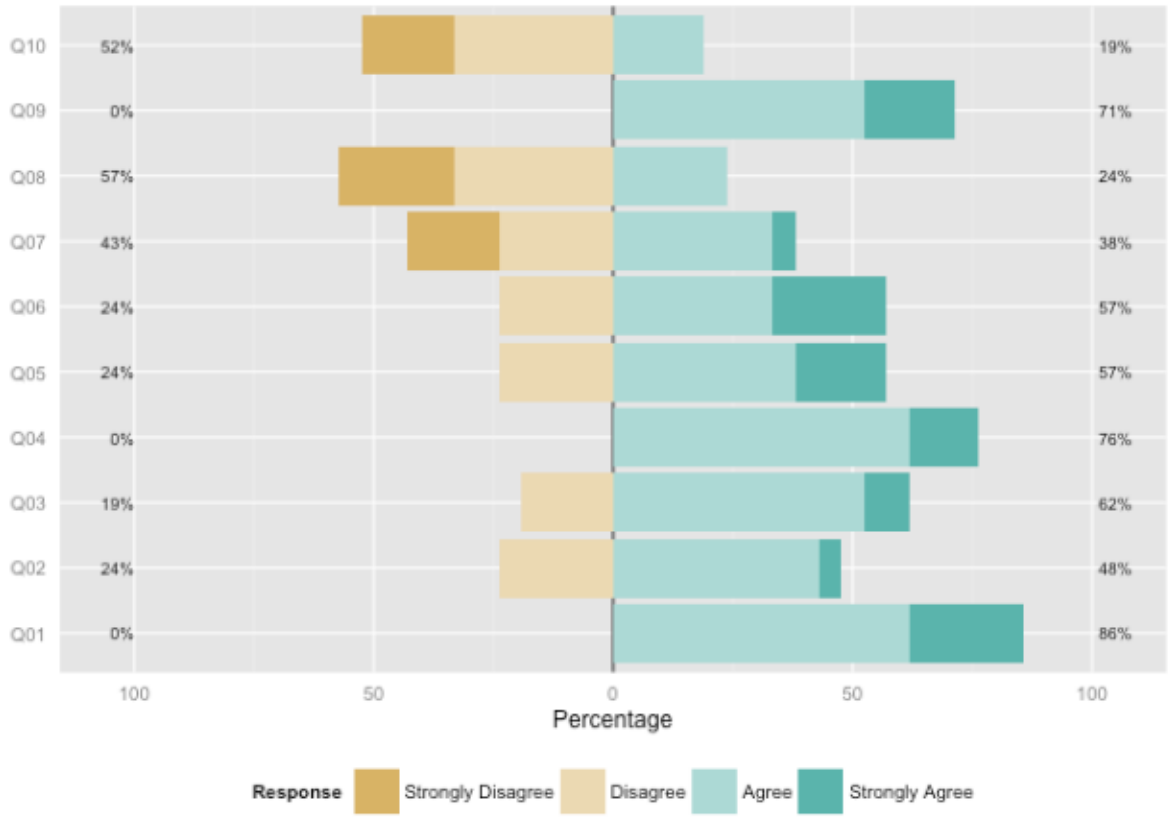

Figure 2 - Survey results of faculty attitudes concerning assessment.

3.1. Expectancy

Faculty beliefs about their ability to successfully conduct assessments of student learning are addressed by survey questions 1, 2, and 3. The faculty believe that they are able to write effective outcomes. However, the survey respondents reported a little doubt about their level of training in assessment and their ability to accurately assess student outcomes. This indicates that future departmental assessment workshops could be helpful.

3.2. Value

Different aspects of the perceived value of assessment were addressed by questions 4, 5, 6, and 7. The faculty ascribed to the attainment value of assessment at the highest rate. The utility value of both formative and summative assessment was the next highest rated aspect. The lowest (but still acceptable) scores were for intrinsic value. These findings were somewhat surprising. It is widely perceived that a key factor limiting the success of current assessment efforts is that faculty do not value the process. These results indicate that the problem likely lies elsewhere.

3.3. Cost

Question 8 deals with the perceived costs of assessment. This question garnered the most negative responses of the survey. This result suggests that the program might benefit from standardizing and automating some of the assessment processes. If the process of analyzing and reporting assessment results could be made easier, more faculty would probably participate.

3.4. Trust

The final two questions dealt with trust issues. The faculty report that they are comfortable in sharing their findings with others. However, there is still a widespread skepticism that those findings will be properly used by others. This distrust absolutely poisons the culture of assessment on our campus.

The results of this survey seem to indicate that the two best ways to improve faculty assessment efforts are to make the process easier to implement (decrease cost) and make the process of data use by others more transparent (increase trust).

Summary of findings

Below is a brief synopsis of the findings of this report.

Strengths of the program

- The program's assessment plan is very good. The learning outcomes are very good and the curriculum map is clear and concise.
- There are good processes of data collection in place. Most of the course-level data that is needed for program improvement is already present. I just isn't disseminated.
- There are many examples of exemplary analysis by program faculty.
- The faculty highly value assessment and are confident that they can successfully use assessment to improve the program.

Weaknesses (opportunities) of the program

- The reporting of assessment data is nearly completely absent. This is a serious problem (and is one that affects many other programs in the College of Arts and Sciences). This will need to be addressed immediately.
- The processes of data analysis and reporting are not standardized or automated. This places additional burdens upon the faculty and contributes to the poor record of reporting.
- There is currently no formal process for closing the assessment loop in the program.
- Some of the faculty report that there is not enough assessment training on campus.
- There is still a widespread lack of trust in how assessment data will be used by the administration. Until that is resolved, the collection of valid and reliable assessment data will be hindered on our campus.

Recommendations

- Begin by recognizing and using the wealth of assessment data that is already available in the program.
- Make a few specific changes to the assessment plan.
  - Remove outcome 5 – it is a goal and not a learning outcome.
  - Replace BIOL206 in the curriculum map – the course is no longer offered.
  - Systematically update form Es for all Biology courses.
  - Create a common repository for all current course syllabi.
  - Increase assessment of student products and performances.
- Make work is needed to improve the assessment process.
  - Standardize and automate entry of assessment data into TracDat. This should involve the creation of standard scoring rubrics for each learning outcome. The use of standard Excel spreadsheets for these rubrics would further simplify the process of obtaining courses assessment results.
  - Designate an assessment coordinator for the program. This person would be responsible for ensuring that results are making it into TracDat in a timely manner. They should also be a resource to help other faculty with data analysis and reporting.
  - Establish one department meeting per year that is dedicated to the analysis and discussion of programmatic assessment data.
- Set up some faculty workshops to facilitate assessment training and instrument development.
- Begin discussing policies to clearly describe how assessment results will be used at Ferris.

Despite many years of effort, this program's assessment structure is still developing. Most of the pieces are in place. They simply have not been effectively disseminated and used in a systematic way. Much of the hindrance is cultural (and that will take a while to overcome). The best path forward is to slowly improve the assessment process by assimilating the data that already exists. Creating ownership by appointing a coordinator would be a good first step. That individual could them simplify reporting by using the "assignment" feature of TracDat.

Literature cited

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Appendix A: Curriculum map

Required Biology courses for the **BS in Biology**			**BIOL 121** General Biology 1	**BIOL 122** General Biology 2	**BIOL 205 (a)** Human Anatomy and Physiology	**BIOL 206 (a)** Advanced Human Physiology	**BIOL 218 (b)** Microbial Ecology	**BIOL 286 (b)** General Microbiology	**BIOL 321 (a)** Human Physiology and Anatomy 1	**BIOL 322 (a)** Human Physiology and Anatomy 2	**BIOL 346 (c)** Ecological Applications	**BIOL 347 (c)** Environmental Conservation	**BIOL 353 (a)** Plant Physiology	**BIOL 375** Principles of Genetics	**BIOL 386 (b)** Microbiology and Immunology	**BIOL 442 (c)** Ecology	**BIOL460** Current Topics in Biology
Program Outcome 1	Graduates of the BS biology program will demonstrate a solid foundation of knowledge in the major disciplines of biology.	Syllabus	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Imp
		Level (*Cell Bio*)	I	I	R	R	R	R	R	M	–	–	R	R	M	–	M
		Level (*Mol Gen*)	–	I	–	–	R	R	–	–	–	–	–	M	R	–	M
		Level (*Org Biol*)	I	I	R	M	R	–	R	M	M	M	M	–	–	M	M
		Level (*Evo Eco*)	I	–	–	–	R	R	–	–	M	M	R	R	R	M	M
		Assessed	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Program Outcome 2	Graduates of the BS biology program will evaluate, analyze, and synthesize information from scientific literature.	Syllabus	–	–	Exp	–	Exp	Exp	–	–	Imp	Exp	Imp	–	Exp	Imp	Exp
		Level	–	–	I	–	I	R	?	?	R	R	R	–	R	R	M
		Assessed	–	–	A	–	A	A	–	–	A	A	A	–	A	A	A
Program Outcome 3	Graduates of the BS biology program will formulate hypotheses, make careful observations, analyze data, and draw conclusions.	Syllabus	Exp	Exp	Exp	–	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp
		Level	I	I	R	–	R	R	R	R	M	M	R	?	R	M	M
		Assessed	A	A	A	–	A	A	A	A	A	A	A	A	A	A	A
Program Outcome 4	Graduates of the BS biology program will be proficient in laboratory and field techniques appropriate for their discipline.	Syllabus	Exp	Exp	Exp	–	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	–
		Level	I	I	I	–	R	R	R	R	M	M	M	?	M	M	–
		Assessed	A	A	A	–	A	A	A	A	A	A	A	A	A	A	–
Program Outcome 5	Graduates of the BS biology program will be prepared for successful entry into graduate school, professional school, or a position related to the discipline.	Syllabus	Imp	Imp	Imp	Exp	Imp	Imp	Imp	Imp	Imp	Imp	Imp	Imp	Imp	Imp	Imp
		Level	I	I	I	R	R	R	R	R	R	R	R	R	R	R	R
		Assessed	–	–	–	–	–	–	–	–	–	–	–	–	–	–	A?

a) - Depending upon their track, students may elect to take either BIOL 205, BIOL205 and BIOL206, BIOL 231 and BIOL 232, or BIOL 353 to satisfy the physiology content area.

b) - Depending upon their track, students may elect to take BIOL 218, BIOL 286, or BIOL 386 to satisfy the microbiology content area.

c) - Depending upon their track, students may elect to take BIOL346, BIOL 347, or BIOL 442 to satisfy the ecology content area.

Syllabus: The program outcome is either explicity stated (Exp) or implied (Imp) in the course syllabus.

Level: Course materials either introduce (I), reinforce (R), or lead to mastery (M) of the program outcome.
The levels for outcome one are sub-divided into Cell Biology, Molecular Biology/Genetics, Organismal Biology, and Population Biology/Evolution/Ecology as defined by the Biology Major Field Test from ETS.

Assessed: Coursework is analyzed to assess the progress toward the program outcome (A); assessment information is collected for TracDat (T)

APPENDIX B: Program assessment

Course	Name	Form.E.Located	CAT.Located	Syllabus.Located	Total.Objetives	LOL.Objectives	HOL.Objectives	Mapped.Course	Examinations	Products	Performances	TracDat.Data.Present
BIOL 101	Genetics: Human Aspects	N	Y	Y	5	1	4	N	Y	Y	Y	N
BIOL 103	Biological Concepts	Y	N	Y	0	0	0	N	Y	N	N	N
BIOL 108	Medical Microbiology	N	Y	Y	12	6	6	N	Y	Y	Y	Y
BIOL 109	Basic Human Anatomy/Physiology	N	N	Y	8	6	2	N	Y	Y	N	N
BIOL 111	Environmental Biology	N	Y	Y	0	0	0	N	Y	N	N	N
BIOL 114	Biology and Maintenance of Turfgrass	N	N	Y	6	5	1	N	Y	N	N	N
BIOL 116	Nature Study	N	N	Y	0	0	0	N	Y	N	N	N
BIOL 121	General Biology 1	N	Y	Y	4	3	1	Y	Y	N	N	Y
BIOL 122	General Biology 2	N	Y	Y	4	3	1	Y	Y	N	N	Y
BIOL 205	Human Anatomy/Physiology	N	Y	Y	6	3	3	Y	Y	Y	Y	N
BIOL 207	Forensic Biology	Y	N	Y	0	0	0	N	Y	Y	N	N
BIOL 218	Microbial Ecology	N	N	Y	4	2	2	Y	Y	Y	Y	N
BIOL 280	Applied Fermentation	Y	Y	N	0	0	0	N	Y	Y	Y	N
BIOL 286	General Microbiology	N	N	Y	9	4	5	Y	Y	Y	N	Y
BIOL 300	Pathophysiology	N	N	Y	3	3	0	N	Y	N	N	N
BIOL 301	Exercise Physiology	N	N	Y	0	0	0	N	Y	Y	N	N
BIOL 310	Nutrition	Y	N	Y	3	3	0	N	N	Y	N	N
BIOL 321	Human Physiology/Anatomy 1	Y	Y	Y	4	3	1	Y	Y	N	Y	N
BIOL 322	Human Physiology/Anatomy 2	Y	Y	Y	4	3	1	Y	Y	N	Y	N
BIOL 330	Zoology	Y	N	Y	5	3	2	N	Y	N	Y	N
BIOL 340	Evolution	N	Y	Y	3	1	2	N	Y	Y	N	N
BIOL 343	Ornithology	N	N	Y	3	3	0	N	Y	Y	Y	N
BIOL 344	Entomology	N	N	Y	4	2	2	N	Y	Y	N	N
BIOL 345	Environmental Regulations	Y	N	Y	6	6	0	N	N	Y	Y	N
BIOL 346	Ecological Assessment	Y	N	Y	20	5	15	Y	N	Y	Y	N
BIOL 347	Environmental Conservation	N	N	Y	3	1	2	Y	Y	N	Y	N
BIOL 348	Animal Behavior	Y	Y	Y	3	2	1	N	Y	N	N	N
BIOL 349	Medical Parasitology	N	N	Y	5	5	0	N	Y	N	Y	N
BIOL 350	Plants and Fungi	N	N	Y	4	2	2	N	Y	Y	Y	N
BIOL 370	Developmental Biology	N	Y	Y	4	4	0	N	Y	N	N	N
BIOL 373	Cell Biology	N	N	Y	3	3	0	N	Y	N	N	N
BIOL 375	Principles of Genetics	N	Y	Y	2	2	0	Y	Y	Y	N	Y
BIOL 386	Microbiology and Immunology	N	N	Y	7	5	2	Y	Y	N	Y	N

APPENDIX B: Program assessment

Course	Name	Form.E.Located	CAT.Located	Syllabus.Located	Total.Objetives	LOL.Objectives	HOL.Objectives	Mapped.Course	Examinations	Products	Performances	TracDat.Data.Present
BIOL 407	Forensic DNA Analysis	Y	Y	Y	5	4	1	N	Y	N	Y	N
BIOL 421	Endocrinology	N	Y	Y	3	3	0	N	Y	Y	N	N
BIOL 423	Neurobiology	Y	N	Y	5	3	2	N	Y	Y	N	N
BIOL 438	Microbiology and Immunology for Optometry	Y	N	Y	7	4	3	N	Y	N	N	N
BIOL 442	Ecology	N	N	Y	0	0	0	Y	Y	N	N	N
BIOL 453	Plant Physiology	N	Y	Y	5	4	1	Y	Y	N	Y	N
BIOL 460	Current Topics in Biology	N	Y	Y	3	0	3	Y	N	Y	Y	N
BIOL 470	Molecular Genetics	N	N	Y	0	0	0	N	Y	N	N	N
BIOL 471	Recombinant DNA Lab	N	Y	Y	5	2	3	N	Y	Y	Y	N
BIOL 472	Proteins	N	N	Y	6	3	3	N	Y	Y	Y	N
BIOL 473	Proteins Laboratory	N	N	Y	5	1	4	N	N	Y	Y	N
BIOL 474	Advanced Cell/Molecular Biology	N	N	Y	0	0	0	N	Y	N	N	N
BIOL 475	Bioinformatics	Y	N	Y	5	3	2	N	Y	Y	N	N
BIOL 476	Advanced Techniques in Biotechnology	Y	N	Y	10	3	7	N	Y	Y	Y	N
BIOL 485	Biological Research	Y	N	N	0	0	0	N	N	Y	Y	N
BIOL 490	Special Topics in Biology	Y	N	Y	6	4	2	N	Y	Y	Y	N
BIOL 491	Biotechnology Internship	N	N	N	0	0	0	N	N	Y	Y	N
BIOL 492	Biology Internship	Y	N	N	0	0	0	N	N	Y	Y	N
51	Column totals ("Y")	18	18	47				14	43	29	26	5
		31	with either CAT or form E					9	with CAT or form E			
	Mean Lower				4.1	2.4	1.8					
	Mean Upper				4.1	2.4	1.6					
	Median Lower				4.0	2.5	1.0					
	Median Upper				4.0	3.0	1.0					
							LOWER DIV	100.0%	57.1%	35.7%		
							UPPER DIV	78.4%	56.8%	56.8%		

Source: Labor Insight Jobs (Burning Glass Technologies)

Is there strong demand for your selected jobs?

Aug. 01, 2014 - Jul. 31, 2015 (Data not available after Aug. 09, 2015)

Active Selections

Last 12 months AND (State : Michigan) AND (((Education : Bachelor's degree (specified)) AND (Program of study : Biology/Biological Sciences, General (specified))) AND (Experience : 0 to 2 years))

What is the demand for these jobs?

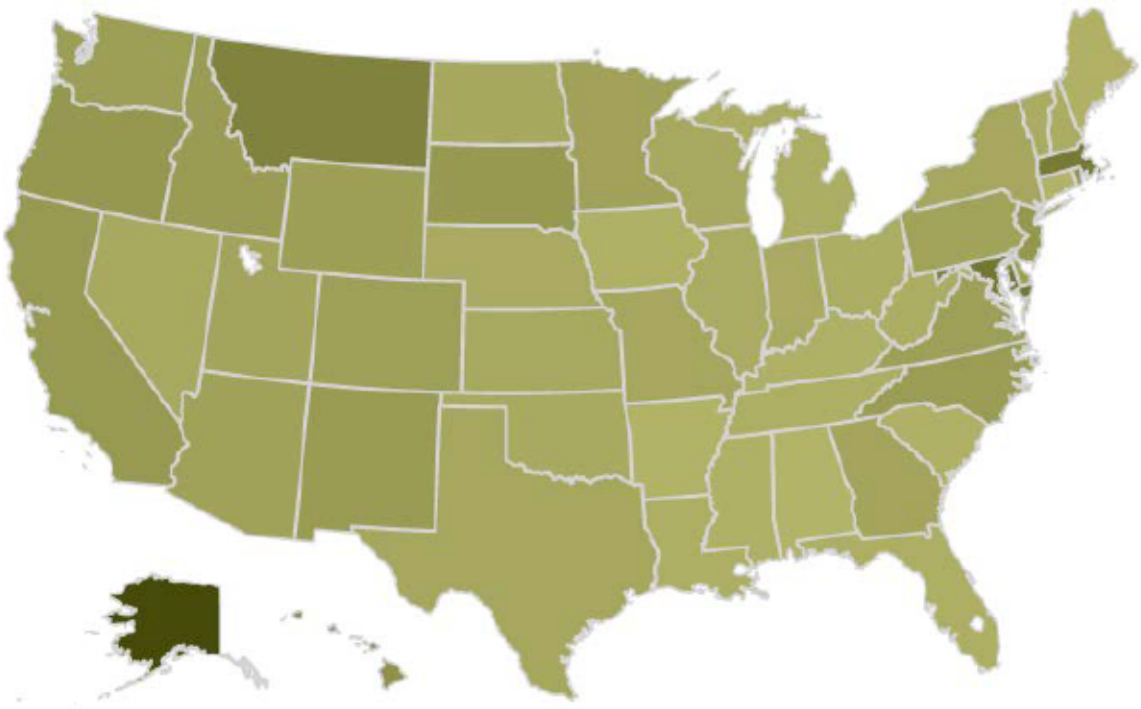
208 Job postings in the last 12 months

Is there a strong concentration of jobs in my area?

Local area demand is calculated relative to national demand.

Demand for these jobs **Lower demand than average**

What are the top locations for these jobs?



Top hiring regions

State	Job Postings	Job Postings per 10,000 people employed, last 12 months	Growth in demand
Wisconsin	179	0.66	Lower demand than average
Florida	351	0.46	Much lower demand than average
Georgia	302	0.76	Average demand
Hawaii	88	1.44	Much higher demand than average
Nebraska	56	0.59	Lower demand than average
Mississippi	40	0.37	Much lower demand than average
Montana	87	1.96	Much higher demand than average
Nevada	76	0.64	Lower demand than average
Connecticut	49	0.3	Much lower demand than average

South Dakota	48	1.17	Higher demand than average
Oklahoma	99	0.63	Lower demand than average
Colorado	226	0.95	Average demand
Indiana	170	0.59	Lower demand than average
Kansas	90	0.66	Lower demand than average
North Carolina	430	1.07	Higher demand than average
Maryland	612	2.39	Much higher demand than average
Ohio	263	0.51	Much lower demand than average
Idaho	68	1.08	Higher demand than average
Minnesota	237	0.87	Average demand
Utah	100	0.78	Average demand
Vermont	17	0.56	Lower demand than average
Alaska	126	3.88	Much higher demand than average
North Dakota	30	0.68	Average demand
Delaware	42	0.99	Average demand
Maine	21	0.36	Much lower demand than average
New Mexico	87	1.1	Higher demand than average
Michigan	208	0.51	Lower demand than average
New Jersey	484	1.25	Higher demand than average
Missouri	185	0.69	Average demand
Iowa	59	0.39	Much lower demand than average
New Hampshire	33	0.53	Lower demand than average
Pennsylvania	487	0.86	Average demand
Illinois	319	0.55	Lower demand than average
Louisiana	84	0.44	Much lower demand than average
Arkansas	37	0.32	Much lower demand than average
South Carolina	70	0.37	Much lower demand than average
Virginia	347	0.95	Average demand
Kentucky	66	0.37	Much lower demand than average
Massachusetts	751	2.26	Much higher demand than average
Tennessee	123	0.45	Much lower demand than average
Washington	291	1	Average demand

District of Columbia	191	2.83	Much higher demand than average
Wyoming	27	0.96	Average demand
Alabama	51	0.27	Much lower demand than average
Texas	772	0.69	Average demand
Arizona	222	0.88	Average demand
California	1,749	1.16	Higher demand than average
New York	612	0.69	Average demand
Oregon	207	1.23	Higher demand than average
Rhode Island	69	1.49	Much higher demand than average
West Virginia	34	0.48	Much lower demand than average

Change in employment between 2013-2014 for the top occupations in this set of postings

Occupations	Local area change	National change
Chemical Technicians	7%	0%
Life, Physical, and Social Science Technicians, All Other	118%	8%
Medical and Clinical Laboratory Technicians	-2%	2%
Medical and Clinical Laboratory Technologists	-4%	-1%
Zoologists and Wildlife Biologists	4%	2%

Source: Labor Insight Jobs (Burning Glass Technologies)

Skill clusters in demand

Aug. 01, 2014 - Jul. 31, 2015
There are 208 postings available with the current filters applied.
There are 19 unspecified or unclassified postings.

Active Selections

Last 12 months AND (State : Michigan) AND (((Education : Bachelor's degree (specified)) AND (Program of study : Biology/Biological Sciences, General (specified))) AND (Experience : 0 to 2 years))

Skill Cluster	Job Postings
Common Skills: Communication and Coordination	126
Common Skills: Problem Solving	90
Common Skills: Business Environment Skills	86
Common Skills: Project and Process Flow Skills	69
Sciences: Biology	63
Sciences: General	61
Health: Basic Patient Care	49
Sciences: Chemistry	48
Health: Medical Specialties	39
Sciences: Biotech	39
Customer Service: Basic Assistance	31
Green: Natural Resource Conservation	28
Green: Research and Development	27
Health: Advanced Patient Care	27
Sciences: Physics	26
Admin Support: General	24
Green: Pollution Reduction, Removal, and Remediation	23
Common Skills: Language	19
Health: Research	18
IT: Databases and Data Warehousing	17
Business: Process and Planning	15
Sales: General	14
IT: Support	13
Health: Mental/Behavioral	13
Engineering: Environmental	13
IT: Business Intelligence	13
Research: Quantitative	11
Customer Service: Basic Assistance: Health and Insurance	11
Supply Chain and Logistics: General	10
Health: Surgical	10
Green: Green Research	10
Green: Environmental Regulation and Enforcement	10
HR: Employee Training	9

Finance: Investment Strategy/Financial Advisement: Investment Planning	8
Marketing: General	8
Health: Therapy	8
Food Service: Food Safety	8
Advanced Manufacturing: Process Improvement	7
Defense: Intelligence	7
Sciences: Biotech: Research	6
Legal: General	6
Product Design and Development	6
Customer Service: Billing and Account Related Tasks	6
IT: Software Testing and Qa	6
Health: Diagnostic Specialties	5
Management: Process Improvement	5
Repair: General	5
Health: Informatics	5
HR: Organizational and Employee Development	5
Engineering: Chemical	4
Engineering: General	3
Green: Environmental Promotion and Advocacy: General	3
Arts: Writing: Technical	3
IT: Network Administration and Security	3
Green: Renewable Energy: General	3
Sales: Technical	3
Finance: Accounting, Bookkeeping, and Tax Preparation: Tax Preparation and Advice	3
Finance: Financial Compliance and Risk Management: Auditing and Monitoring	3
Finance: Accounting, Bookkeeping, and Tax Preparation: Accounting	3
HR: Legal Compliance	2
HR: Employee Benefits and Compensation	2
IT: Web Design and Technologies	2
Green: Energy Efficiency	2
Data Mining: General	2
Sciences: Biotech: Clinical Trials	2
Physical Abilities: General	2
IT: Programming, Development, and Engineering	2
Research: Market Research	2
Construction: Plumbing	1
Customer Service: Basic Assistance: Technical and Electronic	1
Green: Environmental Promotion and Advocacy: Education and Training	1
Research: Program Development and Evaluation	1

Management: Program Development and Evaluation	1
Advanced Manufacturing: General	1
Health: Pharmacy	1
Digital Media and Design: Visual and Graphic Design	1
Construction: Carpentry	1
Construction: General	1
Engineering: Architectural	1
Education: General	1
Customer Service: Sales	1
Sciences: Social	1
Research: Qualitative	1

Source: Labor Insight Jobs (Burning Glass Technologies)

Summary demand and requirements table by occupation

This report provides information on both the preferred and minimum/required education levels for job postings. For this reason, a job posting may be counted in more than one of the educational categories shown in the table below. Please also note that Bureau of Labor Statistics (BLS) data is only available at the 6-digit SOC code level.

Aug. 01, 2014 - Jul. 31, 2015

There are 208 postings available with the current filters applied.

Active Selections

Last 12 months AND Nationwide AND (((Education : Bachelor's degree (specified)) AND (Program of study : Biology/Biological Sciences, General (specified))) AND (Experience : 0 to 2 years))

Category:		Demand and Employment				Salary		Education level based on posting requirements (*excluding NA)					Education level of employed individuals		
Source:		Burning Glass	BLS/OES, 2014			Burning Glass	BLS/OES, 2014	Burning Glass					ACS, 2011		
SOC Code(ONET-6)	Occupation Title	Number of Job Postings	Number Employed	% Change in Employment, 2013-2014	Projected Statewide Change in Employment, 2010-2020	Mean Advertised Salary	Mean Salary	% Requiring high school*	% Requiring Post-Secondary or Associate's Degree*	% Requiring Bachelor's Degree*	% Requiring Graduate or Professional Degree*	% with Unspecified Education	% with a high school diploma or less	% with Some College or an Associate's	% with a Bachelor's or higher
19-4099	Life, Physical, and Social Science Technicians, All Other	22	5,480	118%	11.7%	$41,143	$33,020	5%	0%	100%	0%	0%	N/A	N/A	N/A
29-2012	Medical and Clinical Laboratory Technicians	19	6,310	-2%	4.1%	N/A	$35,830	32%	32%	100%	5%	0%	13%	36%	51%
19-4031	Chemical Technicians	13	2,600	6%	2.4%	N/A	$41,990	0%	100%	100%	0%	0%	27%	42%	30%
19-1023	Zoologists and Wildlife Biologists	11	240	4%	N/A	N/A	$66,490	0%	0%	100%	45%	0%	0%	4%	96%
29-2011	Medical and Clinical Laboratory Technologists	10	6,740	-3%	2.3%	N/A	$56,480	0%	0%	100%	0%	0%	13%	36%	51%
31-9097	Phlebotomists	10	2,420	-7%	N/A	N/A	$28,470	100%	0%	100%	0%	0%	24%	67%	9%
19-1022	Microbiologists	9	280	100%	8.3%	N/A	$60,620	0%	0%	100%	44%	0%	0%	4%	96%
29-2099	Health Technologists and Technicians, All Other	9	2,940	-1%	N/A	N/A	$43,040	11%	22%	100%	0%	0%	24%	50%	27%
19-2031	Chemists	8	3,330	-4%	2.2%	N/A	$81,130	0%	0%	100%	63%	0%	0%	8%	92%
19-4021	Biological Technicians	8	770	-71%	17.3%	N/A	$37,530	N/A	N/A	N/A	N/A	13%	23%	32%	45%
51-1011	First-Line Supervisors of Production and Operating Workers	7	25,490	4%	-0.1%	N/A	$59,580	43%	14%	100%	0%	0%	51%	34%	15%
19-1042	Medical Scientists, Except Epidemiologists	6	2,080	18%	30.5%	N/A	$67,430	N/A	N/A	N/A	N/A	17%	0%	16%	84%
29-1141	Registered Nurses	6	90,340	-1%	N/A	N/A	$67,180	N/A	N/A	N/A	N/A	17%	1%	44%	55%
11-3051	Industrial Production Managers	5	10,770	-5%	8.6%	N/A	$105,300	N/A	N/A	N/A	N/A	20%	26%	31%	43%
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	5	53,060	-3%	6.4%	N/A	$63,160	N/A	N/A	N/A	N/A	20%	22%	33%	45%
11-1021	General and Operations Managers	4	59,390	5%	-1%	N/A	$108,830	N/A	N/A	N/A	N/A	25%	19%	34%	47%
15-2041	Statisticians	4	490	19%	10.2%	N/A	$82,020	N/A	N/A	N/A	N/A	25%	N/A	N/A	N/A
17-2031	Biomedical Engineers	3	300	50%	54%	N/A	$75,190	N/A	N/A	N/A	N/A	33%	N/A	N/A	N/A
29-9011	Occupational Health and Safety Specialists	3	1,190	21%	6.7%	N/A	$67,830	N/A	N/A	N/A	N/A	33%	N/A	N/A	N/A
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	3	7,830	-12%	9.9%	N/A	$83,060	N/A	N/A	N/A	N/A	33%	22%	33%	45%
11-9111	Medical and Health Services Managers	2	11,770	0%	13.8%	N/A	$97,870	N/A	N/A	N/A	N/A	50%	12%	30%	58%
11-9121	Natural Sciences Managers	2	990	10%	4.8%	N/A	$102,440	N/A	N/A	N/A	N/A	50%	3%	10%	87%
15-1132	Software Developers, Applications	2	14,960	2%	23.5%	N/A	$81,860	N/A	N/A	N/A	N/A	50%	3%	15%	82%
17-2112	Industrial Engineers	2	22,390	-8%	10.3%	N/A	$80,040	N/A	N/A	N/A	N/A	50%	6%	22%	73%
17-2141	Mechanical Engineers	2	38,700	18%	9.8%	N/A	$88,730	N/A	N/A	N/A	N/A	50%	4%	24%	71%
19-1031	Conservation Scientists	2	370	-7%	8.1%	N/A	$60,770	N/A	N/A	N/A	N/A	50%	0%	16%	84%
29-2031	Cardiovascular Technologists and Technicians	2	2,030	-15%	22.2%	N/A	$51,940	N/A	N/A	N/A	N/A	50%	10%	67%	23%
41-2031	Retail Salespersons	2	141,610	2%	7.9%	N/A	$24,770	N/A	N/A	N/A	N/A	50%	38%	44%	19%
43-6011	Executive Secretaries and Executive Administrative Assistants	2	12,870	-18%	7.5%	N/A	$50,320	N/A	N/A	N/A	N/A	50%	33%	49%	19%
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	2	48,610	8%	-0.3%	N/A	$33,850	N/A	N/A	N/A	N/A	50%	33%	49%	19%
11-9051	Food Service Managers	1	5,870	8%	-5.2%	N/A	$50,540	N/A	N/A	N/A	N/A	100%	41%	38%	21%
13-1041	Compliance Officers	1	4,880	12%	11.3%	N/A	$66,710	N/A	N/A	N/A	N/A	100%	13%	30%	57%

15-1111	Computer and Information Research Scientists	1	350	105%	22.2%	N/A	$103,550	N/A	N/A	N/A	N/A	100%	3%	12%	85%
15-1131	Computer Programmers	1	5,840	-26%	7.9%	N/A	$74,810	N/A	N/A	N/A	N/A	100%	7%	25%	69%
17-2081	Environmental Engineers	1	1,600	10%	14.6%	N/A	$83,690	N/A	N/A	N/A	N/A	100%	5%	11%	84%
17-3029	Engineering Technicians, Except Drafters, All Other	1	2,650	3%	6.4%	N/A	$58,730	N/A	N/A	N/A	N/A	100%	N/A	N/A	N/A
19-2099	Physical Scientists, All Other	1	1,750	337%	0.7%	N/A	$69,050	N/A	N/A	N/A	N/A	100%	0%	2%	98%
19-3091	Anthropologists and Archeologists	1	N/A	N/A	11.1%	N/A	N/A	N/A	N/A	N/A	N/A	100%	N/A	N/A	N/A
27-3042	Technical Writers	1	990	-29%	14.8%	N/A	$63,590	N/A	N/A	N/A	N/A	100%	6%	21%	73%
29-1124	Radiation Therapists	1	480	-23%	10.8%	N/A	$71,870	N/A	N/A	N/A	N/A	100%	2%	53%	45%
29-9012	Occupational Health and Safety Technicians	1	230	-32%	6.9%	N/A	$42,720	N/A	N/A	N/A	N/A	100%	N/A	N/A	N/A
35-1012	First-Line Supervisors of Food Preparation and Serving Workers	1	26,040	-2%	7.3%	N/A	$30,330	N/A	N/A	N/A	N/A	100%	50%	37%	12%
43-5061	Production, Planning, and Expediting Clerks	1	7,670	14%	4.3%	N/A	$47,040	N/A	N/A	N/A	N/A	100%	28%	42%	30%

Source: Labor Insight Jobs (Burning Glass Technologies)

Summary demand and requirements table by occupation

This report provides information on both the preferred and minimum/required education levels for job postings. For this reason, a job posting may be counted in more than one of the educational categories shown in the table below. Please also note that Bureau of Labor Statistics (BLS) data is only available at the 6-digit SOC code level.

Aug. 01, 2014 - Jul. 31, 2015

There are 208 postings available with the current filters applied.

Active Selections

Last 12 months AND (State : Michigan) AND (((Education : Bachelor's degree (specified)) AND (Program of study : Biology/Biological Sciences, General (specified))) AND (Experience : 0 to 2 years))

Category:		Demand and Employment				Salary		Education level based on posting requirements (*excluding NA)					Education level of employed individuals		
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SOC Code(ONET-6)	Occupation Title	Number of Job Postings	Number Employed	% Change in Employment, 2013-2014	Projected Statewide Change in Employment, 2010-2020	Mean Advertised Salary	Mean Salary	% Requiring high school*	% Requiring Post-Secondary or Associate's Degree*	% Requiring Bachelor's Degree*	% Requiring Graduate or Professional Degree*	% with Unspecified Education	% with a high school diploma or less	% with Some College or an Associate's	% with a Bachelor's or higher
19-4099	Life, Physical, and Social Science Technicians, All Other	22	5,480	118%	11.7%	$41,143	$33,020	5%	0%	100%	0%	0%	N/A	N/A	N/A
29-2012	Medical and Clinical Laboratory Technicians	19	6,310	-2%	4.1%	N/A	$35,830	32%	32%	100%	5%	0%	13%	36%	51%
19-4031	Chemical Technicians	13	2,600	6%	2.4%	N/A	$41,990	0%	100%	100%	0%	0%	27%	42%	30%
19-1023	Zoologists and Wildlife Biologists	11	240	4%	N/A	N/A	$66,490	0%	0%	100%	45%	0%	0%	4%	96%
29-2011	Medical and Clinical Laboratory Technologists	10	6,740	-3%	2.3%	N/A	$56,480	0%	0%	100%	0%	0%	13%	36%	51%
31-9097	Phlebotomists	10	2,420	-7%	N/A	N/A	$28,470	100%	0%	100%	0%	0%	24%	67%	9%
19-1022	Microbiologists	9	280	100%	8.3%	N/A	$60,620	0%	0%	100%	44%	0%	0%	4%	96%
29-2099	Health Technologists and Technicians, All Other	9	2,940	-1%	N/A	N/A	$43,040	11%	22%	100%	0%	0%	24%	50%	27%
19-2031	Chemists	8	3,330	-4%	2.2%	N/A	$81,130	0%	0%	100%	63%	0%	0%	8%	92%
19-4021	Biological Technicians	8	770	-71%	17.3%	N/A	$37,530	N/A	N/A	N/A	N/A	13%	23%	32%	45%
51-1011	First-Line Supervisors of Production and Operating Workers	7	25,490	4%	-0.1%	N/A	$59,580	43%	14%	100%	0%	0%	51%	34%	15%
19-1042	Medical Scientists, Except Epidemiologists	6	2,080	18%	30.5%	N/A	$67,430	N/A	N/A	N/A	N/A	17%	0%	16%	84%
29-1141	Registered Nurses	6	90,340	-1%	N/A	N/A	$67,180	N/A	N/A	N/A	N/A	17%	1%	44%	55%
11-3051	Industrial Production Managers	5	10,770	-5%	8.6%	N/A	$105,300	N/A	N/A	N/A	N/A	20%	26%	31%	43%
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	5	53,060	-3%	6.4%	N/A	$63,160	N/A	N/A	N/A	N/A	20%	22%	33%	45%
11-1021	General and Operations Managers	4	59,390	5%	-1%	N/A	$108,830	N/A	N/A	N/A	N/A	25%	19%	34%	47%
15-2041	Statisticians	4	490	19%	10.2%	N/A	$82,020	N/A	N/A	N/A	N/A	25%	N/A	N/A	N/A
17-2031	Biomedical Engineers	3	300	50%	54%	N/A	$75,190	N/A	N/A	N/A	N/A	33%	N/A	N/A	N/A
29-9011	Occupational Health and Safety Specialists	3	1,190	21%	6.7%	N/A	$67,830	N/A	N/A	N/A	N/A	33%	N/A	N/A	N/A
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	3	7,830	-12%	9.9%	N/A	$83,060	N/A	N/A	N/A	N/A	33%	22%	33%	45%
11-9111	Medical and Health Services Managers	2	11,770	0%	13.8%	N/A	$97,870	N/A	N/A	N/A	N/A	50%	12%	30%	58%
11-9121	Natural Sciences Managers	2	990	10%	4.8%	N/A	$102,440	N/A	N/A	N/A	N/A	50%	3%	10%	87%
15-1132	Software Developers, Applications	2	14,960	2%	23.5%	N/A	$81,860	N/A	N/A	N/A	N/A	50%	3%	15%	82%
17-2112	Industrial Engineers	2	22,390	-8%	10.3%	N/A	$80,040	N/A	N/A	N/A	N/A	50%	6%	22%	73%
17-2141	Mechanical Engineers	2	38,700	18%	9.8%	N/A	$88,730	N/A	N/A	N/A	N/A	50%	4%	24%	71%
19-1031	Conservation Scientists	2	370	-7%	8.1%	N/A	$60,770	N/A	N/A	N/A	N/A	50%	0%	16%	84%
29-2031	Cardiovascular Technologists and Technicians	2	2,030	-15%	22.2%	N/A	$51,940	N/A	N/A	N/A	N/A	50%	10%	67%	23%
41-2031	Retail Salespersons	2	141,610	2%	7.9%	N/A	$24,770	N/A	N/A	N/A	N/A	50%	38%	44%	19%
43-6011	Executive Secretaries and Executive Administrative Assistants	2	12,870	-18%	7.5%	N/A	$50,320	N/A	N/A	N/A	N/A	50%	33%	49%	19%
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	2	48,610	8%	-0.3%	N/A	$33,850	N/A	N/A	N/A	N/A	50%	33%	49%	19%
11-9051	Food Service Managers	1	5,870	8%	-5.2%	N/A	$50,540	N/A	N/A	N/A	N/A	100%	41%	38%	21%
13-1041	Compliance Officers	1	4,880	12%	11.3%	N/A	$66,710	N/A	N/A	N/A	N/A	100%	13%	30%	57%

15-1111	Computer and Information Research Scientists	1	350	105%	22.2%	N/A	$103,550	N/A	N/A	N/A	N/A	100%	3%	12%	85%
15-1131	Computer Programmers	1	5,840	-26%	7.9%	N/A	$74,810	N/A	N/A	N/A	N/A	100%	7%	25%	69%
17-2081	Environmental Engineers	1	1,600	10%	14.6%	N/A	$83,690	N/A	N/A	N/A	N/A	100%	5%	11%	84%
17-3029	Engineering Technicians, Except Drafters, All Other	1	2,650	3%	6.4%	N/A	$58,730	N/A	N/A	N/A	N/A	100%	N/A	N/A	N/A
19-2099	Physical Scientists, All Other	1	1,750	337%	0.7%	N/A	$69,050	N/A	N/A	N/A	N/A	100%	0%	2%	98%
19-3091	Anthropologists and Archeologists	1	N/A	N/A	11.1%	N/A	N/A	N/A	N/A	N/A	N/A	100%	N/A	N/A	N/A
27-3042	Technical Writers	1	990	-29%	14.8%	N/A	$63,590	N/A	N/A	N/A	N/A	100%	6%	21%	73%
29-1124	Radiation Therapists	1	480	-23%	10.8%	N/A	$71,870	N/A	N/A	N/A	N/A	100%	2%	53%	45%
29-9012	Occupational Health and Safety Technicians	1	230	-32%	6.9%	N/A	$42,720	N/A	N/A	N/A	N/A	100%	N/A	N/A	N/A
35-1012	First-Line Supervisors of Food Preparation and Serving Workers	1	26,040	-2%	7.3%	N/A	$30,330	N/A	N/A	N/A	N/A	100%	50%	37%	12%
43-5061	Production, Planning, and Expediting Clerks	1	7,670	14%	4.3%	N/A	$47,040	N/A	N/A	N/A	N/A	100%	28%	42%	30%

Source: Labor Insight Jobs (Burning Glass Technologies)

Distribution of advertised salary

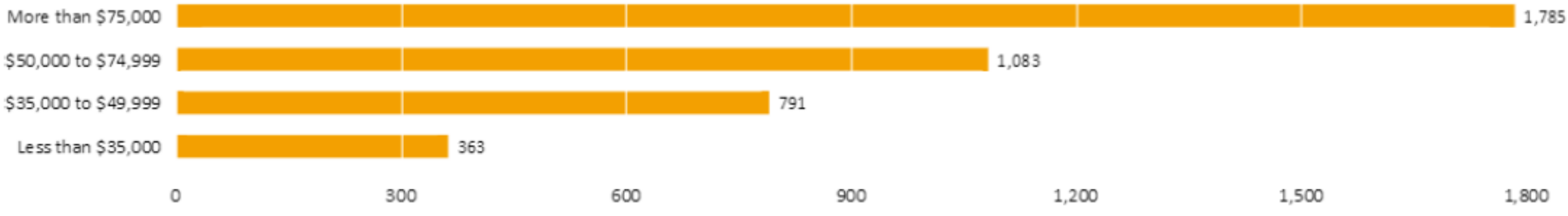
Note: 65% of records have been excluded because they do not include salary information. As a result, the chart below may not be representative of the full sample.

Mean real-time salary = $73,753

Aug. 01, 2014 - Jul. 31, 2015
There are 11,393 postings available with the current filters applied.
There are 7,371 unspecified or unclassified postings.

Active Selections

Last 12 months AND Nationwide AND (((Education : Bachelor's degree (specified)) AND (Program of study : Biology/Biological Sciences, General (specified))) AND (Experience : 0 to 2 years))



***This report uses data from real-time job postings. Salary figures are prorated to reflect full-time, annual wage status. For additional salary data by occupation from the Bureau of Labor Statistics, please refer to the summary tables options under the occupation category on the "Create reports" tab.**

Source: Labor Insight Jobs (Burning Glass Technologies)

Distribution of advertised salary

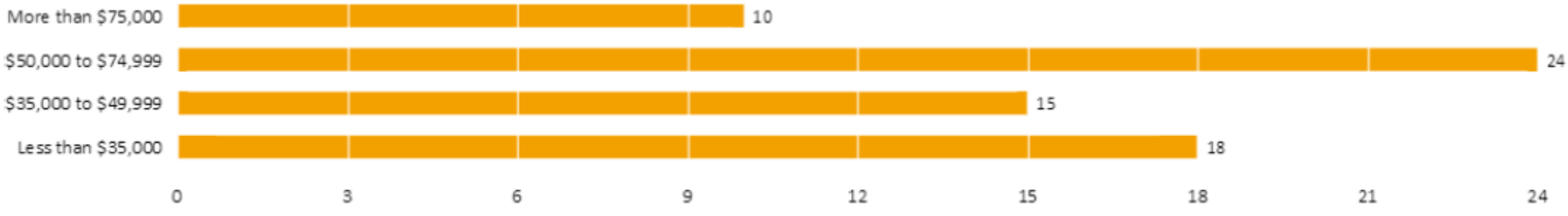
Note: 68% of records have been excluded because they do not include salary information. As a result, the chart below may not be representative of the full sample.

Mean real-time salary = $50,957

Aug. 01, 2014 - Jul. 31, 2015
There are 208 postings available with the current filters applied.
There are 141 unspecified or unclassified postings.

Active Selections

Last 12 months AND (State : Michigan) AND (((Education : Bachelor's degree (specified)) AND (Program of study : Biology/Biological Sciences, General (specified))) AND (Experience : 0 to 2 years))



***This report uses data from real-time job postings. Salary figures are prorated to reflect full-time, annual wage status. For additional salary data by occupation from the Bureau of Labor Statistics, please refer to the summary tables options under the occupation category on the "Create reports" tab.**

Kimberly Andrus 323 N. Center St. #106 Salt Lake City, UT 84103 (801) 652-3568

Education

Master's of Art in Teaching and Learning	University of Utah	2008
Bachelor's of Science in Biology *Minor Chemistry*	University of Utah	2007
Associates of Science	Brigham Young University-Idaho	2005

Certification

Secondary Teaching License For the state of Utah 2008

Passed with "Recognition of Excellence" Praxis II Biology content knowledge test
Passed with "Recognition of Excellence" Praxis II Principles of Learning and Teaching 7-12 test

Related Coursework

General Biology with lab	Organic Chemistry with lab	Methods of Teaching
Microbiology with lab	Biochemistry with lab	Integrated Technology

Teaching Experience

Student Teacher — Northwest Middle School — Salt Lake City, UT — 2008

- Taught 7th grade Integrated Science.
- Developed lesson plans, assessment tools and student-centered instruction.
- Worked as a member of a middle school core curriculum team.

AVID Tutor — Granite School District — Salt Lake City, UT — 2006-2007

- Tutored students in all subjects in junior high and high school.
- Supported students' understanding through small group collaboration and the use of Cornell note strategies and Costa's three levels of questioning.

Classroom Aide — West Lake Junior High School — Salt Lake City, UT — 2006-2007

- Provided support in an eighth grade science classroom; helped with assignments and additional instruction.
- Tutored students in math and science after school.
- Assisted in summer school physical activities program.

Skills

Ability to relate and communicate with a variety of students
Capability to foster students' interest in scientific topics
Capacity to think creatively, critically and expressively
Familiarity with writing structured lesson plans
Ability to generate independent thinking within students
Proficiency in laboratory techniques as well as scientific reasoning and thought

*** * Degree(s) * * * * * * * * * * * * * * * * * ***

AUG 2005 ASSOCIATE OF SCIENCE IN GENERAL STUDIES

*** * * BYU-I Class Records * * * * * * * * * ***

Fall Semester 2003

GS	290B	801		APT LEADERSHIP	1.0	A	
HS	131	004		PER HLTH & WEL	2.0	A	Z
HUM	201H	001	H	WESTERN CULT	3.0	B-	A
PHIL	110H	001	H	INTRO TO PHIL	3.0	B+	L
REL	121H	201	H	BOOK OF MORMON	2.0	A	R
SOC	112H	001	H	SOCIAL PROBLEM	3.0	A	S

Carr: 14.0 Earn: 14.0 Pts: 50.3 GPA: 3.593

Winter Semester 2004

CHEM	105	006		GENERAL CHEM	4.0	A-	P
ED	200	012		FOUNDATION ED	2.0	B+	
FA	100	001		PER VIS ART LB	0.0	P	A
FR	102	001		2ND SEM FR	4.0	A	F
REL	122	030		BOOK OF MORMON	2.0	A	R

Carr: 12.0 Earn: 12.0 Pts: 45.6 GPA: 3.800

Fall Semester 2004

BIO	199	001		BIOLOGY ORIENT	1.0	A	
BIO	200	004		INTRO TO BIO I	4.0	B+	B
CHEM	106	001		GENERAL CHEM	4.0	A-	P
IS	140	008		MICRO APPLIC	3.0	A	Z
MATH	221	008		STATISTICS	3.0	A-	M
REL	341	002		CHURCH HISTORY	2.0	B+	R

Carr: 17.0 Earn: 17.0 Pts: 62.3 GPA: 3.665

Winter Semester 2005

BIO	211	004		INTRO BIO II	4.0	B+	
BIO	221	002		GENERAL MICRO	3.0	B+	B
BIO	222	003		GEN MICRO LAB	1.0	B+	B
ENG	316C	006		ADVWRTG/TECHCM	3.0	A-	E
REL	342	002		CHURCH HISTORY	3.0	A	R

Carr: 14.0 Earn: 14.0 Pts: 50.3 GPA: 3.593

CUM Carr: 57.0 Earn: 57.0 Pts: 208.5 GPA: 3.658

*** * * Advanced Placement * * * * * * * * * ***

BEAR RIVER HIGH SCHOOL

2002

07 U.S. HISTORY 3

HIST 120 US TO 1877	3.0	P	I
HIST 121 US SINCE 1877	3.0	P	I

Carr: 0.0 Earn: 6.0 Pts: 0.0 GPA: 0.000

*** * * Transfer Courses * * * * * * * * * * * ***

UTAH STATE UNIVERSITY

LOGAN, UT

FALL SEMESTER 2001

MATH 1050 COLLEGE ALGEBRA	4.0	A-	M

SPRING SEMESTER 2003

BIOL 1010 BIOL & THE CITIZEN	3.0	A	B
ENGL 1010 INTRO TO WRITING	3.0	A-	E
ENGL 1030 UNDERSTANDING LIT	3.0	A-	L

Carr: 13.0 Earn: 13.0 Pts: 49.0 GPA: 3.769

CUM Carr: 70.0 Earn: 76.0 Pts: 257.5 GPA: 3.679

*** * * * * * * End of Transcript * * * * * ***

REFERENCES

Mary D. Burbank, M. Ed.
Director of Secondary Education
University of Utah
1705 Campus Center Dr Rm 225
SLC UT 84112
mary.burbank@ed.utah.edu
(801) 581-6074

Niki Hack, Ph.D.
Secondary Education Teacher
Salt Lake City School District
Niki.Hack@slc.k12.ut.us
1730 West 1700 North
Salt Lake City, Utah 84116
(801) 578-8547

Fred Montague, Ph. D.
Professor of Biology
University of Utah
257 South 1400 East Bldg 44 Rm 135
Salt Lake City, UT 84112-0840
montague@bioscience.utah.edu
(801) 581-6244

UNIVERSITY OF UTAH

SALT LAKE CITY, UTAH 84112

Official Transcript

Name: ANDRUS, KIMBERLY
Student ID: 00392982
SSN: XXX-XX-7749
Birthdate: XXXX-07-29

UNIVERSITY OF UTAH DEGREES
Bachelor of Science
Major in Biology
Minor in Chemistry
Confer Date: May 04, 2007
Degree GPA: 3.473

DEGREES AWARDED BY OTHER INSTITUTIONS
BRIGHAM YOUNG UNIVERSITY - IDAHO
REXBURG, ID
Associate in Science
August 15, 2005

BEGINNING OF UNDERGRADUATE SEMESTER CAREER

Course	Description	Units Enrolled	Units Earned	Grade
TRANSFER UNITS				
BRIGHAM YOUNG UNIVERSITY - IDAHO				
REXBURG, ID				
Accepted units			48.00	
UTAH STATE UNIVERSITY				
LOGAN, UT				
Accepted units			13.00	
TEST CREDIT			Earned	Score
AP Jun 09, 2005	American History		8.000	3
	Fall 2005			
BIOL 2020	Princ of Cell Biology	3.00	3.00	A-
CHEM 2310	Organic Chemistry I	4.00	4.00	A-
CHEM 2315	Organic Chemistry Lab I	1.00	1.00	B+
ETHNC 2570	American Indian Exper	3.00	3.00	A-
	Diversity & Humanities Explor			
MATH 1060	Trig	2.00	2.00	A
Term GPA: 3.715		13.000	13.000	
Dean's List				

Continued Next Column

Course	Description	Units Enrolled	Units Earned	Grade
	Spring 2006			
BIOL 2030	Genetics	3.00	3.00	B+
BIOL 3370	Microbial Biology	3.00	3.00	B
BIOL 3900	Teaching Biology	2.00	2.00	B
CHEM 2320	Organic Chemistry II	4.00	4.00	B-
CHEM 2325	Organic Chem Lab II	1.00	1.00	A-
MATH 1210	Calculus I	4.00	4.00	B+
	Quant Reas (Math & Stat/Log)			
Term GPA: 3.094		17.000	17.000	
	Summer 2006			
BIOL 3960	Topics In Biology	2.00	2.00	A
	Organic Gardening			
	Service Learning			
MATH 1220	Calculus II	4.00	4.00	A
	Quant Reas (Math & Stat/Log)			
PHYS 2010	General Physics I	4.00	4.00	B+
PHYS 2020	General Physics II	4.00	4.00	A-
Term GPA: 3.714		14.000	14.000	
Dean's List				
	Fall 2006			
BIOL 3115	Cmptr Appl Cell Bio Lab	2.00	2.00	B
BIOL 3240	Intro Cell Neurobiology	3.00	3.00	B-
BIOL 3245	Cell Neurobiology Lab	2.00	2.00	B
BIOL 3510	Biological Chemistry I	3.00	3.00	A-
BIOL 5221	Human Evol Genetics	3.00	3.00	A-
	Quantitative Intensive			
FA 3600	Writing for New Media	3.00	3.00	A
	Upper Division Comm/Wrtg			
Term GPA: 3.394		16.000	16.000	
	Spring 2007			
BIOL 3410	Ecology & Evolution	3.00	3.00	B+
BIOL 3515	Biological Chem Lab	2.00	2.00	B
BIOL 3520	Biological Chemistry II	3.00	3.00	A
BIOL 5210	Cell Structure and Function	3.00	3.00	B+

Continued Page 2

Timothy J. Ebner
University Registrar

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UNIVERSITY OF UTAH

SALT LAKE CITY, UTAH 84112

Official Transcript

Name: ANDRUS, KIMBERLY
Student ID: 00392982
SSN: XXX-XX-7749
Birthdate: XXXX-07-29

Course	Description	Units Enrolled	Units Earned	Grade
	Spring 2007 (Continued)			
ECON 3100	Labor Economics	3.00	3.00	A
	Quantitative Intensive			
	Term GPA: 3.557	14.000	14.000	
	Dean's List			

CAREER SUMMARY

Cumulative GPA:	3.473	
Cumulative GPA Units:	74.000	
Units Enrolled:	74.000	
U of U Units Earned:		74.000
Total Transfer Units:		61.000
Total Test Credit:		8.000
Total Other Credit:		0.000
Cumulative Units		143.000

END OF UNDERGRADUATE SEMESTER CAREER

BEGINNING OF GRADUATE SEMESTER CAREER

Course	Description	Units Enrolled	Units Earned	Grade
	Summer 2007			
ECS 6632	Rsrch Multicultural Ed	3.00	3.00	A
ED PS 6960	Special Topics	3.00	3.00	A
	Adolescent Learning			
SP ED 6011	Inclusive Classrooms	3.00	3.00	A
T L 6126	Content Area Lit. Instr.	3.00	3.00	A
T L 6741	Integration Ed Tech	3.00	3.00	A
	Term GPA: 4.000	15.000	15.000	
	Fall 2007			
T L 6410	Curricu/Assess Diversity	3.00	3.00	A
T L 6411	Instruction & Management	3.00	3.00	A-
T L 6490	Field Pract: Sec	3.00	3.00	A
T L 6743	Critical Perspectives	3.00	3.00	A
	Term GPA: 3.925	12.000	12.000	

Continued Next Column

Course	Description	Units Enrolled	Units Earned	Grade

CAREER SUMMARY

Cumulative GPA:	3.967	
Cumulative GPA Units:	27.000	
Units Enrolled:	27.000	
U of U Units Earned:		27.000
Total Transfer Units:		0.000
Total Test Credit:		0.000
Total Other Credit:		0.000
Cumulative Units		27.000

END OF GRADUATE SEMESTER CAREER

End of Transcript

Timothy J. Ebner
University Registrar

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Crystal Marrie Austin

13115 17 Mile Road • LeRoy, Michigan 49655 • (313) 516-3560 • c.marrie.austin@gmail.com
http://crystalmaustin.wordpress.com/

Education

Ph.D., Microbiology
University of Georgia, Athens, GA
May 2014

Interdisciplinary Certificate in University Teaching
SoTL Research: *Blended learning in a microbiology classroom.*
University of Georgia, Athens, GA
May 2014

B.S., Biology, *cum laude*
Ferris State University, Big Rapids, MI
December 2008

Professional Experience

Adjunct Professor, Anatomy and Physiology I; Summer 2014
West Shore Community College, Scottville, MI
Taught Anatomy and Physiology I lecture and laboratory to both traditional and non-traditional students who are pursuing careers within the Health Sciences. Created a collaborative, student-centered learning environment through small group work and used backward design to prepare course content.

Graduate Teaching Assistant, Basic Concepts in Biology Laboratory; Fall 2013
University of Georgia, Athens, GA
Taught a writing intensive, inquiry-based introductory biology course to freshman and sophomore students (non-science majors) with an emphasis on developing critical thinking skills and designing experiments.

Guest Lecturer, Anatomy and Physiology I; Fall 2013
University of Georgia, Athens, GA
Prepared and delivered course material on the skeletal system. Emphasized learning outcomes and incorporated a think-pair-share activity into lectures.

Graduate Teaching Assistant, Introductory Microbiology Laboratory; Spring 2013, Fall 2012
University of Georgia, Athens, GA
Engaged students (science majors; junior/senior level) in microbiological practices and guided them as they designed experiments to identify an unknown bacterium. Designed quiz and exam questions, and created MicroWiki, a wiki used by students for studying and planning experiments.

Graduate Teaching Assistant, Introductory Microbiology Hybrid Course; Spring 2012, Fall 2011
University of Georgia, Athens, GA
Interacted with small groups as they worked together to complete in-class active learning exercises and graded weekly online student reflective blogs as they related to group work and hybrid course design. Assisted professor in developing quiz and exam questions and in designing group activities.

Instructor, Microbiology and Health Care; Summer 2012
University of Georgia, Athens, GA
Taught an introductory microbiology course to Nursing and Allied Health majors. Prepared four lectures per week incorporating in-class case studies and problem-solving. Created three semester exams, a cumulative final exam, and a final laboratory practical exam. Held review sessions and office hours. Regularly met with and advised the laboratory teaching assistants.

Instructor/Graduate Teaching Assistant, Biomedical and Health Sciences Research Methods; Fall 2011 (Instructor), Spring 2011 and Fall 2010 (Teaching Assistant)
University of Georgia, Athens, GA
Collaborated with the Associate Provost, the Director of the Biomedical and Health Sciences Institute, and faculty members from multiple disciplines to design the curriculum and course syllabus. Created assignments, arranged laboratory tours, and invited guest speakers for the class. Advised students as they searched for a research mentor and registered for research courses. Planned and coordinated a symposium each semester where faculty and students met to discuss research opportunities.

Graduate Student Mentor, CURO Undergraduate Researcher; Summer 2011
University of Georgia, Athens, GA
Mentored student one-on-one as she learned about the oxidative stress response and introduced her to molecular biology techniques that she used to construct and characterize a bacterial mutant strain.

K-12 Teaching

Instructor
UGA – Duke Talent Identification Program (TIP): Microbes and You; April 21 – 22, 2012
Designed a two-day microbiology course for 8-11th graders. Students cultured bacteria, practiced bacterial staining techniques, performed PCR and gel electrophoresis, and made squash mounts of the termite gut.

Instructor
UGA – Duke TIP: The Invisible World of Microorganisms; January 21, 2012
Created an introduction to microbiology course for 5th and 6th graders. Students examined different types of microorganisms, including bacteria, fungi, and protists under the light microscope.

Service Learning

Partner Teacher
Project: Fostering Our Community's Understanding of Science (FOCUS); Fall 2011
Collaborated with a 5th grade teacher to plan science activities as they related to the life sciences with an emphasis on bacterial, animal, and plant cells.

Community Engagement

Experience UGA; Spring 2014

Girls Inc., Youth Leadership Program; Summer 2013

Leadership without Limits! Migrant Education Youth Program; Summer 2012, Summer 2011

Georgia Science and Engineering Fair Junior Division Judge; Spring 2012, Spring 2011, Spring 2010

Georgia Science and Engineering Fair Junior Division Reader; Spring 2012, Spring 2010

Summer Program for English Language Learners; Summer 2011

Sin Limites; Summer 2011

Science Night Demonstration at Fowler Drive Elementary School; Spring 2011

Clarke County Young Scientist's Fair Demonstration; Spring 2011

Fowler Drive Elementary School Science Demonstrations; Fall 2011, Fall 2010

Whitehead Elementary School Science Demonstration; Fall 2010

Teaching Coursework

EDHI 9040: Using Technology in the College Classroom (online course design)

PBIO 8010: Seminar in Teaching Biology

GRSC 7800: College Teaching and Student Learning

GRSC 7770: Seminar in University Teaching

WIPP 7001: Pedagogy of Writing in the Science Disciplines

Publications

Austin, C., and R. J. Maier. 2013. Aconitase-mediated posttranscriptional regulation of *Helicobacter pylori* peptidoglycan deacetylase. Journal of Bacteriology. 195: 5316-5322.

Austin, C., D. Johnson, R. Orlando, and R. J. Maier. 2014. Putative targets for posttranscriptional regulation by *Helicobacter pylori* aconitase. To be submitted.

Presentations

Dustman, W., and C. Austin. 2013. Blended learning in a microbiology classroom. Abstract publication and poster presentation. Best practices for promoting student engagement and learning. University System of Georgia Teaching and Learning Conference, Athens, Georgia.

Phillips (Austin), C., and R. J. Maier. 2012. Posttranscriptional regulation of peptidoglycan deacetylase by aconitase in *Helicobacter pylori*. Abstract publication and poster presentation. Annual Southeastern Branch American Society for Microbiology Meeting, Athens, Georgia.

Phillips (Austin), C., *et al*. 2009. Wild rice viability and germination testing to compare southern and northern ecotypes of northern wild rice, *Zizania aquatica* var. *angustifolia*, for restoration

potential in Michigan. Oral presentation. Michigan Academy Annual Meeting, Detroit, Michigan.

Herron, S., *et al*. 2009. A hands-on learning approach: wild rice conservation, harvesting, restoration, and processing research at an undergraduate teaching university in Michigan. Poster presentation. USDA-CREES National Water Conference, St. Louis, Missouri.

Awards/Honors

University of Georgia Graduate Teaching Assistantship; Summer 2012 – May 2014

Outstanding Teaching Award; Spring 2013

Thank-a-Teacher Recognition; Spring 2013

Center for Undergraduate Research Opportunities (CURO) Graduate Fellow Assistantship; Fall 2010 – Spring 2012

National Science Foundation (NSF) Graduate Research Fellowship Program Honorable Mention; Fall 2011

University of Georgia Graduate Research Assistantship; Summer 2009 – Summer 2010

College of Arts and Sciences Student Research Grant, Ferris State University; Spring 2009

Professional Development

Center for Teaching and Learning (CTL) Future Faculty Program; Fall 2013 – May 2014

American Society for Microbiology (ASM) Science and Teaching Fellowship Program; Fall 2013

CTL Seminar and Workshop Series: "Teaching Naked" presented by Dr. José Bowen; September 2013

University of Georgia STEM Institute on Teaching and Learning; April 2013

University System of Georgia Teaching and Learning Conference: Best practices for promoting engaged student learning; April 2013

CTL Teaching Portfolio Workshop; Spring 2013

Georgia Intern Fellowship for Teachers (GIFT) Program Facilitator; Summer 2012

Professional Memberships

American Society for Microbiology (ASM); 2009 – Present

Microbiology Graduate Student Association; 2009 – 2014

Curriculum Vitae

Daisy L. Daubert

Address:

Ferris State University
Dept. of Biology
820 Campus Drive, ASC 2004
Big Rapids, MI 49307

Ph: (231)591-2554
E-mail: dauberd@ferris.edu

Residence
1304 Darwin Ave.
Big Rapids, MI 49307
Ph: (503) 421-4882

Education:

B.S.	December 1998	Washington State University Pullman, Washington Major: Animal Science Minor: Neuroscience
Ph.D.	June 2006	Oregon Health & Science University Integrative Biomedical Science Program

Teaching Experience (* Denotes new prep)

Ferris State University

Fall 2013	Human Physiology and Anatomy I (BIOL 321) 4 lecture and lab sections *Basic Human Anatomy-Physiology (BIOL 109) 4 lecture sections
Summer 2013	Human Physiology and Anatomy II (BIOL 322) 1 lecture and lab section
Spring 2013	Human Physiology and Anatomy II (BIOL 322) 3 lecture and lab sections Pathophysiology (BIOL 300) 1 lecture section
Fall 2012	Human Physiology and Anatomy I (BIOL 321) 4 lecture and 3 lab sections *Endocrinology (BIOL 421) 1 lecture section
Summer 2012	Human Physiology and Anatomy II (BIOL 322) 1 lecture and lab section
Spring 2012	Human Physiology and Anatomy II (BIOL 322) 3 lecture and lab sections Pathophysiology (BIOL 300) 1 lecture section
Fall 2011	Human Physiology and Anatomy I (BIOL 321) 3 lecture and lab sections

	Pathophysiology (BIOL 300) 1 lecture section
Summer 2011	Human Physiology and Anatomy II (BIOL 322) 1 lecture and lab section
Spring 2011	Human Physiology and Anatomy II (BIOL 322) 2 lecture and lab sections Pathophysiology (BIOL 300) 1 lecture section Human Anatomy and Physiology (BIOL 205) 1 lab section
Fall 2010	Human Physiology and Anatomy I (BIOL 321) 2 lecture and 3 lab sections *Pathophysiology (BIOL 300) 1 lecture section
Summer 2010	Human Physiology and Anatomy II (BIOL 322) 1 lecture and lab section
Spring 2010	*Human Physiology and Anatomy II (BIOL 322) 3 lecture and lab sections *Human Anatomy and Physiology (BIOL 205) 1 lab section
Fall 2009	*Human Physiology and Anatomy I (BIOL 321) 2 lecture and 4 lab sections

Research Experience:

1) Summer 1993. Technical Assistant: Dept. of Veterinary Microbiology and Pathology, Washington State University, Pullman, WA. Dr. Thomas Besser.
2) 1994. Technical Assistant: Field Disease Investigative Unit, Washington State University, Pullman, WA. Dr. Thomas Besser.
3) 1995-1996. Animal Technician: Wegner Hall Vivarium, Washington State University, Pullman, WA.
4) 1996-1999. Technical Assistant: Dept. of Veterinary and Comparative Anatomy, Pharmacology and Physiology, Washington State University, Pullman, WA. Dr. Robert Speth.
5) 1999. Graduate Student: Neuroscience Program, Veterinary Comparative Anatomy, Pharmacology and Physiology, Washington State University, Pullman, WA. Dr. Robert Speth.
6) 1999-2006. Graduate Student: Integrative Biomedical Science, Department of Physiology and Pharmacology, Oregon Health & Sciences University, Portland, OR. Dr. Virginia Brooks.
7) 2006. Postdoctoral Fellow: Department of Pharmacology, University of Missouri-Kansas City, Kansas City, MO. Dr. Deborah Scheuer.
8) 2006-2009. Postdoctoral Associate: Department of Physiology and Functional Genomics, University of Florida, Gainesville, FL. Dr. Deborah Scheuer.
9) Summer 2012. Visiting Scientist: Oregon Health & Sciences University, Portland, OR. Dr. Virginia Brooks.
10) Summer 2013. Research Volunteer: University of Florida, Gainesville, FL. Dr. Deborah Scheuer

Memberships:

American Physiological Society: 2003-present.

Human Anatomy and Physiology Society: 2011-present

Grants:

American Heart Association pre-doctoral fellowship: $40,000, July 2003-July 2005.

Awards:

One of the four best writing portfolio submissions for Fall 1998 at Washington State University

N.L. Tartar Trust Research Fellowship: July 2001-July 2002.

Oregon Health & Science University student research forum best student talk award: May 2004.

FASEB Summer Research Conferences; Neural Mechanisms in Cardiovascular Regulation travel award: July 2004.

2005 Caroline tum Suden/Frances A. Hellebrandt Professional Opportunity Award

Committee Service:

Biology Awards Committee: 2010-present
Biology Faculty Development Committee: 2010-present
Chair 2012-present
Biology Planning Committee: 2011-present
Academic Senate: 2012-present
Health Promotion Committee: 2012-2013
Biology Geneticist Faculty Search Committee: 2012-2013

Conferences Attended:

Experimental Biology April 2010
Human Anatomy and Physiology Society May 2011
CUR Beginning a Research Program in the Natural Sciences at a Predominantly Undergraduate Institution November 2011

Professional Development:

Attended Faculty Center for Teaching and Learning workshop on using the smart classroom, Fall 2009

Attended Faculty Center for Teaching and Learning new faculty transition seminar series, Spring 2010

Presented a poster at Experimental Biology, April 2010

Attended Faculty Center for Teaching and Learning Presentation Zen, Summer 2010

Attended Human Anatomy and Physiology Society conference, May 2011

Attended Pearson Publishers seminar on the use of different computer/web programs in biology education, March 2011

Attended Academically Adrift seminar at Central Michigan University, October 2011

Attended Faculty Center for Teaching and Learning the Naked Presenter, Spring 2012

Did research with Virginia Brooks at Oregon Health & Science University, May-June 2012

Did research with Deborah Scheuer at the University of Florida, May-June 2013

Attended McGraw Hill seminar on the use of LearnSmart adaptive learning program and Tegrity, September 2013

Continue to work on research started in at the University of Florida, July 2013-present

Abstracts:

Daubert D.L., Meadows G.G., Wang J.H., Sanchez P.J., and Speth R.C.. 1998. Changes in angiotensin II receptors in dopamine-rich regions of the mouse brain with aging and ethanol consumption. Society for Neuroscience Abstracts, 24:2180.

Daubert D.L., Meadows G.G., Sanchez P., and Speth R.C.. 1999. Chronic ethanol consumption increases adrenal angiotensin II receptor density in female mice in an age and time dependent manner. Society for Neuroscience Abstracts, 25:2200.

Daubert D.L., Giraud G.D., Brooks V.L. 2003. Role of nitric oxide in impaired baroreflex function during pregnancy in conscious rabbits. The FASEB Journal, 17:A23.

Daubert D.L., Brooks V.L. 2004. Role of angiotensin II (AngII) and nitric oxide (NO) in the decreased baroreflex gain of pregnancy. The FASEB Journal, 18:A1078.

Daubert D.L., Brooks V.L. 2004. Stress decreases baroreflex gain (BRG) through increased nitric oxide (NO). The FASEB Journal, 18:A294.

Daubert D.L., Chung M-Y, Brooks V.L. 2005. Decreased insulin sensitivity: mechanism for decreased baroreflex gain during pregnancy? The FASEB Journal, 19:A576.

Daubert D.L., Chung M-Y., Brooks V.L. 2006. Decreased insulin sensitivity: mechanism for decreased baroreflex gain during pregnancy? The FASEB Journal, 20:A359.

Daubert D.L., Looney B.M., Su Y. and, Scheuer D.A. 2008. Corticosterone in the dorsal hindbrain does not alter the number of neurons in cardiovascular brain regions activated by stress. The FASEB Journal, 22: 1171.5

Looney B.M., **Daubert D.L.**, Su Y., and Scheuer D.A. 2008. Low doses of corticosterone act in the dorsal hindbrain to enhance the arterial pressure response to both acute and repeated stress. The FASEB Journal, 22: 1171.4

Su Y., **Daubert D.L.**, Sumners C., Speth R., Li H., and Scheuer D.A. 2008. Glucocorticoids enhance expression of angiotensin II type 1 receptors in the dorsal hindbrain. The FASEB Journal, 22: 1171.6.

Daubert D.L., Dong Y., Scheuer D.A. 2010. Chronic increases in dorsal hindbrain (DHB) corticosterone (Cort) enhance the blood pressure response to restraint stress without changing peripheral Cort. The FASEB Journal, 24: 1019.18

Publications:

Daubert, D.L., Meadows, G.G, Wang, J.H., Sanchez, P.J, Speth, R.C. 1999. Changes in angiotensin II receptors in dopamine-rich regions of the mouse brain with aging and ethanol consumption. Brain Research, 816:8-16.

Speth, R.C., **Daubert, D.L.**, Grove, K.L. 1999. Angiotensin II: a reproductive hormone too? Regulatory Peptides, 79:25-40.

Braileanu, G.T., Simasko, S.M., Speth, R.C., **Daubert, D.**, Hu, J., Mirando, M.A. 2002. Angiotensin II increases intracellular calcium concentration in pig endometrial stromal cells through type 1 angiotensin receptors, but does not stimulate phospholipase C activity or prostaglandin F2alpha secretion. Reproduction Fertility and Development, 14:199-205.

Daubert, D.L., Brooks, V.L. 2007. Nitric oxide impairs baroreflex gain during acute psychological stress. American Journal of Physiology, 292(2): R955-61.

Daubert, D.L., Liu, D., Zucker, I.H., Brooks, V.L. 2007. Roles of nitric oxide and angiotensin II in the impaired baroreflex gain of pregnancy. American Journal of Physiology, 292(6): R2179-87.

Daubert, D.L., Chung M.Y., Brooks, V.L. 2007. Insulin resistance and impaired baroreflex gain during pregnancy. American Journal of Physiology, 292(6): R2188-95.

Daubert D.L., McCowan M., Erdos B., Scheuer D.A. 2012. Nucleus of the solitary tract catecholaminergic neurons modulate the cardiovascular response to psychological stress in rats. Journal of Physiology, 590(Pt 19): 4881-95.

Publications in Preparation:

Daubert, D.L. and Scheuer, D.A. Involvement of corticosterone and vasopressin in cardiovascular and neuroendocrine responses to psychological stress in rats. Submitted to the Journal of Physiology.

Curriculum Vitae

Christopher DeFraia
Assistant Professor, Ferris State University
Phone: (845) 901-0676
Email: cdefraia@gmail.com
Address: 441 Madison Ave Apt. 3
Grand Rapids, MI 49503

EDUCATION

2010 **Ph.D.**, Microbiology and Cell Science (Molecular Biology), University of Florida.
Dissertation: Characterization of NPR1 suppressors and their role in plant immunity. Advisor: Dr. Zhonglin Mou.

2005 **B.S.**, Biotechnology, *cum laude*, Rutgers University.
Thesis: Molecular characterization of dissimilatory arsenate respiring prokaryotes using an arsenate respiratory reductase gene (*arrA*) as a biomarker. Advisor: Dr. Lily Young.

UNIVERSITY TEACHING EXPERIENCE

Spring 2014 **Visiting Assistant Professor of Biology**, Department of Biology, Kenyon College, Gambier, OH.
Instructor, Applied Bioinformatics (BIOL 391)
-Developed a new upper-level bioinformatics computer laboratory course for biological science majors
-Taught analysis of single gene and genomic sequence data
-Oversaw presentation and peer-review of independent research projects
Lecturer, Genetic Analysis (BIOL 255)
-Course is a survey of the principles and applications of genetics
-Taught a lecture class of 15 biology majors and non-majors
-Taught students to read and evaluate primary literature

Fall 2013 **Visiting Professor**, Department of Biology and Earth Science, Otterbein University, Westerville, OH.
Lecturer: Genetics (BIO 2010)
-Taught 72 biological science majors the principles and applications of genetics
-Developed two new lectures on epigenetics and RNA interference
-Collaborated with Otterbein faculty to enrich the genetics laboratory course

2005-2006 **Graduate Student,** Department of Microbiology and Cell Science,

University of Florida, Gainesville, FL.

Teaching Assistant, Bacterial Genome Sequencing Analysis (MCB 4320C)

-Taught computer laboratory section of the course in which students annotated genes from a novel bacterium

-Created computer laboratory activities and assessments

-Oversaw independent student projects and creation of manuscripts

Lead Instructor, Basic Biology of Microorganisms Laboratory (MCB 3020L)

-Taught microbiological techniques and theory to 36 microbiology majors in this intermediate-level, six hour/week class.

-Supervised three undergraduate teaching assistants

RESEARCH EXPERIENCE

2013-Present **Postdoctoral Researcher**, Department of Molecular Genetics, Ohio State University, Columbus, OH.
Research topic: Architecture and movement of the nucleus
Advisor: Dr. Iris Meier

2010-2013 **Postdoctoral Fellow**, Department of Molecular Genetics, Ohio State University, Columbus, OH.
Research topic: Epigenetic silencing of transposable elements
Advisor: Dr. R. Keith Slotkin

2005-2010 **Graduate Research Fellow**, Department of Microbiology and Cell Science, University of Florida, Gainesville, FL.
Research topic: Identification and characterization of genes essential for disease resistance in plants.
Advisor: Dr. Zhonglin Mou

2004-2005 **Undergraduate Research Fellow,** Department of Environmental Sciences, Rutgers University, New Brunswick, NJ.
Research topic: Identification and sequencing of an arsenic respiration gene from a novel bacterium.
Advisor: Dr. Lily Young

2003 **Undergraduate Researcher**, Biotechnology Center for Agriculture and the Environment, Rutgers University, New Brunswick, NJ.
Research topic: Histidine Biosynthesis in *Arabidopsis thaliana*
Advisor: Dr. Thomas Leustek

UNDERGRADUATE RESEARCH MENTORING

2013-Present **Anisa Moussa**, Undergraduate Researcher, Ohio State University
-Research topic: Isolation of nuclearmembrane mutants.

2011-2013 **Erica Thomas**, Undergraduate Researcher, Ohio State University

-Research topic: Production of mutant plants with active transposons
-Will pursue a Ph.D. in molecular biology

2010-2011 **Jennifer Bosse**, Undergraduate Researcher, Ohio State University
-Research topic: Genotyping of plant transposon silencing mutants
-Currently a graduate student at Ohio State University

Summer 2008 **Mallory Bembry**, NSF REU Undergraduate Research Fellow, University of Florida
-Research topic: Genetic analysis of an immunocomprimised mutant
-Obtained B.S. in Plant Science Biotechnology from Fort Valley State University

2007-2010 **George Marek**, Undergraduate Researcher, University of Florida
-Research topic: Isolation of immunocompromised mutant plants using a bacterial sensor
-Obtained B.S. in Microbiology from the University of Florida
-Currently a MD-PhD student at the University of Florida

PUBLICATIONS

1. **DeFraia, C,** & Slotkin, R. K. (2014). Analysis of retrotransposon activity in plants. Methods in Molecular Biology (Clifton, NJ), **1112**, 195–210.
2. **DeFraia C***, Wang Y*, and Mou Z. (2013). The histone acetyltransferase activity of Elongator subunit 3 is essential for its role in plant immunity. *BMC Plant Biology*. **13**:102. (2013). *Indicates equal contribution.
3. Nuthikattu S, McCue AD, Panda K, Fultz D, **DeFraia C**, Thomas EN, Slotkin RK. The initiation of epigenetic silencing of active transposable elements is triggered by RDR6 and 21-22 nucleotide small interfering RNAs. *Plant Physiol*. May;**162**(**1**):116-31. (2013).
4. **DeFraia, C** and Mou, Z. The role of the Elongator complex in plants. *Plant Signal Behav* 6 (2). (2011).
5. **DeFraia C**, Zhang X, and Mou Z. Elongator subunit 2 is an accelerator of immune responses in *Arabidopsis thaliana*. *Plant J.* 64 (3):511–523. (2010).
6. Xiong Y, **DeFraia C**, Williams D, Zhang X, and Mou Z. Deficiency in a cytosolic ribose-5-phosphate isomerase causes chloroplast dysfunction, late flowering and premature cell death in Arabidopsis. *Physiol Plant* **137**: 249–263. (2009).
7. Xiong Y, **DeFraia C**, Williams D, Zhang X, Mou Z. Characterization of Arabidopsis 6-phosphogluconolactonase T-DNA insertion mutants reveals an essential role for the oxidative section of the plastidic pentose phosphate pathway in plant growth and development. *Plant Cell Physiol* **50** (7): 1277–1291. (2009).
8. **DeFraia C**, Schmelz E, and Mou Z. A rapid biosensor-based method for quantification of free and glucose-conjugated salicylic acid. *Plant Methods* **4**, 28. (2008).
9. Zhang X, Xiong Y, **DeFraia C**, Schmelz E, and Mou Z. The Arabidopsis MAP Kinase Kinase 7: A crosstalk point between auxin signaling and defense responses? *Plant Signal Behav* **3**, 272-274. (2008).

10. Zhang X, Dai Y, Xiong Y, **DeFraia C**, Li J, Dong X, and Mou Z. Overexpression of Arabidopsis *MAP Kinase Kinase 7* leads to activation of plant basal and systemic acquired resistance. *Plant Journal* **52**, 1066-1079. (2007).
11. Perez-Jimenez J, **DeFraia C**, Young L. Arsenate respiratory reductase gene (*arrA*) for *Desulfosporosinus* sp. strain Y5. *Biochem Biophys Res Commun* Dec **16**:(2):825-9 (2005).

ABSTRACTS

1. **DeFraia C**. and Slotkin RK. "Transgenerational Epigenetic Silencing of Transposable Elements in Arabidopsis Pollen." Ohio State University Comprehensive Cancer Center Symposium. Columbus, OH. (2013).
2. **DeFraia C**. and Slotkin RK. "Epigenetic Silencing of Transposons by sRNAs in Arabidopsis." Ohio State University Comprehensive Cancer Center Symposium. Columbus, OH. (2013).
3. **DeFraia C**., McCue A., and Slotkin, RK. "Transgenerational activation of transposable elements in Arabiodopsis." Cell Symposia: Epigenetics and the Inheritance of Acquired States. Boston, MA. (2011).
4. **DeFraia C**., Zhang X., Mou., Z."A genetic screen for suppressors of *npr1*-mediated SA toxicity identifies a novel positive regulator of salicylic acid-mediated immunity." 21st International Conference on Arabidopsis Research. Yokohama, JP. (2010).
5. **DeFraia C**. and Mou Z. "A rapid and biosensor-based method for quantification of free and glucose-conjugated salicylic acid." 19th International Conference on Arabidopsis Research. Montreal, CA. (2008).
6. **DeFraia C**. and Mou Z. "Suppressor mutants of *npr1* restore salicylic acid tolerance and pathogen resistance in Arabidopsis thaliana." Florida Genetics. Gainesville, FL. (2007).

FELLOWSHIPS AND AWARDS

2011-2013	Pelotonia Postdoctoral Fellowship
2010	IFAS/CALS Graduate Student Travel Grant
2009	Davidson Graduate Student Travel Scholarship
2005-2009	University of Florida Alumni Fellowship
2004	Center for Environmental Bioinorganic Chemistry Research Fellowship
2003	Rutgers Undergraduate Research Fellows Award

PROFESSIONAL ACTIVITIES

2014	Invited Speaker, Otterbein University
2013	Manuscript Reviewer, Public Library of Science (PLOS) Genetics
2012	Manuscript Reviewer, The Plant Cell
2006-Present	Member, American Association for the Advancement of Science

COMMUNITY SERVICE

2011-2012	**Planning Committee Member**, Tour-de-H2O. Helped plan and execute a charity bike ride to fund clean water projects in African villages.
2008	**Panel Member**, Café Scientifique. Discussed transgenic plants and genetically modified organisms in a public forum.
2007	**Presenter**, Sunbelt Agricultural Expo. Discussed the state of plant disease resistance research with farmers and the public.

UNIVERSITY SERVICE

2012-2013	**Co-Instructor,** Young Scholars Program, 7th grade biology. Taught 7th grade students the scientific method through plant biology experiments
2010	**Poster Judge**, University of Florida Undergraduate Research Symposium.
2006-2007	**Graduate Representative**, University of Florida Career Fair. Discussed graduate school and career opportunities with undergraduates.
2005-2006	**Chair**, Invited Speaker Committee for Microbiology and Cell Science.

LABORATORY SKILLS

Confocal and fluorescence microscopy, real time PCR, microarray analysis, northern blot, fluorescence-activated cell sorting, genetic screening, map-based cloning, construction of transgenic plants, next-generation sequencing, western blot, yeast two-hybrid, recombinant protein expression and purification, bisulfite sequencing, chromatin immunoprecipitation, enzyme activity assays, subcellular fractionation, HPLC.

COMPUTER SKILLS

Blackboard, Moodle, DNA and protein sequence analysis, microarray data analysis, Graphpad Prism, ImageJ, Galaxy/Bowtie (analysis of genomic deep sequencing data).

OLUKEMI FADAYOMI
Department of Biological Sciences

Arts and Sciences Commons 2009
Ferris State University
Big Rapids, MI 49307
Telephone: (231) 591-5628
Fax: (231) 591-5240
Email: fadayok@ferris.edu

EDUCATION

Ph.D. North Texas State University, Denton, Texas, Biology (Immunoparasitology) 1986
MS Stephen F. Austin State University, Nacogdoches, Texas Biology (Microbiology) 1982
B.Sc. East Texas Baptist College, Marshall, Texas Biology 1980

PROFESSIONAL HISTORY

Fulbright Scholar, University of Namibia 2003

Biotechnology Program Coordinator, Ferris State University 2000 to 2003

Professor of Biology, Ferris State University 1997 to present

Visiting Fellow, Centers for Disease Control and Prevention, Atlanta, GA 1994 to 1996

Associate Professor of Biology, Ferris State University 1992 to 1997

Assistant Professor of Biology, Ferris State University, 1987 to 1992

Visiting Assistant Professor of Biology, Virginia Commonwealth University, Richmond, VA 1986 to 1987

TEACHING EXPERIENCES

Ferris State University (Courses taught)

General Biology 1 and II (zoology and botany)
Cell and Molecular Biology
Introduction to Biotechnology
Medical Parasitology
Advanced Immunology laboratory
Current Topics in Biology

University of Namibia

General Microbiology
Advanced Microbiology

Virginia Commonwealth University 1986-87 (Courses taught)

General Parasitology
Cell Biology
General Microbiology
General Biology

COLEGE/UNIVERSITY SERVICES

University:

Academic Program Review	2005- present
Senate Diversity Committee	2000 - 2003
Distinguished Teacher Award Committee	2000 - 2001
Scientific Understanding Committee	1999 - 2001
Faculty Research Grant Committee	1998 - 2000
Academic Senate	1997 - 98
Diversity Counts	1997 - 99
Animal Care and Use Committee	1988 – 89, 1990 - 94
Graduate and Professional Council	1992 - 94
Radiation Safety Committee	1990 - 93

College:

Sabbatical Leave Committee	1996 - 97
Curriculum Committee	1991 - 93
Minority Retention Task Force	1990 - 94
Pre-Optometry Advisory Board	1989 - 94, 1997 - 99

Department:

Present or past chair in

Biotechnology Advisory Board	2000 - 03
Department Tenure Review Committee	1996 - 98
Faculty Development Committee	1996 - 97
Candidate Tenure Committee	1996 - 98
Curriculum Committee	1990 - 93
Faculty Development Committee	1989 - 91
General Biology Committee	1988 - 94

Member

Planning Committee	2001- 03
Arts and Science Remodeling Subcommittee	1989 - 90
Curriculum Committee	1988 - 89
General Biology Committee	1987 – present

PROFESSIONAL HONORS, FELLOWSHIPS, LISTINGS, AWARDS, AND RESEARCH SUPPORT

Merit promotion 2007
Fulbright Scholar Award (Namibia, Africa), 2003
College of Arts and Sciences Deans Initiative Grant, 1999, 2002
Michigan Association of Governing Boards' of State Universities Distinguished Faculty Award, 1997
Development of a Multimedia and Interactive Approach to Teaching Laboratory Biology Courses. Ferris State University Faculty Development Grant, 1997.
Establishment and Maintenance of the Life Cycle of the Human Blood Fluke *Schistosoma mansoni*. Ferris State University. Ferris State University Faculty Research Grant, 1997.
Visiting Scientist Fellowship, National Centers for Infectious Diseases, Centers for Disease Control, Atlanta, GA, 1995 –96

Who's who of American Women, 1991
Selected to participate in a two-week intensive NSF workshop on Introduction of Molecular Biology to Undergraduate Curriculum, 1993
Role of Immune Response in the Protection against *Trichinella spiralis*. Ferris State University Faculty Research, 1989.

REPRESENTATIVE PROFESSIONAL ACTIVITIES

Consultancies

- Wadsworth Publishing Company, 2002
- Williams and Wilkins Publishers, 1991
- Wm. C. Brown Publishers, 1989 - 90
- McGraw-Hill Publishing Company, 1989

Membership

- Association of College and University Biology Educators 1997 - present.
- American Society of Tropical Medicine and Hygiene 1994 – present
- International Alliance of Teacher Scholars, Inc. 2001-2002

Publications

- Adewusi, O.I, R. Mitchell III and D. Stewart 1999. "General Biology Laboratory Manual", Kendall/ Hunt Publishing Company, Dubuque, IA. 203 pages

- Adewusi, O.I, Nix, N.A., Lu, X., Colley, D.G. and Secor, W.E. 1996. *"Schistosoma mansoni*: Relationship of tumor Necrosis Factor-∝ to Morbidity and Collagen deposition in Chronic Experimental Infection." *Experimental Parasitology* 84: 115-123.

- Adewusi, O.I., Colley, D.G., and Secor, W.E. 1996. "Association Between TNF-α and Morbidity During Experimental Chronic Schistosomiasis," *FASEB.*

- Adewusi, K. and Goven, A.J. 1987. "Enhanced Lysophospholipase Activity in Sensitized Mice Challenged with *Trichinella spiralis*: A Role for Cell-cooperation." *Developmental and Comparative Immunology* 11: 215-225.

- Adewusi, K. And Goven, A.J. 1987. "The Effect of Anti-thymocyte Serum on the Eosinophil and Lysophospholipase Responses in Mice Infected With *Trichinella spiralis*." *Parasitology* 94: 115-122.

- Adewusi, K. and Goven, A.J. 1986. "Enhancement of Lysophospholipase Activity with *Trichinella spiralis* Antigen: Evidence for Cell Cooperation." *Journal of Parasitology* 72: 716-722.

- Adewusi, Kemi 1982. "Fine Structure of the Tegument and Associated Structures in the Tapeworm *Cittotaenia*." *Journal of Texas Society for Electron Microscopy* 13:15.

Presentations

- Advances in Agricultural Biotechnology. March 2003. Neudamm College, Windhoek Namibia

- Adewusi, OI, Freeman Jr.GL, Colley, DG, and Secor, WE. December 1996. "Production of TNF-α by Spleen Cells of Mice with Chronic *Schistosoma mansoni* Infections," American Society of Tropical Medicine and Hygiene, Baltimore, MD.

- Adewusi, OI, Colley DG, and Secor WE. June 1996. "Association between TNF-∝ and Morbidity during Experimental Chronic Schistosomiasis." America Association of Immunologists Annual Meeting, New Orleans, Louisiana.

- Adewusi, OI, Colley, DG, and Secor, WE. November 1995. "Association of Hypersplenomegaly Syndrome and High TNF-α Levels in the Liver Homogenates of Mice with Chronic Schistosomiasis." American Society of Tropical Medicine and Hygiene, San Antonio, Texas.

- Adewusi, OI. October 1995. "The Role of Tumor Necrosis Factor-alpha in Chronic Schistosomiasis." Fancy Gap Immunological Meeting, Fancy Gap, Virginia.

- Adewusi, OI., 1994. "Women of Other Cultures ", Ferris Professional Women's Conference, Big Rapids, MI

- Adewusi, O.I., 1994. "Women's Issues and the Healing of Racism" Big Rapids, MI.

- Adewusi, Olukemi 1992. "Effects of Ivermectin on the Cyclophillidean Tapeworm, *Railletina salmoni.*" Annual Midwestern Conference of Parasitologists, Eau Claire, Wisconsin.

- Adewusi, Olukemi 1991. "The Role of Eosinophilic Lysophospholipase in Immune Response against *Trichinella spiralis*." International Symposium of Tropical Diseases, Haikou, Hainan, People's Republic of China.

- Adewusi, Olukemi 1990. "Animals and Parasites," Annual Meeting of American Association of Laboratory Animal Science, Lansing MI.

- Adewusi, Olukemi 1990. "The Protective Role of Eosinophils in Selected Helminth Infections." Department of Immunology and Microbiology, California State University, San Bernardino, California.

- Adewusi, Olukemi 1989. "The Effect of Anti-thymocyte Serum on the Production of Lysophospholipase in Mice Infected with *Trichinella spiralis*" Ferris State University Science Week.

- Adewusi, K.I. 1986. "Eosinophil Mediated Damage to Parasites via Lysophospholipase Activity." Virginia Commonwealth University: Faculty Research Session.

- Adewusi, K.I. and Goven, A.J. 1986. "Enhanced Synthesis of Phospholipase B in mice infected with *Trichinella spiralis*: Evidence for cell cooperation." American Society for Microbiology, Boston MA.

- Adewusi, K.I. and Goven, A.J. 1986. "Effect of Anti-thymocyte serum on phospholipase B activity in mice infected with *Trichinella spiralis*. Southwestern Association of Parasitologists.

- Adewusi, K.I. and Goven, A.J. 1984. " Phospholipase B: Confirmation of the Eosinophil as the Sole Leukocyte Source in an Inflammatory Reaction." Southwestern Association of Parasitologists.

Attendance

- Annual Meeting of American Society of Tropical Medicine and Hygiene, Denver, CO November 2002
- Lily Conference on College and University Teaching, Ferris State University, September 2002
- AAC&U General Education and The Assessment of Student Learning, Dallas, TX. February 2002
- National Association of Biology Teachers' Convention, Montreal, Canada November 2001
- Lily Conference on College and University Teaching, Ferris State University, September 2001
- Association of Biology Education Conference University of Chicago, June 2001
- Critical Thinking Workshop/Think Tank session with Richard Paul, Ferris State March 2001
- McGraw/Hill General Biology Road show, Chicago, IL March 2001
- Diversity in the New Millennium. Eastern Michigan University, Ypsilanti March 2000
- National Science Foundations' Regional Grants Conference, Lawrence, Kansas October, 1998
- Diversity Conference, Central Michigan University, Mt. Pleasant MI, October 1997.
- CDC, Atlanta, GA November 1997
- AAC&U Diversity Network Workshop, Ann Arbor, MI April 1997
- Minority Equity Conference Western Michigan University, Kalamazoo, MI March 1997.
- Campus Climate Imperatives: Building a Just Responsive Community, Central Michigan University, Mt. Pleasant, MI October 1997
- Project Kaleidoscope, a NSF workshop on revitalizing undergraduate biology curriculum, Morehouse College, Atlanta, GA, November 1996.
- International Symposium on Tropical Diseases, Haikou, China November 1991.
- AAAS Symposium on "Biology of Parasitism", New Orleans, LA February 1990.

Chautauqua courses for college teachers:

- Molecular Epidemiology (May 2001)
- Internet and the World Wide Web (May 1997).
- Virology in the Nineties (1993)
- Recombinant DNA: Technology and Application (May 1991),
- Advances in Immunology (February 1989)

Ferris State University Workshops:

- Connecting with the Learners, Summer 2000
- Comprehensive Guidance Program: Re-Awakening the Soul of Education, February 2000
- Faculty winter institute: Development of web-based instruction using Webct, January 1999
- Health Professions Education Futures Conference, Holiday Inn Conference center, March 1997.
- Antibody Mutagenesis In vitro., Biology Lecture Series November 1997
- Cellular Schizophrenia, Biology Lecture Series , February, 1998

CIVIC AND COMMUNITY ACTIVITIES

- Monday/Tuesday Night Technology (presentation of hands-on biology lab experience to area middle school students) 1999 – present
- K-12 Science Olympiad (judge) 1998

- Odyssey of the Mind (judge and facilitator) 1998
- EXCEL (Founding member. Parental organization for enhancement of education of academically gifted K-12 students.) 1997 - 2001
- Girls' Scout (troop leader) 1994 - 96
- Big Rapids Forum on the Healing of Racism 1992 - 94
- Michigan Department of Education Workshops. (ACT preparatory workshop for economically disadvantaged high school students in rural areas) 1992.
- Wade McCree Program (Presented biology workshops for minority students from urban Detroit) 1992, 1993.
- Martin Luther King Jr./Caesar Chavez/Rosa Parks College day program (Provided hand-on experience for minority high school students) 1990 - 92.
- Muskegon Area Explorations in Math and Science (presenter). A conference for 7th and 8th Grade girls 1990.

CINDY FITZWILLIAMS-HECK
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EDUCATION

PhD (candidate), EDUCATION (Learning, Instruction, and Innovation in Environmental Education)
Walden University, Minneapolis, MN
Current Focus: ***Using experiential learning techniques and a social-ecological approach in an environmental adult education curriculum to improve environmental literacy, and natural resource management***
(Golden Key International Honour Society)

MS, BIOLOGY (Emphasis: Aquatic Ecology; Endorsement: Conservation Biology)
Central Michigan University, Mt. Pleasant, MI
Thesis: ***The effects of filamentous cyanobacteria on the growth, survivorship, and fecundity of* Daphnia pulicaria.** Emphasis on intricacies of food web dynamics within a lake ecosystem.
(Honors Graduate)

BS, BIOLOGY EDUCATION (General Science Minor)
Ferris State University, Big Rapids, MI
Michigan Secondary Teaching Certificate
(Honors Graduate)

WORK HISTORY

Biology Instructor, Ferris State University (2001-present)
Classes Taught:

1. Nature Study 116 (lecture and lab – since 2005)
2. Ecology 442 (lecture and lab – 2009, 2002)
3. Biological Concepts 103 (lecture and lab – 2006, 2005)
4. Environmental Biology 111 (lecture and lab – 2005, 2003, 2002)
5. Laboratory Instructor [as needed] for General Biology 121, 122, Ecology 442, Environmental Biology 111, Biological Concepts 103

- Place-based education: 1) Sub-watershed studies before and after two rain gardens planted (partnerships with the Muskegon River Watershed Assembly - MRWA, Big Rapids High School, and Mecosta-Osceola Career Center); 2) 'My Nature Spot: Developing a connection with one place in nature'. A semester-long project using journaling to connect students with the outdoors and the concepts learned in class; emphasis on a watershed perspective.
- Community service project [each semester]: Litter clean-up along local waterways to help students become more aware of human impact on the environment (a written reflection of the experience assigned); associated with Alliance for the Great Lakes, The Ocean Conservancy research, and the MRWA.
- Active-learning: Implemented environmental education activities, macro-models, and inquiry-based learning in the classroom and laboratory settings.
- Technology: Classroom performance system ("clickers") used in lectures to stimulate discussion, assess student learning, and as a formative assessment tool (2009-2013).

Instructor of Education, Ferris State University (Summer 2013)
Classes Taught: EDUC 494; EDUC 694 – Special Topics in Conservation and Experiential Education

- Courses revolved around the Michigan Department of Natural Resources' (DNR) week-long workshop, *Academy of Natural Resources* (ANR).
- Students consisted of certified teachers, pre-service teachers, non-formal educators.
- Focused on innovative application and assessment of workshop material.

Environmental Educator, Independent Contractor (2005-2013)

- Assisted in developing structure of teacher training workshops for the 'Aquatic Academy for Teachers', and presented programs (MRWA Education Committee – 2008, 2009, 2010, 2013)
- Planned and presented at the 'Natural Shorescaping Workshops' within the Muskegon River Watershed (with the MRWA Education Committee) (2011, 2012).
- Led training seminars for volunteers interested in collecting benthic macroinvertebrates for stream quality assessments within the Muskegon River Watershed (an ongoing project affiliated with the MRWA, MiCorps and Michigan Department of Environmental Quality) (2005-present).
- Facilitator for third and fourth grade water festivals (MRWA – 2009, 2010, 2011, 2013)

Faculty Advisor, Outdoor Club of Ferris State University (2004-2005, 2011-present)

- Offered guidance and mentored club members interested in outdoor recreation, environmental education, and volunteerism in the outdoors.

Field Trip Co-Leader, Ferris State University - Geology of Michigan (2004) and Geology of Martinique (2003)

- Assisted in planning trip destinations, educational material covered, and directing students.
- Provided information about the natural history of the areas visited.

Environmental Educator, Naturalist, Asst. Program Coordinator, Hiking Club President, and **Assistant Summer Camp Director,** Woldumar Nature Center - Lansing, MI (1999-2001)

- Developed, coordinated, and taught a broad range of environmental biology and ecological programs for schools (following their science curriculum for pre-K through 12th grades), families, adults, and senior citizens.
- Led numerous interpretive nature walks year-round that emphasized food web dynamics, succession, other ecological concepts, and taxonomy.
- Founded and coordinated the Hiking Club that promoted environmental education, stewardship, and maintaining overall health and well being by monthly newsletters and weekly local hikes.
- Created, organized, and executed educational backpacking trips for adults that focused on the natural history, and watershed ecology in the area that was visited in MI. Areas visited and studied were Isle Royale National Park, North and South Manitou Islands/Sleeping Bear Dunes National Lakeshore, Nordhouse Dunes Wilderness Area, and the Manistee River/North Country Trail Loop.
- Assisted in development and implementation of a new environmental education summer day camp structure.
- Mentored high school students in Project GREEN, a cooperative school program that focused on water quality testing and interpretation of the Grand River Watershed.
- Assisted in organization and leadership of the Teachers Programming Committee for Environmental Education in the Classroom.

Biology Laboratory Instructor, Central Michigan University (1998-1999)

- Taught introductory college biology laboratories for biology majors, non-majors, and teacher education students.
- Created new laboratory exercises.
- Assisted in the updating of the Introductory Biology Laboratory Manual.

Research Assistant, Central Michigan University (1997-1998) – *Predatory zooplankton as the potential cause for the decline of yellow perch larva in Lake Michigan*.

- Collected, identified, and enumerated zooplankton and larval fish in Lake Michigan and Crystal Lake.
- Responsible for the organization and maintenance of the aquatics laboratory.

Substitute Teacher, Mecosta/Osceola, MI ISD (1996-1997); Lansing Area Schools, MI (1999-2001)

- Long-term subbing position for tenth grade biology at Pine River H.S. (1997).

Student Teacher (High School Physical Science & Biology) (1996) – Pine River High School, Leroy, MI.

- Immediately took initiative in teaching four, ninth-grade physical science classes, and one tenth-grade biology class.
- Effectively incorporated organized cooperative learning groups in the classroom.

PROFESSIONAL COMMITMENTS

- MRWA Executive Board – Vice Chair (2013-2015)
- Michigan Alliance of Environmental and Outdoor Education (MAEOE) Board of Directors (2013)
- DNR-ANR Advisory Committee (2013-present)
- MRWA Education Committee (2002-present)
- MRWA Action Committee (2013-present)
- MRWA Voyage of Discovery Committee (2012-present)
- Mecosta County Northern Lights Environmental Award Committee (2013)
- Ferris Non-tenure Track Faculty Organization Leadership Committee – Contract Review Chair (2009-present)

PROFESSIONAL DEVELOPMENT ACTIVITES

- Great Lakes Stewardship Initiative's *Place-Based Education Conference* (2012, 2013)
- MAEOE Annual Conference (2000, 2012, 2013)
- *Great Lakes Conference on Teaching and Learning* – CMU (2013)
- *Transforming Education Towards a More Sustainable Future* – Green Teacher (2013)
- Michigan Science Teacher's Association Annual Conference (2013)
- *Assessment in Action: The Use of Electronic Media for Classroom Assessment* (FSU Faculty Center for Teaching and Learning – FCTL , 2012)
- *Game-Based Learning* (FSU – FCTL, 2012)
- Pearson's *Innovations in Teaching Science* (Washtenaw Community College 2012)
- Preparing Students for a Changing Climate: Campus Sustainability Day 2012 – webcast and interactive panel
- Academy of Natural Resources (DNR): *Forests, Field, & Fins Field Camp* (Roscommon, MI 2012)
- National Wildlife Federation's webinar, *Sustainability in the Classroom* (2011)
- Environmental Protection Agency's webinar, *State of the Lakes Ecosystem Conference* (2011)
- Great Lakes Conference 2010 in E. Lansing, MI - *Learning from the Past, Looking Towards the Future* (2010)
- National Wildlife Federation Webinar – *Evaluating Campus Sustainability* (2010)
- Great Lakes Beach Conference 2010 – *Rapid Analytical Methods Wet Lab*
- The Watershed Academy's *Healthy Lakeshores Through Better Shoreline Stewardship* (2010)
- Interactive webinar on *Creating a Native Plant Specification* – JFNew Full-Service Ecological Solutions (2010)
- Science Fair Judge for Mecosta-Osceola Intermediate School District's, Math, Science, Technology Center (2010)
- Benthic Macroinvertebrate Symposium – MiCorps (Bay City, MI 2005)
- Lilly Conference Series on College and University Teaching and Learning (Traverse City, MI 2002, 2003)
- Pre-Cambrian Geology of the Marquette area (MTU – Ted Bornhorst, Field Geology, May 2002)
- Karst Geology of Michigan field trip (Association of Professional Geologists, Gaylord, MI 2002)
- National Association of Interpreters Annual Meetings (1999-2001)

CERTIFICATIONS

- Wilderness Awareness School - Kamana Naturalist Training Program (2011-2012)
- Environmental Protection Agency's Watershed Management Training Certificate (2010)
- Wildlife Management – Queens College, NY (2010)
- Wilderness First Responder (2001)
- Project Learning Tree (2001)
- Project WILD (2000)

PRESENTATIONS

- *Healthy Lake Ecosystems* (Michigan Chapter, North American Lake Management Society - MCNALMS 2012)
- *Understanding the Shoreline* (MCNALMS 2012)
- *Planning a Natural Shoreline Landscape* (MCNALMS 2012)
- *Basics of Natural Shoreline Ecosystems* (Natural Shoreline Workshop – MRWA 2011, 2012)
- *Native Plant Selection and Design* (Natural Shoreline Workshop – MRWA 2011, 2012)
- *Maintaining a Natural Shoreline* (Natural Shoreline Workshop – MRWA 2011, 2012)
- *Volunteer Stream Monitoring Program* (MRWA & MiCorps) Seminars consisted of educating the public on the physical and ecological dynamics of streams, the biology of benthic macroinvertebrates, and proper sampling and identification techniques (2005-present).
- *Lake & River Monitoring* (MRWA's Aquatic Academy for Teachers 2009, 2010)
- *What's in the Water and Why Should We Care? An Introduction to Simple and Fun Ways to Water Monitoring* (MRWA's Aquatic Academy for Teachers 2008)
- *Earth Day Enlightenment Hike: The History and Significance of Earth Day* (FSU Wellness Week 2007, 2008)
- *This is my True Home: Using Experiential & Place-based Education to Enhance Learning* (FSU Recreation Leadership seminar series 2008)
- Poster presentation at CMU of thesis research *The effects of filamentous cyanobacteria on the growth, survivorship, and fecundity of* Daphnia pulicaria (1999)
- Poster presentation at CMU of research on (co-author) *Daily vertical migrations of* Chaoborus sp. *in response to presence or absence of potential food sources* (1998)
- Poster presentation at CMU on *Sedimentation characteristics & zooplankton assemblages used to determine lake-level fluctuations in Lake Michigan* (1997)

FUNDING

- *Helping Hands to Reforest the Muskegon River Watershed*. Consumers Energy grant for purchasing trees (2012).
- Co-founder/coordinator for the grassroots venture, *Project Stormwater: A collaborative effort between Ferris State University faculty, staff, and students, and the Muskegon River Watershed Assembly, to reduce stormwater runoff into the Muskegon River.* Funding awarded through Ferris Foundation Grant, and Consumers Energy to construct a rain garden on campus (2011, 2010).
- FSU Academic Service Learning funds used to complete projects on campus to reduce stormwater runoff (2009, 2008), and clean up litter along local waterways (2007).
- Received funding from FSU's Political Engagement Project for students to conduct an ecological assessment of the property at Camp Newaygo, MI, *A comparison between the windward and leeward communities of a ridge - biotic and abiotic similarities and differences* (2009).

AWARDS

- Mecosta County Northern Lights Environmental Award (2013)

PROFESSIONAL MEMBERSHIPS

- National Science Teachers Association
- Michigan Science Teachers Association
- American Institute of Biological Sciences
- North American Association of Environmental Education
- Michigan Alliance of Environmental and Outdoor Educators
- Association of Watershed and Stormwater Professionals
- Ecological Society of America
- Big Rapids Rock, Mineral, and Gem Club
- National Wildlife Federation – Campus Ecology
- Muskegon River Watershed Assembly
- The Michigan Nature Association
- Woldumar Nature Center
- The Nature Conservancy
- The Sierra Club

STEWARDSHIP & CONSERVATION EXPERIENCE

- Lake Sturgeon release in the Black River of Michigan (2013)
- Stream quality monitor of Mitchell Creek & Ives Ave Creek (using macroinvertebrates as indicators) (2007-present)
- Great Backyard Bird Count (2010-present)
- Salmon egg harvesting and fertilization for Salmon-in-the-Classroom program (2012 MAEOE conference)
- Assisted in the design & planting of five native rain gardens for the MRWA (2007-2012)
- Organized & participated in 'Litter Cleanup Day' along the Muskegon River, Big Rapids, MI (2002-present) – Alliance for the Great Lakes, The Ocean Conservancy, and MRWA.
- Geology field assistant for the investigation & interpretation of the Muskegon River Valley glacial geology (FSU -2001-present)
- Evaluated Woldumar Nature Center's (WNC) conservation efforts then proposed & implemented plans for composting, removal of exotic species & promoting native/indigenous plant species (1999-2001).
- Researched and planted native prairie plants and wildflowers at WNC (1999-2001).
- Participated in the removal of the exotic plant, purple loosestrife, along the Grand River in Lansing, MI (2000).
- Trained in and participated with The Nature Conservancy's (TNC) for prescribed prairie burns at WNC (2000).
- Participated in bird banding during 1998-1999 Fall and Spring migration through Mt. Pleasant, MI.
- Assisted in fish shocking and inventory of trout populations in the west Pere Marquette River, MI (1998).
- Volunteered for TNC's removal of exotic plant species in the Sleeping Bear Dunes National Lakeshore (1998).
- Assisted with the riverbank preservation along Chippewa River (1997) near Mt. Pleasant, MI.

REFERENCES

Dr. Joe Lipar - Department Head of Biological Sciences (2011-present), FSU (231) 591-2550
Ms. Terry Stilson – Program Coordinator, MRWA (231) 591-2324
Mr. Kevin Frailey – Education Services Manager, DNR (517) 373-7306
Dr. Karen Strasser – former Department Head of Biological Sciences, FSU (2006-2011), FSU (231) 591-3856
Dr. Gary Rodabaugh - Professor of Biology, FSU (231) 591-2308
Ms. Bridget Booth - WNC, Program/ Environmental Education Director (formerly) (517) 853-9863
Dr. Scott McNaught - Professor of Biology, Graduate Advisor, CMU (517) 774-1335
Mr. Dan Benjamin - Biology Instructor, Teaching Assistant Coordinator, CMU (517) 774-2491

January 2014

Clifton V. Franklund

Personal Information:

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Blog:	http://www.wordpress.com/assessmentinaction

Professional Employment:

Associate Professor	Department of Biological Sciences, Ferris State University, Big Rapids, MI	2009 – present
Assistant Professor	Department of Biological Sciences, Ferris State University, Big Rapids, MI	2006 – 2009
Assistant Professor	Department of Biological Sciences, California State University, Long Beach, Long Beach, CA	2000 – 2006
Research Associate	Department of Microbiology and Immunology, Virginia Commonwealth University, Richmond, VA	1999 – 2000
Adjunct Professor	Division of Natural Sciences, Piedmont Virginia Community College, Charlottesville, VA	1996 – 1999

Post-Doctoral Training:

University of Virginia, School of Medicine, Department of Microbiology. Charlottesville, Virginia 22908. February 1997 to 1999. Was a research associate in the laboratory of Dr. Joanna Goldberg, Associate Professor of Microbiology.

University of Virginia, School of Medicine, Department of Microbiology. Charlottesville, Virginia 22908. January 1991 to January 1997. Was a research associate in the laboratory of Dr. Robert J. Kadner, Professor of Microbiology.

Education:

Medical College of Virginia/Virginia Commonwealth University, Health Sciences Division. Richmond, Virginia 23298. August 1986 to December 1990. Ph.D. Department of Microbiology and Immunology. Advisor: Dr. Phillip Hylemon, Professor of Microbiology.

North Dakota State University, Fargo, North Dakota 58105. August 1984 to July 1986. M.S. Department of Bacteriology. Advisor: Dr. Thomas Glass, Associate Professor of Bacteriology.

Concordia College, Moorhead, MN 56560. August 1980 to May 1984. B.A. Major: Biology. Minor: Philosophy.

Professional Affiliations:

American Society for Microbiology, Michigan Regional Branch of the American Society for Microbiology, Sigma Xi Honor Society, and the Anaerobe Society of the Americas

Professional Roles:

Academic Affairs assessment coordinator
Ferris State University Quality Matters Trainer
Ferris State University Online Instruction Trainer
Ferris State University Blackboard Learn 9.1 Mentor (assigned 33 faculty members)
Assessment coordinator for the department of Biological Sciences
Co-program coordinator for the B.S. in Biological Science

Awards:

Top 25 STEM Professor in Michigan (2013)
Ferris State University Distinguished Teacher of the Year (2012)
Softchalk Higher Education Online Challenge Winner (2011)
Exemplary On-Line Course, Web Enhanced (2007)

Certificates:

Certificate of Online Adjunct Teaching, University of Maryland (2013)
Assessment Specialist Graduate Certificate, James Madison University (Begun 2013)

Courses Taught at Ferris State University:

BIOL108: *Medical Microbiology*. (2006 - present)
This three-unit course is taught every semester and is part of the core curriculum for allied health sciences majors at Ferris State University. The class focuses upon the diversity of microbial life forms, the basis of a protective immune defense, and a brief survey of important microbial pathogens. The laboratory covers essential microbiological techniques and includes a group-based directed research project on a topic of the students' choosing.

BIOL286: *General Microbiology*. (2006 - present)
This three-unit course is taught every semester and is part of the curriculum for the clinical laboratory sciences program at Ferris State University. The lectures serve as a brief introduction to the microbial world including microbial structure, function, metabolism, classification, genetics, control of microbial growth and immunity. The laboratory provides practical experience with fundamental concepts, techniques and instrumentation and includes fieldtrips to the Big Rapids wastewater treatment plant. I am also attempting to coordinate visits to the Yoplait plant in Reed City, the Big Rapids hospital diagnostic lab, and the Big Rapids water treatment plant.

BIOL387: *Microbiology and Immunology*. (2008 and 2009)
This three-unit course is taught every semester and is part of the curriculum for the clinical laboratory sciences program at Ferris State University. The lectures serve as a brief introduction to the microbial world including microbial structure, function, metabolism, classification, genetics, control of microbial growth and immunity.

BIOL472: Proteins. (2013)
This three-unit course is taught every other year and is part of the curriculum for the Biotechnology program at Ferris State University. The class covers protein structure, function, purification, and characterization with an emphasis on lab applications, problem solving, and trouble-shooting.

Courses Taught at Other Institutions:

MICR320: *Bacterial Pathogenesis.* CSULB (2000 – 2006)
This five-unit course is taught every semester and is part of the core curriculum for Microbiology majors at CSULB. Lectures were focused upon molecular mechanisms of host-parasite interactions in a broad range of human pathogens.

MICR471: *Bacterial Physiology.* CSULB (2000 – 2006)
This is a three-unit course that is taught once per year during the spring semester. Using a comparative approach, the growth, metabolism, nutrition, and ecology of bacteria and archaebacteria are discussed. Recent publications are used to compare and contrast the diverse strategies employed by prokaryotes to adapt to their environment.

BIOL696: *Research Methods.* CSULB (2002 – 2006)
This three-unit, course is offered during the fall semester for graduate students in the process of completing their thesis. Topics covered include experimental design, data presentation, computer graphics, and technical writing. The class culminates with formal oral, written, and poster presentation of their research.

BIOL220H: *Introduction to Bioinformatics.* CSULB (2004)
This two-unit, team-taught course is offered during the fall semester to honors students in the department. Topics covered include the nature of biological information, database design and queries, sequence comparisons, phylogenetic analyses, and predictions of structure and function based upon sequence data. One half of the course time is dedicated to using current computer algorithms for actual sequence analyses.

MICR200: *General Microbiology for Health Professionals.* CSULB (2005)
This is a general microbiology course for those planning careers in nursing, health care and education, and foods and nutrition. This course offers a broad overview of the structure, function, and diversity of microorganisms with an emphasis on their roles in human health. I served as a laboratory instructor.

NAS185: *Microbiology.* Piedmont Virginia Community College (1997 – 1999)
This four-unit course provided an introduction to microorganisms, their metabolism, and involvement in human disease. Emphasis was placed upon prokaryotic metabolism and genetics as well as the molecular and cellular aspects of the human immune system.

BIO101/102: *Introductory Biology Laboratory.* Piedmont Virginia Community College (1996 –1999)
Laboratory sessions included exercises spanning Botany, Animal Physiology, Biochemistry, Genetics, and Molecular Biology. As laboratory instructor, I prepared, presented, and graded all lab materials, quizzes, and practical exams.

Research Funding:

Faculty Research Grant – Lipopolysaccharide sialation in *Fusobacterium nucleatum*
Faculty Research Committee, Ferris State University 2007
Role: P.I.

3 S06 GM 063119-02S2 (Kingsford, Laura) 2003 - 2005
Support for Continuing Research Excellence (SCORE)
Role: P.I.

2 R25 GM 0089-04 (Bauer, Roger) 2003 – 2004
Bridges to the Future: Baccalaureate Bridge Program
Role: Faculty participant.

Committee Appointments at Ferris State University:

Department:

Department Planning Committee (2011-present) – currently serving as chair

Department Awards Committee (2012-present)

Geneticist Faculty Search Committee (2012-2013)

Microbiologist Faculty Search Committee (2010-2011)

Developmental Biologist Faculty Search Committee (2007-2008)

Department Curriculum Committee (2007-2009)

Department Assessment Committee (*ad hoc*) (2009-present) – currently serving as chair

College:

College of Arts and Sciences Dean Search Committee (2011-2012)

College of Arts and Sciences Planning Committee (2011-present)

College of Arts and Sciences Assessment Committee (2012-present, current chair)

College of Arts and Sciences Assessment Committee (2007-2013)

University:

Vice-President of Student Affairs Search Committee (2013, co-chair)

National Competitive Scholarships Committee (2006-2007)

Human Subjects Review Committee (2006-2013)

General Education Scientific Understanding Committee (2008-2010)

University Assessment Committee (2012-present, current chair)

Directed Student Research at Ferris State University:

	Student Name	Program	Tenure	Current Position
1.	Peter Wissink	Pre-medicine	2013	Calvin College
2.	Jennifer Franklund	Biology	2012	Southern Illinois Univ.
3.	Tracy Elliott	Pre-Dentistry	2011	Student at FSU
4.	Ewa Slotwinski	Biotechology	0211	Student at FSU
5.	Alicia Weeks	MSTS	2011	High school
6.	Jason Workman	Biotechnology	2010	Student at FSU
7.	Allison Wyatt	Biotechnology	2010	Student at FSU
8.	Jeremy Way	Pre-Medicine	2009	Student at FSU
9.	Akshay Chellappa	Biotechnology	2009	Student at FSU
10.	Erika Dittmar	Pre-Medicine	2008	USDA Forest Service
11.	Ashley Pointdexter	MSTC	2008	High school
12.	Bridgette Buse	MSTC	2008	High school
13.	David Bosak	College of Optometry	2008	DO program
14.	Brad Christopherson	College of Optometry	2008	DO program

I directed an additional 30 students while a faculty member at California State University, Long Beach

Selected Professional Development Training Attended:

New Faculty Orientation Week
Using RSS Feeds for Teaching or Research
Ways to Conduct & Manage Class Discussions
CAS Outcomes-Assessment
Motivating Students
McGraw-Hill Microbiology Symposium, Atlanta, GA
Managing a College Classroom--Control, Community and Discipline
SLI 2007, Creating a Learning-Centered University
Conducting Effective Class Discussion
Faculty Writing Institute
Online Instructor Certification
2008 NC State Undergraduate Assessment Symposium
Making a Difference in Student Learning: Assessment as a Core Strategy, HLC (2009)
New Faculty Orientation Week, Planning session (2011 and 2012)
Inquiries into Teaching and Learning (2010 and 2011)
Lilly North Conference, Traverse City, MI. 2007, 2008, 2009, 2010
IUPUI Assessment Institutes (2012 and 2013)
North Central Association – HLC (2012 and 2013)
HLC-NCA Assessment Academy (2013)
Improving the Validity and Reliability of Your Tests or Quizzes (2010)
Planning an Assessment of Student Learning (2011)
Inquiries into Teaching and Learning dinner (2011)
Welcome Back! Faculty Professional Development Day (2012 and 2013)
Evidence-Based Teaching: A Journal Club on Research in Teaching and Learning (2011 and (2012)
Best Practices Workshop (2012)
Quality Matters Training (2012)
Blackboard Learn 9.1 Training (both modules 1 and 2) (2012)

Abstracts:

1. Creating Institutional Processes that Enhance Faculty Engagement in Learning Assessment. HLC-NCA Assessment Workshop. 2013.
2. **Franklund, C.V.**. Facilitating Collaborative Learning with Google Apps. Lilly Conference on College and University Teaching. 2010.
3. Woodman, H., **C.V. Franklund**, and C. Conley-Sowels. Rubrics + Readability = Retention -- The 3 Rs: Making the Connection. Lilly Conference on College and University Teaching. 2010.
4. Woodman, H., **C.V. Franklund**, and C. Conley-Sowels. Rubrics Rock! Using Rubrics to Assess Authentic Student Learning. Texas A&M Assessment Conference. 2010.
5. Woodman, H., **C.V. Franklund**, and C. Conley-Sowels. Rubrics Rock! Rubistar and Beyond: Rubrics to Use Monday Morning. Lilly Conference on College and University Teaching. 2009.
6. **Franklund, C.V.** Using Computer-Assisted Formative Feedback to Enhance Learning in an Introductory-Level Microbiology Course. Lilly Conference on College and University Teaching. 2008.
7. Nolan, D., H. Abdelhadi, and **C.V. Franklund**. Cloning and Characterization of the *recA* Gene from *Fusobacterium nucleatum* 10953. National Meeting of the American Society for Microbiology. 2003
8. Raps, A., and **C.V. Franklund**. Cloning and Analysis of a Lipopolysaccharide Core Gene from *Fusobacterium nucleatum*. National Meeting of the American Society for Microbiology. 2002.

9. Raps, A., and **C.V. Franklund**. Cloning and Analysis of a Lipopolysaccharide Core Gene from *Fusobacterium nucleatum*. Southern California Branch Meeting of the American Society for Microbiology. 2001.
10. Krebs, T., **C.V. Franklund**, and J.B. Goldberg. Function Analysis of Enzymes in Lipopolysaccharide Biosynthesis. Annu. Meet. of the Virginia Branch of the Amer. Soc. for Microbiol. 1999. (Honorable Mention).
11. Dean, C.D., **C.V. Franklund**, J.D. Retief, M.J. Coyne, Jr., K. Hatano, D.J. Evans, G.B. Pier, and J.B. Goldberg. Sequence Analysis of the O Antigen Locus from the Serogroup O11 *Pseudomonas aeruginosa* Strain PA103. Abstr. Annu. Meet Am. Soc. Microbiol. 1998.
12. **Franklund, C.V.** and J.B. Goldberg. Cloning and Characterization of GltX from *Pseudomonas aeruginosa*. Abstr. Annu. Meet. Am. Soc. Microbiol. 1998.
13. **Franklund, C.V.** and R.J. Kadner. Regulation of *btuB* in *Escherichia coli*. Abstr. Annu. Meet. Am. Soc. Microbiol. 1996.
14. Baron, S. F., **C. V. Franklund**, and P. B. Hylemon. Cloning, Sequencing, and Expression of the Gene coding for 7a-hydroxysteroid dehydrogenase from *Eubacterium* sp. VPI 12708. Southeastern Microbial Physiology and Genetics Conference 1994.
15. Baron, S. F., **C. V. Franklund**, and P. B. Hylemon. Characterization of the Bile Acid-Inducible NADH:Flavin Oxidoreductase Gene from *Eubacterium* sp. VPI 12708. Annu. Meet. of the Virginia Branch of the Am. Soc. for Microbiol. 1993.
16. Baron, S. F., **C. V. Franklund**, and P. B. Hylemon. Characterization of the Bile Acid-Inducible NADH:Flavin Oxidoreductase Gene from *Eubacterium* sp. VPI 12708. Abstr. Annu. Meet. Am. Soc. Microbiol. 1993.
17. **Franklund, C.V.**, and P.B. Hylemon. Purification and Characterization of a 7a - Hydroxysteroid Dehydrogenase from *Eubacterium* sp. Strain VPI 12708. Annu. Meet. of the Virginia Branch of the Am. Soc. for Microbiol. 1989. (Outstanding Speaker Award)
18. **Franklund, C.V.**, and P.B. Hylemon. Evidence for a Multiprotein Complex Containing the Cholate-Inducible NADH:Flavin Oxidoreductase from *Eubacterium* sp. Strain VPI 12708. Abstr. Ann. Meet. Am. Soc. Microbiol. 1988.
19. **Franklund, C.V.**, and P.B. Hylemon. Evidence for a Multiprotein Complex Containing the Cholate-Inducible NADH:Flavin Oxidoreductase from *Eubacterium* sp. Strain VPI 12708. Annu. Meet. of the Virginia Branch of the Amer. Soc. for Microbiol. 1988.
20. **Franklund, C.V.**, and T.L. Glass. Glucose Uptake by the Cellulolytic Rumen Anaerobe *Bacteroides succinogenes* S85. Annu. Meet. of the North Dakota Branch Am. Soc. Microbiol. 1986.
21. **Franklund, C.V.**, and T.L. Glass. Glucose Uptake by the Cellulolytic Rumen Anaerobe *Bacteroides succinogenes* S85. Abst. Ann. Meet. Am. Soc. Microbiol. 1986.

Peer Reviewed Publications:

1. Pandak, W.M., P. Bohdan, **C. Franklund**, D.H. Mallonee, G. Eggertsen, I. Björkhem, Z.R. Vlahcevic, and P.B. Hylemon. Expression of Sterol 12a-Hydroxylase Alters Bile Acid Pool Composition in Primary Rat Hepatocytes and *In Vivo*. Gastroenterology **120**:1801-9 (2001).
2. Dean, C.D., **C.V. Franklund**, J.D. Retief, M.J. Coyne, Jr., K. Hatano, D.J. Evans, G.B. Pier, and J.B. Goldberg. Characterization of the O Antigen Locus from the Serogroup O11 *Pseudomonas aeruginosa* Strain PA103: Identification of the O Antigen Polymerase Gene. J. Bacteriol. **181**: 4275–4284 (1999).
3. **Franklund, C.V.**, and J.B. Goldberg. Cloning and Characterization of *gltX* from *Pseudomonas aeruginosa* PAK. J. Bacteriol. **181**:3582-3586 (1999)

4. **Franklund, C.V.** and R.J. Kadner. Multiple Transcribed Elements Control Expression of the *Escherichia coli btuB* Gene. J. Bacteriol. **179**:4039-4042 (1997)
5. Aitchison, Paul M., Spencer B. Gay, **C.V. Franklund**, and J.J. Jackson. A Web-based End of Rotation Quiz. Acad. Radiol. **4**: 860-61 (1997).
6. **Franklund, C.V.**, S.F. Baron, and P.B. Hylemon. Characterization of the baiH Gene Encoding a Bile Acid-Inducible NADH:Flavin Oxidoreductase from *Eubacterium* sp. Strain VPI 12708. J. Bacteriol. **175**:3002-3012 (1993).
7. Baron, S.F., **C.V. Franklund**, and P.B. Hylemon. Cloning, Sequencing, and Expression of the Gene Coding for Bile Acid 7-Hydroxysteroid Dehydrogenase from *Eubacterium* sp. Strain VPI 12708. J. Bacteriol. **173**:4558-4569 (1991).
8. Hylemon, P.B., P.D. Melone, **C.V. Franklund**, E. Lund, and I. Björkhem. Mechanism of Intestinal 7-dehydroxylation of Cholic Acid: Evidence that Allo-Deoxycholic Acid is an Inducible Side-Product. J. Lipid Res. **32**: 89-96 (1991).
9. **Franklund, C.V.**, P. de Prada, and P.B. Hylemon. Purification and Characterization of a Microbial, NADP-Dependent Bile Acid 7-Hydroxysteroid Dehydrogenase. J. Biol. Chem. **265**: 9842-9849 (1990).
10. White, W.B., **C.V. Franklund**, J.P. Coleman, and P.B. Hylemon. Evidence for a Multigene Family Involved in Bile Acid 7-Dehydroxylation in *Eubacterium* sp. Strain VPI 12708. J. Bacteriol. **170**: 4555-4561 (1988).
11. **Franklund, C.V.**, and T.L. Glass. Glucose Uptake by the Cellulolytic Rumenal Anaerobe *Bacteroides succinogenes*. J. Bacteriol. **169**: 500-506 (1987).

Non-Peer Reviewed Publications:

1. Lathrop, J.T., **C.V. Franklund** and R.J. Kadner. Communication Between Membranes in TonB-Dependent Transport Across the Bacterial Outer Membrane. In W.N. Kohings, H.R. Kaback and J.S. Lolkema (eds). Handbook of Biol. Phys. Vol. 2. Elsevier Press (1996).
2. **Franklund, C.V.** Microbiology. Chancellors Learning Systems, Fishers, IN. (2004).

DAVID M. GRIFFITH

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ASC 2004
Ferris State University
Big Rapids, MI 49307
(231) 591-5855
davidgriffith@ferris.edu

521 Linden St
Big Rapids, MI
49307

EDUCATION

Ph.D. in Biology, University of Illinois at Chicago, 1990
Concentration: Evolution and Environment
Dissertation: Ecology and evolution of predatory behavior in the carabid cave beetle *Neaphaenops tellkampfi*

B.S. in Biology, Hillsdale College, Hillsdale, Michigan, 1983

PROFESSIONAL EXPERIENCE

Visiting Assistant Professor of Biology, Ferris State University, Big Rapids, MI. 2003-present

Substitute Teacher and stay at home dad, Pike County (606) 433-9300 and Pikeville Independent Boards of Education (606) 432-8161. 1997-2003

Adjunct Professor of Biology, Prestonsburg Community College, Prestonsburg, Kentucky 1996-1997

Assistant Professor of Biology, Pikeville College, Pikeville, Kentucky 1993-1996

University Lecturer in Biology, Governors State University, University Park, Illinois 1990-1993

COURSES TAUGHT

Ferris State University: Biol 121: General Biology (majors), Biol 205: Human Anatomy & Physiology. Biol 344: Entomology; Biol 442: Ecology

Pikeville College: Human Anatomy, Ecology, Genetics, Principles of Biology I and II for majors, Introduction to Biology (non-majors), Invertebrate Zoology, Special Topics (Cave Ecology), and Comparative Anatomy.

Governors State University: General Biology, Human Physiology (a two semester sequence for Nursing majors), General Zoology, Human Genetics (non-majors), and Ecology.

Prestonsburg Community College: Human Anatomy and Physiology

PUBLICATIONS

Griffith, D. and T. Poulson, 1993. Mechanisms and consequences of intraspecific competition in a carabid cave beetle. Ecology **74**: 1373-1383

Griffith, D. and J. Brown. 1992. A null model of patch assessment with an application to a carabid cave beetle. Oikos **64**: 523-526.

Griffith, D. 1991. The effects of substrate moisture on survival of adult cave beetles (*Neaphaenops tellkampfi*) and cave cricket eggs (*Hadenoecus subterraneus*) in a sandy deep cave site. Bulletin of the National Speleological Society **53**: 98-103.

Griffith, D. 1990. Laboratory studies of predatory behavior in two subspecies of the carabid cave beetle *Neaphaenops tellkampfi*. International Journal of Speleology **19**: 29-38.

GRANTS

National Speleological Society Grant: Ecology of a terrestrial cave community; January-December 1986. $140.00

Karst Research Grant, Cave Research Foundation: The dynamics of a terrestrial cave predator-prey system: abiotic and biotic interactions; January-December 1987. $1,000.00

University of Illinois at Chicago Travel Grant, August 1987. $200.00

PRESENTATION OF PAPERS

"Ecology of a Terrestrial Cave Community." Presented at the Sigma Xi Graduate Student Forum, UIC, March, 1986.

"The Dynamics of a Terrestrial Cave Predator-prey System: Biotic and Abiotic interactions." Presented to the UIC Committee on Evolutionary Studies, April, 1986.

"Coevolution in a Cave Predator-Prey system." Presented at the National Speleological Society Annual Convention, Marquette, Michigan, June, 1987.

"Measuring Patch Assessment by a Carabid Cave Beetle: A Model and a Test." Presented at the 76th Annual Ecological Society of America meeting, San Antonio, Texas, August, 1991.

PUBLISHED ABSTRACTS

Griffith, D. 1988. Evolutionary and ecological interactions between the cave beetle *Neaphaenops tellkampfi* (Coleoptera: Carabidae) and the cave "cricket" *Hadenoecus subterraneus* (Orthoptera: Rhaphidophoridae) in Mammoth Cave National Park. Abstracts of the fourteenth annual scientific research meeting, Great Smoky Mountains National Park, May 12-13, 1988.

PUBLICATIONS IN NON-REFEREED JOURNALS

Griffith, D. 2004. Mark-recapture studies of cave beetles: a review and new methods. Cave Research Foundation Annual Report.

Griffith, D. 1985. Investigation of a predator-prey system found in Great Onyx Cave, Kentucky. Cave Research Foundation Annual Report.

Poulson, T., D. Griffith, and K. Schmidt. 1991. Energetic advantage of interspecific competition in *Neaphaenops t. tellkampfi*. Cave Research Foundation Annual Report.

COMMITTEE WORK

Governors State University: Division of Science Safety Committee (we developed a new set of rules and guidelines for safety in the science laboratories)

Pikeville College: Special Events Committee

PERSONAL DATA

Married to Jeannette; Children: Joseph and Matthew. Member of Tri-Beta Biology Honor Society, Captain of Hillsdale Soccer Club, Life Scout, Youth Soccer Coach for the Pikeville Area YMCA, 1993-2003.
JV Soccer Coach and Assistant Varsity Soccer Coach, Reed City High School, 2006
Hobbies: Chinese Philosophy and Language (Mandarin); Soccer, Nature Photography

PROFESSIONAL ASSOCIATIONS

Michigan Entomological Society
National Speleological Society
Human Anatomy & Physiology Society

REFERENCES

Dr. Robert Friar
Professor of Biology
Ferris State University
ASC 2019
Big Rapids, MI 49307
231-591-2542

Dr. James Hoerter
Professor of Biology
Ferris State University
ASC 3087
Big Rapids, MI 49307
231-591-2563

Mr. John Johnson
Adjunct Instructor
Biology Department
Ferris State University
Big Rapids, MI 49307
231-591-5849

Scott M. Herron
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820 Campus Dr. ASC 2017, Big Rapids, Michigan 49307-2225
Phone 231-591-2087; fax 231-591-2540, herrons@ferris.edu

Education:

2002 **Southern Illinois University,** Carbondale, IL - **Ph.D., Plant Biology**
Honor: Phi Kappa Phi, GPA 4.0
Specialization: Ethnobotany, Plant Taxonomy, and Cultural Anthropology
Dissertation: Ethnobotany of the Anishinaabek Northern Great Lakes Indians
Advisor: Dr. Donald Ugent

1998 **Grand Valley State University,** Allendale, MI - **B.S., Biology & Botany.**
Honor: Cum Laude, GPA: 3.80

Botanical Work Experience

1997 Frederik Meijer Botanical Garden; *Horticulture Intern*. Grand Rapids, Michigan.
1996-97 The GVSU Arboretum; *Arborist Intern*. Office of the Vice President for Finance and Administration, Grand Valley State University.
1996 Motman's Greenhouse; *Horticultural Assistant*. Grand Rapids, Michigan.

Teaching Appointments:

2008-10 ***Visiting Associate Professor*; University of Michigan Biological Station, Pellston, Michigan. College of Literature, Science and the Arts, University of Michigan**
2008- ***Tenured Associate Professor;*** Biological Sciences Department. Ferris State University, Big Rapids, Michigan.
2007- ***Associate Professor;*** Biological Sciences Department. Ferris State University, Big Rapids, Michigan.
2004-07 ***Assistant Professor;*** Biological Sciences Department. Ferris State University, Big Rapids, Michigan.
2004-08 ***Visiting Assistant Professor*; University of Michigan Biological Station, Pellston, Michigan. College of Literature, Science and the Arts, University of Michigan**
2003 ***Lecturer of* Ethnobotany; University of Michigan Biological Station, Pellston, Michigan. Department of Ecology and Evolutionary Biology, University of Michigan**
2002-04 ***Adjunct Assistant Professor;*** Biological Sciences Department. Ferris State University, Big Rapids, Michigan.
2001-02 ***Part-time Biology Instructor*; Life Science Department. John A. Logan College, Carterville, Illinois.**
2001 ***Co-coordinator;*** Economic Botany Seminar Series with Dr. Don Ugent. Department of Plant Biology. Southern Illinois University, Carbondale, Illinois.
1997-98 ***Supplemental Instructor, Peer Mentor;*** Minority Science Education Center. Office of Minority Affairs. Grand Valley State University, Allendale, Michigan.

Courses Taught:

2009-10:

Integrated Ecology (INBI 303): 4 credits- 1 lecture and 1 lab section (Grand Rapids)
Basic Botany (Biology 113): 3 credits- 1 lecture and 1 lab section
Microbial Ecology (Biology 218): 3 credits- 1 lecture and 1 lab section
Plant Propagation & Horticulture Seminar (Horticulture 152 & 250): 2+1 credits- 1 lecture and 1 lab section, 1 seminar section
Ethnobotany (EEB 455): 5 credits- Lecture/Lab/Field Course (UMBS Spring Term)

2008-09:

Integrated Ecology (INBI 303): 4 credits- 1 lecture and 1 lab section
Basic Botany (Biology 113): 3 credits- 1 lecture and 1 lab sections

Microbial Ecology (Biology 218): 3 credits- 1 lecture and 1 lab section
Plant Propagation & Horticulture Seminar (Horticulture 152 & 250): 2+1 credits- 1 lecture and 1 lab section, 1 seminar section
Ethnobotany (EEB 455): 5 credits- Lecture/Lab/Field Course (UMBS Spring Term)

2007-08:

Integrated Ecology (INBI 303): 4 credits- 1 lecture and 1 lab section
Basic Botany (Biology 113): 3 credits- 1 lecture and 1 lab sections
Microbial Ecology (Biology 218): 3 credits- 1 lecture and 1 lab section
Plant Propagation & Horticulture Seminar (Horticulture 152 & 250): 2+1 credits- 1 lecture and 1 lab section, 1 seminar section
Ethnobotany (EEB 455): 5 credits- Lecture/Lab/Field Course (UMBS Spring Term)

2006-07:

Integrated Ecology (INBI 303): 4 credits- 1 lecture and 1 lab section
Basic Botany (Biology 113): 3 credits- 1 lecture and 2 lab sections
Microbial Ecology (Biology 218): 3 credits- 1 lecture and 2 lab sections
Plant Propagation & Horticulture Seminar (Horticulture 152 & 250): 2+1 credits- 1 lecture and 1 lab section, 1 seminar section
Ethnobotany (EEB 455): 5 credits- Lecture/Lab/Field Course (UMBS Spring Term)

2005-06:

Non-Majors Biology (Biology 103): 4 credits- 1 lecture and 3 lab sections
Basic Botany (Biology 113): 3 credits- 1 lecture 2 lab sections
Microbial Ecology (Biology 218): 3 credits- 1 lecture and 2 lab sections
Plant Propagation (Horticulture 152): 2 credits-1 lecture and 1 lab section
Ethnobotany (EEB 455): 5 credits- Lecture/Lab/Field Course (UMBS Spring Term)

2004-05:

Non-Majors Biology (Biology 103): 4 credits- 1 lecture and 3 lab sections
Basic Botany (Biology 113): 3 credits- 1 lecture 2 lab sections
Microbial Ecology (Biology 218): 3 credits- 1 lecture and 2 lab sections
Plant Propagation (Horticulture 152): 2 credits-1 lecture and 1 lab section
Ethnobotany (EEB 455): 5 credits- Lecture/Lab/Field Course (UMBS Spring Term)

2003-04:

Non-Majors Biology (Biology 103): 4 credits- 1 lecture and 3 lab sections
Microbial Ecology (Biology 218): 3 credits- 1 lecture and 2 lab sections
Non-Majors Biology (Biology 103): 4 credits- 1 lecture and 2 lab sections
Ethnobotany (EEB 455): 5 credits- Lecture/Lab/Field Course (UMBS Spring Term)

2002-03:

Non-Majors Biology (Biology 103): 4 credits- 1 lecture and 3 lab sections
Majors Biology (Biology 121): 4 credits- 1 lab section
Non-Majors Biology (Biology 103): 4 credits- 1 lecture and 2 lab sections
Microbial Ecology (Biology 218): 3 credits- 1 lecture and 1 lab section
Ethnobotany (EEB 455): 5 credits- Lecturer/TA (UMBS Spring Term)

2001-02:

Non-Majors Biology (Biology 100): 3 credit hours- 1 section lecture and lab
Human Anatomy and Physiology (Biology 106): 4 credit hours- 1 section lecture and lab
Non-Majors Biology (Biology 100): 3 credit hours- 2 lecture and 2 lab sections

Grants

2010	Student Research Grant with Lauren Mitten and Joshua Byers. FSU College of Arts and Sciences- $1000 (Pending)
2010	Lower Michigan Wild Rice Camp (workshop) September 2010. Ferris Foundation Exceptional Merit Grant, $5860
2010	Travel and Presentations to Ecological Society of America's Annual Meeting, Pittsburgh, Pennsylvania, August 1-6, 2010. Timme Travel Grant, $850
2009	Lower Michigan Wild Rice Camp (workshop) September 10-13. Great Lakes Regional Water Program. Co-PI with Patrick Robinson, University of Wisconsin-Extension, Green Bay, and Great Lakes Regional Water Progam, $6000

2009	Faculty and Staff Diversity Mini-Grant (lead investigator), Raising Expectations with Handicapped Accessible Raised Bed Gardens, $4000
2009	Biology Department Travel Grant-Michigan Academy Annual Meeting, Presentation by Dr. Herron's research team of undergraduates: Crystal Phillips, Chris LaVelle, Michael Reynolds, and Lauren Mitten, $300
2008	Student Research Grant-Crystal Phillips, Chris LaVelle, Michael Reynolds, FSU College of Arts and Sciences- $2000
2007	Great Lakes Regional Water Program; Wild Rice Camp (White Earth, MN) Travel Grant, University of Wisconsin Extension, $750
2007	Political Engagement Project Resource Grant (Integrated Ecology course), FSU- $242
2006	Political Engagement Project Resource Grant (Integrated Ecology course), FSU- $250
2006	Special Opportunity Grant for Wild Rice Coalition & Conference, Great Lakes Aquatic Habitat Network & Fund, Tipp of the Mitt Watershed Council, Petoskey, Michigan- $400
2005-06	Environmental Leadership Program Activity Fund award recipient-$6000
2006	Professional Development Grant, FSU Academic Senate; Wild Rice Restoration and Preservation: Professional Development in Ecology-$1213
2006	Student Research Grant-Elizabeth Mansfield, FSU College of Arts and Sciences- $500
2005	Student Research Grant-Melissa Holman, FSU College of Arts and Sciences- $500
2002	Travel Grant from Dean of Arts and Science to present a paper at Great Lakes United Indigenous Peoples Hub Workshop on Indigenous Organizational Development sponsored by the Great Lakes Aquatic Habitat Network and Fund, Sugar Island Cultural Camp, Sault Ste. Marie, MI.-$500
2000	James E. Ozment Achievement Award in Natural History. Southern Illinois University Foundation and the College of Science.-$600
1998	Michigan Botanical Club Annual Spring Foray Award. White Pine Chapter Foundation. -$1000
1997	Salski Award Grant. Department of Biology, Grand Valley State University.-$500

Research Fellowships & Professional Awards:

2010	Cambridge Who's Who VIP Member, Executive Professionals http://www.cambridgewhoswho.com/Members/MI/Scott-Herron-983839.html
2008-10	Carnegie/AASCU Scholar of Political Engagement
2006-	Golden Key International Honor Society Honorary Member
2005-	Environmental Leadership Program, senior fellow
2004-05	Environmental Leadership Program, national fellow
2005-06	Featured Teacher in 2005-06 Edition of Marquis Who's Who in Science and Engineering
2001-02	Dissertation Research Assistantship (DRA) Fellowship. *Graduate School*, Southern Illinois University-Carbondale.
1998-01	Illinois Minority Graduate Incentive Program (IMGIP) Fellowship. *State of Illinois*, Southern Illinois University-Carbondale.
1998	Thomas M. Seykora Award for Outstanding Volunteer Contribution. *Grand Valley State University*
1996-97	Outstanding Biology Student Awards. *Grand Valley State University*.

Professional Development Activities:

2009	Ethnobiology & Wild Rice Presentation. Protectors of the Earth Youth Camp. Seventh Generation Cultural Center. Saginaw Chippewa Indian Tribe of Mt. Pleasant. July 29th.
2008	Political Engagement Project Meeting (national report to PEP and NY Times) at New York Times Headquarters, Manhattan, NY, January 25, 2008. Ferris report to PEP, NYT given with co-authors: Anthony Baker and Connie Meinholdt
2006-10	*Native Wild Rice Coalition, Co-Chair*; Regional coalition of governmental agencies, universities, tribal community colleges, graduate student researchers, tribal community members, non-profits, tribal governments and community groups funded through grants and administrated through the University of Wisconsin Extension through the Great Lakes Regional Water Program. Co-Chair, Patrick Robinson, UWEX-Green Bay.

2007	Traditional Wild Rice Camp, August 30-September 2. White Earth, Minnesota. Hosted by the Sah-kay-tay Indigenous Preservation Society.
2007	*Native Wild Rice Coalition,* Strategic Planning Meeting, March 6; College of Menominee Nation, Keshena, Wisconsin.
2006	Pere Marquette Sea Lamprey Symposium on October 14, 2006 at West Shore Community College.
2006	56th Annual Meeting of the Eastern Region of the International Plant Propagators Society on October 4-7, 2006 at the Amway Grand Plaza Hotel in Grand Rapids, Michigan.
2006	*Wild Rice Conference brochure and website;* Design and development with Patrick Robinson and Rebecca Power-University of Wisconsin Extension; summer 2006. *http://www.uwex.edu/ces/regionalwaterquality/wildrice/index.htm*
2006	*Northern Michigan University Special Topics Course Proposal, Manoomin Niikaanisag: Wild rice and all its relations;* 3/13/06; approved as NAS 298 for 3 credits through the NMU Center for Native American Studies; Instructor Donald Chosa; 9 students enrolled and completed the class held at Wild Rice Conference.
2005	Professional Development Plan revised for the Environmental Leadership Program.
2004	Professional Development Plan developed and peer reviewed for the Environmental Leadership Program.
2003-06	Protectors of the Earth Youth Camp executive committee: Chair of Equipment and Supplies committee (2003-2005); Member of Evaluation Team (2003-2006); Chaperone and Camp Counselor (2003-2004)

Published Papers

2010	Herron, S.M.; Human History (Chapter 1) in *The Changing Environment of Northern Michigan: A Century of Science and Nature at the University of Michigan Biological Station;* editors: Knute Naddelhoffer, Alan Hoag & Brian Hazlett. University of Michigan Press.
2009	Robinson, P., Herron, S., Power, R, and D. Zak; *A regional multicultural approach to sustaining wild rice. Journal of Extension*, Vol. 47 (6):1-5. http://www.joe.org/joe/2009december/pdf/JOE_v47_6iw6.pdf
2003	Herron, S.M.; Catnip, *Nepeta cataria,* a morphological comparison of mutant and wild type specimens to gain an ethnobotanical perspective. *Economic Botany*, Vol. 57(1): 135-142.
2003	Herron, S.M.; American Indian use of the natural resources in the Muskegon River watershed (Pre-contact). *River View: News from the Muskegon River Watershed Assembly*. Vol. 1(8): 3.
2000	Herron, S.M.; Ethnobotanical Crisis as the US Government Attempts to Utilize Biowarfare to Unwisely Combat the War on Drugs. *Ethnobotanical Leaflets*, Spring-Summer 2000, www.siu.edu/~ebl/scott.htm.
1999	Herron, S.M.; The Natural History of Mahogany. *Ethnobotanical Leaflets*, Spring 2000, www.siu.edu/~ebl/leaflets/mahogany.htm.
1998	Herron, S.M.; Medicinal Plants Usage of the Anishinaabek Great Lakes Indians. Ningiziwaush Press, Detroit, Michigan.
1996	Herron, S.M. and M. L. Hulls; *Within the Depths of Peyote.* A video produced, edited, filmed, and narrated by Scott Herron and Michelle Hulls. SHMH Productions, Allendale, Michigan.

Published Abstracts

2010	Dr. Scott Herron, Josh Byers, Brenna Chencinski, Andrea Lodholtz, Lauren Mitten, Nicole Patrosso, Michael Reynolds, and Sarah Thompson. *The Importance of Wild Rice Camps for the Continued Research and Harvesting of Wild Rice in Lower Michigan.* Michigan Academician: Papers of the Michigan Academy of Science, Arts and Letters. Volume XXXX (4). http://webcache.googleusercontent.com/search?q=cache:usNE3pJXT_cJ:themichiganacademy.org/Content/Documents/Document.ashx%3FDocId%3D115280

2009 Phillips, C. and S. Herron. COS 97-10: *Wild Rice population resiliency in response to fungal smut pathogen.* 94th Ecological Society of America Annual Meeting. http://esameetings.allenpress.com/2009/Paper16743.html

2009 Mitten, L. and S. Herron. COS 94-3: *Viability and germination studies to elucidate the dynamics of wild rice restoration from northwestern to southeastern populations in the Great Lakes region.* 94th Ecological Society of America Annual Meeting. http://esameetings.allenpress.com/2009/Paper18425.html

2009 Mitten, D. and S. Herron. *COS 5-4 The politics of green: Civically engaging undergraduate students.* 94th Ecological Society of America Annual Meeting. http://esameetings.allenpress.com/2009/Paper18442.html

2009 Herron, S. M., P. Robinson, and R. LaBine. *COS 115-2 Incorporating traditional ecological knowledge into wild rice research, education and management efforts in the Great Lakes region.* 94th Ecological Society of America Annual Meeting. http://esameetings.allenpress.com/2009/Paper17575.html

2009 Crystal Phillips, Michael Reynolds, Chris LaVelle, Lauren Mitten, and Scott M. Herron. *Wild Rice Viability and Germination Testing to Compare Southern and Northern Ecotypes of Northern Wild Rice, Zizania aquatica Var. angustifolia, for Restoration Potential in Michigan.* Michigan Academician: Papers of the Michigan Academy of Science, Arts and Letters. Volume XXXIX (4):263-264. http://www.thefreelibrary.com/Botany+and+plant+ecology.-a0219833051

2008 Herron, S. M. *The use of ecological Detrended Correspondence Analysis (DCA) in evaluating the dissemination of ethnobotanical knowledge within the Anishinaabek Great Lakes Indian culture;* Michigan Academician, Volume XXXVII(4). *A Published Abstract* from presentation at Michigan Academy of Science, Arts, and Letters Annual Meeting; *Botany and Plant Ecology Section,* at Oakland University on March 3, 2006

2008 Herron, S., P. Robinson, E. Hoagland, W. Paulson, P.David, D. M. Zak, and R. Power. PS 87-151: *Native Wild Rice Coalition's cultural and ecological restoration.* 93rd Ecological Society of America Annual Meeting. http://eco.confex.com/eco/208/techprogram/P14632.HTM

2008 Herron, Scott. *Coalition Building as a Model to Address Regional Environmental Issues in Restoration Ecology: A Case Study to Sustain Wild Rice.* Michigan Academician: Papers of the Michigan Academy of Science, Arts and Letters. Volume XXXVIII (4):16. http://goliath.ecnext.com/coms2/gi_0199-10351687/Botany-plant-ecology.html

University Service Load:

2009-11 Biology Curriculum Committee
2008-09 American Democracy Project (ADP)-Political Engagement Project (PEP) Council
2008-11 College of Arts and Sciences Diversity Committee
2007-10 Senate Diversity Committee, Chair (2007-2009)
2007-08 Equity Conference Planning Committee, hosted by FSU March 30-April 2, 2008.
2004-10 Biology Education Coordinator and Advisor
2007-09 Diversity Planning Committee, University-wide committee chaired by Dr. David Pilgrim.
2006-07 University Chief Diversity Officer hiring committee (hired David Pilgrim).
2005-10 College of Arts and Sciences' Education Program Coordinators (Secondary Education) committee
2005-06 Diversity Incidents Team, FSU campus wide committee advocating justice, equality, and equity within the campus community 2005-2006
2005 Program Review Panel Member (Elementary Education BS of Science Degree)
2005 Program Review Panel Member (Ornamental Horticulture Technology AAS Degree)
2004-05 College of Arts and Sciences' Integrated Science Teaching Minor (Elementary Education) committee
2004 Biology Department's Lab Prep Supervisor hiring committee (hired Andrea Bruziac)
2004-05 Biology Department's Vertebrate Biologist hiring committee (hired Dr. Joseph Lipar)
2004-05 Biology Department's Cell and Molecular Biology hiring committee (hired Dr. Brad Isler)
2004-05 Biology Department's General Biology hiring committee (hired Dr. Paul Klatt)
2004-07 Biology Department Planning Committee

2003, 06	Biology Department Microscope Committee
2003-06	Student Affairs/Academic Affairs Divisions Hispanic (Minority) Recruitment Initiative
2002-04	Office of Minority Student Affairs - American Indian consultant and advisor,
2002-06	Rankin Center Art Gallery – American Indian art acquisition project
2002-05	American Indian and ethnic minority recruiter; Admissions and Records under Assistant Director Cathryn Claerhout and Vice President Dan Burcham.

Current Professional and Academic Association Memberships:

2005-10	Ecological Society of America; *Traditional Ecological Knowledge section member; Plant Population Ecology Section member; Education Section member; Environmental Justice section member; Microbial Ecology Section member*
2004-10	Michigan Academy of Science, Arts, and Letters; *Botany and Plant Ecology Section Vice-Chair (2005-07); Co-Chair (2007-09).*
2000-10	Society of Ethnobiology.
1998-10	Society for Economic Botany; member- *Student Advisory Committee member (1999-2002)*
2003-05	American Association of Plant Taxonomists
2001-03	Phi Kappa Phi Honor Society
2001-03	Society of Ecological Anthropology
1998-02	WDBX 91.1 FM-Carbondale, IL – "Native Voices"- American Indian Radio Show; *Co-host and co-producer.*
1998-00	American Indian Association; *Vice President.* Southern Illinois University.
1994-98	Native American Student Association; *President, Senior Advisory Council Member, Director of Subcommittees.* Grand Valley State University.
1995-98	Minority Student Organization Council; *Board Member.* Grand Valley State University.

Professional Presentations:

2010	*Translating Wetland Field Experiences into Classrooms at* Get Wet and Wild: Aquatic Academy for Teachers. Muskegon River Watershed Assembly, Camp Newaygo http://www.mrwa.org/repository/pdf/brochure-2010.pdf (workshop leader).
2010	Dr. Scott Herron, Josh Byers, Brenna Chencinski, Andrea Lodholtz, Lauren Mitten, Nicole Patrosso, Michael Reynolds, and Sarah Thompson 2010. *The Importance of Wild Rice Camps for the Continued Research and Harvesting of Wild Rice in Lower Michigan.* Michigan Academy of Science, Arts and Letters: Botany and Plant Ecology Section, Calvin College (oral).
2009	Phillips, C. and S. Herron. COS 97-10: *Wild Rice population resiliency in response to fungal smut pathogen.* 94th Ecological Society of America Annual Meeting. (oral).
2009	Mitten, L. and S. Herron. COS 94-3: *Viability and germination studies to elucidate the dynamics of wild rice restoration from northwestern to southeastern populations in the Great Lakes region.* 94th Ecological Society of America Annual Meeting. (oral).
2009	Mitten, D. and S. Herron. *COS 5-4 The politics of green: Civically engaging undergraduate students.* 94th Ecological Society of America Annual Meeting. (oral).
2009	Herron, S. M., P. Robinson, and R. LaBine. *COS 115-2 Incorporating traditional ecological knowledge into wild rice research, education and management efforts in the Great Lakes region.* 94th Ecological Society of America Annual Meeting. (oral).
2009	A hands-on learning approach-wild rice conservation, harvesting, restoration, processing, and environmental analyses research at an undergraduate teaching university in Michigan. Scott Herron, Andrea Lodholtz, Crystal Phillips, Michael Reynolds, Chris LaVelle, and Patrick Robinson. National Water Conference, St. Louis, MO (poster).
2009	Multistate Knowledge of Wild Rice Cultural and Ecological Knowledge. Scott Herron, and Patrick Robinson. National Water Conference, St. Louis, MO (oral).
2009	Wild Rice Restoration and Preservation: Michigan's Aquatic Gardens. Michigan Wildflower Confereence, Kellog Center, East Lansing. (invited oral plenary).
2009	Wild rice viability and germination testing to compare southern and northern ecotypes of northern wild rice, *Zizania aquatica* var. *angustifolia*, for restoration potential in

Michigan. Scott Herron, Crystal Phillips, Michael Reynolds, Chris LaVelle, and Lauren Mitten. Michigan Academy of Science, Arts, and Letters, Wayne State University (oral)

2008 *Native Wild Rice Coalition's cultural and ecological restoration.* Scott Herron (presenter), Patrick Robinson, Earl Hoagland, William Paulson, Peter David, Deborah Zak, and Rebecca Power. Ecological Society of America Annual Conference, Milwaukee, Wisconsin, August 2008. (poster).

2008 Wild Rice Roundtable Discussion. Ecological Society of America Annual Conference, Milwaukee, Wisconsin, August 2008.

2008 *The role of traditional drums in the bridging of traditional ecological knowledge from the past to the future.* Scott Herron, Society for Ethnobiology Annual Conference, Fayetteville, AR, April 17, 2008. (oral).

2008 *Wild rice ecosystems: The place to be for bird watching and food harvesting!* Scott Herron, Michigan Botanical Club-White Pine Chapter, Grand Valley State University, March 22, 2008. (oral).

2007 *Sustaining wild rice through multicultural partnerships.* Patrick Robinson, Rebecca Power, and Scott Herron, Outreach Scholarship Conference, University of Wisconsin-Madison, October 8, 2007. (oral).

2007 *Wild Rice Coalition building in the Great Lakes.* Scott Herron and Patrick Robinson, Society of Ethnobiology 30th Annual Conference, University of California-Berkeley, CA, March 28-31, 2007. (oral).

2007 *Coalition building as a model to address regional environmental issues in restoration ecology: A case study to sustain wild rice.* Scott Herron and Patrick Robinson, Michigan Academy of Science, Arts, and Letters, *Botany and Plant Ecology Section*, at Ferris State University on March 9, 2007. (oral).

2007 *What is Ethnobotany? Career prospects and educational pathways (workshop)*; Protectors of the Earth Youth Camp; Bay Mills Community College on July 31, 2007.

2006 *The Journey Ahead: Building a Regional Network to Sustain Wild Rice/Manoomin (keynote address);* Wild Rice Restoration and Preservation Conference; Lac Vieux Desert Resort and Conference Center in Watersmeet, Michigan, August 7-10, 2006.

2006 *Native Harvested Plants: Ethnobotany of the Lake Superior Anishinaabek (workshop)*; Protectors of the Earth Youth Camp; Bay Mills Community College on August 1, 2006.

2006 *Wild Rice Restoration and Coalition Building on Hamlin Lake & the Ludington Area*; Hamlin Township Hall in Ludington on June 22, 2006.

2006 *Wild Rice's status in Michigan & Houghton Lake: What is happening in the restoration and coalition movements;* Houghton Lake Improvement Board meeting on April 25, 2006

2006 *Wild Rice Restoration and Coalition Building on the Muskegon River Watershed*; Grand Valley State University Annis Water Institute in Muskegon on April 10, 2006.

2006 *The use of ecological Detrended Correspondence Analysis (DCA) in evaluating the dissemination of ethnobotanical knowledge within the Anishinaabek Great Lakes Indian culture;* Michigan Academy of Science, Arts, and Letters Annual Meeting; *Botany and Plant Ecology Section,* at Oakland University on March 3, 2006. (oral).

2005 *The role of forensic insects in deposition of pollen at a death scene*. Rebecca J Kirby, Anita L. Guedea, Phillip L. Watson, Roger E. Mitchell and Scott M. Herron. American Academy of Forensic Sciences meeting in New Orleans in February 2005.

2005 *Wild Rice Coalition Building;* Ziibiwing Museum of the Saginaw Chippewa Indian Tribe in Mt. Pleasant, MI on December 1, 2005 (oral).

2004 *Ethnobotany of the Lake Superior Anishinaabek (workshop)*; Protectors of the Earth Youth Camp; Sugar Island Culture Camp on Sugar Island, near Sault Ste. Marie, August 1-6, 2004.

2004 *Wild Rice Restoration & Population Ecology on the Muskegon River Watershed;* Scott Herron and Gale Nobes, Michigan Academy of Science, Arts, and Letters Annual Meeting; *Botany and Plant Ecology Section* at Grand Valley State University on March 5-6, 2004. (oral).

2003 *Outdoor Life & Survival Skills of the Great Lakes Indians (workshop with Bucko Teeple)*; Protectors of the Earth Youth Camp; Clear Lake Camp near Shingleton, Michigan, August 8-16, 2003.

Bradley Jacob Isler

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Professional Experience

***Associate Professor of Biology and Biotechnology Program Coordinator,* Ferris State University, Big Rapids, Michigan, 2005 - present**

- Responsible for the instruction of several biology and biotechnology courses
- As coordinator of the biotechnology program, responsible for recruiting, advising, and supervision of curricular activities
- Current research project: A study of the genetic differences between normally sighted and anophthalmic rats

***Research Geneticist,* U.S. Meat Animal Research Center, Clay Center, Nebraska, 2003 - 2005**

- Postdoctoral position
- Area of focus: Quantitative and molecular genetics of sheep
- Primary research project: Investigation of genomic regions associated with carcass and meat quality traits in sheep
- The U.S. Meat Animal Research Center is a unit of the United States Department of Agriculture and the Agricultural Research Service

Education

***The Ohio State University*, Columbus, Ohio, 1997 - 2003**

- Ph.D. in Animal Genetics, March 2003
- M.S. in Animal Genetics, December 1998
- Area of focus: Quantitative and molecular genetics of swine
- Cumulative GPA: 3.70 / 4.00
- Advisor: Dr. Keith Irvin
- Ph.D. dissertation title: An investigation of the associations between several candidate genes and reproductive traits in swine
- M.S. thesis title: Association between the estrogen receptor gene and reproductive components in swine

***Iowa State University*, Ames, Iowa, 1996 - 1997**

- Attended graduate school
- Major: Molecular, Cellular, and Developmental Biology
- Cumulative GPA: 4.00 / 4.00
- Advisor: Dr. Donald Beitz

***Ohio Northern University*, Ada, Ohio, 1992 - 1996**

- B.S. in Biochemistry, with High Distinction
- Biochemistry degree certified by the American Chemical Society
- Cumulative GPA: 3.80 / 4.00

Teaching Experience

***Associate Professor of Biology,* Ferris State University, August 2005 - present**

- Biology 101 (Genetics: Human Aspects)
  - Course designed for non-science majors
  - Taught fall semesters 2005-09
- Biology 122 (General Biology 2)
  - Second course in the two semester general biology series
  - Taught spring semesters 2005-06, summer semesters 2006-09
- Biology 174 (Introduction to Biotechnology)
  - Course designed to introduce students to the biotechnology program at Ferris State and the biotechnology industry as a whole
  - Newly developed fall 2006
  - Taught fall semester 2006-07
- Biology 375 (Principles of Genetics)
  - Junior-level general genetics course for biology and biotechnology students. Serves a prerequisite for many other courses.
  - Taught spring semester 2008-present
- Biology 491 (Biotechnology Internship)
  - Internship course for biotechnology students.
  - Taught as needed, usually in summer.
  - Redesigned in summer 2009.
- Biology 475/490 (Bioinformatics)
  - Course designed to explore the newly emerging field of bioinformatics, which combines molecular biology and information technology
  - Newly developed spring 2006
  - Taught spring 2006

***Instructor,* The Ohio State University, 2002**

- Animal Sciences 320 (Principles of Genetic Improvement)
  - Course designed to introduce students to the basics of animal breeding and genetics
  - Fully responsible for all aspects of course
  - Taught winter semester 2002

***Teaching Assistant,* The Ohio State University, 1997 - 2001**

- Animal Sciences 320 (Principles of Genetic Improvement)
  - Prepared and taught daily lectures during professor's absence
  - Prepared and graded student examinations and quizzes
  - Managed supplemental student project (cow herd computer simulation)
- Animal Sciences 543 (Swine Production)
  - Assisted students in laboratories
- Animal Sciences 600 (Capstone Current Issues and Writing Course)
  - Assisted students in preparation of group presentations
  - Prepared and graded student examinations
  - Presented a special lecture on biotechnology and the future of animal agriculture

***Teaching Assistant,* Iowa State University, August 1996 - December 1996**

- Biology 201L (General Biology Laboratory)
  - Prepared and taught weekly lectures and laboratory experiments
  - Prepared and graded examinations, quizzes, and reports

Research Experience

***Associate Professor of Biology,* Ferris State University, 2005 - present**

- Investigating the genetic differences between normally sighted and anophthalmic rats
- Four biotechnology students and one high school student have assisted with this project

***Research Geneticist,* U.S. Meat Animal Research Center, 2003 - 2005**

- Investigated the relationship between regions of the sheep genome and economically important traits
- Performed a genome scan for quantitative trait loci that are associated with production and carcass traits in sheep
- Investigated the PRNP locus in sheep, which codes for the prion protein and is related to scrapie, one of the transmissible spongiform encephalopathies

***Research Assistant,* Department of Animal Sciences, The Ohio State University, 1997 - 2003**

- Studied the effect of candidate genes on reproductive tract components in several breeds of swine
  - Study involved the discovery and analysis of novel polymorphisms in a variety of candidate genes: estrogen receptor-α, estrogen receptor-β, paternally expressed 1, paternally expressed 3, H19, prolactin receptor, and retinol binding protein-4
- Studied the genetic and meat quality issues surrounding the Rendement Napole condition in swine

***Research Assistant,* Molecular, Cellular, and Developmental Biology Program, Iowa State University, 1996 - 1997**

- Participated in the molecular, cellular, and developmental biology rotation program
- Studied a variety of topics in molecular and cellular biology, including the role of G-proteins in tumor formation, the porcine PIT-1 gene, and methods to increase the concentration of conjugated linoleic acid in the rumen of dairy animals

University and Community Service

- Biotechnology program coordinator, 2005-present
- Summer registration advisor, 2006-present
- Co-advisor for Delta Nu Alpha (biotechnology student organization), 2006-present
- Biotechnology Summer Academy for high school students
  - Camp director, 2007-09
  - Camp assistant, 2006
- Invited presentations
  - 2007 FSU-Grand Rapids Career Pathways Teachers Academy, summer 2007
  - Honors program "Lunch and Learn" series, fall 2007
  - CARE 102 Career and Education Planning course, fall 2007
- Search committee membership
  - Biology department head, September-November 2006
  - One year developmental biologist, summer 2007
  - Tenure-track developmental biologist, 2007-08 and 2008-09
  - Tenure-track anatomist and physiologist, 2008-09.
  - General biology advisor, summer 2008.
  - One year protein biochemist, summer 2009.
- General committee membership
  - University institutional animal care and use (IACUC), 2006-present
  - Honors program nationally competitive scholarship, 2007-present
  - College of Arts and Sciences standards and policies, 2006- 009
  - College of Arts and Sciences advising excellence, 2007-present
  - College of Arts and Sciences sabbatical leave committee, fall 2009-present
  - Biology department planning, 2007-present
  - Biology department awards committee, 2008-present
- Ferris State faculty representative for the Udall Scholarship
- Recruitment activities.
  - Honors symposium, February 2006.
  - Phone recruitment drive, Spring 2009
- Judge for the local competition of the International Engineering and Science Fair, March 2008 and 2009.

Honors and Awards

- L.E. Kunkle Award, 2003
  - Awarded annually to the outstanding animal sciences graduate student at the Ohio State University
- Charles E. Thorne Memorial Scholarship, 2001
  - Awarded to a single outstanding graduate student selected from all agricultural science graduate students at The Ohio State University
- National Swine Improvement Federation Outstanding Graduate Student Award, 1999
  - Awarded annually to the outstanding swine genetics graduate student in the United States
- Gamma Sigma Delta National Agriculture Honorary, 1999

Grants

- College of Arts and Sciences Dean's grant. A study of the genetic differences between normally sighted and SDF/Fsp-*anop* anophthalmic rats. $4287. 2007-2008.
- Ohio Pork Producers Council. $4,500. Examination of the Relationship between Several Candidate Genes and Reproductive Traits in Swine. 2001-2002

Reviewerships

- *Journal of Animal Science* Editorial Board, 2009- present
- *Human Heredity*, Cummings, Eighth Edition
- *Theriogenology*

Professional Memberships

- American Society of Animal Science, 1997-present

Publications and Presentations

Isler, B.J., B.A. Freking, R.M. Thallman, M.P. Heaton and K.A. Leymaster. 2006. Evaluation of associations between prion haplotypes and growth, carcass, and meat quality traits in a Dorset x Romanov population. Journal of Animal Science. 82: 783-788.

Isler, B.J, B.A. Freking, K.A. Leymaster, and M.A Heaton. 2004. Investigation of the association between prion genotype and economically important traits in sheep. Journal of Animal Science. 83(Suppl. 2): 44 (Abstract).

Isler, B.J, B.A. Freking, and K.A. Leymaster. 2004. 2003-2004 U.S. Meat Animal Research Center annual report to NC-109. Paper presented at the 2004 NC-109 annual sheep research meeting in Duluth, Minnesota.

Isler, B.J., K.M. Irvin, S.M. Neal, S.J. Moeller, and M.E. Davis. 2002. Examination of the relationship between the estrogen receptor gene and reproductive traits in swine. Journal of Animal Science. 80:2334-2339.

Isler, B.J., K.M. Irvin, S.M. Neal, S.J. Moeller, and M.E. Davis. 2002. Examination of the relationship between the paternally expressed gene 3 and reproductive tract components in swine. Proceedings of the 7th World Congress of Genetics Applied to Livestock Production. CD-Rom Communication. N° 08-28.

Isler, B.J., K.M. Irvin, S.M. Neal, S.J. Moeller, and M.E. Davis. 2002. Investigation of the relationship between the estrogen receptor beta gene and reproductive components in swine. Journal of Animal Science. 80(Suppl. 1): 378 (Abstract).

Isler, B.J., K. M. Irvin, M.F. Rothschild, and G.J. Evans. 2001. Examination of the relationship between the prolactin receptor gene and reproductive components in swine. Research and Reviews: Swine 2001, OARDC special circular 185. 83-86.

Isler, B.J., K. M. Irvin, M.F. Rothschild, and G.J. Evans. 2000. Association between the prolactin receptor gene and reproductive components in swine. Poster presented at the 2000 Annual Conference of the National Swine Improvement Federation.

Isler, B.J., K. M. Irvin, M.F. Rothschild, and G.J. Evans. 2000. Association between the prolactin receptor gene and reproductive components in swine. Proceedings of the 27th Conference of the International Society of Animal Genetics. CD-Rom Communication. N° C032. (Abstract).

Isler, B.J., K.M. Irvin, S.M. Neal, S.J. Moeller, M.E. Davis, and D.L. Meeker. 1999. Examination of the relationship between the estrogen receptor gene and reproductive traits in swine. Presentation at the 1999 Annual Conference of the National Swine Improvement Federation.

Isler, B.J., K. M. Irvin, S. M. Neal, S.J. Moeller, M.E. Davis, and D.L Meeker. 1999. The effect of estrogen receptor genotype, breed, and parity on litter traits and reproductive tract traits in swine. Journal of Animal Science. 77(Suppl. 1): 131 (Abstract).

Isler, B.J., K. M. Irvin, S. M. Neal, S.J. Moeller, and M.E. Davis. 1999. Association between the estrogen receptor gene and reproductive components in swine. Journal of Animal Science. 77(Suppl. 1): 32 (Abstract).

Isler, B.J., K. M. Irvin, S. M. Neal, S.J. Moeller, M.E. Davis, and D.L Meeker. 1999. The effect of the estrogen receptor gene on litter traits in swine. Research and Reviews: Poultry and Swine, OARDC special circular 171. 50-53.

Isler, B.J., K. M. Irvin, and S. M. Neal. 1999. Examination of the relationship between the estrogen receptor gene and reproductive tract components in swine. Research and Reviews: Poultry and Swine, OARDC special circular 171. 54-59.

Isler, B.J., K. M. Irvin, and S. M. Neal. 1998. Investigation of the estrogen receptor gene and its association with reproductive tract traits in swine. Research and Reviews: Poultry and Swine, OARDC special circular 164. 49-51.

Isler, B.J., K. M. Irvin, and S. M. Neal. 1998. Investigation of the estrogen receptor gene and its association with reproductive tract traits in swine. Ohio Swine Day 98 Proceedings: Issues For a Healthy Pork Industry.

Irvin, K.M., S. M. Neal, S. J. Moeller, D. L. Meeker, B. J. Isler, R. Emnett, S. Kacirek, and M. Barhorst. 1997-98 Ohio annual report to NC-220. Paper presented at the 1998 NC-220 Annual Meeting in Auburn, Alabama.

JOHN W. JOHNSON

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EDUCATION

Central Michigan University — **Mt. Pleasant, Michigan**
Master of Arts in Physical Education and Sport — May 2000
Major: Exercise Science

Carthage College — **Kenosha, Wisconsin**
Bachelor of Arts — August 1996
Major: Biology

Alpena Community College — **Alpena, Michigan**
Associate of Science — May 1994
Graduated Magna Cum Laude

EXPERIENCE

Ferris State University — **Big Rapids, Michigan**
Lab Instructor for BIOL 205 — 08/07 to present

- Teach Anatomy/Physiology students pursuing degrees in Nuclear Medicine, Pre-pharmacy, Forensic science, and other allied health professions to apply what they have learned in lecture to experimentation
- Instruct students on proper use of lab equipment
- Assist students in developing skills necessary to approach and solve problems in a scientific manner

Advanced Cardiac Specialists — **Gilbert, Arizona**
Director of Cardiac Rehabilitation (8/01 to 7/06) — 02/99 to 07/06

- Managed five rehab sites
- Served as source of information on exercise, anatomy, physiology, cardiac medications, procedures, and nutrition to patients and staff
- Lectured at community outreach programs
- Acted as liaison between patient and doctor to aid in patient care
- Provided medical surveillance of rehab patients, including BP, HR, SaO2, and ECG analysis
- Performed VO_2 Max stress testing with MedGraphics metabolic cart
- Administered EECP treatments with Vasomedical equipment

Chandler/Gilbert Community College — **Chandler, Arizona**
ACSM Exercise Specialist Workshop Instructor — Summer '00 & '01

- Taught several subjects including ECG Interpretation, Medications, Training Special Populations, New Concepts in Cardiovascular Interventions, and Human Behavior
- Aided in explaining metabolic calculations

Q The Sports Club **Tempe, Arizona**
Personal Trainer 02/99 - 03/99
- Educated clients in proper technique and physiological adaptations to exercise
- Developed exercise programs for clients
- Instructed clients on health risks and nutrition

Central Michigan University **Mt. Pleasant, Michigan**
ECG Assessment Lab Assistant 07/98 – 05/98
- Assisted in ECG interpretation and answered physiological questions
- Instructed students on proper lead placement technique

Central Michigan University **Mt. Pleasant, Michigan**
Human Performance Lab Assistant 09/97 – 12/97
- Assisted students in use of laboratory technical equipment (underwater weighing, spirometry, Quinton stress testing, ECG machines)
- Instructed students on blood pressure techniques
- Body fat composition, strength testing, flexibility testing

Lincoln Haven Health Care Centre **Lincoln, Michigan**
Nurse Assistant 11/96 – 08/97
- Measured vital signs and provided daily care of residents with Multiple Sclerosis, stroke victims, and cognitively impaired

INTERNSHIP

Arizona Heart Institute-East / Cardiac Conditioning **Mesa, Arizona**
Graduate Intern 09/98 – 12/98
- Monitored telemetry unit and hemodynamic responses to exercise
- Calculated exercise prescriptions and assisted in progression of workloads
- Provided source of information for patients and assisted in instruction of undergraduate intern
- Assisted in the administration of stress tests and interpretation of results
- Experience in venipuncture and glucometer
- Performed nutritional summaries and provided patients with dietary information
- Observed CABG, angiogram, and echocardiograms

COMPUTER SKILLS

- Windows XP, some Access
- Nutribase Pro, Dine Healthy
- Internet

ACTIVITIES

- Second-degree black belt in Shorei-Ryu Karate (07/03)
- Volunteered in Physical Therapy department (170 hours) at Alpena General Hospital (1996)
- Studied language and culture at Kitakyushu University in Japan (Summer 1995)
- Co-captain of Carthage College Swim Team (1995-1996)
- US Army Mechanic/Recovery Specialist stationed in Germany (09/88 – 09/91)

HONORS

- CCIW All Academic (12/95)
- Dean's List (01/92 – 12/94)
- Carthage College Presidential Scholarship (09/94)
- Carthage College Robert Todd Scholarship (09/94)
- Army Commendation Medal (07/91)

REFERENCES

Dr. Tariq Khalil
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(480) 283-7943 (cell)

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Mesa, AZ 85206
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(W) 480-472-6650

PAUL H. KLATT

CURRENT POSITION

Ferris State University. Associate Professor of Biology. 2008-present.

EDUCATION

North Dakota State University. Ph.D. Zoology. 2002. Major Professor: Dr. Nuechterlein.
Eastern Kentucky University. MS. Biological Sciences. 1992. Major Professor: Dr. Ritchison.
University of Illinois at Urbana-Champaign. BS. Psychology. 1988.

TEACHING EXPERIENCE

Ferris State University

- 2008-present, Associate Professor of Biology
- 2005-2008, Assistant Professor of Biology

Course	Description	Enrollment
Biology 121	General Biology I (2005-2008)	100
Biology 122	General Biology II (2006-2009)	100
Biology 347	Environ. Conservation (2006-2008)	40
Biology 348	Animal Behavior (2007-2009)	40
Biology 492	Biology Internship (2007-2009)	4

University of North Dakota

- 2002-2005, Visiting Assistant Professor of Biology

Course	Description	Enrollment
Biology 338	Animal Behavior (2002-2004)	40
Biology 332	General Ecology (2002, 2003)	100
Biology 370	Vertebrate Zoology (2003-2005)	40
Biology 432	Fish and Wildlife Disease (2004)	30

North Dakota State University

- 1997-2002, Graduate Teaching Assistant, General Biology, General Zoology, and Human Anatomy and Physiology.
  - instruction of labs, writing and grading exercises and quizzes

Course	Description	Enrollment
Zoology 360	Animal Behavior (2000)	70
Zoology 170	General Zoology (1997)	250

  - taught full courses as a graduate student

University of Alberta

- 1993-1996, Graduate Teaching Assistant, Introductory Biology, General Zoology, Natural History of the Vertebrates, Mammalogy, and Ornithology.
  - instruction of labs, writing and grading quizzes and lab practical exams

Eastern Kentucky University

- 1988-1991, Graduate Teaching Assistant and 1991-1992, Part-Time Faculty, Introductory Biology.
  - instruction of labs, writing and grading exercises and quizzes

RESEARCH EXPERIENCE

FSU Student Research

Bobby Hathaway Jr. Continue counting, banding, and observing the birds of Pierce Cedar Creek. 2007.

Kari Kammer. Counting, banding, and observing the birds of Pierce Cedar Creek. 2006.

Research Associate with Bridget J.M. Stutchbury, Ph.D., York University. Incubation feeding and extra-pair paternity in Scarlet Tanagers. 2003-2005.

Doctorate Research - Territorial Behavior of Red-necked Grebes. 1993-2002.

Research Associate with Gary Ritchison, Ph.D., Eastern Kentucky University and David Westneat, Ph.D., University of Kentucky. Mate guarding and extra-pair paternity in Northern Cardinals. 1992-1993.

Master's Research - The effect of mate removal on the vocal behavior of male and female Eastern Screech-Owls. 1988-1992.

Undergraduate Research Assistant to Nancy Burley, Ph.D. and Lowell Getz, Ph.D., Dept. of Ecology, Ethology, and Evolution, University of Illinois at Urbana-Champaign. 1986-1988.

FSU SERVICE

- College of Arts and Sciences, Promotion Committee (2008-present).
- Developmental Biologist Search Committee (2007-present).
- Anatomy and Physiology Search Committee (2008-present).
- Academic Senate (2006-present).
    - Ad Hoc Emeriti sub committee (2006-present).
- Registered Student Organization Advisor to Ferris Recyclers (2006-present).
- Registered Student Organization Advisor to Table Tennis Club (2008-present).
- Ferris Foundation Grants and Gifts Committee (2006-present).
- Faculty Research Committee (2008-present).
- Faculty Development Committee Chair, Biological Sciences (2006-present).
- Biology, Environmental Biology Concentration Head (2006-present).
- Biology Department Head Search Committee (2005-2006).

ORGANIZATIONS AND HONORS

Pierce Cedar Creek Institute for Environmental Education

- Advisory Board and Research Review Committee (2006-present).

Association of Field Ornithology (2006).

Waterbird Society (2005).

American Ornithologist's Union (2003).

NDSU Wildlife Graduate Student of the Year (2000).

Dr. Harvey K. Nelson Award - excellence in aquatic biology, NDSU Zoology (1999).

NDSU Zoology Graduate Student Representative to the Faculty (1999-2000).

Raptor Research Foundation (1993).

Cooper Ornithological Society - student membership award (1991).

Phi Sigma National Biological Honor Society (1990).

Animal Behavior Society (1988).

GRANTS

Pierce Cedar Creek Institute, Hastings, MI. Continue counting, banding, and observing the birds of Pierce Cedar Creek. 2007. $6,000.

Pierce Cedar Creek Institute, Hastings, MI. Counting, banding, and observing the birds of Pierce Cedar Creek. 2006. $6,000.

Animal Behavior Society. The dispersion of Red-necked Grebes breeding in territories and colonies. 1997. $300.

Canadian Circumpolar Institute, Edmonton, AB. Territory-size regulation in Red-necked Grebes. 1994. $1,500.

PRESENTED PAPERS

2004 Annual meeting of the Cooper Ornithological Society - Female Scarlet Tanagers called when their mates were temporarily removed during incubation. Paul H. Klatt, University of North Dakota and Bridget J.M. Stutchbury, York University.

2003 Annual meeting of the American Ornithologists Union - Incubation feeding by male Scarlet Tanagers: a removal experiment (poster presentation). Paul H. Klatt, University of North Dakota and Bridget J.M. Stutchbury, York University.

2001 Annual meeting of The Animal Behavior Society - From colonial to solitary: territorial behavior and nesting dispersion in Red-necked grebes. Paul H. Klatt, North Dakota State University. W.C. Allee Student Award Session.

1996 Annual meeting of the Association of Field Ornithologists - Genetic evidence that Eastern Screech-Owls do not engage in extra-pair copulations (poster presentation). Sunni Lawless and Gary Ritchison, Eastern Kentucky University, Paul H. Klatt, University of Alberta, and David F. Westneat, University of Kentucky.

1993 Annual meeting of The Raptor Research Foundation - Effect of mate removal on the vocal behavior and movement patterns of Eastern Screech-Owls. Paul H. Klatt and Gary Ritchison, Eastern Kentucky University.

1992 Annual meeting of The American Ornithologists Union - Duetting behavior of male and female Eastern Screech-Owls. Paul H. Klatt and Gary Ritchison, Eastern Kentucky University.

1992 Annual meeting of The Animal Behavior Society - Effect of mate removal on the singing behavior of male and female Eastern Screech-Owls. Paul H. Klatt and Gary Ritchison, Eastern Kentucky University.

1991 Fall Meeting of The Kentucky Ornithological Society - Effect of mate removal on the singing behavior of male and female Eastern Screech-Owls. Paul H. Klatt and Gary Ritchison, Eastern Kentucky University.

1990 Meeting for The Kentucky Academy of Sciences - Activity levels and the natal dispersal of Eastern Screech-Owls. Gary Ritchison and Paul H. Klatt, Eastern Kentucky University, and James R. Belthoff, Clemson University.

1990 Midwest Regional Animal Behavior Conference - Activity levels and the dispersal of juvenile Eastern Screech-Owls. Gary Ritchison and Paul H. Klatt, Eastern Kentucky University, and James R. Belthoff, Clemson University.

PUBLICATIONS

1) **Klatt, Paul H.**, Bridget J.M. Stutchbury, and Melissa Evans. 2008. Incubation feeding by male Scarlet Tanagers: a mate removal experiment. Journal of Field Ornithology 79(1):1-10.

2) **Klatt, Paul H**. and Cynthia A. Paszkowski. 2005. Intruder pressure explains more of the variation in territory size than fish abundance for Red-necked Grebes (*Podiceps grisegena*) breeding on small boreal lakes. Ornis Fennica 82:129-136.

3) Paszkowski, Cynthia A., Beverly A. Gingras, Kayedon Wilcox, **Paul H. Klatt**, and William M. Tonn. 2004. Stable isotope analysis of trophic relations of the Red-necked Grebe on lakes in the western boreal forest. Condor 106:638-651.

4) **Klatt, Paul H.**, Gary L. Nuechterlein, and Deborah Buitron. 2004. Frequency and distribution of behaviour of Red-necked Grebes breeding in a colony and in classic territories. Behaviour 141:263-277.

5) **Klatt, Paul H**. 2003. Territorial behavior and nesting dispersion in Red-necked Grebes. Waterbirds 26(1):94-99.

6) Lawless, Sunni, Gary Ritchison, **Paul H. Klatt**, and David F. Westneat. 1997. The mating strategies of Eastern Screech-Owls: a genetic analysis. Condor 99:213-217.

7) Ritchison, Gary, **Paul H. Klatt**, and David F. Westneat. 1994. Mate guarding and extra-pair paternity in Northern Cardinals. Condor 96:1055-1063.

8) **Klatt, Paul H**. and Gary Ritchison. 1994. The effect of mate removal on the vocal behavior and movement patterns of male and female Eastern Screech-Owls. Condor 96:485-493.

9) **Klatt, Paul H**. and Gary Ritchison. 1993. Duetting behavior of Eastern Screech-Owls. Wilson Bull. 105:483-489.

REFERENCES

Karen Strasser, Ph.D., Biology Department Head, Associate Professor of Biology, Ferris State University, Big Rapids, Michigan 49307. 231-591-2543.

Phillip Watson, Ph.D., Candidate Tenure Committee Chair, Professor of Biology, Ferris State University, Big Rapids, Michigan 49307. 231-591-2558.

Michelle Skedgell, Executive Director, Pierce Cedar Creek Institute, Hastings, Michigan 49058. 269-721-4770.

Bridget J.M. Stutchbury, Ph.D., Research Associate, Professor of Biology, York University, Toronto, Ontario M3J 1P3. 416-736-2100.

Joseph L. Lipar
Curriculum Vitae

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CURRENT POSITION (Ferris State University)

August 2005 – August 2008:	Assistant Professor
August 2008 – Present:	Associate Professor
January 2006 – August 2011:	Director, Card Wildlife Education Center
August 2007 – August 2011:	Coordinator, Program in Biology
July 2011 – December 2013:	Department Head, Biological Sciences
January 2014 – Present:	Department Chair, Biological Sciences

PREVIOUS POSITION

August 2002 – August 2005: Assistant Professor, Lycoming College, Williamsport, PA

EDUCATION

1993	Michigan State University	B.S., Zoology (With Highest Honor)
1993	Michigan State University	B.S., Biochemistry (With Highest Honor)
2000	Indiana University	Ph.D., Biology (Advisor: Dr. Ellen Ketterson)

Dissertation Title: Maternal Investment via Yolk Hormones: Do Female Birds Influence Nestling Competition through Differential Allocation of Steroid Hormones?

POSTDOCTORAL EXPERIENCE

2000-2002 Postdoctoral Teaching and Research Associate, Washington State University (Mentor: Dr. Hubert Schwabl)

ACADEMIC FELLOWSHIPS

1994	Indiana University - Graduate School Fellowship
1995-1998	National Science Foundation Predoctoral Fellowship
2000	Indiana University - Institute of Molecular Biology Graduate Fellowship

TEACHING EXPERIENCE

Department of Biology, Indiana University, Bloomington, IN

Fall 1996	Teaching Assistant – Biology For Elementary Education Teachers
Spring 1997	Teaching Assistant – Introductory Biology
Fall 1999	Teaching Assistant – Biology of Birds

School of Biological Sciences, Washington State University, Pullman, WA

Fall 2000	Human Physiology
Fall 2001	Comparative Physiology

Department of Biology, Lycoming College, Williamsport, PA

Fall 2002	Human Physiology
Spring 2003	Human Physiology
	Animal Behavior
Fall 2003	Vertebrate Biology
	Birds! Birds! Birds! – A freshman, non-majors class designed to serve as an introduction to the biology of birds. The roles of birds in art, literature, poetry, folklore, and popular culture were also examined.
Spring 2004	Human Physiology
	Endocrinology
Fall 2004	Human Physiology
	Birds! Birds! Birds!
Spring 2005	Human Physiology
	Animal Behavior
Summer 2005	Ornithology

Department of Biology, Ferris State University, Big Rapids, MI

Fall 2005	General Biology
	Human Anatomy and Physiology (Labs)
Spring 2006	Endocrinology
	Human Anatomy and Physiology (Labs)
Summer 2006	Vertebrate Natural History
	Birds of Michigan
Fall 2006	Nature Study
	Current Topics in Biology

Spring 2007	Endocrinology
	Current Topics in Biology
	Human Anatomy and Physiology (Labs)
Summer 2007	Vertebrate Natural History
	Birds of Michigan
Fall 2007	Endocrinology
	Current Topics in Biology
Spring 2008	Current Topics in Biology
Summer 2008	Vertebrate Natural History
Fall 2008	Endocrinology
	Current Topics in Biology
Spring 2009	Current Topics in Biology
Summer 2009	Vertebrate Natural History
Fall 2009	Endocrinology
	Current Topics in Biology
Spring 2010	Current Topics in Biology
Summer 2010	Vertebrate Natural History
Fall 2010	Endocrinology
	Current Topics in Biology
Spring 2011	Current Topics in Biology
Summer 2011	Vertebrate Natural History
Fall 2014	Endocrinology
Spring 2015	General Biology (Labs)

TEACHING AWARDS

1999 Indiana University Teaching Excellence Recognition Award

RESEARCH EXPERIENCE

1991-1993 Michigan State University, East Lansing, MI
Research Assistant: Regulation of DNA Replication by *dnaA* Protein.
Advisor: Dr. Jon Kaguni, Department of Biochemistry

1993 Michigan State University, East Lansing, MI
Research Assistant: Electromagnetic Radiation Environmental Impact Study.
Advisor: Dr. Donald Beaver, Department of Zoology

1994-1995 Indiana University, Bloomington, IN
Graduate Research Pilot Study: Effects of Testosterone on Winter Social Interactions in the Dark-eyed Junco, *Junco hyemalis*.
Advisor: Dr. Ellen Ketterson, Department of Biology

1995-2000 Indiana University, Bloomington, IN
Dissertation Research: Investigation of Steroid Hormones in Avian Eggs including A) The Relationship between Variation in Yolk Steroid Concentration

and Variation in the Developmental Parameters of Nestlings and B) The Relationship between Steroid Concentrations in the Laying Female and Steroid Concentrations in its Eggs. Species investigated include the Red-winged Blackbird, *Agelaius phoeniceus*, the European Starling, *Sturnus vulgaris*, and the Dark-eyed Junco, *Junco hyemalis*.
Advisor: Dr. Ellen Ketterson, Department of Biology

2000-2002 Washington State University, Pullman, WA
Post-Doctoral Research: A) Investigation of the Effects of Yolk Testosterone on the Physiological and Functional Development of the Hatching Muscle in the Red-Winged Blackbird. B) Investigation of Individual and Seasonal Variation in Incubation Patterns of Female Red-Winged Blackbirds.
Advisor: Dr. Hubert Schwabl, School of Biological Sciences

2002-2004 Lycoming College, Williamsport, PA
Mentoring of Undergraduate Research Projects: A) The Relationship Between Yolk Steroids and Offspring Sex. B) The Effects of Yolk Testosterone on Hatching Behavior and the Development of the Hatching Muscle. C) Investigation of Changes in Yolk Testosterone Concentration During Development.

RESEARCH GRANTS

National Science Foundation Dissertation Improvement Grant (1997, IBN 97-01334)
American Museum of Natural History (1995)
American Ornithologists' Union (1997)
Indiana Academy of Sciences (1995, 1996, 1997, 1999)
Research Training Grant in Animal Behavior, Indiana University (1995, 1996, 1997, 1999)
Professional Development Grant, Lycoming College (2003)

PUBLICATIONS

Research Papers

Lipar, J.L., E.D. Ketterson, and V. Nolan, Jr. 1999. Intraclutch Variation in Testosterone Content of Red-winged Blackbird Eggs. *Auk* 116: 231-235.

Lipar, J.L., E.D. Ketterson, V. Nolan, Jr., and J.M. Casto. 1999. Egg Yolk Layers Vary in the Concentration of Steroid Hormones in Two Avian Species. *General and Comparative Endocrinology* 115: 220-227.

Lipar, J.L., and E.D. Ketterson. 2000. Maternally-Derived Yolk Testosterone Enhances the Development of the Hatching Muscle in the Red-winged Blackbird *Agelaius phoeniceus*. *Proceedings of the Royal Society of London B* 267: 2005-2010.

Bowden, R.M., M.E. Ewert, J.L. Lipar, and C.E. Nelson. 2001. Concentrations of Steroid Hormones in Layers and Biopsies of Chelonian Egg Yolks. *General and Comparative Endocrinology* 121: 95-103.

Lipar, J.L. 2001. Yolk Steroids and the Development of the Hatching Muscle in Nestling European Starlings. *Journal of Avian Biology* 32: 231-238.

Groothius, T.G.G., Carere, C., Lipar, J.L., Drent, P.J., and Schwabl, H. 2008. Selection on Personality in a Songbird Affects Maternal Hormone Levels Tuned to its Effect on Timing of Reproduction. Biology Letters – Animal Behavior 4: 465-467.

Book Chapters

Schoech, S.J. and J.L. Lipar. 1996. Conservation Endocrinology: Field Endocrinology Meets Conservation Biology. 461-477. In: *Conservation Biology* (P.L. Fiedler and P.M. Kareiva, Editors). Chapman & Hall.

Schwabl, H. and J. Lipar. 2001. Hormonal Regulation of Begging Behaviour. 221-244. In: *The Evolution of Begging: Competition, Cooperation and Communication* (J. Wright and M. L. Leonard, Editors). Kluwer Academic Publishers.

Ketterson, E.D., V. Nolan, Jr., J.M. Casto, C.A. Buerkle, E. Clotfelter, J.L. Grindstaff, K.J. Jones, J.L. Lipar, F.M.A. McNabb, D.L. Neudorf, I. Parker-Renga, S.J. Schoech, and E. Snajdr. 2001. Testosterone, Phenotype and Fitness: A Research Program in Evolutionary Behavioral Endocrinology. 19-40. In: *Avian Endocrinology* (A. Dawson and C.M. Chaturvedi, Editors). Narosa Publishing House, New Delhi, India.

Lipar, J.L. 2003. The Palouse. In: *A Bird Finding Guide to Washington*. Washington Ornithological Society.

Research Featured in Science Media

BBC Wildlife Magazine, December 2000. "One Shot Ahead of the Nest: Extra Hormones Boost the Chances of Youngest Chicks".

Published Abstracts

Lipar, J.L., E.D. Ketterson, and V. Nolan, Jr. 1995. Steroid Hormones in the Yolk of Red-Winged Blackbird Eggs. *Poultry and Avian Biology Reviews*. 6: 329.

Lipar, J.L., and E.D. Ketterson. 1998. Interlayer Variation in Steroid Concentration within the Yolks of Dark-eyed Junco (*Junco hyemalis*) Eggs. *American Zoologist* 38: 21A.

Atkinson, T., G. Britton, J. Lipar, S. Raouf, S. Schlossberg, B. Van Roo, and D. Sengelaub. 1998. Sexual Experience does not Alter Adult Motoneuronal Morphology. *Society for Neuroscience Abstracts* 24: 1549.

Lipar, J.L., and E.D. Ketterson. 1999. The Relationship Between Yolk Testosterone Concentration and *Complexus* Mass in Nestling Red-winged Blackbirds. *American Zoologist* 39: 63A.

Casto, J.M., J.L. Lipar, C.A. Buerkle, J. Grindstaff, E.D. Ketterson, and V. Nolan, Jr. 1999. Extended Phenotypic Effects of Elevated Testosterone in Male Dark-eyed Juncos: Female Mates Produce Smaller Eggs, but do not Alter Yolk Steroid Concentrations or Primary Sex Ratios. *American Zoologist* 39: 63A.

CONFERENCE PRESENTATIONS

Lipar, J.L., E.D. Ketterson, and V. Nolan, Jr. Steroid Hormones in the Yolks of Red-Winged Blackbird Eggs. VIth International Symposium on Avian Endocrinology, Lake Louise, Alberta, Canada. April 1996.

Lipar, J.L., E.D. Ketterson, and V. Nolan, Jr. Steroid Hormones in the Yolk of Red-Winged Blackbird Eggs: Implications for Nestling Development and Survival. Animal Behavior Society Midwest Regional Conference, Bloomington, Indiana. November 1996.

Lipar, J.L., E.D. Ketterson, and V. Nolan, Jr. Steroids in Red-Winged Blackbird Eggs: Implications for Nestling Competition in the Context of Hatching Asynchrony. Annual Meeting of the Indiana Academy of Science, Rennselaer, Indiana. October 1997.

Atkinson, T., G. Britton, J. Lipar, S. Raouf, S. Schlossberg, B.Van Roo, and D. Sengelaub. 1998. Sexual Experience does not Alter Adult Motoneuronal Morphology. Annual Meeting of the Society for Neuroscience, Los Angeles, California. November 1998.

Lipar, J.L., and E.D. Ketterson. Interlayer Variation in Steroid Concentration within the Yolks of Dark-eyed Junco (*Junco hyemalis*) Eggs. Annual Meeting of the Society for Integrative and Comparative Biology, Denver, Colorado. January 1999.

Lipar, J.L., and E.D. Ketterson. The Relationship Between Yolk Testosterone Concentration and *Complexus* Mass in Nestling Red-winged Blackbirds. Annual Meeting of the Society for Integrative and Comparative Biology, Atlanta, Georgia. January 2000.

Casto, J.M., J.L. Lipar, C.A. Buerkle, J. Grindstaff, E.D. Ketterson, and V. Nolan, Jr. Extended Phenotypic Effects of Elevated Testosterone in Male Dark-eyed Juncos: Female Mates Produce Smaller Eggs, but do not Alter Yolk Steroid Concentrations or Primary Sex Ratios. Annual Meeting of the Society for Integrative and Comparative Biology, Atlanta, Georgia. January 2000.

Ketterson, E.D., V. Nolan, Jr., J.M. Casto, J.L. Lipar, C.A. Buerkle, and J. Grindstaff. Phenotypic and Extended Phenotypic Effects of Testosterone and Consequences for Fitness in Dark-eyed Juncos. VIIth International Symposium on Avian Endocrinology, Varanasi, India. January 2000.

Lipar, J.L., and E.D. Ketterson. The Relationship Between Yolk Testosterone Concentration and Complexus Mass in Nestling Red-winged Blackbirds. VIIth International Symposium on Avian Endocrinology, Varanasi, India. January 2000.

Lipar, J.L., E.D. Ketterson, and V. Nolan, Jr. Yolk Testosterone Influences the Development of the Hatching Muscle in the Red-Winged Blackbird. Annual Meeting of the American Ornithologists' Union, Seattle, Washington. August 2001.

Lipar, J.L. Yolk Testosterone Influences the Development of the Hatching Muscle in an Altricial Avian Species. XXVII International Ethological Conference, Tübingen, Germany. August 2001.

CONFERENCES ATTENDED

June 23-26, 2004 – Attended Council on Undergraduate Research National Conference at the University of Wisconsin - LaCrosse – "Crossing Boundaries: Innovations in Undergraduate Research"

September 22-24, 2006 – Attended Michigan Ornithological Congress at the University of Michigan Biological Station, Pellston, MI.

April 15, 2007 - Attended a meeting of the Michigan IBA (Important Bird Areas) Program in Lansing, MI. The purpose of this meeting was to learn about the IBA Program, which is an international effort, and to organize efforts within the state of Michigan.

August 27, 2007 - Attended a meeting of the Research/Monitoring Subcommittee of the Michigan Bird Conservation Initiative in Lansing, MI.

April 27-May1, 2008 – Attended Annual Meeting of the American Association of Museums, Denver, CO.

April 3-5, 2009 – Attended Michigan Ornithological Congress at Northern Michigan College, Petoskey, MI.

INVITED SEMINARS / SPEAKING ENGAGEMENTS

University of Nebraska-Cedar Point Biological Station
Summer Seminar Series, June 1997

Washington State University/University of Idaho-Center for Reproductive Biology
Seminar Series, October 2001

Invited Speaker at the Williamsport Lions Club Meeting – "Christmas Bird Counts in Williamsport and Across the Country", February 2004

November 1, 2007 - Invited Speaker at the Mecosta Audubon Club Meeting – "The History and Purpose of the Card Wildlife Education Center: A Tour of the Museum".

Invited Speaker at the Mecosta Audubon Club Meeting – "Investigations of Yolk Hormones in the Eggs of Birds", November 2008

Invited Speaker at the Big Rapids Rotary Club Meeting - "Studies of Yolk Hormones and their Effects on Offspring Development", April 2009

COMMITTEES AND APPOINTMENTS

2003 – 2005	Director, Medical Technology Program, Lycoming College
2003 – 2005	Chair, Writing Across the Curriculum Committee, Lycoming College
2004 – 2005	Chair, Admissions, Financial Aid, and Retention Committee, Lycoming College
2002 – 2005	Health Professions Advisory Committee, Lycoming College
2003 – 2005	President Elect, Lycoming College Chapter of Phi Kappa Phi
2006 – Present	Chair, Department of Biology Curriculum Committee, Ferris State University
2006 - Present	College of Arts and Sciences Curriculum Committee, Ferris State University
2006 - 2007	Member, Department of Biology Faculty Search Committee (Anatomy and Physiology)
2006 - 2007	Member, Department of Biology Faculty Search Committee (Temporary Development Biology)

2007 – Present	Coordinator, Program in Biology
2007 – Present	Member, College of Arts and Sciences Advising Excellence Committee
2007 – Present	Member, Department of Biology Assessment Committee
2007	Member, Department of Biology Curriculum Revision Committee (Environmental Biology)

SERVICE

2004 – 2006	Reader, AP Biology Exam
2005 – Present	Member, Mecosta Audubon Club
2009 – Present	President, Mecosta Audubon Club
2006 - Present	Judge, Science Competition in the MOISD - Math/Science Center.
2006 – Present	Faculty Advisor, Outdoor Club, Ferris State University
2006 – Present	Member, Research/Monitoring Subcommittee of the Michigan Bird Conservation Initiative
2008 – Present	Faculty Advisor, Pre-Physical Therapy Club, Ferris State University
2008 – Present	Faculty Advisor, Trout Unlimited, Ferris State University

MANUSCRIPTS REFEREED

American Midland Naturalist
Animal Behaviour
Auk
Behavioral Ecology and Sociobiology
Hormones and Behavior
Journal of Avian Biology
Journal of Comparative Physiology B
Journal of Field Ornithology
Physiological and Biochemical Zoology
Proceedings of the Royal Society of London B
Wiener Tierärztliche Monatsschrift (Veterinary Medicine Austria)

CURRICULUM VITAE

Gary Miller

Address: Ferris State University
820 Campus Drive, ASC 2004
Big Rapids, MI 49307
Phone: 231-591-5844 FAX: 231-591-2540
Email: millerg6@ferris.edu

EDUCATION: Grand Valley State University, B.S., Biology, 1991
Bowling Green State University, Ph.D., Biology, 1997

Dissertation Title: The Evolution of Senescence in *Drosophila melanogaster*
(advisor: Dr. Mark H. Gromko)

POSITIONS HELD

Institution	Title	Year
Ferris State University Biological Sciences	Visiting Assistant Professor	Present
University of Kansas Ecology/Evolutionary Biology	Post-Doctoral Researcher	2004-2006
Cuyahoga Community College	Lecturer	2003-2004
Syracuse University Department of Biology	Assistant Research Professor	2002-2003
Syracuse University Department of Biology	Research Associate	1997-1999; 2000-2002
Syracuse University Department of Biology	Teaching Associate	1999-2000
Bowling Green State University Biological Sciences	Teaching Assistant	1991-1994; 1996-1997
Bowling Green State University Biological Sciences	Non-Service Fellowship	1995-1996
Bowling Green State University Biological Sciences	Research Assistant	1994-1995

TEACHING EXPERIENCE

Ferris State University-Assistant Professor		Semester
BIOL 121	General Biology I	Fall 2006
		Summer 2007
		Fall 2007
BIOL 122	General Biology II	Spring 2007

Cuyahoga Community College- Instructor

BIO 1500	Principles of Biology I Intro to molecular, cell, genetics, and evolution for majors	Fall 2003 Spring 2004
BIO 1100	Intro to Biological Chemistry	Fall 2003 Spring 2004

Syracuse University - Instructor		Semester
BIO 345	Population Biology Population and evolutionary genetics	Spring 2000
BIO 799	Seminar in Evolutionary Biology Darwin and The Origin of Species	Fall 1997

Bowling Green State University - Laboratory Instructor

BIO 204	Concepts in Biology I Introduction to ecological and evolutionary biology for majors	Fall 1991 Spring 1992 Fall 1992 Spring 1993
BIO 104	Introduction to Biology The cell, metabolism, genetics,reproduction, development, evolution, ecology for non-majors	Fall 1993 Spring 1994
BIO 205	Concepts in Biology II Introduction to molecular and cellular biology for majors	Fall 1996 Spring 1997

PUBLICATIONS:

Miller, G. T., Starmer, W. T. and S. Pitnick. 2003. Quantitative genetic analysis of among-population variation in sperm and female sperm-storage organ length in *Drosophila mojavensis*. Genetical Research 81: 213-220.

Miller, G. T. and S. Pitnick. 2003. Functional significance of seminal receptacle length in *Drosophila melanogaster*. Journal of Evolutionary Biology 16: 114-126.

Pitnick, S., Miller, G. T., Schneider, K., and T. A. Markow. 2003. Ejaculate-female coevolution in *Drosophila mojavensis*. Proceedings of the Royal Society of London B 270: 1507-1512.

Miller, G. T. and S. Pitnick. 2002. Sperm-female coevolution in *Drosophila*. Science 298: 1230-1233.

Miller, G. T., Starmer, W. T. and S. Pitnick. 2001. Quantitative genetics of seminal receptacle length in *Drosophila melanogaster*. Heredity 87: 25-32.

Pitnick, S., Brown, W. D. and G. T. Miller. 2001. Evolution of female remating behaviour following experimental removal of sexual selection. Proceedings of the Royal Society of London B 268: 557-563.

Pitnick, S., Miller, G. T., Reagan, J., and B. Holland. 2001. Males' evolutionary responses to experimental removal of sexual selection. Proceedings of the Royal Society of London B 268: 1071-1080.

Pitnick, S. and G. T. Miller. 2000. Correlated response in reproductive and life history traits to selection on testis length in *Drosophila hydei*. Heredity 84: 416-426.

INVITED DEPARTMENTAL SEMINARS

Bowling Green State University, Department of Biological Sciences, Fall 1993.
Syracuse University, Department of Biology, Fall 1997.
University of Kansas, Ecology and Evolutionary Biology, Fall 2004

CONFERENCE PRESENTATIONS

Miller, G. T. and M. H. Gromko. 1994. Joint Meeting of the SSE, ASN, SMBE, and SSB, Atlanta, Georgia.

Miller, G. T. and M. H. Gromko. 1995. Joint Meeting of the ASN, SSB, NT and SSE, Montreal, Canada.

Pitnick, S., Miller, G. T., and T. L. Karr. 1998. 7th International Behavioral Ecology Congress, Pacific Grove, California.

Pitnick, S., Miller, G. T., Reagan, J., and B. Holland. 2000. Joint Meeting of the SSE, ASN, ATB, and SSB, Bloomington, Indiana.

Gleason, J. M., Cropp, K. A., Dewoody, R. S., Drury, D., and G. T. Miller. 2004. Kansas NSF Epscor Symposium, Genes in Ecology, Ecology in Genes, Overland Park, Kansas.

Miller, G. T. and J. M. Gleason. 2005. Ecological Genomics Spring Workshop, Manhattan, Kansas.

Miller, G. T., Dewoody, R. S., Cropp, K. A., and J. M. Gleason. 2005. Kansas NSF Epscor Symposium, Genes in Ecology, Ecology in Genes, Overland Park, Kansas.

CURRICULUM VITAE

ROGER E. MITCHELL II

Department of Biological Sciences
Ferris State University
820 Campus Dr.
Big Rapids MI 49307-2225
Phone: (616)-591-5879
E. Mail: mitchelr@ferris.edu

CAREER GOAL

To teach biology in a college or university setting, with botanical research as a secondary goal.

EDUCATION

B.S., Molecular Biology, 1984, University of Wisconsin (Madison).

- Only 2 classes short of a chemistry major.

Ph.D., Genetics, University of Minnesota (Twin Cities), 1992.

- Thesis advisor, Dr. Irwin Rubenstein. Informal advisor, Dr. David Somers.
- Thesis, "Expression of Zein Associated Protein Genes" in the developing endosperm of *Zea mays* L. (corn).
- Applied a wide range of molecular and tissue culture research techniques to plant systems.
- Classroom emphases: genetics, plant breeding, applied statistics.
- Corn breeding.

POSTDOCTORAL RESEARCH

1993, Louisiana State University, Department of Plant Pathology and Crop Physiology.

- Principal investigator, Dr. Norimoto Murai.
- Gene expression in common bean (*Phaseolus vulgaris* L.).

TEACHING EXPERIENCE

Georgia Southern University in Statesboro, Georgia, Temporary, full-time assistant professor of biology, Winter and Spring quarters, 1994. Courses taught:

- Bio. 151 lecture: Introductory biology for non-majors. Topics: biology as science, survey, ecology, genetics, molecular genetics.
- Bio. 152 lecture: Introductory biology for non-majors. Topics: evolution, biochemistry, plant biology, vertebrate anatomy and physiology.
- Bio. 370 lab: Cell biology lab for mid-level biology majors. Taught: microscopy, cell anatomy, enzymology.

Ferris State University in Big Rapids, Michigan, Temporary, full-time assistant professor of biology, 1994-95 and 95-96 terms. Tenure-track assistant professor of biology, Fall 1996, associate professor, fall 1999 to present, tenured, Fall 2001, Courses taught:

- Biol. 113, lecture and lab: Botany for horticulture majors. Topics: taxonomy, anatomy, physiology, biochemistry
- Biol. 121, lecture and lab: Introductory biology for biology majors. Topics: genetics, evolution, survey, ecology, plant biology.
- Biol. 122, lecture and lab: Introductory biology for biology majors. Topics: zoology, vertebrate anatomy and physiology, biochemistry, molecular genetics.
- Biol. 207 lab only: Forensic Biology for the criminal justice and the forensic biology programs. In Fall '04, I took over the teaching of the DNA-related labs in this course. Dr. Philip Watson teaches the lecture an the remainder of the labs.
- Biol. 353, lecture and lab: Plant physiology for biology majors. Topics: anatomy, water relations, biochemistry, photosynthesis, cellular respiration, growth and hormones.
- Biol. 407, lecture and lab: Forensic DNA lab for forensic biology majors (a track within the B.S. in Biology). This class was new and began in Winter '05. It teaches the theory and methods used by the modern forensic community to solve crimes using DNA evidence.
- Biol. 460 lecture: Senior seminar for biology majors. Students prepare posters and monographs that review a current topic in biology. Includes computer instruction.
- Biol. 471 lab: Recombinant DNA lab for biotechnology majors. Teaches modern methods including cloning, bacterial transformation, DNA purification, Southern hybridization, sequencing, PCR. Includes computer instruction.

RELATED EXPERIENCE

Teaching:

- Teaching assistant, University of Minnesota.
- Three years teaching research methods to undergraduates in graduate lab.
- Attended peer review of teaching workshop, winter '96.
- Attended the Research Link 2000 workshop for biology research, August '00. at Ferris State University in August 2000.

Computers:

- Proficient in wide range of computer word-processing, statistics, graphics, taxonomy, and presentation applications.
- Studied three computer programming languages.

- Set up or upgraded several personal computers.
- Sold computers briefly.
- Teach Microsoft Word, Excel, and PowerPoint, as well as Adobe PhotoShop in two of my classes (BIOL. 353 and BIOL. 471), Fall '94 through present.

Communication:

- Competitive forensics and debate in high school.
- High school debate judge while in college.

UNIVERSITY SERVICE

- Committee service: terms are academic years (Fall and the following Winter/Spring semester), present is the '09 - '10 academic year:
  - Course:
    - Introductory lab revision committee ('94 -' 95 and '96 - '97 through Fall '02), occasional meetings, replaced by:
    - Introductory lab preparation and coordination committee (Winter '03 though present), weekly meetings. Co-chair, then chair, Fall '04.
    - Introductory biology textbook selection committee (Winter '95 and winter '04).
  - Program:
    - Biotechnology program coordination committees ('94 - '95 through present).
    - Biotechnology program review committee ('97 - '98 through present).
    - Forensic Biology program coordination committee ('03 – '04 through present)
  - Department:
    - Department planning committee ('96 - 97 through '99 - '00 and '02 - '03 through '07 - '08), chair, last three terms.
    - Department curriculum committee ('98 - '99 through '01 - '02), chair, last two terms.
    - Department professional development committee ('96 - '97, '99-'00, and '00 - '01, chair, last term).
    - Four search committees, two for 9-month positions, one for a single tenure-track position, and one for four tenure-track positions (three filled)).
    - Department tenure committee, chair ('03 – '04 through present, chair).
    - Candidate tenure committee, for Dr. Scott Herron ('03 – '04 through '07 - '08), Dr. Bradley Isler ('05 – '06 through present),

Dr Joseph Lipar ('05 – '06 through present, chair) and (Dr. Changqi Zhu ('09 - '10 through present, chair).

- Interdepartmental:
  - Forensic science track in criminal justice development committee ('96 - '97).
- College:
  - Sabbatical leave committee ('01 - '02 through '06 - '07), chair, five terms ('02 - '03 through '06 - '07).
  - Standards and policies ('03 - '04).
- University:
  - University scientific understanding committee ('00 - '01 through '03 - '04), chair last term.
  - All university sabbatical leave committee ('04 - '05 and '05 – '06), chair, first term.

- Coordinator of introductory biology (BIOL. 121 and 122) labs. This position involves chairing the introductory biology lab committee, editing and writing new material for the lab manual, training new faculty in the labs, coordinating textbook selection, and coordinating and developing assessment for the courses.
- Helped plan, develop and teach first biotechnology workshop for high school students and teachers (Winter '95).
- Prepared poster for, and represented biotechnology program at, Autumn Adventure, a high school recruitment event (Fall '94 through its discontinuation after Fall '01).
- Supervised two biotechnology student interns in the summer of '97, and again in the summer of '98. Shared supervision of a fifth student in the fall of '98. Supervised two more biotechnology student interns in the summer of '99. Shared supervision of an eighth student Summer '02 through Winter '03.
- Supervised undergraduate student independent study, Winter '97, Winter '98, Fall '98, Fall '00, Winter '03, Summer '03, and fall '08 - Spring '09.
- Supervised high school (Math and Science Center) student projects, '00 - '01, '01 - '02, and '02 - '03.
- Supervised student assistants in my main research program on *Rosa* (rose) species breeding,
- Assessment projects.
  - I served on the committee that wrote the short pre/post test used for the BIOL. 121-122 sequence, and I organize its administration in the labs (Fall '07 - present). I am currently writing a new, expanded version. This test assesses student leaning in the intro sequence, which is programmatically critical.

- I wrote a brief pretest on biologically important chemistry, which I have administered to all of my classes since Fall '07 (some every time the class meets, some selected semesters only). Chemistry competence is highly predictive of student success in biology classes, and I use the results as a basic for advising individual students in BIOL. 353. The chemistry classes required for various biology degrees are also a critical programmatic issue, and I have sought cooperation of other instructors in administering this test in a range of courses.
- I administer the Biology Field Exam to my BIOL. 471 class, representing the seniors in the Biotechnology program. This comprehensive, nationally recognized, standardized exam is also administered to Biology BS students, so it serves as an final assessment of our department's graduating majors.
- I am developing a set of shared questions related to plant biology to administer as a part of regular graded exams in the two classes in which the topic is covered (BIOL. 121, mostly first-semester freshmen and BIOL. 353, juniors and seniors) to asses this topic from a programmatic standpoint.
- I have been selectively breaking down regular graded lecture exam and lab quiz questions to address specific course assessment issues. This most often relates to teaching methodology. For example, compare student performance in BIOL. 353 and 407 on material that is/is not included on sample or is/is not covered by their textbooks.

OTHER ACTIVITIES

- Regularly attend the American Academy of Forensic Sciences yearly meeting ('04, '05, '06) and attended a workshop on the forensic role in terrorism at Duquesne Univeristy ('04).
- Carry out lily breeding program and very large rose breeding program (fall '06 through present).
- Carried a out lab research project on lily (*Lilium*) species taxonomy, utilizing DNA sequencing, Polymerase Chain Reaction (PCR), and other methods. This work is supported by grants from the North American Lily Society, the Wisconsin Regional Lily Society, and the Ferris State University professional development fund. Summer '06 - Fall '00. I presented a talk about this research at FSU in November '00.
- Carried out lab research project on rose (*Rosa*) species seed germination.
- I am very active on the Rose Hybridizing Society's open internet forum. I read it regularly during most of the year, and make contributions when I feel I have something to contribute. This serves to enhance my own research by exchanging information, to document my own work,

and in an educational role, since the other participants often are not scientifically trained, and benefit form explanations of that aspect of the subject.

- I have produce materials on my rose breeding program that have been added to my faculty materials on the FSU web site. This helps to communicate and document my work, as well as providing exposure for FSU to the community of rose breeders.
- Carried out a lab research project on Wisconsin Fast Plants (*Brassica rapa*) salt tolerance.
- Carry out a lab research project on plant chromosome characterization.
- Member of several horticultural societies: North American Lily Society (NALS), Species Lily Preservation group (within NALS), Rose Hybridizers Association, American Rose Society.
- Wrote newsletter articles for, and served as assistant editor of, the Wisconsin Regional Lily Society newsletter.
- Served as flower exhibit chairman for Wisconsin Regional Lily Society.
- Served as an accredited judge for the North American Lily Society.
- Write fiction as a hobby.

PUBLICATIONS:

Peer-reviewed journal:

- Mitchell RE (2009) The Inheritance of Juvenile Recurrence in Rosa Species Hybrids. Floriculture and Ornamental Biotechnology 3 (Special Issue 1), 46-52

Non-peer-reviewed journals, newsletters, books, etc.:

- "Expression of Zein Associated Protein Genes," Roger E. Mitchell II, Ph.D. thesis, University of Minnesota, St. Paul Minnesota, Jan. 1992.
- "Lily hybridizing: Something for everyone," Roger E. Mitchell II, Quarterly Bulletin of the North American Lily Society, vol. 49, #1, March 1, 1995.
- Mitchell, R., "New Genes for Lilies," Yearbook of the North American Lily Society, 1997, pp. 67-68. Subject: genetic engineering of flower crops.
- Mitchell, R., "Colder-Climate Trumpets: Trumpet Lily Hybrids," Yearbook of the North American Lily Society, 1997, pp. 77-80. Subject: horticulture. I have been told by society members, including the yearbook editor, that this article was very well received.
- Mitchell, R., "Species DNA Research Report," Quarterly Bulletin of the North American Lily Society, March 1, 1998, Vol. 52, No. 1, pp. 8-9.
- Mitchell, R., "Lily Hybrids: Understanding Without Intimidation," Yearbook of the North American Lily Society, 1998, pp. 54-62. Subject:

how classical genetics is used by breeders. I have received a lot of favorable feedback about this article, as well.

- Mitchell, R., "What Causes Lily Decline?," Yearbook of the North American Lily Society, 1999, pp. 20-35. Subject: horticulture. This article was the best received in the recent history of the yearbook, according to its editor.
- Mitchell, R., "Rose Hybridizing in the Summer Greenhouse," Rose Hybridizers' Association Newsletter, 2001. The RHA web site is www.rosehybridizers.org
- Mitchell, R., "Rose Hybridizing in the Greenhouse," in "Rose Hybridizing - The Next Step," Rose Hybridizers' Association, John and Mitchie Moe, editors, 2002.
- Mitchell, R., "Rose Hybridizing in Big Rapids, Michigan," Rose Hybridizers' Association Newsletter, 2006.
- Mitchell, R., "Accidental Ground Cover Roses," Rose Hybridizers' Association Newsletter, Spring 2006
- Mitchell, R., "High-Volume Growing and Selection of Rose Seedlings," Rose Hybridizers' Association Newsletter, Spring 2007.
- Mitchell RE (2008) Strategies to maintain species percentage in hybrids. Rose Hybridizers Association Newsletter 39 (1), 15-20
- Mitchell RE (2008) Managing Rose Seedlings. Rose Hybridizers Association Newsletter 39 (3), 7-8
- Mitchell RE (2008) Fertile Seed Parents and a Dilemma Involving Miniature Roses. Rose Hybridizers Association Newsletter 39 (4), 6-7
- Mitchell RE (2009) A miniature Note on Miniatures. Rose Hybridizers Association Newsletter 40 (1), 13
- Mitchell RE (2009) Breeding with *Rosa spinosissima* and its Relatives. Rose Hybridizers Association Newsletter 40 (1), 6-10
- Mitchell RE (2009) Breeding with *Rosa gallica* Relatives, Including 'Alika.' Rose Hybridizers Association Newsletter [published, I need to look up the information]
- Mitchell RE (2009) Classifying the Pimpinellifoliae. Rose Hybridizers Association Newsletter [published, I need to look up the information]

Meeting abstracts:

- "Transient expression of foreign genes in endosperm tissue," Roger E. Mitchell II and Irwin Rubenstein, Maize Genetics Cooperation Newsletter, #64, 1990.
- "Simplified cloning techniques utilizing kanamycin resistant plasmids," Roger E. Mitchell II, John Hunsperger, and Irwin Rubenstein, Maize Cooperation Newsletter, #64, 1990.

PROFESSIONAL MEETINGS ATTENDED:

- North American Lily Society annual meetings ('96 - '03, '05, '06)
- World Federation of Lily Societies ('04)
- American Rose Society spring meeting ('06)
- Rose Hybridizers' Association meeting ('06)
- American Academy of Forensic Sciences annual meeting ('04 – '07)
- meeting on forensic response to biological terrorism ('04)

Curriculum vitae

Mary Rengo Murnik

Department of Biological Sciences
Ferris State University
Big Rapids, Michigan 49307

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FAX 231-591-2540
email: murnikm@ferris.edu

Education

Michigan State University, Ph.D., Zoology (Genetics)
Michigan State University, B.S. *With High Honor*, Zoology (Honors College)
Marquette University, Biology

Professional Experience

Professor, Department of Biological Sciences, 1992-
Professor & Head, Dept. of Biological Sciences, Ferris State University, 1980-92
Acting Head, Dept. of Physical Sciences, Ferris State University, 1983-84
Assistant Professor to Professor, Biology, Western Illinois University, 1970-80
Sabbatical, Rutgers University, Dept. of Psychology (Behavior Genetics), 1979
Assistant Professor, Fitchburg State College, Massachusetts, 1968-70

Professional Memberships

American Association for the Advancement of Science, Sigma Xi, American Society of Genetics, National Science Teachers Association, American Biology Teachers Association, National Center for Science Education

Professional Subscriptions

Science, Genetics, The American Biology Teacher, Journal of College Science Teaching, American Scientist, The Scientist, Natural History, Science News, Discover, Scientific American

Courses Taught:

BIOL 101 Genetics: Human Aspects
BIOL 375 Principles of Genetics
BIOL 340 Evolution
FSUS 100 Ferris State University Seminar

Advisor: Pre-dental advising chair

Awards and Honors

Ferris Distinguished Teacher award, 2007
Dr. Martin Luther King "Social Justice Award", 2004
Ferris Faculty Merit Award, 2002, 2006
Ferris Professional Women *Woman of the Year,* 1998
Michigan Association of Governing Boards' Award for Teaching Excellence,1998

Professional Workshops/Seminars Presented (recent)

2011 "Genes,bacteria environmental influences and your weight." FSU Honors Program lunch + learn series
2008 "New insights about the nature of the gene", FSU Honors Program lunch + learn series
2007 "Genomic Imprinting and Epigenesis", FSU STEM seminar

2005 "Strategies to encourage students to *think* biologically", National Association of Biology Teachers annual meeting, Milwaukee
2004 "Critical Thinking in College Biology Courses", 24th International Conference on Critical Thinking, Palo Alto, CA
2004 "How to Think about Weird Things", with Judith Hooper, Critical Thinking Conference for Educators, Ferris Applied Technology Center, Grand Rapids
2004 "Rosalind Franklin, the Dark Lady of DNA", FSU Chemistry Club seminar
2004 "Genetics, Development and Human Sexual Orientation" presentation with Dr. Robert Friar to DSAGA
2003 "Rosalind Franklin, the Dark Lady of DNA, and You", Select 60 Lecture Series, FSU
2003 "Critical Thinking Tips for Teachers", Critical Thinking Institute, Ferris State University
2003 "Critical Thinking in Science Courses", Critical Thinking in Higher Education Conference, Northwest Michigan College, Traverse City
2003 "Critical Thinking Tips for Teachers", Critical Thinking in Higher Education Conference, Northwest Michigan College, Traverse City
2002 "Pursuing careers in Science", Ferris YBBW 2002 Annual Conference

Recent Professional Meetings and Workshops

2010 DAT Biology Test Construction Committee workshop, American Dental Association, Chicago
2010 OAT Biology Test Construction Committee workshop, American Dental Association, Chicago
2009 Drosophila Research Conference, Chicago
2009 DAT Biology Test Construction Committee workshop, American Dental Association, Chicago
2009 OAT Biology Test Construction Committee workshop, American Dental Association, Chicago
2008 DAT Biology Test Construction Committee workshop, American Dental Association, Chicago
2008 American Biology Teachers Annual Meeting, Boston
2007 Dental Admission Test Item Writing Workshop, American Dental Association, Chicago
2006 Teaching Evolution: Applying Critical Thinking and Other Effective Strategies, Chautauqua short course for College Science Teachers, Dayton
2006 OAT/DAT Biology Test Construction meeting, American Dental Association, Chicago
2005 Dental Admission Test Item Writing Workshop, American Dental Association, Chicago
2005 "Making a Difference", FSUS Faculty Development Conference, Ferris State University
2004 24th Annual International Conference on Critical Thinking, Palo Alto
2003 1st Annual Scientific Thinking Conference, Sonoma State University
2002 9th Annual National Academy on Critical Thinking, Sonoma State University
2002 Mentorship training in Critical Thinking, Sonoma State Univ.

Research projects with students (recent)

2007-8 Quinn,Ashley(Math/Science/Technical Center), Induction of sex-linked recessive lethal mutations by resorcinol in *Drosophila melanogaster*
2006-7 Sarkozi, Rebecca (Math/Science/Technical Center), Muller-5 analysis of the mutagenicity of resorcinol in *Drosophila melanogaster*
2006 Trombley, Jamie, Toxicity assays with *Drosophila melanogaster*
2005-6 Winowiecki, Jenice, Effects of resorcinol on the life cycle of *Drosophila melanogaster*

Reviewer, recent, textbooks
Jones Bartlett Publishers, Thomson Brooks/Cole, W.H. Freeman&Co, Wm. C. Brown, Publishers, McGraw Hill Companies

Publications
Instructional Materials, recent

2010 Evolution: Lecture Guide, for BIOL 340- Evolution, Ferris State University, 200 p. (annual editions since 2000)
2010 Genetics: a Lecture Guide for BIOL 375- Principles of Genetics, Ferris State University, 333 p. (annual editions)
2010 Genetics: Human Aspects, Lecture Guide for BIOL 101, Ferris State University, 298 p.(annual editions)
2010 BIOL 101 Laboratory Manual, Ferris State University, 197 p. (annual editions)

Professional Service since 2002

Academic Program Review, Biology B.S., B.A. panel, 2008-9
2008-10 FSU Diversity Planning Committee
2008- FSUS Board
2008 Judge, Honors Senior Symposium, FSU Honors Program
Faculty sponsor, Ferris Pre-dental Club, 2007-
Faculty sponsor, Ferris Pre-dental Club, 1987-
Dental Admission Test Constructor, Biology Content Area, American Dental Association, 2006-
Ferris Accreditation Task Force Committee, 2005-2006
Ferris Distinguished Teacher Award Committee, 2003-2006
Volunteer docent for Ferris State University "Jim Crow Museum", 2001-
Judge MOISD Science Fair, Ferris State University, annually, 2001-8
Scientific Understanding Outcomes and Assessment Committee, 2003-8
Biology Department Search Committee (four tenure-track positions), 2004-2005
Biology Department Planning Committee, 2001- 2004, 2006-8
Faculty Mentor, Dr. Karen Strasser, 2002-6
Faculty Mentor, Dr. Bradley Isler, 2005-9
Member, Zimmer Tenure Committee, 2007-
Chair, Strasser Tenure Committee, 2002-6
Chair, Isler Tenure Committee, 2005-9
Member, Klaat Tenure Committee, 2005-9
Ferris Strategic Direction Committee 2002-3
Academic Program Review, Secondary and Vocational Ed. B.S. panel, 2002-3
Academic Program Review, Applied Biology B.S. panel, 2002-3

Faculty Panel, Student Leadership Conference, 2002-2004
Select 60, Ferris mentorship program, 2001-
Chair, Pre-Dental Advisory Committee, 1995-
Pre-Med Advisory Committee, 1995-

Anna M. Rizzo, B.S.

21701 Forest Lake Dr., Big Rapids, MI 49307

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rizzoa@ferris.edu

Education

Bachelor of Science ,Applied Biology with emphasis in Pharmacy, Ferris State University, Big Rapids, MI, 1990.

Masters of Education, Vocational Education, Ferris State University, Big Rapids, MI, Currently Pending.

Professional Profile

- Strong team player who performs equally well independently.
- Knowledgeable in many areas of Biology, i.e. botany, anatomy, genetics, zoology, environmental
- Strong background in course design.
- Teaching approach covers all facets of learning: visual, auditory, kinesthetic

Academic / Teaching Experience

Instructor at Ferris State University, Big Rapids, MI August 1995 – Present

- Biology 101 Lab Basic Human Genetics
- Biology 111 Lab Environmental Biology
- Biology 121 and 122 General Biology (majors)
- Biology 205 Lab Human Anatomy (Allied Health majors)
- Biology 109 Human Anatomy and Physiology
- Biology 114 Turf Grass Management (8 years)

Structured Learning Assistant/CLS Facilitator at Ferris State University, Big Rapids, MI, 1995 – 1999

- Worked cooperatively with appointed staff in order to align curriculum for higher student achievement.
- Applied appropriated study skills for maximum achievement in course work in biology.
- Courses Facilitated: Biology 101, Biology 375 Genetics (majors), Biology 205 and Biology 122

Para-Professional, Academic Support Center, Ferris State University, Big Rapids, MI August 1996 - 1999

- Develop Seminars for Test-anxiety, study skills, test-taking, time management and reading comprehension.

- Tutoring: Biology and Chemistry

Substitute Teacher, Big Rapids Public School and Reed City Public School 1997 -1999

- Fourth Grade, Kindergarten, Music, and high school biology and chemistry

Committees and University Affiliations

Ferris Non-Tenure Faculty Organization, Ferris State University, Big Rapids 2012 – Present

- President July 2013 – Present
- Vice- President May 2012 – July 2013
- Originating member 2012
- Member of the bargaining team 2013

Presidents Leadership Committee, Ferris State University, Big Rapids 2012 – Present

- Discuss and vote on University wide proposals/policies.

Health Care Committee, Ferris State University, Big Rapids, MI 2012 – Present

- Evaluate medical insurance coverage
- Determine which policies benefit employees
- Provide feedback and university recommendations.

AAUW, Ferris State University Big Rapids, MI 2012 – Present

- Women in the workplace discussions
- Community service projects
- Raise Scholarship money for female students.

Community

Big Rapids Garden Club 2000 – 2003

Brookside Elementary, Big Rapids, MI 2008 – 2012

- PTO e-board member
- Secretary, Vice-President, and President

Big Rapids Co-Op Preschool, Big Rapids MI 1994 -1996

- Executive Board Member

References

Dr. David M. Griffith
Professor of Biology
Ferris State University
820 Campus Dr.
SCI 141
Big Rapids, MI 49307
davidgriffith@ferris.edu

Dr. Mary Murnik
Professor of Genetics
Ferris State University
820 Campus Dr.
ASC 2117
Big Rapids, MI 49307
marymurnik@ferris.edu

Mr. John Johnson
Instructor
Biology
Ferris State University
SCI 141
Big Rapids, MI 49307
JohnJohnson@ferris.edu

Curriculum Vitae

Gary Rodabaugh, Ph.D., Professor, C.H.M.M. (Master)

March 11, 2007

Address	Ferris State University 820 Campus Dr., AHSC 2016 Big Rapids, Michigan 49307	EEAS 15250 92nd Ave. Rodney, Michigan 49342

Contact	FSU Office:	(231) 591-2308
	FSU FAX:	(231) 591-3788
	Home:	(231) 972-2831
	EEAS Office:	(231) 972-4779 (FAX/Phone)
	Email:	rodabaug@ferris.edu

Education

Doctor of Philosophy, 1987
Program: Environmental Protection, College of Natural Resources
Michigan State University

Master of Science, 1981
Program: Pollution Ecology/Biology
Eastern Michigan University

Bachelor of Arts, 1976
Program: Biology
University of Michigan

Associate of Science, 1977
Program: Medical Technology
C.S. Mott Community College

Heritage Native American

Present Position Ferris State University – Academic Rank: Professor – Industrial Hygiene
Professor – Industrial Safety
Professor – Hazardous Materials Management
Professor – Biology

Certifications Certified Hazardous Materials Manager at the Master Level (#539)
Licensed Residential Builder (#2101178188 - Michigan)

Specialization and Areas of Interest

As a Full Professor and Consultant, I am currently practicing in the specialty areas of Industrial Hygiene, Indoor Air Quality, Industrial/Construction Safety and Chemical Management/Exposures in the Environment. Specific information on each of these specialties is provided on following pages.

Present & Past Positions

1986 - Present	Ferris State University Position: Tenured Full Professor of Biology, Tenured Full Professor of Environmental Health and Safety (EHS) Management (Safety, Industrial Hygiene, Hazardous Materials)
1991 - Present	Expert Environmental Assessment Services (EEAS) Position: Owner & CEO
1984 - 1986	General Motors Corporation, Flint, Michigan Position: Senior Environmental Specialist (Level 7)
1983 - 1984	General Motors Corporate Fellowship Scholarship at Michigan State University
1982 - 1983	General Motors Corporation Position: Environmental Specialist (Level 6)
1980 - 1982	General Motors Corporation Position: Associate Chemist (Level 5)
1979-1981	Graduate Instructor, Anatomy & Physiology Eastern Michigan University
1978-1986	Emergency Medical Technician, Ambulance Attendant/Driver, Byron Area Volunteer Ambulance Squad
1978-1980	GLR Construction (General residential construction) Position: CEO
1974-1978	WACO Construction, Saginaw, Michigan Position: Residential subcontractor
1970-1974	Atwood Siding, Saginaw, Michigan Position: Residential subcontractor

Awards and Accomplishments

- Awarded academic tenure [1991]
- Awarded academic sabbatical leave [1993, 1999, 2006]
- Promoted to Full Professor of Hazardous Waste Management, Industrial Hygiene, and Industrial Safety [1989]
- Nominated for Teacher of the Year award [1990, 1991]
- General Motors Corporate Fellowship award - [1983]
- Captain's Certificate of Meritorious Service, South Dakota State Police [1980]
- Listed in Who's Who in America [1985 through 1990]
- Listed in Who's Who in Environmental Activities [1992]
- Appointed to General Motors Divisional Task Force on Hazardous Materials Control Activities [1986]
- Nominated for service on Michigan Hazardous Waste Site Review Board [1989]
- Member: Michigan Department of Education Task Force on Occupational Education [1992]

International Consulting Expert

- Antigua/Barbuda, British West Indies, Caribbean, Industrial Hygiene Evaluation of Community Exposure to Emissions from Asphalt Production Operations.
    - This series of projects involved the exposure of local residents to emissions from a rock quarrying and asphalt production facility. A detailed evaluation of silica and organic vapor emissions was undertaken for the immediate region and detailed soil evaluations for select contaminants was undertaken for the entire island. High levels of silica were found to be emitted from the quarry operation, VOC emissions were not considered significant at the property border and high levels of arsenic were located from a historical agricultural chemical spill.
- Ontario, Canada, Retained by Farmers Reinsurance Group to evaluate environmental releases of hydrocarbons and associated remediation activities
    - From 2003-2005, case evaluations were undertaken for approximately 30 environmental releases of home heating fuels in residential and rural settings. In each case, the file was evaluated, reports were created to discuss adequacies/inadequacies of the remediation methods, site visits were conducted and recommendations were made for the amelioration of any identified deficiencies.
- Ontario, Canada, Retained by several environmental attorneys to evaluate environmental cleanup strategies and community chemical exposure. Investigation of occupational chemical exposure to benzene and the resultant health risks was undertaken for an attorney in Ontario and investigations related to litigation of improper responses to the remediation of heating oil spills have been undertaken.
- Ontario, Canada, Retained to conduct case file evaluation involving major remediation activity on residential structure impacted by release of approximately 500 liters of fuel oil.

Committees and Offices Held

- Chairman - Hazardous Materials Control Committee (General Motors)
- Chairman - Occupational Health and Safety Committee (Ferris State University)
- Member – College of Allied Health Safety Committee (FSU)
- Secretary - Regional Solid Waste Management Committee (GM)
- Radiation Safety Officer (GM)
- Coordinator - Pollution Emergency Response Team (GM)
- Member - Michigan Department of Education Task Force on Occupational Education
- Member - Divisional Hazardous Waste Task Force (GM)
- Member - Radiation Safety Committee (FSU)
- Member - Regional Solid Waste Management Plan Review Committee for Mecosta County
- Member - Graduate Programs Review Council (FSU)
- Member – Deans Advisory Council (FSU)
- Member - Mecosta County Cooperative Extension Service Advisory Board
- Member - Editorial Review Board for *Journal of Environmental Engineering and Management*
- Member – FSU Information Technology Council

Publications

- *Bloodborne Pathogens in Industry - Best Practices*. All About Bloodborne Pathogens and First Aid (CD training Software, Version 5), Keller-Soft Safety Singles 1998

- *Act 201, Michigan's Version of CERCLA*. Presented in New Orleans at the 1996 National Meeting of the Certified Hazardous Materials Managers.

- *Occupational Lead Exposure; OSHA's New Zero Tolerance Standard*. Summer Regional Meeting of the Michigan Chapter of the Air and Waste Management Association, June 1994.

- *Covenants Not to Sue*. Quarterly Newsletter of the Michigan Chapter of the Air and Waste Management Association. February 1994.

- *Changes in Michigan Environmental Law Through Compilation by the Michigan Environmental Code Commission*. Quarterly Newsletter of the Michigan Chapter of the Air and Waste Management Association. February 1994.

- *Handbook of Hazard Control* - Commissioned by the Board of Hazard Control, this textbook is designed to serve as a reference guide for those individuals interested in becoming a Certified Hazard Control Manager [unpublished].

- *The New ASTM Standard for Conducting Phase 1 Environmental Site Assessments* - Academy of Certified Hazardous Materials Managers - Proceedings of the August 1993 National Meeting in Seattle, Washington.

- *Voluntary Exposure to Hazardous Chemicals in Michigan Anglers Utilizing Contaminated Waters* - University Microfilm Publications, Ann Arbor, Michigan, August 1987.

- *Bioaccumulation and Competitive Uptake of Polychlorinated Biphenyls in Select Aquatic Organisms* - American Academy of Sciences, Michigan Division, April 1981.

Internet Course Development

- *Environmental Regulations 1 & 2.* Internet courses providing basic (Env. Regs 1) and detailed information (Env. Regs 2) on compliance with environmental regulations for more advanced users and professionals in the field. It will concentrate on compliance plans, regulatory interpretation and processing of appropriate reports/information for submission to governmental agencies.
- *OSHA Law.* A course designed to provide the student with basic information on the use of OSHA laws in industry and how they affect both employees and employers. Detailed attention is given to a wide variety of specific components of the OSHA regulations, such as HAZCOM, confined space, lockout/tagout and the process of participating in an OSHA inspection.
- *EHS Regulations in Industry.* A compilation of environmental and occupational health & safety regulations, this course provides a detailed treatment of regulations important in the protection of human health and the environment. Community, workplace, industrial and other standards are discussed in detail.
- *Epidemiology and Statistics.* A course designed to provide the student with an introduction to epidemiological and statistical methods used in the health fields.

Courses Taught At Ferris State University

CCHS 102 – EHS Issues in Health Care
EHSM 103 – Fundamentals of Industrial Hygiene and Waste Management
EHSM 330 – OSHA Laws & Regulations
EHSM 303 – Ambient Air Quality
EHSM 304 – Indoor Air Quality
EHSM 222 – Industrial Fire Prevention & Control
EHSM 231 – Mechanical Safety
EHSM 322 – Accident Investigation & Reporting
EHSM 335 – Air Sampling & Analysis
EHSM 340 – Risk Assessment and Communication
EHSM 412 – Industrial Ventilation
EHSM 208 – Environmental Regulations 1
EHSM 440 – Environmental Regulations 2

EHSM 315 – Epidemiology and Statistics
EHSM 245 – Emergency Response 1 (HAZWOPER)
EHSM 415 – Environmental Sampling and Project Design
EHSM 421 – EHS Regulations in Industry
EHSM 416 – Noise & Vibration

Graduate Courses for Wayne State University

CHE 554 - Hazardous Waste Law
CHE 555, 556 Environmental Auditing I & II

Major Professional Projects and Experiences

As noted earlier, Dr. Rodabaugh currently practices in several areas of expertise. Selected experience and expertise in identified areas are presented here.

Industrial Hygiene & Indoor Air Quality

- Responsible for all industrial hygiene activities at Chevrolet Flint Manufacturing in Flint Michigan from 1980-1986. Evaluations of occupational chemical exposure, air sampling, noise evaluations and initiation of control activities were a primary responsibility. Prevention of workplace illnesses caused by physical or chemical stress was part of my daily responsibilities.

- Investigation, risk assessment and site safety plan development for a major structural fire that released large quantities of gold cyanide, silver cyanide, sodium cyanide, potassium cyanide, hydrogen cyanide and other hazardous decomposition products (2004).

- Investigation of cancer cluster at small foundry operation in Michigan.

- Conducted a detailed evaluation of indoor air quality complaints at the Mecosta County Courthouse and other government buildings in Mecosta County.

- Consulting Indoor Air Quality expert for the Michigan Education Association. IAQ evaluations of over 20 Michigan schools have been completed to date.

- Evaluated exposure to gasoline vapors in residential setting as a result of the release of fuel from a local government facility.

- Involvement as primary or consulting expert on over 25 indoor air quality studies related to chemical and microbiological contaminants within occupied structure.

- Completed major environmental impact assessment of worker and community exposure to quarry silica and contaminants from an asphalt production facility in the Caribbean, Antigua, West Indies (2001)

Industrial/Construction Safety

- Author of major training manuals and programs in occupational health, safety, PPE, confined space entry, lockout/tagout, general safety, worker exposure, construction safety, construction fatalities, construction accident/injury/fatality investigations, ergonomics, indoor air quality, training techniques, and other topics for UAW-Chrysler [1995-Present].

- Development of Confined Space Entry programs for several foundries, large manufacturing companies and private industries.

- Development of Lockout/Tagout programs for several foundries, large manufacturing companies and private industries.

- Injury/accident investigations in several residential and commercial buildings in Michigan.

- Assisted in the development and national press release of an Ergonomic Stress Reliever in association with KLAI Enterprises [1995].

- Development and administration of OSHA Hazard Communication program for 5000 employees at a medium size General Motors facility.

- Ergonomic review and facility/workstation redesign at several foundries, manufacturing facilities and private offices in Michigan and Indiana.

Chemical Management/Exposures in the Environment

- Author of a "Best Practices" section of JJ Keller software package. *Bloodborne Pathogens in Industry - Best Practices*. All About Bloodborne Pathogens and First Aid (CD training Software, Version 5), Keller-Soft Safety Singles 1998.

- Responsible for tracking and evaluation of over 100 chemical and hydrocarbon releases at General Motors. Identification of contaminant, mitigation of migration, delineation of release, initial response, final remediation and clearance were key activities for each release.

- Monitoring, testing, evaluating data and reporting spill incidents for 130 NPDES outfalls, including daily sampling, conducting laboratory analysis and submitting results to State of Michigan Department of Natural Resources.

- Investigation of accidental fuel releases and resultant attempts at remediation throughout Eastern Ontario, Canada. Approximately 30 sites of fuel oil release in residential areas were visited during 2001-2002. Each file was reviewed prior to the site visit and recommendations on the adequacy of the remediation efforts were submitted to the reinsurance company. Approximately 50% of the sites were inadequately remediated or the remediation effort was misguided and/or totally incorrect.

- Completed major environmental impact assessment of worker and community exposure to quarry silica and contaminants from an asphalt production facility in the Caribbean, Antigua, West Indies. Sampling of soils for a variety of volatile organic compounds and heavy metals were undertaken throughout several areas of the country. High levels of arsenic were found along 3 kilometers of public road, the result of an historic pesticide spill. High levels of airborne silica were found in areas downwind from the quarry operations.

- Developed Spill Prevention Countermeasure and Control, Pollution Incident Prevention Plans, and Contingency plans for several large industrial facilities as required by various Federal and State environmental regulations.

- Coordinated precautionary removal, storage, and disposal of over 500,000 pounds of Polychlorinated Biphenyls from capacitors and transformers.

- Conducted over 100 Phase 1, Phase 2 and Phase 3 Environmental Site Assessments in Michigan. These projects involved detailed documentation searches, identification of released chemicals, delineation of the migration paths, design of sampling protocols, quality control, sample submission, recordkeeping and final report preparation. Some projects involved the supervision of Phase 3 site remediation and verification of reaching cleanup criteria.

- Identified and supervised the removal of 24 leaking underground storage tanks containing gasoline, oil, and other chemical materials at Chevrolet Flint Manufacturing. Identification of leak, removal of tank and supervision of remediation were assigned responsibilities for these releases.

- Conducted identification, delineation and soil remediation activities for release of high levels of lead from a local industrial facility.

- Researched the rates of bioaccumulation of PCB in select aquatic organisms with *in vitro* experiments utilizing radioactive C_{14}-labled PCB.

- Supervised removal of thousands of meters of asbestos-covered pipe during major renovation activities at Chevrolet Flint Manufacturing.

2007-2008 Rates

EEAS & Dr. Gary Rodabaugh, CHMM

The following rates are effective for Expert Environmental Assessment Services (EEAS) and Dr. Gary Rodabaugh beginning on June 5, 2005.

Hourly rates

Consulting services and document review..... $200/hour

Travel time $100/hour

Deposition and Trial Testimony ..... $2000/day[1]

Technician $45/hour

Training and material development time ..... $175/hour[2]

Expenses

Mileage $0.45/mile

Per diem $200/day

Laboratory fees & sample shipping ..... At cost

Airfare and other travel expenses ..... At cost

Equipment rental ..... At cost

Miscellaneous and specialized equipment/material purchases ..... At cost

The fees noted above will be in effect until further notice. Any miscellaneous expenses, materials, equipment or items not specified above will be invoiced at cost. Any professional time or activity not specifically listed above will be invoiced at a rate of $200/hour.

1 Invoiced in ½ day increments. Minimum ½ day charge.
2 Custom training often requires site visits and approximately 5:1 development time. Charges will vary depending on the level of customized training desired.

CURRICULUM VITAE (last update: 3 June 2009)

MICHAEL DENNIS RYAN

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Ferris State University
Big Rapids, MI 49307
voice: (231) 591-5892 cell: (231) 580-1580
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Home Address:
327 South Stewart Avenue
Big Rapids, MI 49307
(231) 796-2264

Born: 25 March 1947
Pittsburgh, PA

Married: Mary Balestra Ryan
Children: Shawn, Patrick, Kevin, Michael

TEACHING/RESEARCH EXPERIENCE

Professor — 1987-88 to Present
Department of Biological Sciences
Ferris State University

Associate Professor — 1981-82 to 1986-87
Department of Biological Sciences
Ferris State College

Visiting Associate Professor — 1983 Fall Semester
Department of Biology
Central Michigan University
Mt. Pleasant, MI

Assistant Professor — 1977-78 to 1980-81
Department of Biological Sciences
Ferris State College

Laboratory Teaching Assistant — 1974-75 to 1975-76
Department of Microbiology
SUNY at Buffalo, School of Medicine
Buffalo, NY 14214

Microbiology Tutor — 1974-75 to 1975-76
School of Dentistry
SUNY at Buffalo

Research Technician — 1972 - 1973
Department of Microbiology
School of Medicine
SUNY at Buffalo

Teaching Assistant — **1969-70 to 1970-71**
Department of Biological Sciences
Duquesne University
Pittsburgh, PA

Laboratory Teaching Assistant — **1967-68 to 1968-69**
Chemistry Department
St. Vincent College
Latrobe, PA

FELLOWSHIP

NIH Pre-Doctoral Fellowship — **1971, 1974 to 1976-77**
School of Medicine SUNY at Buffalo

EDUCATION

Ph.D. Microbiology — **1980**
Department of Microbiology
School of Medicine
SUNY at Buffalo
Buffalo, NY

Dissertation: "Studies on the Pathogenesis of Infection and the Accompanying Immune Response in Inbred Guinea Pigs Inoculated with *Mycoplasma pneumoniae*"

M.S. Biology — **1971**
Department of Biological Sciences
Duquesne University
Pittsburgh, PA

Thesis: "Comparative Double Diffusion Studies of Saline Extracted Complement Fixing Antigens of *Fasciola hepatica* and *Fascioloides magna*"

B.A. Biology — **1969**
St. Vincent College
Latrobe, PA

PRESENTATIONS/PUBLICATIONS (2002-2007 in Bold)

"Strategic Preparation for Bargaining." Presenter/Panel Discussion Leader. Michigan Association for Higher Education 2007Conference, Lansing, Michigan, 19 October 2007.

"2005 Current Issues and National Trends in Higher Education" Michigan Education Association. Presenter/Panel Discussion Leader. Bargaining Conference, Dearborn, MI. 5 February 2005.

"Higher Education Forum: Impact of GATS on the Future of Higher Education" National Education Association, Midwest Leadership Conference. Presenter/ Panel Moderator. St Louis, MO. 22 January 2005.

"Status and Concerns: Higher Education Re-Authorization Legislation 2004" Michigan Education Association, Higher Education Forum. Presenter. Professional Development Conference, Dearborn MI 4 December 2004

"Managing Campus Crisis: A Workshop". Presenter. Southern Illinois University, Carbondale, IL 14-17 Feb 2004.

"2004 Current Issues and National Trends in Higher Education" Michigan Education Association. Presenter/Panel Discussion Leader. Bargaining Conference, Dearborn, MI 7 February 2004.

"Higher Education Forum: Higher Education Re-Authorization Legislation" National Education Association, Midwest Leadership Conference. Presenter / Panel Moderator. Sioux Falls, SD. 24 January 2004.

"2003 Current Issues and National Trends in Higher Education" Michigan Education Association. Presenter/Panel Discussion Leader. Bargaining Conference, Dearborn, MI 11 February 2003.

"Higher Education Re-Authorization and Federal Legislation Update 2003" Michigan Education Association, Higher Education Forum. Presenter. IPD Conference, Dearborn MI. 2 December 2003

"2002 Current Issues and National Trends in Higher Education" Michigan Education Association. Presenter/Panel Discussion Leader. Bargaining Conference, Dearborn, MI 9 February 2002.

"Higher Education Re-Authorization and Federal Legislation 2002 Update" Michigan Education Association, Higher Education Forum. Presenter. IPD Conference, Dearborn MI. 4 December 2002

"Common Sense Answers to the Current Anthrax Threat". TV Interview, TV 9/10's "The Evening News". Cadillac , MI 16 October 2001.

Hartley, F.A., Hoeksema, W.D. and Ryan, M.D. Fundamental Microbiology for the Health Care Sciences. Fourth Edition. 2001. Kendall-Hunt Publishing Co., Dubuque, IA. 206 pages

"Is This Any Way to Run a Railroad?" A book review. Management Fads in Higher Education: Where They Come From, What They Do and Why They Fail. Robert Birnbaum, Jossey-Bass Press, 2001. In "Thought and Action", Volume XVII, Number 1, Summer 2001

"The Role of Faculty in the Evolution of Technologically Based Higher Education." Presenter and panel discussion member. Washington State Higher Education Association, State Meeting. Seattle/Tacoma, WA. 23-25 February 2001.

"The Role of Technology in Higher Education" Lecturer and panel discussion member. Ferris State University's Futures Conference. 2 September 1999.

"Recent advances in Vaccine Research and Development. A continuing education seminar for the FSU Health Center's Staff Physicians and Nurses. 24 August 1999

"Recent Advances in Vaccines and You". TV Interview. TV 9/10's "Michigan This Morning Show". Cadillac, MI 17 June 1999.

Hartley, F.A., Hoeksema, W.D. and Ryan, M.D. Fundamental Microbiology for the Health Care Sciences. Third Edition. 1995. Kendall-Hunt Publishing Co., Dubuque, IA. 227pages

"Immunological Basis of Ocular Inflammation and Pathology". Basic Concepts of Ocular Therapeutics Conference. Three hour continuing optometry education lecture. Ferris State University, College of Optometry. East Lansing, MI, June 24, 1995.

"Immunological Basis of Ocular Inflammation and Pathology". Basic Concepts of Ocular Therapeutics Conference. Three hour continuing optometry education lecture. Ferris State University, College of Optometry. Iron Mountain, MI, May 20, 1995.

"Immunological Basis of Ocular Inflammation and Pathology". Basic Concepts of Ocular Therapeutics Conference. Three hour continuing optometry education lecture. Ferris State University, College of Optometry. Big Rapids, MI, May 16, 1995.

"Immunology and the Western Blot Technique". Ferris State University/ The Upjohn Company Biotechnology Workshop for Community College Teachers and their Students. Big Rapids, MI. April 8, 1995.

Hartley, F.A., Hoeksema, W.D. and Ryan, M.D. Fundamental Microbiology for the Health Care Sciences. Second Edition. 1993. Kendall-Hunt Publishing Co., Dubuque, IA. 210 pages.

"World of Microbes". Hillcrest Elementary School. April 1992

"Attainment of a doctoral Degree in Microbiology while Maintaining Full-Time Employment" with Drs. Debra Stai and Walter Hoeksema. Presented by Dr. Stai at the 89th Annual International Meetings of the American Society for Microbiology, New Orleans, LA, May 14-18, 1989. Published in the Abstracts of the 89th Annual Meeting, ASM, page 492.

"Immunological Basis of Ocular Inflammation and Pathology." Basic Concepts of Ocular Therapeutics Conference. Three hour continuing optometry education lecture. Ferris State University, College of Optometry, Big Rapids MI, January 22, 1989.

"Immunological Basis of Ocular Inflammation and Pathology." Basic Concepts of Ocular Therapeutics Conference. Three hour continuing optometry education lecture , Ferris State University, College of Optometry, Big Rapids MI, January 15, 1989.

"Monoclonal Antibodies: Concept and Applications." Drug Manufacturing Quality Control Training Course for Federal Drug Agency Investigations, October 17, 1988.

Hartley, F.A., Hoeksema, W.D. and Ryan, M.D. Fundamental Microbiology for the Health Care Sciences. 1986. Kendall-Hunt Publishing Co., Dubuque, IA. 175 pages.

"Pre-medical Career Advising." Cmte on Grad./Prof. Studies. Michigan Association of Collegiate Registrars and Admissions Officers (MACRAO) Annual Meeting, Shanty Creek, Oct. 1986

Ryan, M.D., P. Noker and L.L. Matz. 1975.Immunological properties of glycolipids from membranes of *Acholeplasma laidlawii*. Infection and Immunity 12(4): 799-807.

NOMINATIONS/AWARDS

FSU Martin Luther King Social Justice Award (2005)

Michigan Association of Governing Boards (MAGB)
1985-86 Distinguished Faculty Member Award Winner

Nominee, Outstanding Advisor Award (1985)
ACT/NACADA National Recognition Program for Academic Advising

Nominee, Outstanding Institutional Advising Program Award, 1985
ACT/NACADA National Recognition Program for Academic Advising

Ferris Greek Educator of the Year (1981-82)

CONTINUING EDUCATION

(2002-2009 in Bold)
"The Twelfth Annual Conference on Vacine Research. Sponsored by the national Foundation for Infectious Diseases. Baltimore, Maryland. 27-29 April 2009.

"The One Health Initiative: The Interrelationship between Humans, Animals and Pathogens." ASM-MI Branch Spring Meeting, Delta College,University Center, MI. 27-28 March 2009.

"Beneficial Microbes: How Bacteria Impact Human Health!" ASM-MI Branch Fall Meeting Eastern Michigan University, Ypsilanti, MI October 10-11, 2008,

"Small solution to a big problem: Microbes and Alternative Energy" ASM-MI Branch Spring Meeting Central Michigan University, Mount Pleasant, MI April 11-12, 2008.

"Critical Issues in Higher Education" Fall 2007 MEA Conference Kellogg Center, MSU, East Lansing, MI. 19-20 October 2007.

"Emerging Infectious Diseases". ASM-MI Branch Fall Meeting, Traverse City, Michigan. 12-13 October 2007.

"New Risks and New Defenses: The Technology of Bioterrorism". ASM-MI Branch Spring Meeting, Wayne State University, Detroit, MI 13-14 April 2007.

"Critical Issues in Higher Education" Fall 2006 MEA Conference, Kellogg Center, MSU, East Lansing, MI. 13-14 October 2006.

"Biofilms" ASM-MI Branch Fall Meeting Fall 2006, Lansing Community College, Lansing Mi, 7 October 2006.

"Microbial Physiology in the Genomics Era",ASM-MI Branch Spring Meeting, Ferris State University, Big Rapids, Mi, 1 April 2006.

"New Perspectives and Paradigms in Environmental Microbiology". ASM-MI Branch Fall Meeting. Dearborn. MI. 8 October 2005

"Responses to Infectious Diseases after Natural Disasters". ASM-MI Branch Spring Meeting. Delta College, University Center, MI. 2 April 2005.

"Dimensions of Diversity: The Changing World of Higher Education". National Council for Higher Education (NCHE). San Antonio, TX. 4-6 March 2005.

"Microbial Products; From Arsenic and Steroids to Wine and Cheese". ASM-MI Branch Fall Meeting. Bellaire, MI. 9 October 2004.

"The Seventh Annual International Conference on Vaccine Research" Jointly sponsored by the Centers for Disease Control and Prevention (CDC), National Foundation for Allergy and Infectious Diseases and International Society for Vaccines, among others. Crystal City, MD. May 24-26, 2004.

"Infectious Causes of Neuropsychiatric Disorders Disorders". ASM-MI Branch Spring Meeting Eastern Michigan University, Ypsilanti, MI 20 March 2004.

"Higher Education on Dangerious Ground: Defending a Public Good". National Council for Higher Education (NCHE). Seattle, WA. 5-7 March 2004.

"Life in Extreme Environments". ASM-MI Branch Spring meeting. Western Michigan University, Kalamazoo, MI. 4 October 2003

"The Sixth Annual International Conference on Vaccine Research" Jointly sponsored by the Centers for Disease Control and Prevention (CDC), National Foundation for Infectious Diseases, International Society for Vaccines, (among others). Crystal City, MD. May 6-8, 2003.

ASM-MI Branch Spring Meeting. "Emerging and Re-emerging Pathogens II ". Ann Arbor, Mi. 5 April 2003

"Critical Issues in Higher Education 2003: Process and outcome of Higher Education Accreditation." National Council for Higher Education (NCHE). Washington DC, 1-4 March 2003.

"The Fifth Annual International Conference on Vaccine Research" Jointly sponsored by the Centers for Disease Control and Prevention (CDC) and the National Foundation for Infectious Diseases. Baltimore, MD. May 6-8, 2002.

"Critical Issues in Higher Education 2002: The Promise and the Reality of Distance Education." National Council for Higher Education (NCHE). San Antonio, TX. 1-4 March 2002.

"The Distributed Learning Workshop: Developmental Update" Sponsored by the Midwest Higher Education Commission. Minneapolis, MN 13-15 September 2001.

"The Fourth Annual International Conference on Vaccine Research" Jointly sponsored by the Centers for Disease Control and Prevention (CDC) and the National Foundation for Infectious Diseases. Arlington, MD. May 30-June 2, 2001.

"Critical Issues in Higher Education 2001: The Higher Education Enterprise: Partners, Profits and Politics." National Council for Higher Education (NCHE). San Diego, CA 1-4 March 2001.

"Learning, the Learner and Teaching Methodology: a course for teachers". FSU Center for Teaching, Learning and Faculty Development (CTL&FD). Winter Semester 2001.

"Critical Issues In Higher Education: The Twin Challenges of For-profit and Dis-intermediation" National Council for Higher Education (NCHE). Washington, D.C. 26-28 January 2001

"Restructuring Higher Education To Meet the Challenges of A Global Economy". NEA Higher Education President's Meeting. Minneapolis, MN 1-5 August 2000

"The Third Annual International Conference on Vaccine Research" Jointly sponsored by the Centers for Disease Control and Prevention (CDC) and the National Foundation for Infectious Diseases. Washington, D.C. May 30-June 2, 2000.

"Critical Issues in Higher Education 2000: Technology in Education." National Council for Higher Education (NCHE). Atlanta, GA April 6-9 2000.

"The Distributed Learning Workshop: Initial Developmental Update." Sponsored by the Midwest Higher Education Commission Emeryville, CA 18-21 January 2000.

"The Second Annual International Conference on Vaccine Research" Jointly sponsored by the Centers for Disease Control and Prevention (CDC) and the National Foundation for Infectious Diseases. Bethesda, MD. D.C. May 31-June 1, 1999.

"Critical Issues in Higher Education 1999: Distance Education". National Council for Higher Education (NCHE). San Antonio, TX. March 6-9 1999.

"The First Annual International Conference on Vaccine Research". Jointly sponcered by the Centers for Disease Control and Prevention (CDC) and the National Foundation for Infectious Diseases. Washington D.C. May 31-June 1, 1998.

"The Immune System: Minding the Body, Embodying the Mind". Mind Matters Seminar Series (Mountain View, California) delivered at Grand Rapids, Michigan. March 25, 1998.

"On the Cutting Edge of Quality". National Council for Higher Education. Savannah, Georgia. March 4-6, 1998.

"Critical Issues Seminar: Quality Teaching and Learning Across the Disciplines". National Education Association. Washington, DC. May 29-31, 1997.

"Molecular Approaches to the Control of Infectious Diseases". A Cold Springs Harbor Laboratory Conference. Cold Springs Harbor, New York. September 9-13 1996.

"A Guide to the Internet and the World Wide Web", NSF Chautauqua Course taught by Dr. Wayne Summers (Arizona State University) taught at Dayton, Ohio. May 8-10,1996

"50th Anniversary of Universidad Autonoma de Guadalajara, Pre-medicine Advisors' Conference". Guadalajara, Mexico. October 25-29, 1995.

"IBM Seminar: Think Pad Applications in Higher Education". Detroit, MI, October 1995.

"Pre-medical Advisors Conference". Michigan Medical Schools Council of Deans. University of Michigan, School of Medicine, Ann Arbor, Mi. April 1994.

"Human Immunodeficiency Virus Biology and Clinical Latency". Michigan Branch of the American Society for Microbiology, Ann Arbor, MI. April 1994.

"Basic Biology of Cancer". NSF Chautauqua Course taught by Dr. Kenneth J. Soprano (Temple University, School of Medicine) taught at Dayton, Ohio. March 1994.

"Pre-medical Advisors Conference". Michigan Medical Schools Council of Deans. Wayne State University, School of Medicine, Detroit, MI. April 1993.

"Fundamentals of Virology for the Nineties and Beyond", NSF Chautauqua Course taught by Dr. Linda Pifer (University of Tennessee, School of Medicine) taught at Memphis, TN, March, 1993.

"Critical thinking Workshop", Foundation for Critical Thinking (Sonoma State University) taught at Chicago, IL. March 13-14, 1993

"Equity in the Classroom", Michigan Department of Education, Lansing, MI, April 1993.

"Pathogenic Mechanisms and the Immune Response". Michigan Branch of the American Society for Microbiology, Ann Arbor Michigan, April 1993.

"Critical Thinking in Biology and Physical Science Courses", workshop sponsored by FSU Biological and Physical Sciences Departments, taught by Dr. Craig Nelson of Indiana University, Big Rapids, MI, September, 1992

"Pre-medical Advisors Conference". Michigan Medical Schools Council of Deans. Michigan State University, Schools of Human Medicine and Osteopathic Medicine. East Lansing, MI. April 1992.

"Changing Science Courses to promote Critical Thinking", NSF Chautauqua Course taught by Dr. Craig E. Nelson (Indiana University) taught at Dayton , Ohio, March 1992.

"Mechanisms of Pathogenicity and Immunology", Michigan branch of the American Society for Microbiology. Ann Arbor, MI, September 1993.

"Changing Role of the Pre-health Advisor", national meeting of the National Association of Advisors of Health Professionals, Milwaukee, WI, June 17-21, 1992 .

"Changing Sciences Courses to Promote Critical Thinking", NSF Chautauqua Course, Dayton OH, May 27-29,1992.

"Equity in the Classroom", Sponsored by the Michigan Department of Education and Michigan's Colleges and Universities, Lansing, MI March 27-28, 1992.

CONTINUING EDUCATION (Professor: December 1987 to December 1991)

"Biotechnological Techniques in a Clinical Setting" American Society for Microbiology, Michigan Branch University of Michigan, Flint Campus, Flint, MI April 1991

"Transplantation Immunology" American Society for Microbiology, Michigan Branch University of Michigan, Flint Campus, Flint, MI April 25, 1990

"Methods of Immunological Research and Diagnosis". World Health Organization at-the-bench laboratory program, The Ernest Witebsky Center for Immunology Department of Microbiology, SUNY/AB, Buffalo, NY June 14-23, 1989

"Lyme Disease" American Society for Microbiology, Michigan Branch Eastern University October 1989

"Advances in Immunology: Experimental Approaches and Clinical Application." Chautauqua Short Course, University of Georgia, Atlanta, GA, March, 1989

"Immunology and Immunopathology of the Alimentary Canal." Eleventh International Convocation on Immunology, The Ernest Witebsky Center for Immunology, Department of Microbiology, School of Medicine, SUNY/AB, Buffalo, NY, CME credit, June 12-16, 1988

"Immunology, Virology, and Their Interaction." Chautauqua Short Course, University of Georgia, Atlanta, GA, March, 1988

"Basic Immunology." Chautauqua Short Course, University of Georgia, Atlanta, GA, April, 1987

CONTINUING EDUCATION (Associate Professor: 1981-82 to 1986-87)

"Vaccines: New Concepts and Developments" 10th International Convocation on Immunology The Ernest Witebsky Center for Immunology. School of Medicine. SUNY/AB. Buffalo, NY CME July 14-17, 1986

"Clinical Microbiology for Teachers and Practitioners" Department of Microbiology and Molecular Genetics. Harvard Medical School. Boston, MA CME Credit April 15-19, 1985

"Herpes, Hepatitis and AIDS: Current Concerns of the Health Practitioner" School of Dentistry. The University of Michigan. Ann Arbor, MI CME Credit . November 16, 1983

"Current Topics in Clinical Chemistry and Immunology" Department of Postgraduate Medicine and Health Professions Education. School of Medicine. The University of Michigan. Ann Arbor, MI CME Credit March 10-12, 1982

"Clinical Immunology and Allergy Conference".Department of Postgraduate Medicine and Health Professions Education School of Medicine.The University of Michigan.Traverse City, MI CME Credit June 6-8, 1981

"Current Concepts in Clinical Microbiology: Antibiotic Susceptibility".Department of Postgraduate Medicine and Health Professions Education. School of Medicine.The University of Michigan Ann Arbor, MI. CME Credit. March 27-28, 1981

"Mechanisms of Microbial Pathogenesis: Human Anaerobic Infections" 0.6 CEU Credit
"Detection of Clostridium botulium and its Toxins: Latest Methods" 0.6 CEU Credit
"Mechanisms of Pathogenicity of the Aerobic Cocci" 0.6 CEU Credit February 27- March 1, 1981
American Society for Microbiology. Dallas, TX

CONTINUING EDUCATION (Assistant Professor: 1977/78 to 1980/81)

"Symposium: Frontiers in Biomembrane Research". The Biomembrane Research Center. Wayne State University. Detroit, MI. March 15-16, 1980

"Ocular Bacteriology and Mycology".American Society for Microbiology. Las Vegas, NV.0.4 CEU Credit. May 14, 1978

TEACHING ASSIGNMENTS: FERRIS (assignments during 2002-09 in bold)

BIOL 108 Medical Microbiology (Nursing, Allied Health students)
BIOL 308 Adv. Medical Microbiology/Immunology (Nursing students) * Discontinued in 2000
BIOL 286 General Microbiology (Med. Tech.)
BIOL 280 Applied Fermentation: Wine and Cheese of Italy
(Open to all students, Scientific Understanding Credit)
BIOL 386 General Microbiology and Immunology (Pre-Med/Dent., Biotechnology)
BIOL 387 Clinical Microbiology and Immunology (Pharmacy)
BIOL 438 Microbiology for Optometry
BIOL 460 Current Topics (mentor to 1-3 Applied Biology majors/semsester 1998-2004)
BIOL 480 Microbiology for Optometry (Optometry students) * Discontinued in 2004
BIOL 430/530 Contemporary Microbiology: Basic Concepts and Applications
(High school teachers, special summer course/workshop)
FSUS 100/101 First-Year Transition Seminar
FSUSH 290 Orientation to Medical, Dental and Veterinary Schools

VISITING TEACHING ASSIGNMENTS:

Central Michigan University
Fall Semester 1993: BIO 537 Immunology (Med. Tech., biology majors: grad/undergrad.)
Union Graduate School (Cincinnati, Ohio):
Adjunct Professor/ doctoral thesis advisor, Debra Stai, Ph.D.

NON-TEACHING ASSIGNMENTS/ ACTIVITIES: (2002-2009 in bold)

Member, Board of Directors MESSA (MI Education Special Services Association) (2008- present)
Member of the Editorial Board, Journal of Collective Bargaining in the Academy (2008- present)
(National Center for the Study of Collective Bargaining in Higher Education and the Professions)
Member. Board of Directors, American Society for Microbiology, Michigan Branch (2005- Present)
President –elect, American Society for Microbiology, Michigan Branch (2007-08)
President, American Society for Microbiology, Michigan Branch (2008-09)
Member, Board of Directors, National Education Association, Higher Education at-Large (2002 to 2005)
Member, (non-voting), Board of Directors, Michigan Education Association (2002 to 2005)
Member, NEA, Midwest Leadership Conference Planning Cmte/Conference Facilitator (2002-2005)
Member, NEA, Higher Education Advisory Group (2002-2005)
Member, NEA, Higher Education House of Rep./Senate Lobbying Group
Member, NEA, Continuing Education Distance Learning "Platform Selection" Group
Member, MEA Executive Cmte. (2002-2005)
Member, MEA Board of Directors (2002-2005)
Member, MEA, Local Affiliates Commission (2002-Present)
Member, MEA Area 13, Executive Committee (2002-2005)
Member, MEA Area 13 and 13A Region Leadership Group (2002-2005)
Intel Fellow as Science Judge in the Intel International Science and Engineering Fair (May 2000)
New FSU Faculty Orientation. Annual Presentation on Tenure / Promotion Procedures. (1999-2003) (2004- 2008)

Question author, NY Board of Reagents Exam microbiology section (1999, 2000)
Michigan Optometry Board Exam: Immunology Questions (1989 -1994)
Member, Board of Directors/VP for Four-year Colleges/ Univ. Michigan Assn. for Higher Education (1998- 2006)
Member, Board of Directors, Michigan Assn for Higher Education (1994 to Present)
Member, Board of Directors, Friends of Ferris. A registered political action committee for FSU (1996- present)
FSU Presenter, Michigan House Higher Education Appropriations Subcmte (1996-1999)
Member of the National Association of Advisors for the Health Professions (1984 to present)
Applied Biology (Pre-medicine tract) Advisor: graduation clearance (1996 to present)
Outside Reviewer for International Journal of Pharmacognacy (1998-99)
Participant in Ferris Dental Hygiene Program National Accreditation Site Visit (Nov. 1998)
Member, American Society for Microbiology (1970-1988) **(2006- Present)**
Member, Buffalo Collegium of Immunology (An Invitation only international association) (1977 to present)
Member, Connecting With the Learner Committee, State of Michigan, Department of Education (1997-98)

FSU SERVICE ACTIVITIES (2002-2009 in bold)

Departmental:

Microbiology Candidate Selection Cmte	**(2005-06)**
Individual Tenure Review Subcmte, (Herron), member	**(2002-03 to present)**
Individual Tenure Review Subcmte. (Franklund). Chair	**(2005-06 to present)**
Curriculum Cmte.	**(1998-99 to 2002-03)**
	(1984-85 to 1992-93)
	(1979-80 to 1981-82)
Department Rep. Athletic Recruiting	**(1995-96 to 2002-03)**
Chair, Kenneth E. Spoerk Memorial Award Cmte	**(1982-83 to present)**
Planning Cmte. Chair	(1991-92 to 1994-95)
Biotechnology Advisory Cmte.	(1985-86 to 1994-95)
Ad Hoc Biotechnology Group	(1985-86 to 1994-95)

COLLEGE OF ARTS AND SCIENCES:

College Planning Cmte	**(1999-00 to 2007-08)**
	(1991-92 to 1995-96)
First-Year Transition Program, faculty	(1996-97 to 1997-98)
Academic Advisor: CAS Registration Program	**(1987-88 to 2004-05)**
Pre-medical Advisory Cmte., Chair	**(1978-79 to present)**
Pre-dental Advisory Cmte.	**(1982-83 to present)**
First-Year Challenge Retention Program, Guide	**(1993-94 to 1995-96)**
Re-vision Cmte (Semester Conversion)	**(1990-91 to 1991-92)**
Promotion/Merit Cmte., Chair	(1982-83 and 1983-84)
Member	**(2004-05)**

UNIVERSITY-WIDE: (2002-2009 in bold)

Student Organizations:

Lead, Pre-medical Club Faculty Advisor	**(1978-79 to present)**
Phi Delta Chi, Faculty Advisor	(1979-80 to 1999)

Ferris Faculty Association:

Member, FSU Board-President-FFA Leadership "Culture Discussion Group"	**(2008- present)**
Past- president	**(2008- present)**
President	**(2005-2007)**
	(1996 to 2003)

Contact Negotiation Team member:	**(1983-84) (1986-87)** (1994-1997) (2001-02) **(2006-2007) (2009-10)**
Employee Assistance Program Dev. Cmte,	(1997-98)
President's Leadership Council	**(1996-03 (2005-2006-07)**
Semi-monthly Discussions with VPAA/Provost	(1996-97 - **2006-07)**
Executive Board Member (CAS Rep./Past Pres.)	(1989-90) **(2006- present)**
Faculty Workload Review Cmtes.	(1987-92)
Vice-president	(1987-89)
Summer Quarter Employment Cmte	(1984 to 1989)
FSU MLK Program Cmte	(1999-2000)
Recruitment Retention Policy Cmte	**(2000-02)**
Web-Based Instruction Policy Cmte	(2000-2001)
Ferris Communicable Disease Task Force	**(1985-86 - present)**
Strategic Planning and Resources Council (SPARC)	**(2006-07 – present)**
Assessment Tracking System Task Force	**(2006-07)**
Faculty Senate:	
University Planning Cmte.	**(1995-96 to 2002-03)**
Senator, College of Arts and Sciences	**(1995-96 to 2002-03)**
NCA Executive Cmte., Steering Cmte.,	(1992-93 to 1993-94) (1985-86 to 1987-88)
Budget Systems Cmte.	(1994-95 to1995-96)
University Semester Transition Team	(1990-91 to 1991-92)
APR:College of Arts and Sciences (Biotechnology)	(1991-92)
APR:College of Business: Personnel Management	(1990-91)
Chair, Undergraduate Curriculum Council	(1987-88 to 1990-91)
Member, University Curriculum Committee	(1987-88 to 1990-91)
Educational Planning Cmte. (EPC):	
Academic Program Review Cmte	(1986-87)
Chair, EPC	(1985-86)
Senate Formation Election Cmte.	(1986)
New Faculty Orientation Cmte	(1985-86)
Vice-chair, EPC	(1984-85)
Chair, Long-Range Planning Subcommittee	(1983-84)
National Board Examination Review Session (Dental Hygiene)	(1995-96)
Recruiting Advisory Committee, Office of Admissions	(1994-95)
Ferris Chlamydia Research Project, Co-leader	(1985-86 to 1988-89)
All -College Promotion Cmte member/Chair	(1982-83)/ (1983-84)
Ad Hoc FSC Cmte. on Hepatitis B Vaccination	(1983)
Student Health Advisory Cmte.	(1977-78 to 1983-84)

COMMUNITY SERVICE: (2002-2007 in bold)

Member, Board of Directors, Friends of Ferris (PAC)	**(1998- present)**
Big Rapids Friends of the Library, volunteer	**(1996 – present)**
Mecosta Intermediate School Dist., Science Center Adv. Board	(1990-91 to 1993-94)

Curriculum Vitae

James P Scott DVM

Address: Department of Biological Sciences
Ferris State University
820 Campus Drive, ASC 2018
Big Rapids, Michigan 49307

Phone: 231-591-2620

Email: James_Scott@Ferris.edu

Education

1973 –1976 Central Michigan University Mt Pleasant, MI

- major in Biology
- minor in Chemistry

1976 – 1981 Michigan State University East Lansing, MI

- BS degree Veterinary Science. Major in Fisheries and Wildlife
- Doctorate degree in Veterinary Medicine

Professional Experience:

2004 – Present Ferris State University Big Rapids, MI

Assistant Professor Of Biology Tenure Tract

- **Teaching responsibilities** include Lecture and Laboratory sections in:
  - Human Physiology and Anatomy for Biology Majors BIOL 321-322, 2004 →
  - Human Anatomy and Physiology for Optometry OPTM 537-538, 2006 →
  - Human General Pathology for Optometry OPTM 630, 2004 →
  - Human Forensic Pathology BIOL 307, 2005 →
  - Pathophysiology BIOL 300, 2005 →
- **University service:**
  - Academic Advising of Pre-Veterinary Medicine and Forensic Science Students
  - Procurement and Care of Ferris State University Human Cadaver collection for use in Anatomy and Physiology Laboratories
  - Supervisor of the Biology Department Animal Use and Care protocols
  - Advisor and instructor of Advanced Biology to high school junior students in the Math Science and Technology Center at Ferris State University
- **University Committee work:**
  - Biology Department Curriculum Committee, 2005 - present
  - Biology Department Faculty Development Committee, 2005 - present
  - Biology Department Head Search Committee, 2005-2006
  - Chair, Biology Department Physiology Faculty Search Committee, 2005 -2006
  - Biology Department Physiology Faculty Search Committee, 2006 - present
  - Ferris State University Institutional Animal Care and Use Committee, 2002 - present
  - Ferris State University AAALAC Accreditation Committee, 2004 – present
  - Forensic Accreditation Review Committee 2006 - present

1987 – Present Ferris State University Big Rapids, MI

Ferris State University Animal Care Facility Attending Veterinarian

- Responsibilities are oversight of the Animal Care Facilities at Ferris State University including treatment and care of all animals used in research projects and teaching laboratories. Since 2004 I have been the only one to carry this responsibility due to the retirement of Dr Norwood Neumann DVM.

1981- present Riversbend Animal Hospital Big Rapids, MI

Doctor of Veterinary Medicine

- Specializing in canine, feline, reptile and avian internal medicine and surgery
- Other clinic duties include; management of employees, ordering and maintenance of supplies and equipment, public relations and client education

1987-2004 Ferris State University Big Rapids, MI

Part Time and Temporary Full Time Adjunct Faculty

- Courses Taught:
  - Human Anatomy and Physiology, BIOL 109 Laboratory 1987 – 1992
  - Human Anatomy and Physiology, BIOL 205 Lecture and Laboratory 1992 – 2004
  - Human Physiology and Anatomy, BIOL 232 Laboratory 1994 – 2000
  - Human Anatomy and Physiology for Optometry, BIOL 431 2000 – 2004
  - General Minors Biology, BIOL 103 Lecture and Laboratory 2000 – 2003
  - General Majors Biology, BIOL 121 -122 Lecture and Laboratory 1994 – 2000
  - Introduction to Human Genetics Lecture and Laboratory 1994-1995
  - Botany, BIOL 113 1993 – 1994
  - Plant Identification II, HORT 112 1996 – 1998
  - Plant Propagation, HORT 152 2000 – 2004
  - Fundamentals of Soil Science, HORT 143 1999 - 2004
- During this time I had also been taught lecture and laboratory sections in Biology/Anatomy and Physiology for High School Juniors in the Math/Science Technology Center from the Mecosta/Osceola School District. This responsibility began in 1998 and continues to this date.

1985-present 7522 East Pierce Drive Big Rapids, MI

Greenhouse Operator

- Own and operate a 1200 square foot greenhouse and small scale plant retail center
- Specialized in annual/ perennial flowers and vegetables from 1985-1995
- Hardwood and softwood cutting experience
- From 1985 until 1993 I had been working extensively with lily breeding and culture until disease and several late frosts forced me into other areas of horticulture
- Since 1995 I have been growing Orchids and now have a collection of over 600 species and hybrids

1976-1981 Giltner Hall Michigan State University East Lansing, MI

Laboratory Animal Care Service

Responsible for care and maintenance of several large colonies of rats and mice used for research at Michigan State University

Continuing Education

1981- present

- Although Michigan State Law does not require continuing education after graduation from medical school for veterinarians, I have earned hundreds of hours of continuing education credits through seminars and short courses since graduation (documentation available upon request)
- **Most recent meetings attended:**
  - American Association for Laboratory Animal Science, Salt Lake City, UT, November 2006
  - American Veterinary Medical Association Eastern States Conference, Orlando FL Jan 2006
  - Michigan Veterinary Medical Association Conference, Lansing, MI, Jan. 2006
  - American Academy of Forensic Sciences Seattle, WA, Feb. 2006

Affiliations

- American Association of Laboratory Animal Care – Member since 2004
- American Veterinary Medical Association 1981-present
- Michigan Veterinary Medical Association 1981-present
- Grand Rapids Small Animal Academy 1981-present
- Big Rapids area Wildlife Rescue advisory Board 1981-1995
- Chief Veterinarian of The Wildlife Rescue Organization 1981-1995
- Pine View School Board Treasurer from 1982-1988
- Trustee of Norwich Township Zoning and Planning Board 1995-2000
- North American Lily Society 1987-present
- American Orchid Society 1994 - present
- Grand Valley Orchid Society – President in 2000-01 and 2003-04
- Master Gardener Certification through Michigan State University

References:

- **Dr. Ray Cross, President**

  Morrisville State College

  Morrisville, New York 13408

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  crossrw@morrisville.edu

- **Dr Nancy Peterson-Kline**

  Associate Dean

  Ferris State University Michigan College of Optometry

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- **Paul Bigford**
  Math Science and Technology Center Coordinator
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- **Dr James Hoerter**
  Biology Department Faculty Ferris State University
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- **Dr Karen Strasser**
  Ferris State University Biology Department Interim Head
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CURRICULUM VITAE

Karen M. Strasser

Address: Department of Biological Sciences
Ferris State University
820 Campus Drive, ASC2004
Big Rapids, Michigan 49307

Phone: (231) 591-2543
Email karen_strasser@ferris.edu

Education

Ph.D. University of Louisiana, Lafayette, Louisiana, Environmental and Evolutionary Biology, graduation: December 12, 1998 , GPA: 4.0 (4.0 scale)
D.L. Felder advisor

B. S. University of Tampa, Tampa, Florida, double major: Marine Science/Biology, minor: chemistry
Graduation: May 1994 GPA: 3.86 (4.0 scale)

Research Interests

I. Systematics and Biogeography of Decapod Crustaceans
   A. Comparative studies of larval development (including observations on morphology, number and duration of larval stages) to infer phylogenetic associations.
   B. Comparative morphology of adults

II. Larval ecology- Effects on development, dispersal, settlement, recruitment, and behavior of marine invertebrate larvae (particularly with decapod crustaceans).
   A. Environmental factors such as temperature, salinity and light.
   B. Biological factors such as conspecifics, competitors, predators, tannins, and other species associated with the adult habitat.
   C. Human impacts such as pollutants, pesticides, fertilizers.

III Burrowing behavior of postlarvae; effects of sediment type, grain size, presence of organics, and other species.

Professional Experience

7/07 to present	Department Head, Department of Biological Sciences, Ferris State University, Big Rapids, Michigan.
7/06 to 7/07	Interim Department Head, Department of Biological Sciences, Ferris State University, Big Rapids, Michigan.
8/05 to present	Associate Professor of Biology; Ferris State University, Big Rapids, Michigan. Courses taught: Environmental Conservation (upper level majors), General Biology I and II (for biology majors), Developmental Biology (upper level majors)
8/02 to 9/05	Assistant Professor of Biology; Ferris State University, Big Rapids, Michigan. Courses taught: Biological Concepts (non-majors biology), Environmental Conservation (upper level majors), General Biology I and II (for biology majors), Developmental Biology Lab (upper level majors)
8/99 to 5/02	Assistant Professor of Biology; The University of Tampa, Tampa, Florida. Courses: Ecology, Ecology Lab, Conservation Biology, Biological Diversity, Environmental Science, Senior Seminar, Gateways (Freshman seminar).
5/99	Member of Organizing Committee for the Crustacean Society Meeting in Lafayette, Louisiana.
1/99 to 5/99	Visiting Assistant Professor; University of Tampa; Tampa, Florida. Courses: Conservation Biology, Environmental Science, and Marine Biology;
Summer, 1998	Instructor; Biology 101 (for majors); University of Louisiana; at Lafayette Lafayette, Louisiana.
5/95	Research cruise to the Dry Tortugas, Florida, on the R/V Bellows; trip sponsored by the University of Florida. Survey of Florida Straits decapod fauna by demersal sampling.
Fall 1995, 1996, 1997	Lab Instructor; Invertebrate Zoology; University of Louisiana; Lafayette, Louisiana. Set up labs, ordered and collected specimens, prepared lab handouts, held review sessions, set up and administered lab practicals, and lectured for Dr. Felder as needed.
6/94 to 6/95	Research Assistant; Dr. Julie Bailey-Brock; University of Hawaii, at Manoa; Honolulu, Hawaii. Gained experience in benthic sampling, elutriation, and identification of polychaete worms. Assisted with the generation of reports and data entry into the ODES network.

Spring 1994	Teaching Assistant; University of Tampa; Tampa, Florida. Biology Laboratory (for non-majors): Assisted in lab set up, tutored and held review sessions for students.
5/93 to 5/94	Lab Assistant; Thornton Laboratories; Tampa, Florida. Worked in the Bioassay Department culturing *Pimephales promelas* and *Cyprinella leedsi,* conducted acute and chronic tests, and monitored pH, DO, conductivity, alkalinity, and hardness of breeding tanks.
Fall 1992, 1993	Teaching Assistant; University of Tampa; Tampa, Florida. Introductory Biology Lab (for majors), set up practical exams, tutored, and held review sessions for students.
5/93 to 8/93	Research Assistant; Dr. Stan Rice; University of Tampa; Tampa, Florida. Cultured and assisted with feeding experiments of the wood-boring isopod *Sphaeroma terebrans*, and gathered data on his barnacle settlement study.

Classes taught

General Biology I (BIOL 121, Ferris State University) Lecture and Lab
General Biology 2 (BIOL122, Ferris State University) Lab and Lecture
Developmental Biology (BIOL 370, Ferris State University) Lab and Lecture
Environmental Conservation (BIOL 347, Ferris State University) Lab and Lecture
Biological Concepts (BIOL 103, Ferris State University) Lab and lecture
Ecology (BIO 212, University of Tampa) Lab and Lecture
Conservation Biology (BIO 346, University of Tampa) Lecture and seminar sections
Biological Diversity (BIO 203, University of Tampa) Lecture and Lab
Environmental Science (BIO 112, University of Tampa) Lecture only
Marine Biology (MAR 126, University of Tampa) Lecture only
Gateways I and II (Freshman seminar GTW 100, 102, University of Tampa)
Senior Seminar (BIO 410, University of Tampa) lecture only
Biology II (Majors biology, BIO 102, University of Louisiana) Lecture only
Invertebrate Zoology (BIO 410L, University of Louisiana) lab only

Committee Work (since employed at Ferris State University)

IACUC committee (Fall 2006 →)
Biotech Advisory Board (Fall2006→)
Card Wildlife Center Advisory Board Fall 2006 →)
University Enrollment Task Force (Fall 2006 →)
Chair, Search committee for 2 tenure track positions in Physiology (Fall 2006→ Sp 2007)
National Competitive Scholarship Committee (Fall 2005 → 2007)
CAS Online Learning Steering Committee (Fall 2005→Winter 2006)

CAS Scientific Understanding Committee (Fall 2004→)

Chair, Search committee for 4 tenure track positions in Biology (Fall 2004-Winter 2005)

College Board CLEP National Test Development Committee (July 2004 -->)

Departmental Faculty Development Committee (Fall 2003 -->Winter 2006)

Departmental Planning Committee (Fall 2003 --> Winter 2006)

College of Arts and Sciences Graduate Education Committee (Fall 2003 –Fall 2004)

University Arts and Lectures Committee (Fall 2003 --> Winter 2006)

Chair, Laboratory Tech Search Committee (Winter 2004)

Chair, Department Microscope Committee (Fall 2003, 2006)

Academic Honors, Awards and Fellowships

University of Louisiana Doctoral Fellowship. Stipend and tuition waver. $12,000/yr 1995-1999.

University of Tampa Outstanding Graduate in Biology 1994

Honors Program Member at the University of Tampa. 1990-1994.

Crawford and Company Scholarship. 1992-1994. Merit scholarship helped defray costs of housing and books at the University of Tampa.

University of Tampa Presidential and Life Science Scholarships. 1990-1994. Merit scholarship that covered tuition costs at the University of Tampa.

Reviewerships

Marine Biology

Journal of Crustacean Biology

NSF Division of Ocean Sciences

NSF Assembling the Tree of Life (AToL)

Memoirs of Museum Victoria

Gulf of Mexico Science

Scientia Marina

Gulf and Caribbean Research

Invertebrate Biology

Professional Affiliations

The Crustacean Society

The Society for Conservation Biology

Research Support

Pierce Cedar Creek Institute, Muter B., Strasser KM, Watson P. Approx. $7000 as part of the Undergraduate Research Grant in Environmental Science Program. Funds for summer stipend for B. Muter and equipment to support the project. Summer 2005

Ferris State University Faculty Research Grant, $6,563 to purchase equipment. 2003-2004.

USGS, Felder DL, Strasser KM, Klerks P. - $36,014 funded by as part of the Tampa Bay Project. 2001, and 2002

Delo Grant , The University of Tampa- $5000. 2001-2002

Dana Grant , The University of Tampa - $1700. Summer 2001

Dana Grant, The University of Tampa – $1275. Summer 2000

Graduate student fellowship-- Smithsonian Institution. Provided stipend to work at the Smithsonian Marine Station at Linkport for ten weeks. $3000, 1997.

Graduate student research grant-- Louisiana Universities Marine Consortium. Supplies for dissertation research. $2000, 1996-1998.

Graduate student research grants-- Graduate Student Organization at the University of Louisiana. Covered cost of supplies for dissertation research and travel expenses. $160, Spring 1996; $160, Summer 1996; $240, Spring 1998.

Undergraduate research internship-- NSF Research Experience for Undergraduates. Stipend and supplies for summer research at Shannon Point Marine Center in Anacortes Washington. $2200, 1992.

Honors Research Fellowship-- University of Tampa Honors Program. Merit award for undergraduate research. $1000, 1992-1993; $1000, 1993-1994.

Presented Papers at Professional Meetings

The larval development of two sibling species of hermit crabs in the genus *Paguristes* (Crustacea: Anomura: Diogenidae) under laboratory conditions. Poster presentation at the Annual meeting of the Society of Integrative and Comparative Biology (SICB) January, 2003 in New Orleans, Louisiana. . (K. Strasser)

Settlement Cues determining the distribution and host preference of *Tunicotheres moseri* (Rathbun) in the Tampa Bay, FL. Poster presentation at the Crustacean Society Meeting June, 2003 in Williamsburg, Virginia. (J. Ambrosio, W. Price, and K. Strasser).

Settlement cues determining the distribution and host preference of *Tunicotheres moseri* (Rathbun) in Tampa Bay. March 20-23, 2003. Poster presentation at the Southeastern Estuarine Research Society Meeting, Atlantic Beach, NC (J. Ambrosio, W. Price, and K. Strasser)

Preliminary evidence of molecular variability among populations of the hermit crab *Paguristes tortugae* (Diogenidae), on the basis of the 16s rRNA gene.November 2002. Poster presentation at the Congresso Brasileiro Sobre Crustáceos, Sao Paulo, Brazil (Biagi, Mantelatto, Strasser and Felder).

Effects of ghost shrimp on Tampa Bay sediment characteristics. Poster presentation at the Second Annual Science Conference, Gulf of Mexico Estuaries Integrated Science Tampa Bay Pilot Study, Sept. 2002 in St. Petersburg, FL. (Klerks, Paul, Darryl Felder , Karen Strasser, Pete Swarzenski).

Protracted larval development in *Axianassa australis* (Thalassinidea: Axianassidae). Poster presentation at the 8th Colloquium Crustacea Decapoda Mediterranea, September, 2002 in Corfu Isl., Greece. (Strasser, K. M. & D.L. Felder)

Preliminary evidence of molecular variability among populations of the hermit crab *Paguristes tortugae* (Diogenidae), on the basis of the 16S rRNA gene. Poster presentation at the 8th Colloquium Crustacea Decapoda Mediterranea, September, 2002 in Corfu Isl., Greece. (Garcia, R.B., F.L. Mantelatto, K. Strasser & D.L. Felder)

Factors determining host selection of the symbiotic copepod *Clausidium dissimile* Wilson, 1921 (Crustacea: Cyclopoidia: Clausiidae) in sympatric populations of *Sergio trilobata* (Biffar 1970) and *Lepidophthalmus louisianensis* (Schmitt 1935) (Crustacea: Decapoda: Callianassidae) Poster presented at the National Honors Collegiate Conference Nov. 4 to Nov. 7, 2001 in Chicago, and in March, 2002 at the Benthic Ecology Meeting in Orlando, Florida. (J. Corsetti and K.M. Strasser)

Investigation of the population biology of the ghost shrimp *Sergio trilobata* (Biffar 1970) (Crustacea: Decapoda: Thalassinidea). Poster presented in February, 2002 at the Southeastern Estuarine Research Society meeting in South Carolina. (J. Corsetti and K.M. Strasser)

Preliminary observations on the symbiotic Relationship between the pea crab *Tumidotheres maculatus* and the sea squirt *Styela plicata* in Tampa Bay, FL. Poster presentation at the Southeastern Research Society in Charleston, SC March 29 – 31, 2001 (Jeff Grim, Anthony DiGirolamo, and K.M. Strasser)

Sand as a stimulus for settlement in the ghost shrimp shrimp *Callichirus major* (Say) and *C.islagrande* (Schmitt) (Crustacea: Thalassinidea: Callianassidae). May, 1999. Oral presentation at the Crustacean Society Meeting in Lafayette, Louisiana.

Settlement cues in successive developmental stages of the ghost shrimp *Callichirus major* and *C. islagrande* (Crustacea: Decapoda: Thalassinidea). March, 1998. Oral presentation at the Benthic Ecology Meeting in Melbourne, Florida. (K.M. Strasser and D.L. Felder).

A comparison of settlement cues in the Gulf of Mexico and western Atlantic populations of the ghost shrimp *Callichirus major* (Crustacea: Decapoda: Thalassinidea). January, 1998. Oral presentation at the annual meeting of the Society for Integrative and Comparative Biology in Boston, Massachusetts. (with published abstract, *American Zoologist* 37 (5): 409. (K.M. Strasser and D.L. Felder).

Settlement cues in the Gulf of Mexico population of the ghost shrimp *Callichirus major* (Crustacea: Decapoda: Thalassinidea). May, 1997. Oral presentation at the summer meeting of the Crustacean Society in Mobile, Alabama, 1997. (K.M. Strasser and D.L. Felder).

The hermit crabs of Tampa Bay, Florida. Oral presentation at the annual meeting of Tri Beta regional conference in Tuscalusa, Alabama, 1992, and at the Florida Academy of Science in Tallahassee, Florida, 1994. (K.M. Strasser and W.W. Price).

Publications

Klerks, Paul L., Felder, Darryl L., **Strasser,** Karen, Swarzenski, Peter W. 2007. Effects of ghost shrimp on zinc and cadmium in sediments from Tampa Bay, FL, *Marine Chemistry* 104: 17-26.

Strasser , K. M. and D. L. Felder. 2005. Larval development of the mud shrimp Axianassa australis (DecapodA: Thalassinidea) under laboratory conditions. Journal of Natural History. 39:2289-2306.

Corsetti, J.L and K. M. **Strasser.** 2003 Host selection of the symbiotic copepod *Clausidium dissimile* in two sympatric populations of ghost shrimp. Marine Ecology Progress Series 256 : 151-159.

Corsetti, J.L. and K. M. **Strasser**. 2003 Population biology of the ghost shrimp *Sergio trilobata* (Biffar 1970) (Crustacea: Decapoda: Thalassinidea). Gulf and Caribbean Research. 15: 13-19.

Strasser K. M., and D. L. Felder. 2001 Effect of decreased salinity on development of the ghost shrimp *Callichirus islagrande* and two populations of *C. major* (Crustacea: Decapoda: Thalassinidea).Gulf and Caribbean Research 13:9-19.

Strasser K. M., and D. L. Felder. 2000. Larval development of the ghost shrimp *Callichirus islagrande* (Decapoda: Thalassinidea). Journal of Crustacean Biology 20(1):100-117

Strasser K. M., and D. L. Felder. 1999. Larval development of two populations of the ghost shrimp *Callichirus major* (Decapoda: Thalassinidea). Journal of Crustacean Biology 19(4):844-878.

Strasser K. M., and D. L. Felder. 1999. Sand as a stimulus for settlement in the ghost shrimp Callichirus major and C. islagrande (Crustacea: Decapoda: Thalassinidea). Journal of Experimental Marine Biology and Ecology 239: 211-222.

Strasser K.M. and D. L. Felder. 1999. Settlement cues in an Atlantic coast population of the ghost shrimp *Callichirus major* (Crustacea: Decapoda: Thalassinidea). Marine Ecology Progress Series 183: 217-225.

Strasser, K. M. and W. W. Price. 1999. Species composition and spatial distribution of hermit crabs in Tampa Bay, Florida and surrounding waters. Gulf Research Reports 11: 33-50.

Strasser , K. M. and D. L. Felder. 1998. Settlement cues in successive developmental stages of the ghost shrimp *Callichirus major* and *C. islagrande* (Crustacea: Decapoda: Thalassinidea). Marine Biology 132: 599-610.

Referees:

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Professional Experience

2010- Associate Professor, Department of Biological Sciences, Ferris State University, Big Rapids, MI

2007-2010 Assistant Professor, Department of Biological Sciences, Ferris State University, Big Rapids, MI

Education

Ph.D. East Carolina University Greenville, NC 2003- 2007
Dissertation Title: The Role of 5' AMP-activated Protein Kinase in Skeletal Muscle Hypertrophy with Age and Overload
Major: Bioenergetics
Advisor: Scott E. Gordon, Ph.D.

M.A. East Carolina University Greenville, NC 2001-2003
Thesis Title: The Effects of Angiotensin-Converting Enzyme (ACE) Inhibition on Nuclear Proliferation and Hypertrophy in Overloaded Skeletal Muscle
Major: Exercise and Sport Science, Concentration: Exercise Physiology
Advisor: Scott E. Gordon, Ph.D.

B.S. Ball State University Muncie, IN 1997-2001
Major: Exercise Science and Wellness Minor: Anthropology

Teaching Experience (* Denotes new prep)

Ferris State University

Fall 2011 Human Anatomy & Physiology (BIO 109) 4 lecture/ 3 lab sections and Exercise Physiology (BIO 301) 1 lecture section
Sum 2011 Human Anatomy & Physiology (BIO 205) 2 lecture/lab sections and Pathophysiology (BIO 300) 1 lecture section
Spr 2011 Human Anatomy & Physiology (BIO 205) 4 lecture/ 3 lab sections and Pathophysiology (BIO 300) 1 lecture section
Fall 2010 Human Anatomy & Physiology (BIO 109) 4 lecture/ 3 lab sections and *Exercise Physiology (BIO 301) 1 lecture section
Sum 2010 Human Anatomy & Physiology (BIO 205) 1 lecture/lab sections and Pathophysiology (BIO 300) 1 lecture section
Spr 2010 Human Anatomy & Physiology (BIO 205) 2 lecture/lab sections and Pathophysiology (BIO 300) 1 lecture section
Fall 2009 *Human Anatomy & Physiology (BIO 109) 5 lecture/3 lab sections and Pathophysiology (BIO 300) 1 lecture section
Sum 2009 Human Anatomy & Physiology (BIO 205) 1 lecture section, and Pathophysiology (BIO 300) 1 lecture section.
Spr 2009 Human Anatomy & Physiology (BIO 205) 3 lecture/lab sections, and Pathophysiology (BIO 300) 1 lecture section
Fall 2008 Clinical Anatomy and Physiology 1 (BIO 331) 7 lab sections
Sum 2008 Human Anatomy & Physiology (BIO 205) 2 lecture/lab sections

Spr 2008 *Human Anatomy & Physiology (BIO 205) 3 lecture/2 lab sections, and
*Pathophysiology (BIO 300) 1 lecture section
Fall 2007 *Clinical Anatomy and Physiology 1 (BIO 331) 6 lecture sections

East Carolina University

2004 *Physiology of Exercise
Instructor of record for junior/senior level course, and designed all lectures, tests, and quizzes.

2001-2003 *Physiology of Exercise Lab
Organized and taught laboratory lectures.

2002-2007 Undergraduate Independent Study
Instructed undergraduate students with laboratory procedures.

Research Experience

2003-2007 Research Assistant, East Carolina University, Human Performance Laboratory
Conducted research on the impairment of overload-induced hypertrophy in aged skeletal muscle.

2001-2003 Research and Teaching Assistant, East Carolina University, Human Performance Laboratory
Directed graded exercise testing, body composition assessments, and exercise prescriptions. Conducted research examining the proliferative response of myonuclei, endothelial cells, and fibroblasts to skeletal muscle overload.

2001 Undergraduate Intern, Ball State University, Human Performance Laboratory
Duties included exercise testing and prescription. Assisted with master's thesis experiments involving the effects of water loss on body composition measurements and the effects of menstruation on lactate threshold in women.

Professional Organizations and Certifications

2001-present American College of Sports Medicine

2002-present ACSM Certified Exercise Specialist®

2003-present American Physiological Society

2008-present Human Anatomy and Physiology Society

1999-present CPR/AED Certification

Publications

S.E. Gordon, J.A. Lake, **C.M. Westerkamp**, and D.M Thomson. Does AMP-activated protein kinase negatively mediate aged fast-twitch skeletal muscle mass? Exerc. Sport Sci. Rev., Vol. 36, No. 4, pp. 179-186, 2008.

S.E. Gordon, **C.M. Westerkamp**, K.J. Savage, R.C. Hickner, S.C. George, C.A. Fick, and K.M. McCormick, Basal, but not overload-induced, myonuclear addition is attenuated by

N^G–nitro-L-arginine methyl ester (L-NAME) administration, Canadian Journal of Physiology and Pharmacology 2007 85: 646-651.

C.M. Westerkamp and S.E. Gordon, Angiotensin-converting enzyme inhibition attenuates myonuclear addition in overloaded slow-twitch skeletal muscle, Am J Physiol Regul Integr Comp Physiol. 2005 Oct; 289(4): R1223-31.

Abstracts

R. M. Kraus, **C.M. Westerkamp**, T.K. Brtis. The 30-minute Time Trial as a Predictor of Ventilatory Threshold Running Velocity and Heart Rate. ACSM National Conference, Denver, CO. May 2011.

J.D. Redford, E. Coccimiglio, D. Benham, **C.M. Westerkamp**. Skeletal Muscle Hyperplasia in Response to Synergist Removal. Ferris State University College of Arts and Sciences Recognition Event, Big Rapids, MI. April 2011.

T.K. Brtis, **C. M. Westerkamp**, & R. M. Kraus. The 30-minute time trial as a predictor of ventilatory threshold running pace and heart rate: a preliminary report. Midwest ACSM Conference, Indianapolis, IN. October 2010.

S.E. Gordon and **C.M. Westerkamp.** 5'-AMP-activated protein kinase (AMPK) inhibition restores overload-induced growth of fast-twitch skeletal muscle in aged rats. Nathan Shock Center Conference on Aging, San Antonio, TX. October 2007.

S.E. Gordon and **C.M. Westerkamp**, 5'-AMP-activated Protein Kinase (AMPK) Inhibition Restores Overload-induced Growth of Fast-twitch Skeletal Muscle in Aged Rats. American Federation for Aging Research, New York, NY. October 2007.

C.M. Doty, **C.M. Westerkamp**, J.K. LeMoine, R.C. Hickner, D.M. Thomson, L.C. Katwa, and S. E. Gordon. Acute resistance exercise does not increased skeletal muscle fibroblast content in young, untrained men. Med. Sci. Sports Exerc. Vol. 37(5): S242, 2005, ACSM National Conference, Indianapolis, IN. June 2005.

S.C. George, R.C. Hickner, T.P. Gavin, **C.M. Westerkamp**, L.M. Westerkamp, and S.E. Gordon, Effect of L-NAME administration on angiogenesis in overloaded hypertrophying rat skeletal muscle. Med Sci Sports Exerc. 37: 2005, ACSM National Conference, Indianapolis, IN. June 2005.

C.M. Westerkamp, C.A. Fick, E.M. Hedberg, R.C. Hickner, and S.E. Gordon, Effect of L-NAME administration on myonuclear addition in overloaded skeletal muscle, FASEB, Washington, D.C. April 2004.

C.M. Westerkamp, C.A. Fick, E.M. Hedberg, R.C. Hickner, and S.E. Gordon, Effect of L-NAME administration on myonuclear addition in overloaded skeletal muscle, East Carolina University Graduate Student Research Day, Greenville, NC. March 2004.

C.M. Westerkamp & S.E. Gordon, The effects angiotensin-converting enzyme (ACE) inhibition on nuclear proliferation and hypertrophy in overloaded skeletal muscle. FASEB Satellite Cell Summer Research Conference, Tucson, AZ. July 2003.

C.M. Westerkamp, F.W. Booth, R.C. Yeager, T.P. Gavin, and S.E. Gordon, Angiotensin converting enzyme (ACE) inhibition attenuates angiogenesis and overload-induced hypertrophy in skeletal muscle. East Carolina University Graduate Student Research Day, Greenville, NC. April 2003.

C.M. Westerkamp, F.W. Booth, R.C. Yeager, T.P. Gavin, and S.E. Gordon, Angiotensin converting enzyme (ACE) inhibition attenuates angiogenesis and overload-induced hypertrophy in skeletal muscle. Southeast American College of Sports Medicine Conference, Atlanta, GA, February 2003.

Grants

Ferris Foundation Grant, Title: Fiber-type-specific Skeletal Muscle Hyperplasia with Overload, Not Awarded, 2009.

Gatorade Sports Science Institute Student Grant, Title: Prevention of atrophy and apoptosis in unloaded skeletal muscle, Awarded: $3,200, 2005-2006.

NASA Pre-doctoral Student Research Grant, Title: Apoptosis and AMP kinase in skeletal muscle unloading, Not Awarded, 2005.

Service and Awards

Senate Health Promotion and Substance Abuse Prevention Committee member, 2010-.
Senate Liason, Institutional Animal Care and Use Committee, 2009-.
Chair, College of Arts and Sciences Planning Committee, 2009-2011, Member 2008-2011.
Lead Advisor for Pre-Optometry students 2009-.
Chair, Biology Department Planning Committee 2009-2011.
Member, University Planning Committee (SPARC), 2009-.
Dawg Days Volunteer
Pack 3116 Cub Scout Den Leader 2008-.
Northland United Soccer Coach 2008-.

Graduate Scholar Award, Graduate School, East Carolina University 2003-2007.
Dean's Advisory Committee, College of Health and Human Performance, East Carolina University, 2005-06.
Examiner, ACSM Health Fitness Instructor Certification Exam, 2003.
Patient Simulator, ACSM Health Fitness Instructor Certification Exam, 2002.
Graduate Student Organization, College of Health and Human Performance, East Carolina University, 2001-2006.
Youth Soccer Coach, Greenville FutureStars, 2005-2006.
Deans' List, Ball State University, Spring 2001.
Team Captain and Most Valuable Runner, Ball State University Men's Cross-Country, Fall 2000.
President's Scholar-Athlete Award, Ball State University, 1997-2001.

Professional Development

McGraw-Hill Digital Media Symposium February 2008, San Diego, California
Meeting discussing and presenting various uses of digital media in teaching Anatomy & Physiology.

Faculty Center for Teaching and Learning Classroom Project, Spring 2008.
Analysis of student assessment to determine trends in classroom performance based on students' major, first exam grade, and self-reported studying habits.

Grant Writing Seminar, Fall 2008, Ferris State University
Monthly course discussing how to find funding, prepare, write and submit grants for intra- and extramural funding.

Faculty Center for Teaching and Learning Adobe Flash Learning Group, Fall 2008.
Introductory course into use of Adobe Flash animations and their potential use in the classroom.

Faculty Center for Teaching and Learning Advanced Flash Training, Spring 2009.
Course for advanced users of Adobe Flash concentrating on designing Flash animations for use in the classroom.

American Physiological Society Physiological Understanding (PhUn) Week participant, November 2009.

Educational outreach program involving planning and delivering interactive lessons in physiology for elementary students with Biology Education student with visit to St. Mary's school of Big Rapids.

Faculty Center for Teaching and Learning Presentation Zen training, Summer 2010.

Introduction to optimize presentations using Microsoft PowerPoint.

American Physiological Society Physiological Understanding (PhUn) Week participant, November 2010.

Educational outreach program involving planning and delivering interactive lessons in physiology for elementary students with Biology majors with visits to St. Mary's school and the Big Rapids Middle School.

Lilly North Conference attendee, September 2011.

Attended presentations, symposia, and workshops on scholarship of teaching and learning.

Curriculum Vitae

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BIRTHDATE – 8 January 1943

EDUCATION

1960 Graduated, Sparta High School, Sparta MI

1964 B.S. Design, English minor, Teaching Certificate
University of Michigan, Ann Arbor MI

1983 B.I.S. Biology, Department of Biological Sciences
Central Michigan University, Mt. Pleasant MI

1988 M.S. Biology – Central Michigan University
Ecology, Animal Behavior

TEACHING AND OTHER EMPLOYMENT EXPERIENCE

1964-1967 Teacher - Art and English, Jefferson Junior High School, Pontiac MI

1967-1968 Sales - Knapp's Department Store, Lansing MI

1968-1970 Server- Valleywood Golf Club, Swanton OH

1970-1972 Teacher – Art and English, Delta High School, Delta OH

1972-1980 Owner-Chef of The Rowe Inn, Ellsworth MI

1988-2005 Instructor – Department of Biological Sciences
Ferris State University, Big Rapids MI

2001-2005 Naturalist – Grass River Natural Area, Bellaire MI

ECOLOGICAL AND CONSERVATION ASSOCIATIONS

1986–1990 Coordinator, Michigan Loon Registry

1987-2007 MLPA Loonwatch Area Coordinator
Benzie, Grand Traverse, Kalkaska Counties

1997-2007 President, Michigan Loon Preservation Association

1987 – 2007 Three Lakes Association (Torch, Bellaire, Clam)
2006 – 2007 TLA District Director

1980 - 2007 Michigan Audubon Society Board of Directors

EDUCATIONAL AND CONSERVATION PUBLICATIONS

1989 *The Management of Common Loons, Henderson Lake*, Ogemaw County
Author

1993 *Laboratory Manual for Environmental Biology*,
Watson, Westhoven (co-author, illustrator)

2001 *Laboratory Manual for Environmental Biology*,
Watson, Westhoven (co-author, illustrator)

2007 *Laboratory Manual for Environmental Biology*,
Rodabaugh, Watson, Westhoven (co-author, illustrator)

2001-2007 Wetland Education Programs, Purple Loosestrife Control Program
Grass River Natural Area, Bellaire MI

2002 – 2007 *Loon Echoes,* Newsletter of the Michigan Loon Preservation
Association, Editor and Contributor

CLASSES TAUGHT AT CENTRAL MICHIGAN UNIVERSITY

BIO 101 GRA for labs, biology for majors, emphasis on scientific method, statistics, and scientific writing

Field Illustration – Beaver Island

CLASSES TAUGHT AT FERRIS

1988 – 2007 BIOL 100 – Nature Study
BIOL 105 - Basic Human Anatomy and Physiology
BIOL 119 - Field Ornithology
Sabbatical Replacement for Bruce Beetley, 1988-89

BIOL 105 morphed into BIOL 109
I taught both lecture and labs

BIOL 101 Genetics labs

BIOL 121 General Biology 1 labs

BIOL 122 General Biology 2 labs

BIOL 111 – Environmental Biology
lecture and labs

BIOL 109 – Anatomy and Physiology lab

ART CLASSES TAUGHT

Summer 1987,1988 Biological Illustration, CMU Biological Station, Beaver Island MI

Summer 2004 – 2010 Grass River Natural Area, Bellaire MI

Watercolor

Basic Illustration

PRESENTATIONS

February 2005 ***Into the Ice***
Michigan Association of Environmental Educators
Ralph MacMullan Center, Higgins Lake MI

April 2007 ***Loons and Lead***
Michigan Lake and Stream Associations Annual Conference
Boyne Mountain Conference Center, Boyne Falls MI

ARTWORK EXHIBITED

Artworks, Big Rapids MI, watercolors, pastels, prints

Blue Heron Gallery, Elk Rapids MI, watercolors, pastels, prints

R. Douglas Workman, Ph.D – Curriculum Vitae

Education:

- **Ph. D. in Fisheries, March 2002.** Department of Fisheries and Wildlife, Michigan State University, East Lansing, Michigan.
- **M. S., Biology, 1994.** Emphasis in Fisheries and Aquatic Sciences. Murray State University. Murray, Kentucky.
- **B. S. Department of Fisheries and Wildlife, June 1991.** Michigan State University. East Lansing, Michigan.

Professional Experience:

Advanced Ecological Management, Inc. Reed City, MI
Fisheries/Aquatic Biologist 05/06 to present. Conducting comprehensive fisheries community and aquatic habitat assessments for numerous private firms, including hydro-facilities, as part of environmental assessments. Perform weekly hydrologic monitoring, including stream flow and water level measurement. Conduct threatened and endangered species surveys. Conduct and implement aquatic habitat improvement as part of habitat restoration projects. Coordinate and conduct environmental assessments, and Phase I Environmental Site Assessments. Conduct wetland assessments using a combination of field investigations and GIS analyses.

Ferris State University, Big Rapids, MI
Adjunct Faculty, Biology Department 08/06 to present. Instructor for biology courses.

King & MacGregor Environmental, Inc., Grand Rapids, MI
Fisheries/Aquatic Biologist 01/01 to 05/06. Conducted aquatic habitat sampling and fisheries community assessments for hydro-facility licensing, roadway improvement projects, and other environmental assessment projects. Conducted threatened and endangered species fish surveys. Used GIS to assess land use features that influence invasive plant distributions within mitigation wetlands. Conducted large-scale wetland assessments using a combination of field investigations and GIS analyses. Developed and implementing quantitative study designs for analyses of sensitive headwater systems and other aquatic systems.

Michigan State University, East Lansing, MI
Research Assistant 01/96 to 01/01. Conducted a movement and spawning study of steelhead and longnose suckers in the Pere Marquette River, Michigan using radio telemetry. Investigated fish movement using GIS and developed a model to predict steelhead migratory behavior in response to changes in water temperature and stream flow. Evaluated the influence of an electric sea lamprey barrier on the movements of steelhead and longnose suckers, and described steelhead spawning habitat selection.

Snell Environmental Group Inc., Lansing, MI
Environmental Scientist 05/94 to 01/96. Conducted aquatic habitat sampling. Prepared Environmental Impact Statements, Environmental Assessments, and Phase I Environmental Assessments. Conducted public meetings, wetland delineations, monitored wetland mitigation sites, and conducted corridor land-use analyses using GIS. Project manager for several airport Environmental Assessments.

Murray State University-Hancock Biological Station, Murray, Kentucky
Laboratory Technician/Student Worker 06/93 to 02/94. Water sample collection and analysis for the Kentucky Lake Monitoring Program. Analysis of benthic community distribution in relation to groundwater flow in a Kentucky Lake embayment. Provided seminar presentations for visiting high-school students.

Murray State University. Murray, Kentucky
Research Assistant 08/91 to 06/93. Studied movement and spawning of largemouth bass in Reelfoot Lake, Tennessee to identify problems with recruitment. Evaluated movement patterns and identified home range size using GIS. Identified spawning habitat and movements in relation to water quality.

Michigan State University East Lansing, Michigan
Field Technician/Summer Internship 06/90 to 09/90. Stream ecosystem and habitat study of smallmouth bass and rockbass in relation to water flow on the Huron River, Michigan. Gained familiarity with IFIM by conducting stream flow measurements, habitat identification, and other data collection.

Activities and Achievements:

Chair of the Membership Committee, North Central Division of the American Fisheries Society, 2006-present

Past-President of the Michigan Chapter of the American Fisheries Society 2006

President of the Michigan Chapter of the American Fisheries Society, 2005-2006

President-elect of the Michigan Chapter of the American Fisheries Society, 2004

Chair of Continuing Education Committee, Michigan Chapter of the American Fisheries Society, 2003-8

Web-page Development Committee, Michigan Chapter of the American Fisheries Society, 2002-3

Recipient of best poster award at the Midwest Fisheries Conference in Bettendorf, IA, 2002.

Newsletter Editor of the Education Section of the American Fisheries Society, 1998 to 2001

Administrator and Developmental Assistant of the Non-Game Fish Identification Class of the Michigan Chapter of the American Fisheries Society's Committee for Continuing Education, 1997 to 1998

Activities and Achievements continued:

Moderator of the Fisheries Publications Bulletin Board, Department of Fisheries and Wildlife Graduate Student Organization, 1996 to 1997

Volunteer Conservation Officer for the Michigan Department of Natural Resources, 1989 to 1997

Member: American Fisheries Society
1989 to Present

Trout Unlimited
1996 to 2004

Recipient of the Sigma Xi, scientific fraternity award for public speaking and scientific paper presentation, 1993

Recipient of the Sisk Scholarship Award for academic excellence in aquatic sciences, 1992

Courses and Lectures Taught:

- BIO 103 Biology for non majors, Fall 2006, Spring 2008, Ferris State University
- Computer/network training workshop 1999-2000, conducted workshop to provide training to College of Business graduate students to connect personal computers to MSU network, Michigan State University
- Chaos and Fractals, one lecture during Spring 2000 Teaching Seminar Series, Michigan State University
- FW 471 Ichthyology Teaching Assistant Fall 1997, and frequent guest lecturer Fall 1998 and 1999
- Ecology, guest lecture, Summer 1998, Michigan State University
- Zebra Mussel Workshop-Hancock Biological Station, Murray State University

Certifications and Professional Training:

- Aquatic Plant Identification Workshop, American Fisheries Society, 2009
- Mine Safety and Health Administration 24-hour Part 46 New Miner Training, October 2008
- Smith-Root Electro-Fishing Techniques Workshop, American Fisheries Society, 2008
- Mussel Identification/Life History Workshop, American Fisheries Society, 2007
- Introductory Fluvial Geomorphology Workshop, American Fisheries Society, 2005
- Fisheries Popluation Estimation Workshop, American Fisheries Society, 2005
- Statistical Aspects of Sampling Freshwater Fish Populations and Habitats, American Fisheries Society, 2003

Certifications and Professional Training continued:

- Basic/Intermediate GIS for Fisheries Biologists/Managers, American Fisheries Society, 2003
- Wetland delineation training course, Wetland Training Institute of Frederick Maryland. 1995
- PADI Open-Water Diver Certification, 1991

Presentations:

Workman, R.D. 2010. Invasive species: Asian carp and the Great Lakes Region. Benzie County Chamber of Commerce Public Forum. March 2010.

Workman, R.D. 2010. Invasive species: Asian carp and the Great Lakes Region. Branch County Exposition. March 2010.

Workman, R.D., M.P. Owens, C.L. Wolverton, G.J. Goodman. 2006. Creating wetlands for compensatory mitigation by reclamation of iron mine tailings basins at the Republic Mine in Marquette, Michigan. The 7th Annual Interational Conference of Acid Rock Drainage. St. Louis, MO. March 2006.

Workman, R. D. 2005. An investigation of landscape features that influence the invasiveness of reed canarygrass in compensatory mitigation wetlands. Midwest Fish and Wildlife Conference. Grand Rapids, MI. December 2005.

Workman, R. D. 2005. Career opportunities in Michigan's environmental consulting industry. Lake Superior State University Fisheries and Wildlife Club. Sault Ste. Marie, MI. April 2005.

Workman, R. D., and M. Selzer. 2004. Reed canarygrass (*Phalaris arundinacea*) landscape evaluation and experimental control study. Multi-resource agency meeting in Lansing, MI. November 2004.

Workman, R. D., D. Hayes, and T. G. Coon. 2002. Steelhead spawning habitat selection in the Pere Marquette River, Michigan. Poster presentation at the North Central Division of the American Fisheries Society Midwest Fisheries Conference, Bettendorf, IA. December 2002.

Workman, R. D. 2002. Steelhead spawning habitat selection in the Pere Marquette River, Michigan. Michigan Chapter of the American Fisheries Society Spring Meeting, Muskegon, MI. March 2002.

Workman, R. D., D. Hayes, and T. G. Coon. 2000. A temperature and flow-based model for predicting upstream movement of migratory steelhead in Lake Michigan. American Fisheries Society Annual Meeting, St. Louis, MO. August 2000.

Presentations continued:

Workman, R. D., D. Hayes, and T. G. Coon. 2000. A temperature and flow-based model for predicting upstream movement of migratory steelhead in Lake Michigan. Michigan Chapter of the American Fisheries Society Spring Meeting, East Lansing, MI. March 2000.

Workman, R. D., D. Hayes, and T. G. Coon. 1999. A temperature-based model for predicting upstream movement of migratory steelhead in Lake Michigan. 61st Annual Midwest Fish and Wildlife Conference, Chicago, IL. December 1999.

Workman, R. D., and T. G. Coon 1999. Spawning and movement of steelhead and longnose suckers in the Pere Marquette River. Annual Report to the Michigan Department of Natural Resources, Ann Arbor, MI. April 1999.

Workman, R. D., and T. G. Coon 1998. Spawning and movement of steelhead and longnose suckers in the Pere Marquette River. Lansing, MI Chapter of Trout Unlimited. Lansing, MI. October 1998.

Workman, R. D., and J. M. Jones. 1994. Spawning and movement of largemouth bass (*Micropterus salmoides*) in Reelfoot Lake, Tennessee. Environmental Systems Research Institute, Inc. 1994 User Conference. Palm Springs, CA. May 1994.

Workman, R. D., and Tom Timmons. 1994. Spawning and movement of largemouth bass (*Micropterus salmoides*) in Reelfoot Lake, Tennessee. Southeastern Conference of the American Fisheries Society Annual Meeting, Chattanooga, Tennessee. March 1994.

Workman, R. D., and Tom Timmons. 1993. Movement behavior of largemouth bass (*Micropterus salmoides*) in Reelfoot Lake, Tennessee. Kentucky Chapter of the American Fisheries Society Annual Meeting, Frankfort, Kentucky. March 1993.

Publications:

Workman, R.D., M.P. Owens, C.L. Wolverton, G.J. Goodman. 2006. Creating wetlands for compensatory mitigation by reclamation of iron mine tailings basins at the Republic Mine in Marquette, Michigan. Proceedings of the 7th Annual Interational Conference of Acid Rock Drainage.

Workman, R. D., M. Selzer, and M. Pennington. 2006. Assessing the invasiveness of reed canarygrass using landscape features. Michigan Department of Transportation. Lansing, Michigan

Workman, R. D., D. B. Hayes, and T. G. Coon. 2004. Rainbow trout spawning habitat selection in the Pere Marquette River, Michigan. Journal of Great Lakes Research 30(3):397-406.

Workman, R. D., D. B. Hayes, and T. G. Coon. 2002. A temperature and flow-based model for predicting upstream movement of migratory steelhead in Lake Michigan. Transactions of the American Fisheries Society 131:463-475.

Publications continued:

Workman, R. D., D. B. Hayes, and T. G. Coon. 2000. A description of the migratory behavior of steelhead (*Oncorhynchus mykiss*) and longnose suckers (*Catostomus catostomus*) in the Pere Marquette River, Michigan. Research Report to the Michigan Department of Natural Resources, Ann Arbor, Michigan.

Workman, R. D., and J. M. Jones. 1994. Spawning and movement of largemouth bass (*Micropterus salmoides*) in Reelfoot Lake, Tennessee. Environmental Systems Research Institute, Inc. 1994 User Conference Proceedings.

White, D. S., K. Johnston, G. Rice, and R. D. Workman. 1994. Ecology of the Hyporheic Interface of a Third Order Kentucky Stream. Abstract. Proceedings of the Second International Conference on Ground Water Ecology.

Changqi C. Zhu

Department of Biological Sciences
Ferris State University
820 Campus Drive, ASC 2004
Big Rapids, MI 49307

Tel: 231-591-3196 (Office)
E-mail: Zhuc@ferris.edu

Positions at Ferris State University

Associate Professor since August 2012, Department of Biological Sciences, Ferris State University

Assistant Professor (August 2009 – August 2012), Department of Biological Sciences, Ferris State University

- ***Teaching***: **BIOL 121**: **General Biology I** lectures and three labs (Every fall of 2009 – 2013, enrollment: about 90 students per semester)

  BIOL 370: **Developmental Biology** lectures and two labs (Every spring of 2010, 2011, 2012, and 2013, enrollment: about 48 students per semester)

  BIOL 460: **Current Topics in Biology** (15 students per class, both fall and spring of 2009 to 2013)

  BIOL 474: Advanced Cell and Molecular Biology (Every other spring since 2013, about 25 students)

- ***Research***: Activin signaling regulated aging process in adult fruit flies

  Activin signaling regulated female fertility in *Drosophila melanogaster*

  Drosophila follicle cell size and shape regulation

- ***Service:*** University Graduate and Professional Council (2014 - 2016)

  University Core Research Facility Committee (2013 - 2014)

  College of Arts and Sciences Promotion Committee (2012 – 2014)

  Member of biology curriculum committee (2010 – 2013)

  Member of biology faculty development committee (2011 – 2014)

  Member of biology award committee (2010 – 2011)

  Pre-medicine student adviser (2010 – present)

  Biotechnology student adviser (2013 – present)

  Member of Ferris Global Reflection Committee (2012)

- ***Training attended***: Presentation Zen, Ferris State University, fall 2010
  New Faculty Transition Program, Ferris State University, spring 2010
  Critical Thinking, Ferris State University, spring 2010
  New Faculty Transition Program, Ferris State University, fall 2009
  Grant Writing Training, Ferris State University, Ferris State University, fall 2009

Education

Ph.D. in Molecular and Developmental Biology, University of Karlsruhe, Germany, 1998

M.S. in Genetics, Northwestern Agricultural University, China, 1988 – 1991

B.S. in Biology, Shaanxi Normal University, China, 1984 – 1988

Research and Postdoctoral Training

University of Minnesota, Minneapolis, MN, October 2002 – August 2009 (Advisor: Prof. Michael B. O'Connor)

St. Jude Children's Research Hospital, Memphis, Tennessee, December 1999 – August 2002 (Advisor: St. Jude Investigator Dr. Guillermo Oliver)

Honors and Awards

- DAAD (German Academic Exchange Service) fellowship, 1994 – 1995
- Outstanding Graduate Student Award, Northwestern Agricultural University, China, 1991

Media Attention

- CBS Detroit News, Tech Tour Day Eight: Ferris State Biotech Booming At The Edge Of The North Woods, October 23, 2013 8:17 PM (http://detroit.cbslocal.com/2013/10/23/tech-tour-day-eight-ferris-state-biotech-booming-at-the-edge-of-the-north-woods/)

Previous Teaching Experience

- *Adjunct Teaching*: **Lectures and labs of General Biology** course for undergraduate students (two classes, 24 students per class) at **Concordia University**, Saint Paul, MN, September 2008 – May 2009

- *Visit Teaching*: **Molecular and Cellular Biology course** for undergraduates (30 students, 10 lectures, 2 hours/lecture), **Developmental Biology lectures and labs** for graduates (15 students, 6 lectures and 6 labs), **Shaanxi Normal University**, 2005
- *Teaching Assistant:* Genetics course for undergraduates (one semester, 35 students), **Northwestern Agricultural University**, 1990 – 1991

Doctoral and Postdoctoral Research Experience

- *Research Associate*: TGF-β signaling in *Drosophila* nervous system development, Department of Genetics, Cell Biology & Development, University of Minnesota, Minneapolis, MN, October 2002 – August 2009 (Advisor: Prof. Dr. Michael B. O'Connor, Investigator of Howard Hughes Medical Institute)
- *Postdoctoral Research*: Homeobox gene *six3* in mouse visual system development, Department of Genetics, St. Jude Children's Research Hospital, Memphis, Tennessee, December 1999 – August 2002 (Advisor: Dr. Guillermo Oliver, Investigator)
- *Doctoral Research:* Homeobox gene *goosecoid* in mouse embryogenesis, Institute of Genetics, University of Karlsruhe, Germany, 1994 – 1998 (Advisor: Dr. Martin Blum)

Grants

- A written research proposal titled "TGF-beta signaling regulated aging process in fruit fly (*Drosophila melanogaster*)" to be submitted to the National Institute of Health (NIH) in October 2013.
- Ferris State University Student Research Assistant Award $600.00 for lab supply, Fall of 2013 to Spring of 2014.
- Ferris State University Student Summer Fellowship Research Grant: $1,000 for lab supply; Research project: TGF-β signaling regulated aging process in adult fruit flies.
- Ferris Foundation Exceptional Merit Faculty/Staff Award: $3,955 for the study of "Molecular and cellular Mechanisms of Activin Signaling Regulated Aging Process in *Drosophila melanogaster*" from April 2012 to April 2013.
- Ferris State University Faculty Research Grant: $6,960 for the study of "Molecular Mechanisms of Cell Size and Shape Determination Regulated by Activin Signaling in *Drosophila melanogaster"* from March 2012 to April 2013.

- Ferris Foundation Exceptional Merit Faculty/Staff Award: $3,750 for the study of "Activin Signaling Regulated Aging Process in Adult Male and Female Fruit Flies" from April 2011 – April 2012.
- Ferris State University Faculty Research Grant Award: $7,500 for the study of "Molecular Mechanisms of Activin Signaling-regulated Female Fertility in *Drosophila melanogaster*" from March 2010 – April 2011.
- Faculty Start-up fund: $5,000, Fall 2009.

Students Mentored at Ferris State University

Hannah Lamberg (Ferris Pre-Medicine Program Undergraduate), fall 2014 to now, research project: TGF-β signaling regulated aging process in fruit fly (*Drosophila melanogaster*)

Shaughna Langerak (Ferris Biotechnology Program Undergraduate), fall of 2011 to present: Manage daily work in the lab, maintain the fruit fly stocks, and conduct her own research project: TGF-β signaling regulated aging process in fruit fly (*Drosophila melanogaster*)

Alicia Durst (Pre-Medicine Undergraduate), started in the fall of 2012, research project: TGF-β signaling regulated aging process in fruit fly (*Drosophila melanogaster*)

Caitlin Wright (Ferris Pre-Dental Program Undergraduate), fall of 2012 to present. Research project: *Drosophila* follicle cell size and shape regulation

Emily Arnold (Ferris Pre-Dental Program Undergraduate), fall of 2012 to present. Research project: *Drosophila* follicle cell size and shape regulation

Aaron Nicoles (Pre-Physical Therapy Undergraduate), started in the fall of 2013

Richelle Payea (Pre-Medicine Program Undergraduate), started in the fall of 2013

Adam Bringedahl (Ferris Biotechnology Program Undergraduate), fall of 2012 to spring of 2013: The role of dpp singaling in the regulation of the aging process of fruit flies

Jeffrey Ackroyd (Ferris Biotechnology Program Undergraduate), September 2010 to May 2012: Activin signaling regulated aging process in adult fruit flies

Nicole Totten (Ferris Pre-dental program undergraduate student), Spring 2012: The role of Activin signaling in adipose tissue in the regulation of the aging process in adult fruit flies

Justin Cooper (Ferris Biology Pre-medicine Program Undergraduate), Summer 211: The role of muscle cell Activin signaling in the regulation of aging in adult fruit flies

Grace Farrell (Ferris Pre-Optometry Undergraduate), Spring 2010: Fly food preparation and fly culture maintenance

Corey Potter (Ferris Biology Program Undergraduate), Spring 2010: Fly food preparation and fly culture maintenance

Ferris Students' Poster and Oral Presentations

- **Shaughna Langerak.** The dosage effect of TGF-β signaling on aging regulation in fruit flies. On Ferris campus, August 21, 2013
- **Bringedahl A, Langerak S, and Zhu CC.** The dosage effect of TGF-β signaling on longevity of fruit flies. Ferris State University College of Arts & Sciences Student Recognition Event, Rankin Center, May 03, 2013
- **Ackroyd J, Totten N, Langerak S, Cooper J,** and **Zhu CC.** Activin signaling mediated aging process in *Drosophila melanogaster*. Midwest Developmental Biology Meeting at Cincinnati Children's Research Hospital, Cincinnati, Ohio, May 11 – 12, 2012
- **Ackryod J, Cooper J,** and **Zhu CC.** Knocking-down Activin signaling in *Drosophila melanogaster* results in prolonged longevity. West Michigan Regional Undergraduate Science Research Conference at Van Andel Research Institute, Grand Rapids, Michigan, November 12, 2011

Professional Affiliation

Member of the Society for Developmental Biology (SDB)

Publications

1. **Langerak S,** and Zhu CC. The gene dosage effect of *Drosophila* Activin signaling in aging regulation. *In preparation, 2014*

2. **Zhu CC,** Boone JQ, Jensen PA, Hanna S, Podemski L, Locke J, Doe CQ, and O'Connor MB (2008). *Drosophila* Activin-b and the Activin-like product Dawdle function redundantly to regulate proliferation in the larval brain. *Development **135**, 513-521*

3. **Zhu CC***, Bornemann DJ*, Zhitomirsky D, Miller EL, O'Connor MB, and Simon JA. *Drosophila* histone deacetylase-3 controls imaginal disc size through suppression of apoptosis. *PLoS Genetics. 4(2), 1-11, 2008*

4. Lagutin OV, **Zhu CC**, Kobayashi D, Topczewski J., Shimamura K, Puelles L, Russell HRC, McKinnon PJ., Solnica-Krezel L, and Oliver G. 2003. Six3 repression of Wnt signaling in the anterior neuroectoderm is essential for vertebrate forebrain development. *Genes & Development* 17, 368-379
5. **Zhu CC,** Dyer MA, Lagutin O, Uchikawa M, Kondoh H and Oliver G. 2002. Six3-mediated auto-repression and eye development requires its interaction with the Groucho family of corepressors. *Development* 129, 2835-2849
6. Lagutin O, **Zhu CC,** Furuta Y, Rowitch DH, McMahon A.P. and Oliver G. 2001. Six3 promotes the formation of ectopic optic vesicle-like structures in mouse embryos. *Developmental Dynamics* 221, 342-349
7. **Zhu CC,** Yamada G and Blum M. 1999. Retinoic acid teratogenicity: the role of goosecoid and BMP-4. *Cellular and Molecular Biology* 45, 617-629
8. **Zhu CC,** Yamada G, Nakamura S, Terashi T, Schweickert A, and Blum M. 1998. Malformation of trachea, and pelvic region in goosecoid mutant mice. *Developmental Dynamics* 211, 374-381
9. Alex C, **Zhu CC,** Cato A, and Blum M., 1998. Expression of androgen receptor mRNA in mouse embryogenesis. *Mechanism of Development* 72, 175-178
10. **Zhu CC**, Yamada G, and Blum M. 1997. Correlation between loss of middle ear bones and altered goosecoid gene expression in the branchial region following retinoic acid treatment of mouse embryos in vivo. *Biochemical and Biophysical Research Communications* 235, 748-753

Dissertations

- **Ph.D. Thesis (1998):** The homeobox gene *goosecoid:*embryonic expression, loss-of-function phenotype, and regulation by retinoic acid. Institute of Genetics, Department of Biological and Geological Sciences, University of Karlsruhe, Germany
- **Master Degree Thesis (1991):** Induction and screening of *Fusarium graminearum (Gibberella zeae)* toxin-resistant wheat callus tissues cultured from young wheat spikes. Northwestern Agricultural University, China

- **Undergraduate Work (1988):** Karyotype analysis of two plant species *Lysimachia barystachys Bunge* and *Lysimachia stenosepala Hemsl*. Shaanxi Normal University, China

Meetings and Presentations

- Poster presentation titled "*Drosophila* Activin signaling is required for normal egg production and female fecundity" at the 13th International Congress of Invertebrate Reproduction and Development at Wayne State University, Detroit, MI, July 14 – 19, 2013.

- Inaugural HAN-MO KOO Memorial Lecture by 1993 Nobel Prize laureate Dr. Phillip A. Sharp from Massachusetts Institute of Technology at Van Andel Institute, Grand Rapids, Michigan, May 23 – 24, 2012.

- Poster presentation titled "Activin Signaling Mediated Aging Process in *Drosophila melanogaster*" at the 50th Annual Midwest Developmental Biology Meeting at Cincinnati Children's Hospital Medical Center, Ohio, May 11 – 12, 2012.
- 70th Annual Meeting of Society for Developmental Biology, Chicago, IL, July 21 – 25, 2011.
- Origins of Cancer Conference at Van Andel Institute, Grand Rapids, MI, May 19 – 20, 2011. Keynote speaker: Nobel Laureate Dr. James D. Watson.
- Funding Opportunities for Predominantly Undergraduate Institutions organized by the Council on Undergraduate Research (CUR), Washington D.C., February 24 – 26, 2011.
- Poster presentation titled "Activin signaling is required for Drosophila follicle cell development and normal female fertility" at West Michigan Regional Undergraduate Science Research Conference, Van Andel Institute, Grand Rapids, MI, October 3, 2010.
- Poster presentation titled "Activin signaling is required for Drosophila follicle cell development and normal female fertility" at the Society for Developmental Biology 69th Annual Meeting in Albuquerque, New Mexico, August 5 – 9, 2010.

- Poster presentation titled "The role of Activin signaling in adult *Drosophila* mushroom body neurons" at the 50th annual *Drosophila* conference, Chicago, IL, March 4 – 8, 2009.
- Attended the Conference of Neurobiology of *Drosophila*, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York, October 3 – October 7, 2007.
- Platform talk titled "Non-Canonical signaling of BMP ligands through an Activin-type pathway regulates brain lobe development and photoreceptor axon targeting in Drosophila" at the 47th annual *Drosophila* conference, Houston, TX, 28 March – 2 April 2006.
- Poster presentation titled "Activin type I receptor Babo regulates *Drosophila* photoreceptor axon targeting and optic lobe developemtn" at the Conference of Neurobiology of *Drosophila*, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York, October 5 – October 9, 2005.
- Attended the 46th Annual *Drosophila* Research Conference, San Diego, CA, March 30 – April 3, 2005.
- Attended the 44th Annual *Drosophila* Research Conference, Chicago, IL, March 5 – 9, 2003.
- Poster presentation titled "Mouse Six3 interacts with the Groucho-like Grg protein and functions as a transcriptional repressor" at the 60th Annual Meeting of the Society for Developmental Biology, Seattle, WA, July 18-22, 2001.

MARY ELIZABETH ZIMMER (née Schroeder)

University: Department of Biological Sciences
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Big Rapids, MI 49307
Tel. (231) 591-5022
Email: MaryZimmer@ferris.edu

Home: 19200 Seneca Ave
Big Rapids, MI 49307
Tel. (231) 480-4731

EDUCATION

1997-2002	Ph.D. - The Modulation and Regulation of Episodic Breathing in Mammals Department of Zoology – Comparative Physiology Section University of British Columbia, Vancouver, BC
1994-1996	M.S. - Pulmonary Annexin 1 Expression and Synthesis: Effects of Hyperoxia Department of Animal Health and Biomedical Sciences University of Wisconsin-Madison, Madison, WI
1985-1989	B.S. - Zoology Department of Zoology University of Wisconsin-Madison, Madison, WI

PROFESSIONAL EXPERIENCE

2015-present	Professor, Department of Biological Sciences, Ferris State University, Big Rapids, MI
2010-2015	Associate Professor, Department of Biological Sciences, Ferris State University, Big Rapids, MI
2007-2010	Assistant Professor, Department of Biological Sciences, Ferris State University, Big Rapids, MI
2003-2007	Post-doctoral Fellow, Department of Anatomy and Cell Biology, Wayne State University, School of Medicine, Detroit, MI
1996	Assistant Faculty Associate, UW-Madison, Teacher Enhancement Program in Biology, Madison, WI
1989-1994	Research Specialist, UW-Madison, School of Veterinary Medicine, Department of Comparative Biosciences
1989	Project Assistant, UW-Madison, Veterans Administration Hospital
1986-1989	Laboratory Assistant, UW-Madison, Wisconsin Regional Primate Center

TEACHING EXPERIENCE

Courses Taught

2012-present	BIOL 423 Neurobiology, Ferris State University
2011-present	BIOL 460 Current Topics in Biology, Ferris State University
2009-2011	OPTM 635 Neuroanatomy and Neurophysiology, Michigan College of Optometry, Lecture, Ferris State University

2007-present	BIOL 321, Human Anatomy and Physiology-1 Lecture and Laboratory, Department of Biological Sciences, Ferris State University
2007–present	BIOL 322 Human Anatomy and Physiology-2, Lecture and Laboratory, Department of Biological Sciences, Ferris State University
2004-2006	Lecture: Advanced Respiratory Physiology, Department of Physiology, School of Medicine, Wayne State University
1999-2002	Teaching Assistant: Nursing Anatomy and Physiology Laboratory, University of British Columbia
1999-2001	Teaching Assistant: Comparative Neuroscience, University of British Columbia
1997-1999	Teaching Assistant, Animal Physiology Laboratory, University of British Columbia
1995	Teaching Assistant, Veterinary Histology, School of Veterinary Medicine, UW-Madison
1995	Volunteer Tutor, Cherokee Middle School, Madison, WI

Invited Guest Lecturer

FSU, SCWK 220, Theories- Methods of Practice 1 - basic neurophysiology - 2009
UBC, Biol 354, Environmental Physiology, hibernation – 2002
UBC, Biol 454, Comparative Animal Physiology, hibernation - 2001
UBC, Biol 353, Animal Physiology, hibernation – 1998, 1999
UBC, Biol 450, Molecular Adaptation of Animals to the Environment, hibernation, 1997, 1998, 1999

Student Research Projects

2015	Summer Undergraduate Research Fellowship (Ferris State): Rachel Kempisty
2014-2015	Student Research Projects (Ferris State): Jacqueline Tieu, Katherine Hart, Rachel Kempisty, Robert Pacella, Enefe Adaji, Zac Kramer
2014	Summer Undergraduate Research Fellowship (Ferris State): Jacqueline Tieu
2013-2014	Student Research Projects (Ferris State): Illyas Fana (Student Research Assistantship), Aaron Jackowski (Student Research Assistantship), Brendan Doyle, Catherine Plischke, Sarah Harp, Jacqueline Tieu
2013	Summer Undergraduate Research Fellowship (Ferris State): Catherine Plischke
2012-2013	Student Research Projects (Ferris State): Aaron Jackowski, Brendan Doyle, Illyas Fana, Catherine Plischke,
2011-2012	Independent Study (Ferris State): Danielle Clear, Liala Al-Shatel
2011	Summer Undergraduate Research Fellowship (Ferris State): Liala Al-Shatel
2010-2011	Biotechnology Internship (Ferris State): Rachel Scheib
2009-2010	Independent Study 497 (Ferris State): Marziah Hashimi, Joseph Dalton, Ruben Vaughn
2008-2009	Independent Study 497 (Ferris State): Tim Hotchkiss, Ruben Vaughn
2000	Senior Honors thesis (UBC): Jerome Lee, The Influence of the Pontine Respiratory Group and Vagal Feedback on Inspiratory Termination in the Golden-Mantled Ground Squirrel,.
1999	Senior Honors thesis (UBC): Krista Shaw, The Effect of Body Temperature on Metabolic Rate, Respiratory Pattern and Ventilation in Hibernating Golden-

	Mantled Ground Squirrels (*Spermophilus lateralis*),.
1999	High school honors thesis (UBC): Karolina Dziedzic and Linda Tay; The Effects of Humidity on Apneic Oxygen Uptake in Hibernating Squirrels,
1998	Senior Honors thesis (UBC): Danielle Brochu, Distribution of NMDA-type Glutamate Receptors in Respiratory Nuclei of Euthermic vs. Hibernating Golden-mantled Ground Squirrels, *Spermophilus lateralis*,.

Course development

Digestion Laboratory, Ferris State. I established a new lab to be used to introduce students to the physiology of digestion; fats, proteins and carbohydrates.

Biology Metabolism Laboratory, UBC. I assisted in establishing a first year biology laboratory to teach students about basic cellular metabolism using hibernating ground squirrels.

Teacher Enhancement Program in Biology, UW-Madison. I developed a University course to teach high school teachers basic physiology, as well as easy, practical lessons to be used in the high school classroom. I wrote and received a grant (Eisenhower grant 1996-1997) to purchase equipment for use in 1) the course and 2) for these teachers to use in their high school classrooms in the state of Wisconsin. This allowed them to provide their students with the opportunity to see physiology experiments firsthand using exercise and human based problems as the motivational tool.

PROFESSIONAL SERVICE

2015 – present	Member – Academic Senate
2015 – present	Member – Academic Program Review Council
2014 – 2015	Member – Biology Awards Committee, Ferris State University
2013 - present	Member – College Graduate Education Committee, Ferris State University
2011 - present	Biology Research Seminar Coordinator
2011 – 2014	Member – College Curriculum Committee, Ferris State University
2009 - 2012	Member/Secretary – Institutional Strategic Planning Committee, Ferris State University
2008 - 2010	Member – Biology Faculty Development Committee, Ferris State University
2008 - present	Member – Biology Curriculum Committee, Ferris State University
2008 - present	Advisor to pre-optometry students
2007- present	Advisor to the Registered Student Organization, the Circle K International Group

GRANTS AND AWARDS

Ferris Foundation Exceptional Merit Award, 2014-2015	$3500
Ferris Faculty Research Award, 2013-2014	$7500
Ferris Foundation Exceptional Merit Award, 2011-2012	$5500
Ferris Faculty Research Award, 2009 - 2010	$7250
Dean's Initiative Grant, 2009	$1500
Ferris Foundation Exceptional Merit Award, 2008 - 2009	$7500

Travel Award, International Symposium on Neural Regeneration, 2003
McLean Fraser Summer Research Fellowship, 2001
Wisconsin Alumni Scholarship, 1985

PROFESSIONAL SOCIETIES

American Physiological Society, 2002-present
Society for Neuroscience, 2002

AD HOC EDITORIAL REVIEWS

Respiration physiology and neurobiology - 2003

INVITED PRESENTATIONS

The effect of spinal cord injury on learning and memory. August 2014. Michigan AALAS meeting. Ferris State University

Getting inside your student's heads – literally! Feb, 13, 2014. New Faculty Transition Program, Faculty Center for Teaching and Learning, Ferris State University

The biological and psychological aspects of learning. Spring 2013. New Faculty Transition Program, Faculty Center for Teaching and Learning, Ferris State University

Control mechanisms of episodic breathing in mammals. August 2012. Michigan AALAS meeting. Ferris State University

Latent motor pathways after spinal cord injury: "latent" or just inhibited? January 30, 2006, Department of Biological Sciences, University of Idaho

Latent motor pathways after spinal cord injury: "latent" or just inhibited? January 27, 2005, Department of Physiology, Wayne State University

The effect of the pons and neonatal age on respiratory rhythm in the hypothermic rat brainstem-spinal cord preparation, July 2001, Department of Anatomy and Cell Biology Wayne State University

PUBLICATIONS

1. Zimmer MB, Fong AY, Milsom WK. (***In preparation)***. The effect of age and the pons on respiratory rhythm during hypothermia in neonatal rats. *Respiration Physiology and Neurobiology*
2. Zimmer MB, Grant J, Ayar A, Goshgarian HG. 2014. Ipsilateral inspiratory intercostal muscle activity after C2 spinal cord hemisection. *Journal of Spinal Cord Medicine,* 26: Epub ahead of print PMID: 2499369.
3. Fong AY, Zimmer MB, Milsom WK. 2009. The conditional nature of the "Central Rhythm Generator" and the production of episodic breathing. *Respiration Physiology and Neurobiology,* 168: 179-187.
4. Fong AY, Corcoran AE, Zimmer MB, Andrade DV, Milsom WK. 2008. Respiratory rhythm of brainstem-spinal cord preparations: effects of maturation, age, mass, and oxygenation. *Respiration Physiology and Neurobiology,* 164: 429-440.
5. Zimmer MB, Nantwi KD, Goshgarian HG. 2008. Effect of spinal cord injury on the neural regulation of respiratory function. *Experimental Neurology.* 209: 399-406.
6. Zimmer MB, Goshgarian HG. 2007. Spinal cord injury in neonates alters respiratory

motor output via supraspinal mechanisms. *Experimental Neurology*. 206(1): 137-145.
7. Zimmer MB, Nantwi KD, Goshgarian HG. 2007. Effect of spinal cord injury on the respiratory system: basic research and current clinical treatment options. *Journal of Spinal Cord Medicine*. 30(4): 319-30.
8. Zimmer MB, Goshgarian HG. 2007. GABA, not glycine, mediates inhibition of latent respiratory motor pathways after spinal cord injury. *Experimental Neurology*. 203(2): 493-501.
9. Zimmer MB, Goshgarian HG. 2006. Spinal activation of serotonin 1A receptors enhances latent respiratory activity after spinal cord injury. *Journal of Spinal Cord Medicine*. 29(2): 147-155.
10. Zimmer MB, Goshgarian HG. 2005. Spontaneous crossed phrenic activity in the neonatal respiratory network. *Experimental Neurology*. 194: 530-540.
11. Milsom WK, Chatburn J, Zimmer MB. 2004. Pontine influences on respiratory control in ectothermic and heterothermic vertebrates. *Respiration Physiology and Neurobiology*. 143: 263-280.
12. Zimmer MB, Milsom WK. 2004. Effect of hypothermia on respiratory rhythm generation in hamster brainstem-spinal cord preparations. *Respiration Physiology and Neurobiology*. 142: 237-249.
13. Zimmer MB, Milsom WK. 2002. Ventilatory pattern and chemosensitivity in unanesthetized, hypothermic ground squirrels (*Spermophilus lateralis*). *Respiration Physiology*. 133:49-63.
14. Milsom WK, Zimmer MB, Harris MB. 2001. Vagal control of cardiorespiratory function in hibernation. *Experimental Physiology*. 86(6):791-79
15. Zimmer MB, Milsom WK. 2001. Effects of changing ambient temperature on metabolic, heart and ventilation rates during steady state hibernation in golden-mantled ground squirrels (*Spermophilus lateralis*). *Physiological and Biochemical Zoology* 74(5):714-723.
16. Barros RC, Zimmer ME, Branco LGS, Milsom WK. 2001. Hypoxic metabolic response of the golden-mantled ground squirrel. *Journal of Applied Physiology* 91:603-612.
17. Milsom WK, Zimmer MB, Harris MB. 1999. Regulation of cardiac rhythm in hibernating mammals. *Comparative Biochemistry and Physiology*. 124A:383-391.
18. Christou M, Keith IM, Shen X, Schroeder ME, Jefcoate R. 1993. Reversal of cytochrome P450-1A1 and P450-EF expression in MCA-C3H/10T cell derived tumors as compared to cultured cells. *Cancer Research*. 53(5):968-976.
19. Uno H, Schroeder ME, Fors T, Mori O. 1990. Macaque and rodent models for the screening of drugs on stimulating hair growth. *Journal of Cutaneous Aging and Cosmetic Dermatology*. 1(3):193-204.

Books

Zimmer, MB. 2015. Fundamentals of Human Physiology; A Comparative Examination. Cognella, San Diego, CA.

Conference Proceedings

Zimmer MB, Harris MB, Milsom WK. 2000. Control of cardiac and ventilation frequencies during hibernation in ground squirrels. In: *Life in the Cold*, edited by G.Heldmaier, M

Klingenspor. Springer-Verlag, Berlin, Heidelberg, Germany. Pp 159-167.

Conference Abstracts

1. Tieu J, Zimmer MB, 2014. The effect of spinal cord injury on learning and memory in rats. *Experimental Biology*. Boston, MA.
2. Tieu J, Zimmer MB, 2014. The effect of spinal cord injury on learning and memory. West Michigan Regional Undergraduate Science Research Conference. Grand Rapids, MI.
3. Doyle B, Zimmer MB, 2014. The effect of exercising intensity on learning and memory in humans. *Experimental Biology*. San Diego, CA.
4. Jackowski A, Harp S, Zimmer MB 2014. Effect of upper body resistance training on memory. *Experimental Biology*. San Diego, CA
5. Plischke C, Fana I, Zimmer MB, 2014. The effect of C2 spinal cord injury on learning and memory. *15th International Symposium on Neural Regeneration.* Pacific Grove, CA
6. Fong AY, Zimmer MB, Milsom WK, 2012. Effects of postnatal development, temperature and the pons on respiratory rhythm and pattern generation in rat pups. *Experimental Biology*.
7. Zimmer MB, Grant J, Ayar A, Goshgarian, HG, 2011. Ipsilateral inspiratory intercostal muscle activity after C2 spinal cord hemisection. *14th International Symposium on Neural Regeneration.* Pacific Grove, CA.
8. Scheid R, Fong AY, Milsom WK, Zimmer MB, 2011. GABAergic mechanisms underlying breathing pattern in rat brainstem-spinal cord preparations. *Experimental Biology.*
9. Zimmer MB, Grant J, Ayar A, Goshgarian, HG, 2007. Ipsilateral inspiratory intercostal activity persists after C2 hemisection. *Experimental Biology*.
10. Zimmer MB, Goshgarian HG, 2006. Spinal cord injury in neonate rats alters respiratory neural output via supraspinal mechanisms. *Experimental Biology*.
11. Zimmer MB, Alilain W, Goshgarian HG, 2005. GABA-mediated inhibition of crossed phrenic pathways. *International Symposium on Neural Regeneration.*
12. Huang Y, Zimmer MB, Goshgarian HG, 2005. The neural pathway underlying the expression of crossed phrenic activity following spinal cord hemisection in the neonate rat. *International Symposium on Neural Regeneration.*
13. Zimmer ME, Goshgarian HG, 2005. Spinal activation of serotonin 1A receptors turns on latent respiratory pathways after spinal cord injury. *Faseb Journal* 19(5): A1282, Part 2, Suppl. S.
14. Zimmer MB, Goshgarian HG. 2004. Crossed phrenic pathways in the neonatal rat respiratory network: an *in vitro* assessment. *Faseb Journal* 18(4): A333 Suppl. S.
15. Zimmer MB, Goshgarian HG. 2003. Serotonin 1A receptor activation of a latent motor pathway after spinal hemisection. *Journal of Rehabilitation Research and Development* 40(6):56 Suppl 3.
16. Zimmer ME, Taylor BE, Milsom WK. 2002. Developmental and species differences in pontine influences on respiratory motor output in the mammalian brainstem spinal cord. Program No 171.4 Abstract Viewer/Itinerary Planner. Washington DC: *Society for Neuroscience, Online.*
17. Zimmer MB, Milsom WK. 2002. Species and developmental differences in respiratory

cold tolerance: hibernator versus non-hibernator. The power of comparative physiology: evolution, integration, and application. the-aps.org/publications/ p9.

18. Zimmer MB, Milsom WK. 2002. Recovery from respiratory arrest in the hypothermic rat pup brainstem en bloc. *Faseb Journal* 16(4): A45, Part 1.
19. Zimmer ME, Barros RCH, Milsom WK. 1999. Separate and combined influences of body temperature and metabolic rate on ventilatory pattern and chemosensitivity in golden-mantled ground squirrels. *Comparative Biochemistry and Physiology* 124A:S112.
20. Zimmer ME, Milsom WK. 1999. Episodic breathing in ground squirrels (Spermophilus lateralis): a consequence of "state," temperature or metabolic rate? *Canadian Society of Zoologists Bulletin.* 29:121.
21. Zimmer ME, Milsom WK. 1998. Ventilatory chemoresponses during hypothermia (5 and 10C) in golden-mantled ground squirrels (Spermophilus lateralis). *Faseb Journal* 12(4):A335.
22. Zimmer ME, Milsom WK. 1998. Uncoupling of ventilation and metabolic rate in hibernating ground squirrels. *Canadian Society of Zoologists Bulletin.* 28(2):100.
23. Zimmer M, Ling L, Olson E, Janssen P, Mitchell G, Keith I. 1994. Chronic neonatal hyperoxia causes persistent lung damage, pulmonary hypertension, and neuropeptide changes in rats. *Faseb Journal.* 8(4): A418.
24. Ryan ML, Keith IM, Zimmer ME, Hedrick MS, Bisgard GE. 1994. Carotid body peptide and catecholamine content in intact and sympathetically denervated goats. *Faseb Journal.* 8(5):A912.
25. Keith IM, Schroeder ME, Tsao FHC. 1992. Localization of phospholipid binding protein in rabbit lung. *Faseb Journal.* 6(4):A1162.

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EDUCATION:

2002-2009. Ph.D. in Microbiology. Department of Botany and Microbiology, University of Oklahoma, College of Arts and Sciences and Institute for Earth and Energy, Norman, OK.

2002. B.S. in Biology, minor in Chemistry (*Summa Cum Laude*). Central Michigan University, College of Arts and Sciences, Mt. Pleasant, MI.

APPOINTMENTS:

2014-Present	Ferris State University	Associate Professor of Biol. Sciences
2011-2014	Ferris State University	Assistant Professor of Biol. Sciences
2009-2011	University of Oklahoma	Postdoctoral Research Associate

TEACHING EXPERIENCE:

2011-Present: Faculty member in the Department of Biological Sciences, Ferris State University (Big Rapids, MI). Courses taught include General Biology 2 (Biol 122; lecture + lab), Medical Microbiology (Biol 108; lecture + lab), Microbial Ecology (Biol 218; lecture + lab) and Current Topics in Biology (Biol 460; lecture).

2008: Graduate Teaching Assistant for Microbial Physiology and Molecular Biology Laboratory (MBIO 4873). Department of Botany and Microbiology, University of Oklahoma, Norman, OK.

2007-2008: Graduate Teaching Assistant for Ecology/Pathology Laboratory (MBIO 4813). Department of Botany and Microbiology, University of Oklahoma, Norman, OK.

2006: Graduate Teaching Assistant for Fundamentals of Microbiology Introductory Laboratory (MBIO 3812). Department of Botany and Microbiology, University of Oklahoma, Norman, OK.

1999-2000: Chemistry Laboratory Aide for Introduction to Chemistry Laboratory. Department of Chemistry, Central Michigan University, Mt. Pleasant, MI.

1998: Anatomy and Physiology Lecture Course Tutor. Central Michigan University, Mt. Pleasant, MI.

RESEARCH EXPERIENCE:

2011- Present: Principal investigator and research advisor for undergraduate students. Department of Biological Sciences, Ferris State University, Big Rapids, MI.

2009-2011: Postdoctoral Research Associate. Department of Botany and Microbiology, University of Oklahoma, Norman, OK. Contact: Lee Krumholz, (405) 325-0427.

2002-2009: Graduate Research Assistant. Department of Botany and Microbiology, University of Oklahoma, Norman, OK. Dissertation title: Characterization of Subsurface Microbial

Communities Involved in Bioremediation of Uranium and Nitrate. Research advisor: Lee Krumholz, (405) 325-0427.

2000-2002: General Student Research Assistant. Biology Department, Central Michigan University. Contact: Elizabeth Wheeler Alm, (989) 774-2503.

2000: Research Technician for Hospital Disinfectant Research and Development. Caltech Industries, Inc., Midland, MI. Contact: Catherine Anders, (800) 234-7700.

PUBLICATIONS:

Spain, A. M., M. S. Elshahed, F. Z. Najar, and L. R. Krumholz. Metatranscriptomic analysis of a high-sulfide aquatic spring reveals insights into sulfur cycling and unexpected aerobic metabolism. Peer J *In review.*

Spain, A. M. and L. R. Krumholz. 2012. Cooperation of three denitrifying bacteria in nitrate removal of acidic nitrate- and uranium-contaminated groundwater. Geomicrobiol J **29:** 830-842

Spain, A. M. and L. R. Krumholz. 2011. Nitrate reducing bacteria at the nitrate and uranium contaminated Oak Ridge Integrated Field Research Challenge Site: A Review. Geomicrobiol J **28:** 418-429.

Spain, A. M., A. D. Peacock, and L. R. Krumholz. 2011. Effects of microbial community structure, terminal electron accepting conditions, and molybdate on the extent of U(VI) reduction in landfill aquifer sediments. Geomicrobiol J **28**:430-443.

Spain, A. M., C. W. Forsberg, and L. R. Krumholz. 2011. Phylum XVII. *Fibrobacteres*, p. 737-746. *In* N. R. Krieg, J. T. Staley, D. R. Brown, B. Hedlund, B. J. Paster, N. Ward, W. Ludwig, and W. B. Whitman (ed.), Bergey's Manual of Systematic Bacteriology, 2nd ed, vol. 4. Springer Verlag, New York.

Istok, J. D., M. Park, M. Michalsen, **A. M. Spain**, L. R. Krumholz, C. Liu, J. McKinley, P. Long, E. Roden, A. D. Peacock, and B. Baldwin. 2009. A thermodynamically-based model for predicting microbial growth and community composition coupled to system geochemistry: Application to uranium bioreduction. J Contam Hydrol **112:**1-14

Spain, A. M., L. R. Krumholz, and M. S. Elshahed. 2009. Abundance, composition, diversity and novelty of soil *Proteobacteria*. ISME J **3:**992-1000.

Michalsen, M. M., A. D. Peacock, A. N. Smithgal, D. C. White, **A. M. Spain**, Y. Sanchez-Rosario, L. R. Krumholz, S. D. Kelly, K. M. Kemner, J. McKinley, S. M. Heald, M. A. Bogle, D. B. Watson, and J. D. Istok. 2009. Treatment of nitric acid-, U(VI)-, and Tc(VII)-contaminated groundwater in intermediate-scale physical models of an in situ biobarrier. Environ Sci Technol **43:**1952-61.

Elshahed, M. S., N. H. Youssef, **A. M. Spain**, C. Sheik, F. Z. Najar, L. O. Sukharnikov, B. A. Roe, J. P. Davis, P. D. Schloss, V. L. Bailey, and L. R. Krumholz. 2008. Novelty and uniqueness patterns of rare members of the soil biosphere. Appl Environ Microbiol **74:**5422-8..

Spain, A. M., A. D. Peacock, J. D. Istok, M. S. Elshahed, F. Z. Najar, B. A. Roe, D. C. White, and L. R. Krumholz. 2007. Identification and isolation of a *Castellaniella* species important during biostimulation of an acidic nitrate- and uranium-contaminated aquifer. Appl Environ Microbiol **73:**4892-904.

Michalsen, M. M., A. D. Peacock, **A. M. Spain**, A. N. Smithgal, D. C. White, Y. Sanchez-Rosario, L. R. Krumholz, and J. D. Istok. 2007. Changes in microbial community composition and geochemistry during uranium and technetium bioimmobilization. Appl Environ Microbiol **73:**5885-96.

Alm, E., J. Burke, and **A. Spain.** 2003. Fecal indicator bacteria are abundant in wet sand at freshwater beaches. Water Research **37:**3978-3892.

ABSTRACTS AND PRESENTATIONS (Names of undergraduate student mentees are underlined):

Muriset, R. and **A.M. Spain**. Characterization of two bacterial soil isolates that display unique surface growth patterns. Presented at the American Society for Microbiology General Meeting. Poster presentation. New Orlean, LA. 2015.

Muriset, R. and **A.M. Spain**. Characterization of growth and surface motility in soil isolates, *Paenibacillus* sp., strains A1 and A3. Presented at the American Society for Microbiology Michigan Branch Fall Meeting. Poster presentation. Traverse City, MI. 2014.

Carr, A. L. and **A. M. Spain**. Prevalence and characterization of tetrathionate-reducing bacteria isolated from environmental samples. Presented at the American Society for Microbiology General Meeting. Poster presentation. Denver, CO. 2013.

Carr, A. L. and **A. M. Spain**. Prevalence and characterization of tetrathionate-reducing bacteria isolated from environmental samples. Presented at the American Society for Microbiology Michigan Branch Spring Meeting. Poster presentation. Big Rapids, MI. 2013.

Spain, A. M., Elshahed, M. S., Najar, F. Z., and L. R. Krumholz. Comparative metatranscriptomic analysis of an anaerobic high-sulfide spring reveals insight into sulfur cycling pathways and unexpected aerobic metabolism. Presented at the American Society For Microbiology General Meeting. Poster presentation. New Orleans, LA. 2011.

Spain, A. M., Krumholz, L. R., and M. S. Elshahed. Composition, diversity, and novelty within soil *Proteobacteria*. Presented at the American Society For Microbiology General Meeting. Poster presentation. Boston, MA. 2008.

Spain, A. M., Senko, J.M., and L. R. Krumholz. Characterization of denitrifying bacteria from a nitrate- and uranium-contaminated aquifer. Presented at the American Society For Microbiology General Meeting. Poster presentation. Toronto, ON, Canada. 2007.

Spain, A. M., Peacock, A. D., Elshahed, Istok, J. D., White, D. C., and L. R. Krumholz. Bioremediation of acidic nitrate- and uranium contaminated groundwater by ethanol results in stimulation of β-Proteobacteria and decrease in bacterial diversity. Presented at the 11th International Symposium for Microbial Ecology. Poster Presentation. Vienna, Austria. 2006.

Spain, A. M., Elshahed, M. S., Najar, F. Z., Roe, B. A., Istok, J, and L. R. Krumholz. Culture-dependent and -independent identification of denitrifying bacteria in an aquifer undergoing bioremediation for nitrate and uranium. Presented at the American Society For Microbiology General Meeting. Poster presentation. Atlanta, GA. 2005.

Spain, A. M., Elshahed, M. S., Najar, F. Z., Roe, B. A., Istok, J, and L. R. Krumholz. Culture-dependent and -independent identification of denitrifying bacteria in Areas 1 and 2 at the FRC. Presented at the Annual Natural and Accelerated Bioremediation Research Program Principal Investigators' Meeting. Poster Presentation. Airlie, VA. 2005.

Spain, A. M., Peacock, A., White, D. C., Istok, J., and L. R. Krumholz. Microbial communities involved in uranium reduction under sulfate-reducing, iron-reducing, and methanogenic conditions. Presented at the American Society For Microbiology General Meeting. Poster presentation. New Orleans, LA. 2004.

Spain, A. M., Peacock, A., White, D. C., Istok, J., and L. R. Krumholz. Microbial communities involved in uranium reduction under sulfate-reducing, iron-reducing, and methanogenic conditions. Presented at the Annual Natural and Accelerated Bioremediation Research Program Principal Investigators' Meeting. Poster Presentation. Airlie, VA. 2004.

Spain, A. M., Senko, J., and L. R. Krumholz. The effect of pH on denitrifying bacteria. Presented at the Joint American Society For Microbiology Missouri Valley Branch Annual Meeting & Midwest Microbiology Educators Conference. Oral presentation. Kansas City, MO. 2004.

INVITED PRESENTATIONS:

Advice to a Young Scientist: Finding Balance in a Scientific Career. Friday, March 23, 2012. College of Science and Technology's Alumni Career Day, Central Michigan University.

Seeing the Unseen: Using Metatranscriptomics to Address Questions in Microbial Ecology. January 12, 2012, Department of Biology, Central Michigan University.

Seeing the Unseen: Using Metatranscriptomics to Address Questions in Microbial Ecology. September 23, 2011. Department of Biological Sciences, Ferris State University.

UNDERGRADUATE STUDENT RESEARCH PROJECTS:

Brett Walker (Fall, 2015). Project title: Molecular identification of *Paenibacillus* strains A1 and A3. This student will complete up to 300 hours of a biotechnology internship (Biol 491) by working in my lab on this project. Ferris State Univ.

Crisha Barrett (Fall, 2015). Project title: Phenotypic characterization of *Paenibacillus* strains A1 and A3. This student is working on her project as a paid research assistant. Ferris State Univ.

Sarah Mathie (2015-Present). Project title: Effects of nutritional parameters on the growth and surface growth pattern of soil isolates *Paenibacillus* species strains A1 and A3. This student was awarded a Summer Research Fellowship (2015) from Ferris State University for her work on this project.

Rebecca Muriset (2014-2015). Project title: The study environmental parameters that affect surface growth and motility patterns of soil isolates *Paenibacillus* species strains A1 and A3. This student completed 400 hours of a biotechnology internship (Biol 491) by working in my lab on this project and was awarded a Student Research Grant from the College of Arts and Sciences to present her research at a national conference. Ferris State Univ.

Megan Knight (Fall, 2014). Project title: Leifson staining procedure on *Paenibacillus taiwanensis* isolates A1 and A3 from soil adjacent to the Muskegon River. This student enrolled in and completed an independent research project (1 credit, Biol 497). Ferris State Univ.

Spencer Crittendon (2013-2014). Project title: Identification and characterization of two soil bacterial isolates that display unique motility features. This student was granted a Student Research Assistant award (2013-2014) from Ferris State University for his work on this project.

Amber Carr (2012-2013). Project title: Prevalence and characterization of tetrathionate-reducing bacteria isolated from environmental samples. This student was awarded a Summer Research Fellowship (2012) from Ferris State University for her work on this project.

Stephanie Demsich (Summer, 2013). Project title: Effects of artificial sweeteners on gastrointestinal tract bacteria. This student enrolled in and completed an independent research project (3 credits, Biol 497). Ferris State Univ.

Chepchumba Kottutt (Spring, 2013). Paper title: Discovering Thiosulfate and Tetrathionate Reduction. This student enrolled in and completed an independent research project (1 credit, Biol 497). Ferris State Univ.

Blaire Kerwin (2011). Project title: Enrichment and enumeration of sulfate-reducing and thiosulfate-disproportionating bacteria from Zodletone source sediment. Univ. Oklahoma.

Foster Dobry (2011). Project title: Microaerophilic sulfur oxidizers from Zodletone Spring. Univ. Oklahoma.

John Frink (2006-2008). Project title: pH-dependent heavy metal (copper, aluminum, and nickel) tolerance in bacteria isolated from nitrate- and uranium-contaminated groundwater. Univ. Oklahoma.

Additional research students (trained/participated on a volunteer basis):

Julie Cohen (Fall, 2012-Spring, 2012)
Chepcumba Kotutt (Fall, 2012)
Zachary Brady (Summer, 2013)
Brett Jenkins (Summer, 2013)
Alexander Totten (Fall/Spring, 2013-2014)
Maria Ilyukhina (Fall, 2013)
Megan Knight (Spring, 2014)
Alyx-Andrea Johnson (Spr-Summer, 2014)
Crisha Barrett (Spring-Summer, 2015)
Elizabeth Utke (Spring, 2015)

DEPARTMENT, COLLEGE, AND UNIVERSITY SERVICE:

2012-Present. Academic Advisor for Biology majors with Pre-Physician Assistant intentions, Ferris State Univ.

2015-Present. Member of the curriculum sub-committee on establishing scientific literacy among Biology majors. Department of Biol. Sciences, Ferris State Univ.

2015-Present. Member of the Standards and Policies Committee, College of Arts and Sciences, Ferris State Univ.

2014-Present. Member of the Promotion/Merit Committee, College of Arts and Sciences, Ferris State Univ.

2012-2015. Member of the Curriculum Committee, Dept. of Biol. Sciences, Ferris State Univ.

2012-2015. Member of the Special Grants Committee, College of Arts and Sciences, Ferris State Univ.

2012-2015. Member of the Health Promotions Committee, Academic Senate, Ferris State Univ.

Fall, 2014. Temporary Coordinator of the "Friday Afternoon Research Talks" seminar series, held by the Dept. Biol. Sciences, Ferris State University.

2013-2014. Member of the Biology Faculty Search Committee (Genetics), Department of Biol. Sciences, Ferris State Univ.

2013. Finalist judge for the Honor's Program Public Address Contest, Ferris State Univ.

2013. Temporary member of the Standards and Policies Committee, College of Arts and Sciences, Ferris State Univ.

2006. Chair of the Graduate Student Committee for the Annual Donald C. Cox Lecture in Microbiology Department of Botany and Microbiology, Univ. Oklahoma

PROFESSIONAL SERVICE:

2012-Present. Board member for the Michigan branch of the American Society for Microbiology (MI-ASM). Served as President-Elect during the 2014-2015 academic year, and have been serving as President of MI-ASM since July 1, 2015.

2015. Oral presentation judge for the spring regional meeting of MI-ASM held at Eastern Michigan University.

2015. Invited reviewer for the journal *PLoS ONE*.

2012 and 2015. Invited reviewer for the journal *Environmental Science and Technology*.

2014. Invited reviewer for the *Journal of Applied Microbiology*.

2012 and 2014. Poster judge for regional meetings of the MI-ASM (held at Central Michigan University in the Spring, 2012 and at Davenport University in the Spring, 2014)

2013. Panelist reviewer for the National Science Foundation's Molecular and Cellular Biosciences Program.

2011 and 2013. *Ad hoc* reviewer for the National Science Foundation's Dimensions of Biodiversity Grant Program.

2013. Planning committee member and co-host for the MI-ASM Spring Meeting at Ferris State University.

2012. Invited reviewer for Central Michigan University's Early Career Grant Program.

2005. Organized and taught a 2-day workshop for the Microbiology department and a visiting research scientist on how to build phylogenetic trees from bacterial 16S rRNA sequences, Univ. Oklahoma.

2005-2006. Volunteered for the Oklahoma Regional Science Bowl.

GRANTS, FELLOWSHIPS, AND SCHOLARSHIPS:

Faculty Research Grant, Ferris State University (2014-2015). Project Title: Effects of Physical and Chemical Parameters on Surface Growth Patterns and Cell Motility of Soil Isolates, *Paenibacillus* species (sp.), Strains A1 and A3. Award total: $7,446.

Faculty Research Grant, Ferris State University (2013-2014). Project Title: Prevalence and Characterization of Tetrathionate-Reducing Bacteria Isolated from Anaerobic Sediments. Award total: $7,270

George L. and Cleo Cross Graduate Scholarship, Department of Botany and Microbiology, University of Oklahoma (2008)

Lois Pfiester Scholarship for Women in Science, Department of Botany and Microbiology, University of Oklahoma (2006).

University of Oklahoma Graduate College Graduate Foundation Fellowship (2002-2006).

International Society for Microbial Ecology Travel Grant Award to attend the 11th International Symposium for Microbial Ecology (ISME-11) in Vienna, Austria, 2006.

American Society for Microbiology Corporate Activities Program Student Travel Grant Award, 2005.

Department of Energy's Natural and Accelerated Bioremediation Research Program Principal Investigators Meeting Student Travel Award, 2004 and 2005.

American Society for Microbiology Undergraduate Research Fellowship (2001). Title: Microbial Community Structure of Arsenic-Contaminated Groundwater.

Arthur Loren Kontio Outstanding Young Biologist Award (2000-2001).

Centralis Gold Scholarship from Central Michigan University (1998-2002).

PROFESSIONAL AFFILIATIONS:

American Society for Microbiology, Member (2012-Present)

American Society for Microbiology, Michigan Branch, Member (2012-Present)

American Society for Microbiology, Postdoctoral Member (2010-2011)

American Society for Microbiology, Student Member (2000, 2002, 2004-2009)

International Society for Microbial Ecology, Student Member (2006)

American Society for Microbiology, Missouri Valley Branch, Student Member (2003-2004, 2011)

American Society for Microbiology, Michigan Branch, Student Member (2002)