

97-98

APPLIED BIOLOGY PROGRAM

PROGRAM REVIEW PANEL REPORT

AUGUST 15, 1997

PROGRAM REVIEW PANEL MEMBERS

- 1. Jack Buss, Chair of PRP, Professor of Biology**
- 2. Walter Hoeksema, Applied Biology Coordinator,
Professor of Biology**
- 3. Douglas Fonner, Applied Biology Program
Faculty, Professor of Biology**
- 4. Mary Murnik, Applied Biology Program
Faculty, Professor of Biology**
- 5. Bill Killian, ICT Program Coordinator**
- 6. Dave Lucey, Coordinator of Sports Medicine**

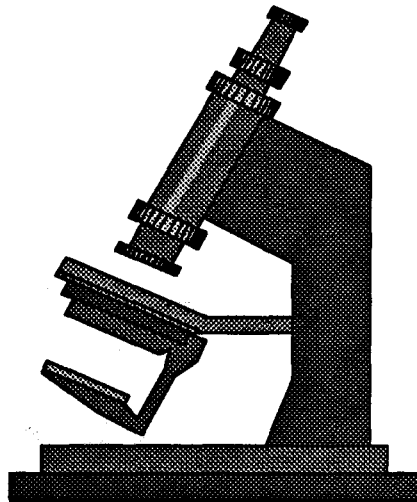


TABLE OF CONTENTS

Section 1	Applied Biology: Program Overview	Page 1
Section 2	Program Evaluation Plan: Techniques and Budget	Page 4
Section 3	Graduate Survey	Page 6
Section 4	Employer Survey	Page 32
Section 5	Student Evaluation of Applied Biology	Page 34
Section 6	Faculty Perceptions of Applied Biology	Page 39
Section 7	Advisory Committee Perceptions	Page 43
Section 8	Labor Market Analysis	Page 46
Section 9	Evaluation of Facilities and Equipment	Page 49
Section 10	Curriculum Evaluation	Page 51
Section 11	Enrollment Trends	Page 151
Section 12	Program Productivity and Costs	Page 153
Section 13	Conclusions	Page 154
Section 14	Recommendations	Page 155
Section 15	Appendix	Page 156

FERRIS STATE UNIVERSITY

Date: January 5, 1998
To: James Hoerter, Head, Department of Biological Sciences
Cc: Tom Oldfield, Walt Hoeksema, Doug Haneline
From: Sue K. Hammersmith, Dean *SKH*
Re: Facilities Concerns

In its recent review of the Applied Biology Program, the Academic Program Review Council noted a number of concerns with the Science Building facility. I am particularly concerned about allegations that the ventilation system may be spreading contaminants throughout the building, that the noise problem has not been dealt with, and that Biology's rooms are not suitable for instructional use.

In order to ensure that each of these concerns is adequately identified and addressed, could you please give me a detailed statement of each noted concern, including the room(s) involved, the nature of the problem, and what actions would be required to address the concern. If any of these concerns has been addressed or alleviated, then please give me a status report from a user's point of view on that as well. I expect I will need this information by the beginning of February if we are to take corrective actions yet this semester.

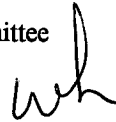
Finally, as we have previously discussed, I do understand the storage space problem, and we are trying to address this already. As we proceed with that effort, we will need more information about the needed size, layout, etc. I am hopeful and optimistic that we will have this situation resolved by fall.

Thank you for your help in this regard. Again, I'd appreciate your report by February 1 if possible.

BUDGET

TO: Doug Haneline, Chair, Academic Program Review Committee

FROM: Walt Hoeksema, Applied Biology Program Coordinator



SUBJECT: Actual Costs for Applied Biology Program Review

DATE: September 17, 1997

Below is the estimated budget and actual costs for Applied Biology Program Review Panel. Thank you for the administrative support of academic program review.

	<u>ESTIMATED</u>	<u>ACTUAL</u>
GRADUATE SURVEYS (500)		
Copying Costs:	\$25.00	\$15.13
Mailing Costs:	\$192.00	\$34.50
Return Envelope Printing:	\$50.00	\$45.00
Return Mailing Costs:	\$192.00	\$71.40
SECRETARIAL SUPPORT	\$190.00	\$0
TELEPHONE EXPENSES	\$25.00	\$10.00 (or less)
DOCUMENT COPYING COSTS	\$50.00	\$243.20
TOTAL:	<u>\$724.00</u>	<u>\$419.23</u>

Department of Biological Sciences
Ferris State University

TO: Dean Sue Hammersmith and Associate Dean Matt Klein
via James Hoerter, Head, Department of Biological Sciences

FROM: Walter Hoeksema, Applied Biology Coordinator

DATE: October 3, 1997

SUBJECT: Applied Biology Annual Report 1996-97

This past academic year Applied Biology graduated 30 students. The names, honors, and vocational goals of these graduates are summarized in the chart (page 4) at the end of this report. A ten-year summary is below.

Year	Graduates	Male	Female	Distinction or Higher
1996-97	30	11	19	43%
1995-96	25	12	13	36%
1994-95	33	16	17	27%
1993-94	21	9	12	14%
1992-93	34	21	13	24%
1991-92	34	16	18	18%
1990-91	29	15	14	14%
1989-90	28	16	12	32%
1988-89	28	13	15	14%
1987-88	32	14	18	38%
Average	29	14	15	26%

The 30 Applied Biology Graduates for 1996-97 is within our predicted range of 20-40 graduates per year. The number of graduates earning distinction is at a 10 year high with 43% earning academic honors. This may reflect greater numbers of pre-med., pre-dent. and pre-opt. students currently in the program. The ten-year averages work out to about 29 graduates a year, equally split between males and females, with 26 percent graduating with academic honors. As of fall semester 1997, there were 121 students officially enrolled in Applied Biology, and a few students enrolled in other programs are also completing the Applied Biology requirements. Our senior capstone course, Biol. 460, which is a good predictor of the number of seniors in Applied Biology, has an enrollment of 17 students this fall 1997 semester. This course is also offered winter semester with typically similar enrollment.

The following chart shows major award winners in Applied Biology this past academic year

AWARD	WINNER(S)
Who's Who Recognition	Jodi Halsey and Kelly Hansul
Vaderlaan Service & Leadership Award	Crista Beaver
Helen Ferris Vartan Scholarship for 1997-98	Amber Shane
Baldwin Ranger Station Summer Internship	Shawn Kanouse and Bill Schlueter

This past academic year was noteworthy for the Applied Biology Program. Program review was carried out and a major report was compiled by the Program Review Panel for the Applied Biology Program. The report finds the Applied Biology Program to be in excellent health. The major conclusions (page 5) and recommendations (page 6) from the Applied Biology Program Review Panel are included at the end of this report. I have also included a composite evaluation (page 7) of the Applied Biology Program by the senior students (1996-97) enrolled in Biol. 460 and a composite evaluation (page 8) by the 164 Applied Biology Graduates who responded to the Program Review Panels Questionnaire. Nearly 500 surveys were sent out to Applied Biology Alumni. In response to program review, the Applied Biology Program will begin a comprehensive curriculum review beginning with the Biology Department Curriculum Committee.

Serious assessment of the Applied Biology Program was also initiated this year. The Applied Biology Program Assessment Plan (page 9) is also included at the end of this report. The primary assessment activity, already in place, is a student survey filled out by senior Applied Biology Students in the capstone course Biol. 460. In addition the Applied Biology Program will develop, within the next 3-5 years, a standardized test to determine level of competence in the basic biological areas in the Applied Biology Curriculum.

This past year I was able to establish an internship arrangement with Sue VanDyke of the Baldwin Ranger Station. Sue called me one day to inquire about the possibility of Ferris Applied Biology Students completing an internship at the Baldwin ranger Station. The Biology Faculty quickly identified for me 3 Applied Biology Students with a career interest in conservation biology. I nominated all 3 individuals and 2 (Shawn Kanouse, Bill Schlueter) accepted the internship with very positive results for both employer and employee. The Office of Academic Affairs provided "seed" money for these internships as well. It is my hope that these internships with the Baldwin Ranger Station will be an on going annual process.

The costs of the Applied Biology Program continue to be very low. Based upon data provided by the Office of Academic Affairs the total teaching cost/cr. hrs is \$94.14 in the Applied Biology Program. This puts Applied Biology in the **lower** 12% (119 out of 134 programs) of all Ferris programs. This is in part due to the fact that Applied Biology continues to use existing courses, facilities, and faculty. Only one two-credit course, Biol. 460, has been developed exclusively for the Applied Biology Program. It is my view that the Applied Biology Program is a nearly free service of the Department of Biological Sciences in terms of both faculty and staff. Since we also clear each student for graduation by hand (each student's curriculum is unique), the advising load on Doug Fonner, Mary Murnik, and me is high. I do receive 25% release time during fall and winter semester to compensate.

The three new tracks (pre-med., pre-dent. and pre-vet.) in Applied Biology that were created the previous academic year and passed by the Academic Senate and approved by the Vice-President for Academic Affairs are functioning very nicely. With an advising chair for each track, Applied Biology Students will get the best possible academic and career advice. This should enhance retention and overall student satisfaction with the program.

Career Services has again provided information on Applied Biology Graduates with respect to employment, salary and employers of Applied Biology Graduates. This information (pages 10 and 11) taken from A Study of 1995-96 Graduates is included at the end of this report.

APPLIED BIOLOGY GRADUATES 1996-97

<u>STUDENT NAME</u>	<u>STUDENT #</u>	<u>HONORS</u>	<u>VOCATION/VOCATIONAL GOAL</u>
Abel, Kristen J.	374-86-4866		Grad. School - Fisheries & Wildlife,
Andrejewski, Kaly A.	374-98-0672	High Distinction	Grad. School, Oakland Univ., Bio.Ed.
Backus, Carl A.	378-84-4254	Distinction	App. Math., (Prior to this in Med. Sch.)
Beaver, Crista A.	374-94-2468	High Distinction	With Scientific Consultants, Lansing, MI.
Boras III, William	386-88-2902	Highest Distinction	Optometry
Brown, Kristian T.	293-76-1868		Occupational Therapy
Carlson, Lars J.	321-74-5188	Distinction	Optometry
Cross, Lynnette C.	374-74-6598		Optician
DiNunzio, Jenna M.	362-88-2043		Ornamental Horticulture
Ezell, Wandella L.	372-82-6744		Grad. School, Wayne State
Felton, Nakia Q.	370-98-9733		Contact Lens Fitter
Halsey, Jodi M.	368-02-6440	Distinction	Michigan College of Optometry
Hamilton, Thomas W.	376-86-7752		Nuclear Medicine
Hansul, Kelly K.	370-04-0184	Distinction	Medicine
Harless, Craig P.	386-92-3124	Distinction	Dental School, U of M
Hogg, Sheri L.	324-52-3098		Medical Technologist – Ludington Hosp.
Kanouse, Shawn, A.	376-80-3199		Grad. School – Fisheries & Wildlife
Kintz, Robin M.	354-58-1267		Grad. School - Microbiology
Maloney, Brenda M.	370-74-9445		Medicine or Pharm. Administration Ph.D.
Metz, Tricia K.	000-12-5455		Nursing
Mutale, Clara	000-12-0050	Highest Distinction	Dental School, Univ. of Penn.
Pulk, Bernard J.	370-86-1538		Michigan College of Optometry
Sialubala, Blessed S.	000-12-0052	Distinction	Medical Technology, FSU
Simcox, Mary T.	383-80-0985		Biology Teacher
Smalley, Jennifer L.	384-94-6915		Optometry
Son, Misuk	626-50-2543	Distinction	Dental school, Tufts University
St. Martin, Mark R.	380-02-0243		Medicine
TerBush, Douglas F.	373-76-8855	Distinction	Phila. College of Optometry
Therault, Julie H.	366-86-4262	High Distinction	Michigan College of Optometry
Waters, Warner M.	317-76-3439		Industrial Chemistry Technology

SUMMARY - MAJOR CONCLUSIONS

1. The FSU Applied Biology Program is a stable, inexpensive and valuable program. It is consistent with the newly adopted mission statement in that the program provides professional education and to a lesser extent career-oriented education especially when combined with a vocational associates degree. The program serves its students and the university well.
2. The Program Review Panel found the FSU Applied Biology Program to be favorably rated, and in some cases exemplary, by all groups surveyed including the FSU Biology Faculty, applied biology graduates, currently enrolled applied biology seniors, employers and this program review panel. We believe this reflects the teaching and advising skills of the FSU Biology Faculty. The FSU Biology Faculty have won numerous teaching awards and hold advanced degrees, in most cases doctorates, in a variety of biology disciplines. The program is administrated effectively and inexpensively by a program coordinator with 25% release time and several biology faculty as part of their normal advising load.
3. From the labor market analysis and the employer survey we recognize that the FSU Applied Biology Program is not vocational per se nor is there a great demand for baccalaureate degree biologists. This is not a new finding nor does it make the program inconsistent with the mission statement but simply reaffirms what we have already known. The program best serves its students, the university and the state when used as a credential for professional or graduate studies or combined with an associates degree in a vocational area such as Industrial Chemistry Technology. The name "Applied" Biology is, in part, a recognition of this fact and the need to apply ones biological education to a specific career track. It is also a reminder of the continued need for skilled advising in the FSU Applied Biology Program as well as the development of specific career tracks to allow career success for those students interested in biology. From data supplied by Career Planning/Placement Services most applied biology graduates (over 80%) find placement in the job market or graduate/professional school. We believe this speaks well of the advising and teaching skills of the biology faculty. From limited information, starting salaries appear to be around \$26,000 which is competitive with starting salaries in business and education.
4. We have learned from our graduates, senior students and the FSU Biology Faculty that we must examine the current Applied Biology Curriculum. Consideration must be given to incorporating courses that emphasize the development of oral presentation skills. Consideration must also be given to increasing the number of credits required in the biology major component of the program, from its present minimum of 30, without increasing the total graduation requirement of 120 semester credits. The biology faculty with its impressive academic diversity can and should be allowed to offer a broad range of biology electives on a regular basis. This will enrich both the FSU Applied Biology Program and the university and help to better serve FSU students both now and tomorrow.
5. The FSU Applied Biology Program is unique because of its applied nature and its ability to tailor the program to individual student needs matching academic abilities with career interests. The advisory board believes the program is not well advertised or made visible especially externally. In part, articulation agreements with community colleges will help as well as a newly created department home page on the world wide web.
6. Enrollment in the FSU Applied Biology Program is stable over the last several years at approximately 100 total students which suggests that demand by students is good. The program has averaged 30 graduates over the last 10 years with nearly 25% graduating with honors.
7. The FSU Applied Biology Program is very inexpensive ranking 119 out of 134 FSU programs or in the bottom 12% with respect to cost. While equipment in biology is presently adequate there is some concern about future equipment needs in an increasingly technological society. To maintain quality science offerings FSU must incorporate newer technologies into its pedagogy. Seniors in applied biology extensively use the research capabilities of the library as they complete their senior project as part of BIOL 460. The library appears to be able to adequately support such projects and as information is increasingly digitalized this support should continue as long as there is a commitment to computers and Internet access by the university.

RECOMMENDATIONS

1. The major recommendation for the FSU Applied Biology Program is to engage in a curriculum review. This should begin with the Biology Department Curriculum Committee and should address the concerns of the senior students, graduates, employers and faculty about the need for greater emphasis on the development of oral presentation skills and more biology electives in the program. The Biology Department Curriculum Committee may also wish to recommend additional career tracks for the Applied Biology Program to maintain enrollment and serve future needs.
2. It is also recommended that the Applied Biology Program examine ways to better advertise the program both internally and primarily externally. The teaching and advising skills of the Biology Faculty, as documented in this report, along with the ability of the Applied Biology Program to accommodate students of widely differing abilities make the FSU Applied Biology Program both novel and attractive to a wide range of students. Good placement of graduates into both the job market and graduate/professional schools as well as the ability to combine the Applied Biology Baccalaureate with a variety of vocational associates degrees at FSU are other attractive and unique features of the FSU Applied Biology Program. This advertising process could begin by meeting with Margaret Avritt, Director of University Relations and Marketing.
3. It is also recommended that the Applied Biology Program examine the projected equipment and computer needs for biology courses in the next 5 years. For the program to maintain its present high evaluation by its graduates will require biology courses that meet the technological challenges of tomorrow. The Biology Department Planning Committee and the Biology Department Head should perform integral roles in this evaluation.
4. It is recommended that the continuation of problem solving and critical thinking skills development be maintained as a primary Biology Department Goal and continue to be incorporated into biology courses. Both alumni and Applied Biology Seniors cite problem solving and critical thinking skills as a strength of the Applied Biology Program.
5. It is recommended that the Biology Faculty be both encouraged and well supported in their professional development activities such as professional travel, consulting and research. Applied Biology Seniors see, as a strength of the program, a Biology Faculty with expertise in their professional areas. To maintain this strength requires a financial commitment on the part of administration as well as a valuing of the faculty member as a skilled professional in terms of both academic credentials and continuing professional development.

STUDENT EVALUATION OF THE APPLIED BIOLOGY PROGRAM - COMPOSITE

(N = 36)

1. Entering Applied Biology: Did you enter Applied Biology at FSU as: (circle one)

- A. a freshman? If so why applied biology? 12 - for career track (pre-med, pre-dent)
 B. from another program at Ferris? If so which one? 18 - pre-opt and pre-pharm most frequently listed.
 and do you plan to obtain dual degrees? 12 yes 6 no (Note: primarily associates degrees in career area)
 C. a transfer student 6

2. Future Plans (circle one) NOTE: Responses are in left margin

- (30) A. I plan to attend graduate or professional school (please state program e.g. medicine, dental, opt, M.S./Ph.D)
 (0) B. I plan to continue in UNDERGRADUATE EDUCATION (please state specific program) _____
 (6) C. I plan to work or seek employment
 have you accepted or had a job offer? 1 yes 5 no
 what area of work are you seeking? med. tech. (1), nuclear medicine (1), OHT (1), opticianary (2) not stated (1)

3. Evaluation of Applied Biology

On a scale of 1 (unsatisfactory) to 5 (excellent) how do you rate your applied biology education in terms of: (Note: The number of responses are shown in parentheses)

	(1)	(1)	(10)	(18)	(6)	
A. preparation for a career or advanced education	1	2	3	4	5	(aver. = 3.75)
B. intellectual challenge*	1	2	3	4	5	(aver. = 4.09)
* (1 student not responding)	(1)	(1)	(2)	(21)	(10)	

What single biology course do you believe will be MOST BENEFICIAL to you in your career? why?

Those in health related career tracks most frequently listed physiology/anatomy (20) and microbiology (8) citing these courses as containing material most directly related to career goal.

What single biology course do you believe will be LEAST BENEFICIAL to you in your career? why?

Responses were random and tended to be courses which the students felt were not directly related (13) to their career goals. Some students either did not respond or said all biology courses were beneficial (5)

What area(s) of the applied biology curriculum are STRENGTHS?

(circle all that apply)

- a. the development of problem solving/critical thinking skills = 32 (89%)
 b. the development of writing skills = 17 (47%)
 c. the development of verbal communication skills = 11 (31%)
 d. the development of computer skills to access scientific information = 11 (31%)
 e. a broad choice of biology courses/electives relevant to my career choice and interests = 22 (61%)
 f. a faculty with expertise in their professional areas = 31 (86%)
 g. sound advice, when I sought it, about careers in biology = 16 (44%)

What area(s) of the applied biology curriculum are WEAKNESSES?

(circle all that apply)

- a. the development of problem solving/critical thinking skills = 4 (11%)
 b. the development of writing skills = 7 (19%)
 c. the development of verbal communication skills = 15 (42%)
 d. the development of computer skills to access scientific information = 14 (39%)
 e. a broad choice of biology courses/electives relevant to my career choice and interests = 9 (25%)
 f. a faculty with expertise in their professional areas = 2 (6%)
 g. sound advice, when I sought it, about careers in biology = 9 (25%)

GRADUATE SURVEY OF THE FSU APPLIED BIOLOGY PROGRAM
(COMPOSITE)

Dear graduate of the FSU Applied Biology Program. The Applied Biology Program is being reviewed this academic year and the Applied Biology Program Review Panel would appreciate your candid responses to the following questions. Please circle your responses and return this form as soon as possible in the post paid envelope. Thank you very much. You can elaborate on your responses, if you wish, on the backside of the questionnaire.

Are you presently employed? yes (156) no (8); If yes, are you employed part-time (23) full-time (133) and what is your occupation? N = 164 (33%) RESPONDERS OUT OF 493 TOTAL SURVEYS SENT OUT.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Unknown	AVERAGE
1. My FSU Applied Biology Baccalaureate helped me or is helping me achieve my career goals.	1 56=34%	2 73=45%	3 23=14%	4 10=6%	5 0=0%	U 2=1%	1.92
2. I was satisfied with the academic preparation I received in the FSU Applied Biology Program.	1 56=34%	2 87=53%	3 15=9%	4 5=3%	5 0=0%	U 1=1%	1.81
3. I was satisfied with the advising I received while in the FSU Applied Biology Program.	1 60=37%	2 58=35%	3 26=16%	4 13=8%	5 6=4%	U 1=1%	2.06
4. I would recommend the FSU Applied Biology Program to prospective students.	1 45=28%	2 75=46%	3 36=22%	4 4=2%	5 1=1%	U 3=2%	2.01
5. The FSU Applied Biology Baccalaureate is a quality degree.	1 52=32%	2 75=46%	3 29=18%	4 4=2%	5 1=1%	U 3=2%	1.93
6. The biology courses I was required to take as an applied biology student were, in general, beneficial.	1 62=38%	2 92=56%	3 7=4%	4 1=1%	5 1=1%	U 1=1%	1.69
7. The chemistry courses I was required to take as an applied biology student were, in general, beneficial.	1 38=23%	2 94=57%	3 23=14%	4 6=4%	5 1=1%	U 2=1%	1.98
8. The mathematics courses I was required to take as an applied biology student were, in general, beneficial.	1 33=20%	2 86=52%	3 33=20%	4 5=3%	5 2=1%	U 5=3%	2.07
9. More biology electives should be made available to applied biology students.	1 55=34%	2 61=37%	3 37=23%	4 8=5%	5 0=0%	U 3=2%	1.99
10. The biology courses I took at FSU helped me to develop critical thinking or problem solving skills in science.	1 39=24%	2 78=48%	3 37=23%	4 6=4%	5 2=1%	U 2=1%	2.10
11. The Applied Biology Curriculum includes enough courses which help to develop sound <u>written</u> communication skills.	1 14=9%	2 68=41%	3 47=29%	4 25=15%	5 5=3%	U 5=3%	2.62
12. The Applied Biology Curriculum includes enough courses which help to develop sound <u>oral</u> communication skills.	1 10=6%	2 59=36%	3 45=27%	4 36=22%	5 9=5%	U 5=3%	2.84

APPLIED BIOLOGY PROGRAM ASSESSMENT

Program Mission: To provide a quality baccalaureate in biology for those students whose career and/or vocational choices will benefit from such a degree.

Goal: The program will ensure a curriculum that is current and teaches the fundamental concepts, principles and theories of the life sciences relevant to a student's career choice.

Responsibility/Timelines: Applied biology program coordinator, Assessment Tool #1 was started academic year 1996-97; Assessment Tool #2 will start within 3-5 years or sooner.

Assessment Tool #1: An exit survey is presently completed by all applied biology seniors enrolled in the required capstone course BIOL 460. The data are tabulated by the program coordinator and are available to all interested parties. See attachment.

Assessment Tool #2: During the next 3-5 years a standardized test (perhaps used in pre-test/post-test format) will be developed to determine levels of student competence/academic achievement. Under consideration are the biology component of the GRE and the ACT scientific reasoning component (pre-test/post-test format).

Goal: Students will become aware of career opportunities in biology that match their interests with their abilities; students will be satisfied with their career preparation.

Responsibility/Timelines: Applied biology program coordinator, the Assessment Tool was started academic year 1979-80.

Assessment Tool: Placement rates of applied biology graduates into the job market and into graduate or professional programs as well as academic accomplishments are tabulated in the applied biology annual report which has been produced annually for the last 17 years. The report is compiled by the program coordinator and is submitted to the biology department head and academic dean as well as being available to all interested parties.

Distribution of Results: Results are the property of the biology faculty but will be available to all interested parties at the discretion of the biology faculty.

Use of Results/Timelines: The results will be used to bring about positive change in the applied biology program where such change is deemed necessary. The biology faculty as well as the applied biology advisory committee and academic program review will be instrumental in guiding and directing such changes. Small inexpensive changes can occur rapidly, e.g. annually, while large scale and/or expensive changes are budget-dependent for implementation.

Applied Biology B.S.

Number receiving degrees 27
 Number responding to survey 13 48.1%

		<u>Full-Time</u>	<u>Part-Time</u>	<u>PT/FT</u>	<u>Unknown</u>
Continuing their education	7	6	1		0
Total employed	8				
Employed in field		5	1		0
Employed, but not in field		2	0		0
Seeking in field	1				
Still seeking employment	0				
Not seeking employment	0				

Had an FSU internship 3 Did their internship with the employer 0

Employment rate 100%

Full Time Salaries

of grads indicating full-time employment: 7 Did Not Answer: 2 # Reporting: 5

\$9-11 K \$12-15 K \$16-19 K \$20-23 K \$24-27 K \$28-31 K \$32-35 K \$36-39 K \$40-43 K \$44-47 K \$48-51 K \$52-55 K \$55-60 K
 3 1 1

Part Time Salaries

of grads indicating part-time employment: 1 Did Not Answer: 0 # Reporting: 1

\$9-11 K \$12-15 K \$16-19 K \$20-23 K \$24-27 K \$28-31 K \$32-35 K \$36-39 K \$40-43 K \$44-47 K \$48-51 K \$52-55 K \$55-60 K
 1

Applied Biology

<u>Employers</u>	<u>City and State</u>	<u>Positions</u>
Ferris State University	Big Rapids MI	SLA Instructor
Gray & Company	Hart MI	Management Trainee R&D
Henry Ford Medical Center		Optometry Technician
Sheridan Hospital	Sheridan MI	Nurse's Aid
Sherman Dental Care	Muskegon MI	Dental Technician
Sun Chemical	Muskegon MI	Laboratory Technician

BUDGET

TO: Doug Haneline, Chair, Academic Program Review Committee
FROM: Walt Hoeksema, Applied Biology Program Coordinator
SUBJECT: Actual Costs for Applied Biology Program Review
DATE: August 15 1997

Below is the estimated budget and actual costs for Applied Biology Program Review Panel. Thank you for the administrative support of academic program review.

	<u>ESTIMATED</u>	<u>ACTUAL</u>
GRADUATE SURVEYS (500)		
Copying Costs:	\$25.00	\$15.13
Mailing Costs:	\$192.00	\$34.50
Return Envelope Printing:	\$50.00	\$45.00
Return Mailing Costs:	\$192.00	\$71.40
SECRETARIAL SUPPORT	\$190.00	\$0
TELEPHONE EXPENSES	\$25.00	\$10.00 (or less)
DOCUMENT COPYING COSTS	\$50.00	\$179.30
TOTAL:	<u>\$724.00</u>	<u>\$355.33</u>

PROGRAM OVERVIEW

The Applied Biology Program at Ferris began in 1972. Its initial focus was to provide an alternate route to a hospital internship for medical technology students. Its enrollment consisted of a handful of students. Over the past 25 years applied biology has evolved into a program with several career tracks (pre-medicine, pre-dentistry, pre-optometry, pre-veterinary medicine, pre-physical therapy, sports medicine and graduate school entry) with others being actively created (e.g. environmental biology track). Applied biology has always been a flexible program offering many options in the amount of chemistry, mathematics and physics a student was required to take. Options also exist in the courses selected for the biology major. This flexible approach has allowed applied biology to accommodate a wide diversity of students with respect to academic abilities and career choices in that we can match interests with abilities. Since the program is somewhat custom created for each individual student and track, advising is challenging. This has been addressed, in part, by incorporating an advising chair for each of the tracks. This faculty member (or members) specializes in that track only (e.g. David Stewart is the pre-veterinary medicine track advising chair) and advises only applied biology students in that track. In this way Ferris students receive the best possible academic advising with respect to their career goals. Applied biology advisors also hand clear each student for graduation and conduct a brief exit interview with each student at the time of graduation clearance. Applied biology also allows students to matriculate through the applied biology curriculum without being officially enrolled in the program. For example applied biology has matriculated several dental hygiene students. These typically are transfer students who are officially enrolled in dental hygiene but at the same time are completing the requirements for an applied biology baccalaureate. The advantage to the dental hygiene student of the applied biology baccalaureate is that it provides a credential for clinical teaching. I state this because such students never appear in the enrollment data for applied biology.

Only one course has been specifically created for the applied biology program, BIOL 460 Current Topics in Biology. All other courses in the curriculum are courses which already existed as support courses for other programs e.g. pre-pharmacy. Similarly, no new faculty positions have ever been created for the applied biology program. Literally, the biology department faculty are the applied biology program faculty. We believe that this makes the applied biology program an even greater bargain than the official program cost data shows it to be.

The new mission statement for Ferris State University reads as follows: **Ferris State University will be a national leader in providing opportunities for innovative teaching and learning in career-oriented, technological and professional education.** The Ferris Applied Biology program is consistent with this FSU mission statement. Some of our graduates go on to successful professional careers in optometry, medicine and dentistry. Many others combine the applied biology baccalaureate with an associates degree such as in industrial chemistry technology or ornamental horticulture. The associates degree provides the technology necessary for entering the job market while the applied biology baccalaureate provides a career advancement credential. Still others complete a sports medicine internship as part of their applied biology baccalaureate and go on to successful careers as athletic trainers. We also send occasional graduates of the applied biology program to graduate school to earn masters and doctoral degrees and go on to successful professional careers in research and teaching. In addition, 3 current members of the biology faculty; namely, Robert Friar, Bruce Beetley and Douglas Fonner are past recipients of the distinguished teaching award recognizing their contributions to innovative teaching in biology. Additionally, many biology faculty are actively incorporating the internet into their teaching pedagogy, developing investigative laboratories and developing innovative multimedia approaches in their classrooms.

The name APPLIED means that each student as part of their applied biology baccalaureate completes course work which reflects their career choice. This course work, all of which counts toward the applied biology baccalaureate, may be as much as an associates degree (ICT, HORT, DHYG, RESP) or a series of courses such as exercise physiology, responding to emergencies, biomechanics, health education and principles of athletic training in the case of sports medicine. We call each of these career options in the applied biology program "TRACKS". For each track there is an advising chair who specializes in just that track or career option. Thus each student in applied biology receives sound academic and career track advice where the emphasis is on matching a student's career choice with their academic abilities. To give the reader a brief insight into the diversity of the applied biology program the first chart on the next page shows the career tracks of the Helen Ferris Vartan Scholarship winners in the applied biology

YEAR(S)	RECIPIENT(S)	ACADEMIC ACCOMPLISHMENT
1985-88	Dawn Lowe	Ph.D. Univ. of Georgia, Exercise Physiology
1988-89	Andrea Panting	M.D. University of Cincinnati
1989-91	Ernest Delemeester	Biotechnologist at Upjohn
1990-91	Monica Leyder	O.D., FSU College of Optometry (with high distinction)
1991-93	Katie Henning Melody Puisis	Senior, Philadelphia College of Optometry Junior at Wisconsin Medical College
1993-94	Lisa Brossia Chris Wright	Sophomore, MSU College of Veterinary Medicine Pre-medical
1994-95	Kristopher Kaye	FSU pharmacy pre-senior, pre-medical
1995-96	Carl A. Backus	Medical school (Caribbean)
1996-97	Amber M. Shane	FSU junior, physical therapy track

The following chart shows the diversity of career choices of the 1995-1996 applied biology graduates

APPLIED BIOLOGY GRADUATES 1995-96

<u>STUDENT NAME</u>	<u>HONORS</u>	<u>VOCATION/VOCATIONAL GOAL</u>
Bailek, Aneta Ilona		Dow, industrial chemistry technology
Bowzer, Jason B.	Distinction	Physical therapy/sports medicine
Garcia, Jennifer Lynn		Physician assistant
Getzinger, Jere Donald	Distinction	Nursing
Goldynia, Karen Marie		Optometry
Hart, Melanie Lynn	Distinction	Graduate school
Hayes, Ricky Lee		Project manager, American Environmental Network, Florida
Ingham, Leon DeWayne		Optometry
Jackson, Sharon Ann		Respiratory therapy, Mt. Clemens Hospital
Kuttner, Jason Andrew		San Diego Zoo zoologist
Lee, Jane H.	Distinction	FSU College of Optometry
Morgan, Michael C.	Distinction	Graduate School, East Carolina University
Nichols, Charlene R.		Biotechnology
Piechocki, Michelle Lynn		Optometry
Prestler, Marie Elizabeth		MLT/MT, Reed City Hospital
Rice, Darren Richard	Distinction	Teaching in Japan
Ruskin, Aaron Mathew		Univ. of Detroit Dental School
Salah, Naseem Nabeel	High distinction	FSU College of Optometry
Sandy, Michael Morris		Memphis College of Optometry
Sartorelli, Gina Terese		Optometry
Smith, Lori Ann	Distinction	Veterinary medicine
VanKirk, Akiko Marie		Graduate School
Vostrirancky, Darrin James		Optometry
White, Michele E.	Distinction	Optometry
Wonch, Jason David		Optometry

The following are identifiable strengths of the applied biology program:

1. Great curriculum flexibility allowing the applied biology program to match a student's career interests with their academic abilities.
2. A large number of career tracks in the applied biology program.
3. Very low program costs.
4. An outstanding biology faculty with a wide range of expertise in the subdivisions of biology and in innovative teaching techniques.
5. A stable enrollment with a 10 year average graduating class size of 30.

The following are concerns of the applied biology program.

1. An inability to offer a number of biology elective courses because of low enrollment. A possible solution is to guarantee certain classes irrespective of enrollment and guarantee the faculty member overload pay for the class.
2. The lack of sufficient scholarship funds to encourage and nurture outstanding students in the applied biology program. An alumni fund raising drive is one possible solution as there are over 500 applied biology alumni.
3. Advising complexities as new tracks such as pre-physical therapy are added to the applied biology program. We have addressed this problem, in part, by establishing an advising chair for each defined track.
4. Historically, but still apparent, is a general lack of understanding by Ferris personnel outside of the biology department of what applied biology is and how it fits in with the Ferris Mission Statement. The new mission statement will help in this latter regard. Annual meetings with academic advisors and admissions counselors would also help alleviate this problem.
5. Finding a common bond shared between all applied biology graduates because of the great academic and career diversity of its students. This becomes increasingly important as alumni associations as well as advisory boards are formed. Possibly establishing an alumni news letter to be published on an annual basis and mailed to all alumni would be helpful.

SECTION 2

PROGRAM EVALUATION PLAN: TECHNIQUES AND BUDGET

PROGRAM EVALUATION PLAN APPLIED BIOLOGY PROGRAM

Degree Awarded: B.S. in Applied Biology

Program Review Panel:

Chair: Jack Buss, Professor of Biology

Program Coordinator: Walt Hoeksema, Professor of Biology

Program Faculty: Doug Fonner, Professor of Biology

Program Faculty: Mary Murnik, Professor of Biology

Special Interest Member: Bill Killian, Associate Professor of Chemistry, ICT Program Coordinator

Outside Faculty Member: Dave Lucey, Coordinator of Sports Medicine

Purpose: To conduct an evaluation of the Applied Biology Program in order to identify its strengths and weaknesses and in doing so to improve the program and its service to Ferris State University.

Data Collection Techniques:

1. Graduate Surveys sent out to all identifiable alumni of the program
2. Employer Surveys from interviews with identifiable employers and professional schools (optometry, medicine, dentistry)
3. Student evaluation of the program through a questionnaire given out to 1996-97 Applied Biology Seniors enrolled in BIOL 460.
4. Faculty Perceptions of the Applied Biology Program from a survey given to the Biology Department Faculty.
5. Advisory Committee Perceptions of the program through a questionnaire to advisory committee members
6. Labor Market Analysis from current market indicators available through the world wide web and statistical data from FSU's Career Planning and Placement Office
7. Evaluation of Facilities and Equipment through an analysis and review by the Biology Department Planning Committee.
8. Curriculum Evaluation through a review and analysis by the Biology Department Curriculum Committee.

SCHEDULE OF EVENTS

<u>ACTIVITY</u>	<u>LEADER(S)</u>	<u>TARGET DATE</u>
Graduate Survey	Fonner, Murnik, Hoeksema	May 1, 1997
Employer Survey	Hoeksema, Murnik, Killian, Lucey	May 1, 1997
Student Evaluation	Hoeksema, Buss	May 1, 1997
Faculty Perceptions of Program	Murnik, Fonner, Hoeksema	May 1, 1997
Advisory Committee Perceptions	Hoeksema, Buss	May 1, 1997
Labor Market Analysis	Fonner, Hoeksema	May 1, 1997
Evaluation of Facilities	Buss	May 1, 1997
Curriculum Evaluation	Hoeksema, Fonner, Biology Curriculum Committee Chair	May 1, 1997

Signature of Program Review Panel Chair: _____

BUDGET

TO: Doug Haneline, Chair, Academic Program Review Committee
FROM: Jack Buss, Chair, PRP and Walt Hoeksema, Applied Biology Program Coordinator
SUBJECT: Proposed Budget for Applied Biology Program Review Panel
DATE: December 12 1996

Below is the estimated budget for the Applied Biology Program Review Panel. Please contact us if you have questions.

GRADUATE SURVEYS (600)

Copying Costs:	\$25.00
Mailing Costs:	\$192.00
Return Envelope Printing	\$50.00
Return Mailing Costs	\$192.00

SECRETARIAL\STUDENT SUPPORT*

40 hours at \$4.75/hour	\$190.00
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TELEPHONE EXPENSES	\$25.00
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FINAL DOCUMENT COPYING COSTS	\$50.00
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TOTAL	\$724.00
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The Biology Department is presently without a departmental secretary which may necessitate additional secretarial costs

SECTION 3

GRADUATE SURVEY

The following uses will be made of these findings:

1. They will be reported to the applied biology advisory committee for their scrutiny, evaluation and recommendations. They, in turn, may suggest certain curricular and non-curricular changes in the applied biology program. Such recommendations will be submitted to the biology curriculum and planning committees for their recommendations.
2. Serious consideration will be given to requiring COMM. 121 (public speaking) rather than allowing a choice between COMM. 105 and COMM. 121 where most graduates choose COMM. 105. This addresses the graduate concern about the lack of development of verbal communication skills in formal presentations.
3. Serious consideration will be given to increasing the number of credit hours in the biology major from 30 to 33 or 36. This can be accomplished without increasing total hours by decreasing from 12 to 9 the number of hours required in cultural enrichment and/or social awareness. The university general education requirements for graduation would still be met. This would address the graduate desire for more biology electives.
4. It will be reported to the biology department head for further administrative review that to offer certain biology electives will require support of low enrollment courses. This, however, will enrich both our courses offerings and the number of biology electives available to applied biology students.
5. It will be reported to the biology department head that the biology faculty have received, from applied biology graduates, many favorable comments regarding their teaching skills and advising skills. These comments will be made available to the biology department head and biology faculty. We would consider such comments to be useful for purposes of annual evaluation and promotion.
6. The development of critical thinking or problem solving skills is a biology department goal. It will be reported to the biology department head and biology faculty that from a graduate perspective we are achieving this goal. This may be important in assessment of department goals.
7. Emphasis on requiring our students to write, whenever and wherever feasible, in their applied biology curriculum will continue. With the addition of BIOL. 460 and the new general education requirements in the recent past we have begun to address this issue. Graduates of more than 10 years ago did not have these requirements and therefore may, in their comments, not accurately reflect current writing requirements.

**GRADUATE SURVEY OF THE FSU APPLIED BIOLOGY PROGRAM
(COMPOSITE)**

Dear graduate of the FSU Applied Biology Program. The Applied Biology Program is being reviewed this academic year and the Applied Biology Program Review Panel would appreciate your candid responses to the following questions. Please **circle your responses** and **return this form as soon as possible** in the post paid envelope. Thank you very much. You can elaborate on your responses, if you wish, on the backside of the questionnaire.

Are you presently employed? **yes (156) no (8)**; If yes, are you employed **part-time (23) full-time (133)** and what is your occupation? **N = 164 (33%) RESPONDERS OUT OF 493 TOTAL SURVEYS SENT OUT.**

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Unknown	AVERAGE
1. My FSU Applied Biology Baccalaureate helped me or is helping me achieve my career goals.	1 56=34%	2 73=45%	3 23=14%	4 10=6%	5 0=0%	U 2=1%	1.92
2. I was satisfied with the academic preparation I received in the FSU Applied Biology Program.	1 56=34%	2 87=53%	3 15=9%	4 5=3%	5 0=0%	U 1=1%	1.81
3. I was satisfied with the advising I received while in the FSU Applied Biology Program.	1 60=37%	2 58=35%	3 26=16%	4 13=8%	5 6=4%	U 1=1%	2.06
4. I would recommend the FSU Applied Biology Program to prospective students.	1 45=28%	2 75=46%	3 36=22%	4 4=2%	5 1=1%	U 3=2%	2.01
5. The FSU Applied Biology Baccalaureate is a quality degree.	1 52=32%	2 75=46%	3 29=18%	4 4=2%	5 1=1%	U 3=2%	1.93
6. The biology courses I was required to take as an applied biology student were, in general, beneficial.	1 62=38%	2 92=56%	3 7=4%	4 1=1%	5 1=1%	U 1=1%	1.69
7. The chemistry courses I was required to take as an applied biology student were, in general, beneficial.	1 38=23%	2 94=57%	3 23=14%	4 6=4%	5 1=1%	U 2=1%	1.98
8. The mathematics courses I was required to take as an applied biology student were, in general, beneficial.	1 33=20%	2 86=52%	3 33=20%	4 5=3%	5 2=1%	U 5=3%	2.07
9. More biology electives should be made available to applied biology students.	1 55=34%	2 61=37%	3 37=23%	4 8=5%	5 0=0%	U 3=2%	1.99
10. The biology courses I took at FSU helped me to develop critical thinking or problem solving skills in science.	1 39=24%	2 78=48%	3 37=23%	4 6=4%	5 2=1%	U 2=1%	2.10
11. The Applied Biology Curriculum includes enough courses which help to develop sound <u>written</u> communication skills.	1 14=9%	2 68=41%	3 47=29%	4 25=15%	5 5=3%	U 5=3%	2.62
12. The Applied Biology Curriculum includes enough courses which help to develop sound <u>oral</u> communication skills.	1 10=6%	2 59=36%	3 45=27%	4 36=22%	5 9=5%	U 5=3%	2.84

**GRADUATE SURVEY OF THE FSU APPLIED BIOLOGY PROGRAM
(PROFESSIONALS)**

Dear graduate of the FSU Applied Biology Program. The Applied Biology Program is being reviewed this academic year and the Applied Biology Program Review Panel would appreciate your candid responses to the following questions. Please **circle your responses** and return this form as soon as possible in the post paid envelope. Thank you very much. You can elaborate on your responses, if you wish, on the backside of the questionnaire.

Are you presently employed? yes (35) no (0); If yes, are you employed part-time (0) full-time (35) and what is your occupation? **PROFESSIONAL** - MD, DDS, OD, DVM, DC, DPM, PH.D. ETC. N = 35 **NOTE:** Full time students are considered to be full-time employed.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Unknown	AVERAGE
1. My FSU Applied Biology Baccalaureate helped me or is helping me achieve my career goals.	1 (19)	2 (14)	3	4 (1)	5	U (1)	1.50
2. I was satisfied with the academic preparation I received in the FSU Applied Biology Program.	1 (14)	2 (19)	3	4 (1)	5	U (1)	1.65
3. I was satisfied with the advising I received while in the FSU Applied Biology Program.	1 (15)	2 (13)	3 (3)	4 (2)	5 (1)	U (1)	1.85
4. I would recommend the FSU Applied Biology Program to prospective students.	1 (13)	2 (17)	3 (3)	4	5	U (2)	1.70
5. The FSU Applied Biology Baccalaureate is a quality degree.	1 (14)	2 (15)	3 (3)	4	5	U (3)	1.66
6. The biology courses I was required to take as an applied biology student were, in general, beneficial.	1 (17)	2 (17)	3	4	5	U (1)	1.50
7. The chemistry courses I was required to take as an applied biology student were, in general, beneficial.	1 (10)	2 (20)	3 (2)	4 (2)	5	U (1)	1.88
8. The mathematics courses I was required to take as an applied biology student were, in general, beneficial.	1 (8)	2 (17)	3 (7)	4 (1)	5	U (2)	2.03
9. More biology electives should be made available to applied biology students.	1 (12)	2 (14)	3 (7)	4	5	U (2)	1.85
10. The biology courses I took at FSU helped me to develop critical thinking or problem solving skills in science.	1 (12)	2 (15)	3 (7)	4	5	U (1)	1.85
11. The Applied Biology Curriculum includes enough courses which help to develop sound <u>written</u> communication skills.	1 (7)	2 (17)	3 (6)	4 (4)	5	U (1)	2.21
12. The Applied Biology Curriculum includes enough courses which help to develop sound <u>oral</u> communication skills.	1 (6)	2 (12)	3 (10)	4 (6)	5	U (1)	2.47

COMMENTS FROM GRADUATES EMPLOYED PROFESSIONALLY

I am currently a veterinary medicine student at the College of Veterinary Medicine at MSU. I feel I was very well prepared for vet school by the Applied Biology program at Ferris. I highly recommend any pre-med or pre-vet students complete the program and get their B.S. degrees. The degree made me a more desirable applicant for vet school.

Regarding question 9: It would have been nice to have a bigger variety of biology classes to choose from. However, because there wasn't that many, I had to take what was offered, which included courses on the fundamental principles of biology that I apply often in vet school.

Regarding question 11: more assignments involving reading journal articles and writing summaries (possibly for extra credit in a class) would be helpful.

Small class sizes and a great faculty make the applied biology program at Ferris special. Courses that I think are especially beneficial for students include: developmental biology, genetics, microbiology / immunology. These are strengths of the program. I used my B.S. in applied biology as a stepping stone to a DVM. In this respect, I think the program is very strong with no major problems or weaknesses. Had I sought out a job in biology using my B.S. in applied biology from Ferris, I probably would have been frustrated just as people with biology degrees from other institutions have been.

The opportunity to take "upper level" courses (e.g. Biochemistry in Pharmacy school) is very beneficial.

The flexibility which allows students to take more courses in their area of interest is also ideal. I believe the Applied Biology Program allowed me to do this.

Looking back, the only aspect of the program that I could have benefited more from would have been to have had some exposure to research. Not necessarily to have been involved in research, but at least to have been given the information about what research involves, career opportunities, etc.

A strength of the program is the faculty. The faculty members that I had interaction with were, without exception, exceptional teachers in the classroom and all-around good people.

The Applied Biology program at FSU is a fine pre-professional program that provides great training/studies of the hard sciences (Biology, Chemistry, and Physics). However this program only prepares the student to continue their education, be it to medical, dental, physician assistant, or physical therapy schools; but this program does not prepare the student to find a job in the workplace without the advent of additional schooling.

Quality of the program comes down to the instructor(s) of each course. I felt fortunate to have many good ones in the science program, especially Mr. Beetley.

I am currently a full-time student in podiatric medical school in Chicago. This spring I will receive my doctor's degree and next year I will be doing an orthopedic residency at Hines V.A. Hospital and Loyola Medical Center in Maywood, IL.

I didn't realize how well prepared I was for medical school until I got here. A large portion of the first year was a repeat of what I was taught at Ferris. However, many other students needed these courses to "catch up" with the rest of us. Even during my interview to be accepted into the school, the interviewer stated that my average GPA carried more weight because I attended Ferris. I was surprised, but extremely pleased.

One of the classes which helped me the most while earning my Applied Biology Degree was the two one credit classes during my last year. The first class was research for a paper presentation and the second class was the actual oral presentation and writing of the paper. We were also taught to evaluate journal articles for any bias. Being in the medical field I use what I learned in those classes several times a week. (Every time I read a journal article.)

The applied biology program of FSU works as a good stepping stone on to further education. It has limited potential for employment directly out of school. I feel that the main priority for improvement should be in developing more electives so that students have various options by which to choose from.

Good preparation for medical school academically, although due to the fact it doesn't have it's own school it can be more difficult to apply than if you went to an undergraduate program where they have their own school.

I am currently a second year medical student at MSU - College of Human Medicine. Throughout my first year of basic sciences I was astounded by how well prepared I was compared to my classmates. Looking back though, my career at Ferris could be termed "atypical". Below I have listed some of the aspects of my educational experience at Ferris that were particularly helpful followed by some things I wish I would have had more of ...

Strengths

- Opportunity to work closely with faculty/staff. The close relationships I developed with my instructors allowed me to gain confidence as a student and to seek out opportunities that would not have otherwise come my way.
- Flexibility in the requirements for the Applied Bio Degree--this allowed me to focus on more advanced / clinically related information that truly has made med. school more endurable.
- Hands on labs - especially Anatomy/Physiology and Embryology!
- Tutoring - Thanks to Dr. Friar & Palmer & Oldfield I was able to truly "cement" my knowledge in ANT/PHS!

I wish I had more ...

- Written and oral communication in Biology.
- Suggestion: An elective research semester in senior year working on health policy promotion project or a scientific project with a small group of students. Similar to the Advanced Topics course, but a little more involved with peers.

Again, I would like to reiterate that I was very pleased with the education I received at Ferris!

I left the pharmacy program and Ferris without a degree to enter medical school. My applied biology degree was awarded after transfer of credits from my 1st year of medical school. Although I was never enrolled in the applied biology program while attending Ferris, Drs. Hoeksema and Ryan were extremely helpful and insightful as I made application to medical school. Both served as advisors and helped make a difficult and intimidating process successful. It has been a long and exciting road, but I now have a full time faculty appointment and teach medical students and residents. I thank them both.

I am very satisfied with my B.S. in Applied Biology. During my first year at Michigan State University I took combined classes which consisted of students from both the College of Osteopathic Medicine (COM) and the College of Human Medicine (CHM). I soon found that the academic preparation I received in the FSU Applied Biology Program was superior to that of most of my classmates, including some well known schools such as University of Michigan. Thanks to my preparation at FSU I was able to enjoy many academic successes at MSU. After taking biochemistry at FSU (PHCH 320) at FSU I was able to score in the top 2 percent of my biochemistry course (BCH 521) here at MSU. That is only one example, I have had similar or even better results in other courses such as physiology, genetics, anatomy, histology, pathology, etc.

I strongly believe that FSU has an excellent Applied Biology Program. This program has taught me how to think and reason through problems that are difficult, if not impossible to prepare for. I am very thankful that I have had the opportunity to obtain my Applied Biology Baccalaureate from Ferris State University.

I was encouraged not to become a physician. (Survey indicates this person is currently employed as a physician.)

I received very good preparation for an advanced degree through Ferris State University Applied Biology B.S. Program. I would highly recommend this program for any student planning on entering a graduate school requiring a science background.

The applied biology program prepared me well for dental school. I am very impressed at the head start I had on my classmates, when I started at my new school.

The courses that I took adequately prepared me to take the DAT and enroll in the dental school of my choosing. The smaller class size and individual attention of the professors help to add to my positive experience at FSU.

The biology program could use more research projects with student involvement. This is key in a good biology program especially for a student who is planning on biology for a career.

The Bachelors of Applied Biology that I received was used as a stepping stone for admission into a graduate program--namely, Optometry. In retrospect, the science courses--physics, chemistry, anatomy/physiology, pathophysiology, and calculus--were of great help to me in learning, understanding, and succeeding in the College of Optometry and as an Optometrist.

As a science major, the electives in the Applied Biology Curriculum that I enrolled in were fund and interesting. At the same time, they were challenging and difficult. From what I remember, most curses demanded participation but did not require many oral presentations. On the flip side, the examinations and class work asked for a lot of written explanations/written communication.

Overall, the Applied Biology curriculum (as do other curriculums) gives a student what he/she gives the curriculum. For me, I am very proud to have an Applied Biology degree from Ferris because it was the building block for obtaining a quality graduate degree and establishing a solid career. P.S. Dr. Hoeksema: As my guidance counselor and professor (in many courses) I want to thank you for all your assistance. You may feel you do little, but you really go out of your way to help/teach students. Best wishes and thanks again.

The applied biology program served as a great pre-optometry program for me. I'm not sure what it would have done for me if I had not gotten into optometry school however. I always felt it was a well organized program and was very happy with my advisor (Dr. Hoeksema) throughout the program.

This degree was used to gain acceptance in to Optometry school, which looked good on my resume.

Don't like the term Applied Biology. The word applied has a "bad" connotation. Need better oral presentations (i.e., students giving presentations). I think FSU Biology Department is very strong. I think I must have had every professor there during my undergrad. I had no complaints, everyone was very helpful!

The reason that I am not employed is that I'm now an optometry student.

GRADUATE SURVEY OF THE FSU APPLIED BIOLOGY PROGRAM
(ALLIED HEALTH RELATED)

Dear graduate of the FSU Applied Biology Program. The Applied Biology Program is being reviewed this academic year and the Applied Biology Program Review Panel would appreciate your candid responses to the following questions. Please circle your responses and return this form as soon as possible in the post paid envelope. Thank you very much. You can elaborate on your responses, if you wish, on the backside of the questionnaire.

Are you presently employed? yes (57) no (1); If yes, are you employed part-time (20) full-time (37) and what is your occupation? ALLIED HEALTH RELATED. N = 58 (Nursing, Dental Hygiene, MLT, Respiratory Therapy, etc.)

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Unknown	AVERAGE
1. My FSU Applied Biology Baccalaureate helped me or is helping me achieve my career goals.	1 (18)	2 (27)	3 (8)	4 (5)	5	U	2.00
2. I was satisfied with the academic preparation I received in the FSU Applied Biology Program.	1 (22)	2 (29)	3 (6)	4 (1)	5	U	1.76
3. I was satisfied with the advising I received while in the FSU Applied Biology Program.	1 (24)	2 (22)	3 (8)	4 (2)	5 (2)	U	1.90
4. I would recommend the FSU Applied Biology Program to prospective students.	1 (18)	2 (27)	3 (12)	4 (1)	5	U	1.93
5. The FSU Applied Biology Baccalaureate is a quality degree.	1 (17)	2 (30)	3 (9)	4 (1)	5 (1)	U	1.95
6. The biology courses I was required to take as an applied biology student were, in general, beneficial.	1 (18)	2 (38)	3 (2)	4	5	U	1.72
7. The chemistry courses I was required to take as an applied biology student were, in general, beneficial.	1 (10)	2 (39)	3 (9)	4	5	U	1.98
8. The mathematics courses I was required to take as an applied biology student were, in general, beneficial.	1 (10)	2 (35)	3 (10)	4 (2)	5	U (1)	2.07
9. More biology electives should be made available to applied biology students.	1 (11)	2 (27)	3 (14)	4 (5)	5	U (1)	2.23
10. The biology courses I took at FSU helped me to develop critical thinking or problem solving skills in science.	1 (13)	2 (30)	3 (13)	4 (1)	5 (1)	U	2.09
11. The Applied Biology Curriculum includes enough courses which help to develop sound <u>written</u> communication skills.	1 (3)	2 (25)	3 (20)	4 (7)	5 (1)	U (2)	2.61
12. The Applied Biology Curriculum includes enough courses which help to develop sound <u>oral</u> communication skills.	1 (2)	2 (25)	3 (17)	4 (10)	5 (2)	U (2)	2.73

COMMENTS FROM GRADUATES EMPLOYED IN ALLIED HEALTH RELATED AREAS

I feel it would be beneficial if more health sciences or medical related classes were included in the curriculum as this degree is often used as a stepping stone to further degrees.

I am currently attending Dental School at U of M. I feel that FSU's Applied Biology Program prepared me very well. I highly recommend Ferris and its programs for those interested in receiving secondary education. For those interested in pursuing a career in dentistry, I would and do, without a doubt, recommend the Applied Biology Program. I regret to say that I cannot help you with any weaknesses of the program.

I believe that the applied biology program at Ferris has enhanced my clinical skills as a respiratory therapist. However, I would not advise students to seek the applied biology degree unless they have an additional degree in allied health as career opportunities are limited for those individuals who solely hold a B.S. in applied biology. The major weakness of this program is limited career opportunities. Conversely, major strengths of this program is the quality of course offerings as well as the superb faculty advisors. Thank you for a quality education!

I didn't know you were still around! (somebody told me you left FSU). I would like to talk to you as you were probably the most outstanding professor I ever had! It would be great to meet with you as I'm looking into working on a Master's Degree. Hope to hear from you.

It was difficult to answer questions 10, 11 & 12 due to how long ago I was in the program. I had started my degree then came back and completed my degree a few years later. Question #5 depends on your goals in obtaining this degree and your further education goals.

I graduated from FSU with a B.S. in Applied Biology in 1980. I was a respiratory therapy student at the time and really had no intention of pursuing a B.S. degree. Dr. Hoeksema met with me and encouraged me to finish my B.S. in Applied Biology. I remember him saying, "You'll never be sorry you did." So I heeded his advice. After 15 years in respiratory therapy, I decided to further my career in nursing. I was fortunate to find a second degree program at GVSU which required a B.S. to enter and honored all of my science courses from FSU. I obtained my 2nd B.S. in nursing from GVSU in 1995. Thank you, Dr. Hoeksema!

I received degree while I was a pharmacy student.

Received dual B.S. degrees in Pharmacy and Applied Biology. I am currently preparing to return to school, the field of study would be (potentially) Biomedical engineering. The biology program is (was) a great program when I went through it, it fanned my interest into a lifelong devotion to biology even if it is not at present my direct area of employment.

I wanted to clarify that my responses were not based on the fact that my profession is from my other B.S. degree in Nuclear Medicine Technology. FSU has the advantage of being a small university. It can utilize that to provide more personalized advisement to its students. While I was on campus there was very little contact or interest on faculty's part to instigate any.

The teachers were great, especially Bruce Beetley and Dr. Oldfield! I wish you continued success.

My applied biology degree really only looks good on paper. I am a Certified Nuclear Medicine Technologist working at the Mayo Clinic in Rochester, Minnesota. I did learn a lot from achieving my degree and did help with getting a diverse education but I mainly use my NMT degree.

After receiving my degree in Applied Biology (1976) I continued at Ferris and completed a B.S. Degree in Nuclear Medicine Technology (1978). I worked as a Technologist for five years before becoming a sales representative, first for Mallinckrodt, and now Amersham Healthcare. Amersham is the world leader in research and manufacturing of Radiopharmaceuticals, products used in Nuclear Medicine and some Radiation Oncology departments. We also manufacture other specialized radioactive products for select industries. As world corporations go, we are a small company with approximately \$500,000 in annualized sales.

As you can imagine in the private sector, management teams change, (so do parent companies), company philosophies change, personnel change and products change. It is my belief that the combination of the two degrees I received from Ferris is part of the reason I've survived six organizational changes as described above, 4 of which occurred in the last 12 years with Amersham. The background I possess must have been of some value when the people responsible for these changes continually opt to keep my services. The Applied Biology Degree rounds out my background nicely by allowing anatomical, physiological, or otherwise technical presentations and educational programs I give to clients and peers to be presented in a knowledgeable manner.

My observations over the years tell me that individuals like those needed at Amersham, people with the technical backgrounds to fit company needs, are not easy to find. The Applied Biology program combined with Nuclear Medicine Hospital experience gives me a competitive edge when facing my clients, understanding pharmacokinetics of new products, and grasping otherwise technical concepts.

The Applied Biology program at Ferris, (with the course selection I picked including Organic Chemistry, Biochemistry, Microbiology and Physiology courses) does indeed provide an individual with essential background for success in business, especially when the nucleus of the business is orientated to scientific products. I would encourage anyone to pursue a Degree in Applied Biology, at Ferris State University. I wear the Bulldog hockey jersey proudly.

Strength - Valuable education - I used it to apply to grad school (Public Health). I also had a Dental Hygiene degree from Ferris.

Weaknesses - More people need to be aware of the program (better promotion). Need to understand the value of the program.

For responses of unknown - I have been away from Ferris for 17 years, so I am unaware of the courses available to students at this time. While at Ferris I was very pleased with all courses offered--I guess it is too that I enjoy Biology.

The Applied Biology Program allowed me to transfer credits (approx. 3 or 4 classes) after I finished Dental Hygiene so there was no need to stay in Big Rapids after Hygiene. I was very pleased with the advising and communication in transferring credits to obtain my B.S. Applied Biology. Thank you!

I feel the Applied Biology Degree program was great for my career. I also received an A.A.S. in Dental Hygiene and these two degrees complemented each other very well. If it wasn't for Dr. Hoeksema, I never would have been advised of this degree. Having a Bachelors in A.B. got me a great sales job with a division of Abbot labs. during recent departure from Dental Hygiene. I highly recommend this degree!

It has been 15 years since I have graduated from FSU. I chose the Applied Biology program because I felt strong about graduating with a Baccalaureate degree. I cannot comment about strengths or weaknesses within the program since it has been so long. I am very satisfied with my education at FSU and believe the college well prepared me for "life's" challenges including an MSA through CMU.

I used my Biology degree as basis for my goal to become a medical technologist. After FSU, I attended Mercy College of Detroit and an internship program there. I took my MT (ASCP) in 1980. Let's face it. I don't think this degree is worth much without further education and/or training in a more specific subject.

I took the Applied Bio Program in conjunction with an Assoc. in MLT to obtain a lab job with future goals of certification as a Medical Technologist. I took the exam for Med. Tech. in 1982 and am now certified both as a MT (Med Tech) and an MLT. Without the B.S. degree, I would not have met requirements to take the exam in 1982. The difference in MTS vs MLT pay scales where I work is about \$1.50/hr. So it was very beneficial to get the B.S. degree. I am now working on a Bachelor's Degree in Business Adm. and all my FSU credits have filled all the actual business classes required. If I had not received the B.S. in Applied Bio, it would take me longer (and at additional expense) to meet my current goal of a degree in general business. Thank you.

As I was one of the first graduates in the Applied Biology program, I feel it was still in the developmental stages. Being able to transfer my Medical Technology courses enabled me to continue on in my goal of becoming a Medical Technologist. Since graduating from Ferris in 1975, I have completed the necessary requirements to become both a registered Medical Technologist and a registered Hematology Technologist. The technical and educational background I received at Ferris enabled me to not only work in this field for twenty-six years, but also to be a supervisor of Hematology at a Level I Trauma Center in Phoenix, Arizona for fourteen of those years. I now am working as a Medical Technologist again. I received the basic English and Speech courses at Ferris. More might have been beneficial. I do not know what the program now requires. Overall, I am pleased with the education I received at Ferris State. And yes, I was one of Dr. Hoeksema's microbiology students!

I also have an Associates in Med. Lab. Tech. With the B.S. in Biology, I was able to get a Medical Technologist position at a major hospital. Fortunately, the hospital and Chief of the Lab, at that time, were hiring people like me. Nowadays, I don't think many hospitals are doing that. Too much downsizing in this field is not good for future Med. Techs. I've been here for 13 years, what other jobs could I have applied for? I might need a change. The morale and stress is getting worse around here!!

I don't know anything else about the Applied Bio degree except in the way I used it (MLT AAS + B.S. App Bio + Med Tech exam = Medical Technologist). From that point of view I think the program should have included more computer classes--these were not required when I was in the program--maybe they are now. I am grateful that the App. Bio. option was open to me as I feel it helped me greatly in my career. I couldn't have afforded to take the time off for another internship at that point in my life. I have worked as a supervisor for 2 years which wouldn't have been available to me without the bachelors degree.

I transferred into the applied biology program to obtain a B.S. degree. I started in the Medical Technology Program and was unable to get an internship through FSC. This was prior to 1977. When I tell someone I have a B.S. in Applied Biology, they start at me with a blank expression. When I explain I was in Medical Technology and transferred to get a B.S. degree with just one additional quarter of classes, they understand. I don't know if it is possible to retitle this program or if it was just in the jobs. I was applying for that that degree had little meaning. I'm very proud to have graduated from FSC and recommend it highly to anyone looking for a 4 year university.

If not for Dr. Hoeksema, I probably would have never finished my applied biology degree. He helped me to work out an academic "game plan" even though I was located in Detroit. Excellent advisor. I wouldn't be qualified for my current "lead technologist" job if I didn't have my degree. I'm not sure if this would be feasible, but I could have used/could still use some instruction in how to write a biological/scientific procedure or protocol. I thought the diversity of bio classes offered was wonderful. Particularly enjoyed entomology.

The Applied Biology program offered me the opportunity to complete my bachelors degree in an area where I will be eligible to take my examination to become a medical technologist, after I have completed enough on the job experience. I have always been grateful for this opportunity. I also feel the advising that I received from the entire staff, and especially Dr. Hoeksema, was second to none.

After completing A.A.S. degrees in Medical Assisting and Medical Laboratory Technology, I discovered I was only 11 courses short of a B.S. in Applied Biology. I took a couple Med Tech classes that satisfied some of the biology credits. I guess I'm not the best choice for survey about the program since I was in it for less than 1 year and did it in such an unusual manner. And it was 1979 I think. It did allow me to further my career though. With the A.A.S. in Med Lab Tech, the B.S. in Biology, and 3 years of experience at Mecosta Co. General Hospital, I was eligible to take the Medical Technologist Registry exam, which I passed. More career choices and higher pay as a registered M.T. P.S. Dr. Hoeksema was the absolute best microbiology professor.

The Applied Biology degree allowed me to graduate from FSU with some degree. In 1974 my area of study, Medical Technology was overwhelmed with placement of their students in 4th year training in teaching hospitals. Dr. Friar and I talked about this dilemma and he was very instrumental in helping these Med Tech students. Since I was one of the first graduates of this program, I don't feel up to date on the classes included in this program now. At the time I was very satisfied in the biology and chemistry classes. I felt I was well prepared, however in Med. Tech programs your year in the hospital training areas really prepares you for the career. I'm not sure what else I could have accomplished, career-wise with this degree because I did get my hospital training and had a career in Medical Technology. That would probably be my only concern today if I was in the program. What can you do with this degree in today's job market?

GRADUATE SURVEY OF THE FSU APPLIED BIOLOGY PROGRAM

(EMPLOYED IN A NON ALLIED HEALTH RELATED AREA)

Dear graduate of the FSU Applied Biology Program. The Applied Biology Program is being reviewed this academic year and the Applied Biology Program Review Panel would appreciate your candid responses to the following questions. Please **circle your responses** and **return this form as soon as possible** in the post paid envelope. Thank you very much. You can elaborate on your responses, if you wish, on the backside of the questionnaire.

Are you presently employed? **yes (25) no (0)**; If yes, are you employed **part-time (1) full-time (24)** and what is your occupation? **Laboratory Research (5), Horticulturist (4), Environmental Scientist (7), Bioengineer (2), Managerial (7).** N = 25

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Unknown	AVERAGE
1. My FSU Applied Biology Baccalaureate helped me or is helping me achieve my career goals.	1 (8)	2 (9)	3 (7)	4 (1)	5	U	2.04
2. I was satisfied with the academic preparation I received in the FSU Applied Biology Program.	1 (7)	2 (14)	3 (2)	4 (2)	5	U	1.96
3. I was satisfied with the advising I received while in the FSU Applied Biology Program.	1 (8)	2 (9)	3 (4)	4 (4)	5	U	2.16
4. I would recommend the FSU Applied Biology Program to prospective students.	1 (6)	2 (11)	3 (7)	4 (1)	5	U	2.12
5. The FSU Applied Biology Baccalaureate is a quality degree.	1 (8)	2 (11)	3 (5)	4 (1)	5	U	1.96
6. The biology courses I was required to take as an applied biology student were, in general, beneficial.	1 (12)	2 (12)	3 (1)	4	5	U	1.56
7. The chemistry courses I was required to take as an applied biology student were, in general, beneficial.	1 (11)	2 (10)	3 (3)	4 (1)	5	U	1.76
8. The mathematics courses I was required to take as an applied biology student were, in general, beneficial.	1 (8)	2 (10)	3 (6)	4	5	U (1)	1.92
9. More biology electives should be made available to applied biology students.	1 (8)	2 (11)	3 (4)	4 (2)	5	U	2.00
10. The biology courses I took at FSU helped me to develop critical thinking or problem solving skills in science.	1 (5)	2 (13)	3 (5)	4 (2)	5	U	2.16
11. The Applied Biology Curriculum includes enough courses which help to develop sound <u>written</u> communication skills.	1 (2)	2 (6)	3 (10)	4 (5)	5 (2)	U	2.96
12. The Applied Biology Curriculum includes enough courses which help to develop sound <u>oral</u> communication skills.	1 (1)	2 (7)	3 (6)	4 (9)	5 (2)	U	3.16

COMMENTS FROM GRADUATES EMPLOYED IN NON ALLIED HEALTH RELATED AREAS

Dr. Hoeksema--A day doesn't go by that I don't say thanks to Ferris. The very well rounded and full set of options in classes has helped me in countless settings. As former director of Sports Medicine at San Diego State University and past president of the California Athletic Trainers Association, I have had the opportunities to share what I learned at Ferris with so many in the medical and scientific field. My loyalty to Ferris is shown in action and word. You still are a tremendous influence--your gentle wisdom is a continual model in my teaching and presentation style. My ability to communicate with plasma physicists, cell biologists to cartographers at Scripps comes directly from Ferris State's training and attitude. Currently I am the President of a rehab and exercise research and education firm in Carlsbad--in our junior year already! I Apply my Biology just like Ferris designed.

Biology deals a lot with animals therefore I feel they should offer Animal Science classes. I received no help in job hunting upon graduation. FSU advisors should be working with the students to give them more direction on careers after college. Especially since the graduating classes from Applied Bio are small.

As a laboratory manager, I evaluate candidates quite often. It has been my experience that students are more often ill-prepared to work in an analytical laboratory. Scientific foundation, public speaking, chemistry--these are all important.

As I was in the first class offered the Applied Biology degree, I'm not sure my opinions are of much use in rating the current curriculum or how effective it is in the workplace. Over the 22 years I've worked since getting my degree, I feel the classes I received have helped me a lot. I still feel Ferris offers an excellent education and I recommend the University whenever I can.

Most of the interviews I went on for laboratory positions asked if I was familiar with HPLC (high performance liquid chromatography). Fortunately, because I had taken a biochemistry lab and a quantitative analysis lab, I was familiar with this procedure. I know the applied biology program is a packed schedule all four years, but the labs I mentioned would make a graduate much more employable.

As an Assistant Vice President of a very large risk management consulting unit, I rely heavily on my communication skills. I will admit that these skills were my weaker side and needs constant attention. I would strongly recommend the Applied Biology program increase their awareness level on a written and oral basis. Furthermore, I believe computer classes would also be very beneficial. Lastly, I found taking "Medical Terminology" extremely helpful and would support making it a mandatory course.

Although it has been 23 years since I left Ferris, I felt it was an excellent program and have recommended it to others.

Graduation requirements including more technical writing courses would benefit new graduates.

More emphasis needs to be made to proper technical/report writing. Much of my current job consists of writing reports to MDEQ (Michigan Department of Environmental Quality), and I had no background in this type of writing. Another item that I discovered lacking in my education, was proper collection of documentation of the important information necessary to prove my ideas.

Biology degree alone was not adequate to achieve my career goals but gave me an excellent start. The profs were excellent!

I personally feel that the mathematical requirements should include two or more terms of calculus, and more in-depth studies in organic chemistry, and/or biochemistry. With the increasing use of computers in the work force, students should most definitely have good working knowledge of the most common computer programs.

[# 2 - Academic] Preparation was weak in some areas--caused difficulties in some grad classes and thesis work.
[# 5 - FSU Applied Biology Baccalaureate] Program needs to provide more rigorous training for those planning to do graduate work.

[#6 - Applied Biology required biology courses] Flexibility demonstrated in tailoring program as best able, for botany, was wonderful!

[#7 - Required chemistry courses] Chemistry 3 (out of sequence) organic chemistry courses from O. Larsen were waste of time--taught the same course under 3 difference course numbers.

[#9 - More biology electives] Definitely need to make more courses available to create a "well-rounded" biology-oriented person. Focus is too narrow. Not everyone wants to go into medicine, folks!

[#10 - Critical thinking] Not as well prepare as classmates from CMU and U of M. Had to acquire some info (basic) through research since professors assumed we already knew it.

[#11 - Written communication] This was good.

I guess I've already made plenty of comments! My experience with the faculty of the Biology Department, for the most part, was excellent. I found, however, that the focus of the overall program was pretty narrow--geared, I guess, toward students who planned some sort of career in medical-related fields. That was frustrating for me personally since I wanted to do graduate work in conservation and field biology--and, in particular, Botany--and I had, due to my circumstances, to do it at FSU. Many of the courses I took were not rigorous enough for a person contemplating graduate work. The result was that I was constantly playing "catch-up" in many of my grad classes which built on information they (grad profs) assumed everyone had already mastered. This was not impossible, but it was very frustrating from time to time. Example: I now am finishing my thesis which involves an understanding of genetics that I am currently having to master on my own. (Dr. Conrad was my instructor at FSU.) I guess what I'm trying to say is that many (most?) universities seem to expect a higher level of expertise from their prospective grad students than FSU seems to supply. In addition, it seems to me that a study of biology needs to provide a more "well-rounded" individual than FSU currently produces. Yes, give them exposure to at least the idea that their goals could include more than medicine (inc. pharmacy) and horticulture! On the good side, most of my instructors were helpful, patient, and flexible where my "needs" departed from the regular curriculum; and I'm not sure you would get that at many other institutions. The Bio faculty were terrific, and I am grateful!

I believe there should be more oral and written projects to help to be able to verbalize ideas and thoughts in a scientific manner. The microbiology and the field botany courses were both excellent and helped me to learn a lot in biology and add to what I already knew. EVERY professor in the biology department at Ferris was very helpful, knowledgeable, and always ready to counsel students in classes and in the advisor capacity. Dr. Hoeksema was MOST helpful with advising me on what to take and when to take it in order to finish in the amount of time that I had. THANK YOU! Overall, the Applied Biology program is a very nice addition to any other career path. I'm very happy I pursued it.

Chemistry, math and physics requirements should be stronger. Alliance with Allied Health is VERY beneficial. Career counseling should include opportunities in cosmetic, pharmaceutical and food industry as microbiologist. I graduated in 1985 from Ferris. I work for Dow Corning now as the Corporate Microbiologist. My name is Denise Brachy (maiden name DeMarais). Please call or send me an e-mail if you would like more information.

Denise Brachy

Dow Corning Corporation

Mail #C043D1 P.O. Box 994

Midland, MI 48686

(517) 496-8058 phone (517) 496-5956 fax E-mail: USDCCYNF@IBMMail.com

The greatest weakness in the program is the written and oral skills classes. One class teaching written and oral skills both is not far reaching enough. I can't emphasize enough the importance of strong written and verbal communication skills. The amount of Biology electives were seriously reduced in the transition to the semester system and this needs to be corrected. The strongest assets the university has is its biology teachers.

During my stay at FSU the faculty and advisors were very helpful in making decisions on what courses to take based on MY career path. The courses I took at FSU gave me a well rounded education. None directly related to my current profession but gave me the ability to adapt and learn!

GRADUATE SURVEY OF THE FSU APPLIED BIOLOGY PROGRAM
(SPORTS MEDICINE/ATHLETIC TRAINER)

Dear graduate of the FSU Applied Biology Program. The Applied Biology Program is being reviewed this academic year and the Applied Biology Program Review Panel would appreciate your candid responses to the following questions. Please circle your responses and return this form as soon as possible in the post paid envelope. Thank you very much. You can elaborate on your responses, if you wish, on the backside of the questionnaire.

Are you presently employed? yes (5) no (0); If yes, are you employed part-time (0) full-time (5) and what is your occupation? ATHLETIC TRAINER. N = 5

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Unknown	AVERAGE
1. My FSU Applied Biology Baccalaureate helped me or is helping me achieve my career goals.	1 (1)	2 (3)	3 (1)	4	5	U	2.00
2. I was satisfied with the academic preparation I received in the FSU Applied Biology Program.	1 (3)	2 (1)	3 (1)	4	5	U	1.60
3. I was satisfied with the advising I received while in the FSU Applied Biology Program.	1 (3)	2	3 (1)	4 (1)	5	U	2.00
4. I would recommend the FSU Applied Biology Program to prospective students.	1 (1)	2 (3)	3	4 (1)	5	U	2.20
5. The FSU Applied Biology Baccalaureate is a quality degree.	1 (3)	2 (1)	3	4 (1)	5	U	1.80
6. The biology courses I was required to take as an applied biology student were, in general, beneficial.	1 (2)	2 (2)	3	4	5 (1)	U	2.20
7. The chemistry courses I was required to take as an applied biology student were, in general, beneficial.	1 (1)	2 (2)	3 (1)	4	5 (1)	U	2.60
8. The mathematics courses I was required to take as an applied biology student were, in general, beneficial.	1 (2)	2 (2)	3	4	5 (1)	U	2.60
9. More biology electives should be made available to applied biology students.	1 (4)	2 (1)	3	4	5	U	1.20
10. The biology courses I took at FSU helped me to develop critical thinking or problem solving skills in science.	1 (2)	2 (1)	3 (2)	4	5	U	2.00
11. The Applied Biology Curriculum includes enough courses which help to develop sound <u>written</u> communication skills.	1 (1)	2 (1)	3 (2)	4 (1)	5	U	2.60
12. The Applied Biology Curriculum includes enough courses which help to develop sound <u>oral</u> communication skills.	1	2 (3)	3 (2)	4	5	U	2.40

COMMENTS FROM SPORTS MEDICINE/ATHLETIC TRAINERS

During my educational years at FSU, from 1984-1988, the following:

Strengths - I felt I had exceptional professors for my Biology, Anatomy & Physiology, and Genetic courses (i.e., Dr. Fonner, Dr. Ryan, Dr. Beetley). Class sizes were small enough to allow for individual question and answer time, as well as class participation. The professor always taught the class him/herself versus an assistant, as larger colleges do. Tuition prices were low.

Weakness - Anatomy class used cats versus human cadavers. Kinesiology was poorly taught with very little beneficial knowledge (it was known to be easy so the PGM students could pass it, but it was unfair to the Biology and Pre-Med students). Scheduling for classes was a hectic situation, making it difficult to get classes needed. The program would allow for Biology students to substitute more beneficial courses for some Humanity classes. I would have liked more Biology, Math and Physics versus art, music, etc.

Overall, I believe the education I received at Ferris was excellent. My advisor and I didn't really "hit it off" but after finding a prof. I connected with, things were great. I believe more electives should be a top priority for the Applied Biology Program. Spending 5 years at Ferris, I had to go to other programs to find electives to fill my schedule. Within the program, I would have liked a "Gross Anatomy" class with fresh cadavers. The 3 semester Anatomy and Physiology series was good but could have been more in-depth. The 2 cadavers we used provided a good learning experience but I believe more could have been learned with the students doing the dissecting. If you have further questions or would like to contact me personally, please feel free to do that.

Melissa (Missy) Martis
Coordinator of Athletic Training Services
TRACC-Botsford General Hospital
39750 Grand River Ave.
Novi, MI 48375
(810) 473-5600

I've been a student athletic trainer or certified athletic trainer for over 4 years now. I've never had to:

- Convert ANYTHING to moles
- Balance an equation
- Identify a chemical structure of leuulose
- Calculate how fast a 4 pound rock rolls down a hill with a slope of 39°
- Figure out the genetic hierarchy of an athlete's family tree
- Classify any type of bug

I know this appears sarcastic, but what I'm trying to say is that I don't understand where most of my education is going to be applied in my career. I know that my skills in problem solving and critical thinking have increased. I just look at my degree as only a stepping stone to get a more important and useful education down the road.

GRADUATE SURVEY OF THE FSU APPLIED BIOLOGY PROGRAM

(TEACHERS)

Dear graduate of the FSU Applied Biology Program. The Applied Biology Program is being reviewed this academic year and the Applied Biology Program Review Panel would appreciate your candid responses to the following questions. Please **circle your responses** and return this form as soon as possible in the post paid envelope. Thank you very much. You can elaborate on your responses, if you wish, on the backside of the questionnaire.

Are you presently employed? yes (10) no (0); If yes, are you employed **part-time (2) full-time (8)** and what is your occupation? **TEACHERS**. N = 10

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Unknown	AVERAGE
1. My FSU Applied Biology Baccalaureate helped me or is helping me achieve my career goals.	1 (4)	2 (4)	3 (2)	4	5	U	1.80
2. I was satisfied with the academic preparation I received in the FSU Applied Biology Program.	1 (3)	2 (6)	3 (1)	4	5	U	1.80
3. I was satisfied with the advising I received while in the FSU Applied Biology Program.	1 (5)	2 (4)	3	4 (1)	5	U	1.70
4. I would recommend the FSU Applied Biology Program to prospective students.	1 (2)	2 (7)	3 (1)	4	5	U	1.90
5. The FSU Applied Biology Baccalaureate is a quality degree.	1 (3)	2 (7)	3	4	5	U	1.70
6. The biology courses I was required to take as an applied biology student were, in general, beneficial.	1 (6)	2 (4)	3	4	5	U	1.40
7. The chemistry courses I was required to take as an applied biology student were, in general, beneficial.	1 (3)	2 (5)	3 (2)	4	5	U	1.90
8. The mathematics courses I was required to take as an applied biology student were, in general, beneficial.	1 (2)	2 (7)	3 (1)	4	5	U	1.90
9. More biology electives should be made available to applied biology students.	1 (7)	2 (1)	3 (1)	4 (1)	5	U	1.60
10. The biology courses I took at FSU helped me to develop critical thinking or problem solving skills in science.	1 (2)	2 (7)	3 (1)	4	5	U	1.90
11. The Applied Biology Curriculum includes enough courses which help to develop sound <u>written</u> communication skills.	1	2 (7)	3	4 (1)	5 (1)	U (1)	2.56
12. The Applied Biology Curriculum includes enough courses which help to develop sound <u>oral</u> communication skills.	1	2 (5)	3 (1)	4 (2)	5 (1)	U (1)	2.89

COMMENTS FROM GRADUATES EMPLOYED AS TEACHERS

I received my B.S. degree in 1981. I assume some aspects of the degree have changed and am commenting on the program as it was when I was enrolled. Having attended two other colleges in Alaska since my time at Ferris, I can say that in comparison, Ferris was far superior in all aspects. The quality of the classes, teaching, and advising was excellent. My degree in Applied Biology has been very helpful. It helped me qualify for several job positions, but by itself, was not adequate for attaining gainful employment (I was advised of this while at Ferris). It is an excellent degree when used in conjunction with another training program for a specific job or trade.

Applied Bio is not a "career" oriented course in of itself. However, it has helped me. Bio Advising was excellent, but Bio Ed advising was poor at best. I would like to have taken a broader spectrum of classes. One thing I think would be extremely beneficial is for the Bio department to offer (perhaps in conjunction with) refresher field Bio courses for vertebrates, invertebrates and botany during the summer for 1-2 weeks (or even 2 weekends). Especially for teachers! Thanks for listening.

I am not sure how much I got out of the Applied Biology program in the areas of written and oral communication, since I had good skills in these areas coming into the program; however, seeing the lack of skills in these areas in today's high school students, I think more instruction in communication skills would be appropriate.

The course work at FSU-Science Dept. is of the highest quality. I believe that is because professors actually teach the students not TA's as in other universities. Lab work was also of outstanding quality because of the direct involvement of the professors. Preparation in the communications area was OK. The most beneficial class was Technical Writing for Science. I don't remember taking a class on oral communication other than Interpersonal Communication. This area is one where I would have liked to have a little more experience.

I was more than pleased with my education at Ferris. If you need any testimonials, please do not hesitate to call! A big hello to all of you. P.S. Medical school wasn't all that it was cracked up to be.

I finished my master's degree in Education in less than 2 years. I was able to pass the Biology test of Michigan Certification Test (Michigan State Boards) the first time out! I know of 3 people who have flunked that test 6 times, and are likewise unable to become Biology teachers. However, all 3 of these people have received degrees in Biology from other Michigan universities. I would like to thank you, Mr. Hoeksema, and all the other teachers for ALL of your great work with me.

Strengths include the following in Biology courses: Biol 460 (Current Topics in Biol), Biol 386 (Micro & Immunol), Biol 370 (Developmental Biol). Weaknesses: Students need to be made more aware of what they can and cannot pursue with an Applied Biology degree. The program needs more "hands-on" courses/options that relate to the student's field.

**GRADUATE SURVEY OF THE FSU APPLIED BIOLOGY PROGRAM
(PHARMACEUTICAL SALES)**

Dear graduate of the FSU Applied Biology Program. The Applied Biology Program is being reviewed this academic year and the Applied Biology Program Review Panel would appreciate your candid responses to the following questions. Please **circle your responses** and **return this form as soon as possible** in the post paid envelope. Thank you very much. You can elaborate on your responses, if you wish, on the backside of the questionnaire.

Are you presently employed? **yes (7) no (0)**; If yes, are you employed **part-time (0) full-time (7)** and what is your occupation? **PHARMACEUTICAL SALES. N = 7**

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Unknown	AVERAGE
1. My FSU Applied Biology Baccalaureate helped me or is helping me achieve my career goals.	1 (2)	2 (4)	3	4 (1)	5	U	2.00
2. I was satisfied with the academic preparation I received in the FSU Applied Biology Program.	1 (1)	2 (5)	3 (1)	4	5	U	2.00
3. I was satisfied with the advising I received while in the FSU Applied Biology Program.	1 (2)	2 (1)	3 (2)	4 (1)	5 (1)	U	2.71
4. I would recommend the FSU Applied Biology Program to prospective students.	1 (1)	2 (3)	3 (2)	4	5 (1)	U	2.57
5. The FSU Applied Biology Baccalaureate is a quality degree.	1 (2)	2 (3)	3 (1)	4 (1)	5	U	2.14
6. The biology courses I was required to take as an applied biology student were, in general, beneficial.	1 (1)	2 (5)	3 (1)	4	5	U	2.00
7. The chemistry courses I was required to take as an applied biology student were, in general, beneficial.	1	2 (6)	3	4 (1)	5	U	2.29
8. The mathematics courses I was required to take as an applied biology student were, in general, beneficial.	1	2 (3)	3 (2)	4 (1)	5 (1)	U	3.00
9. More biology electives should be made available to applied biology students.	1 (3)	2 (1)	3 (3)	4	5	U	2.00
10. The biology courses I took at FSU helped me to develop critical thinking or problem solving skills in science.	1 (1)	2 (3)	3 (1)	4 (2)	5	U	2.57
11. The Applied Biology Curriculum includes enough courses which help to develop sound <u>written</u> communication skills.	1	2 (3)	3 (2)	4 (1)	5 (1)	U	3.00
12. The Applied Biology Curriculum includes enough courses which help to develop sound <u>oral</u> communication skills.	1	2 (2)	3 (2)	4 (2)	5 (1)	U	3.29

COMMENTS FROM GRADUATES IN PHARMACEUTICAL SALES

Hi, Dr. Hoeksema! It'll be twenty years this May since graduating from Ferris State. I felt fortunate to have you as my microbiology teacher because the way you taught made it easy to learn. Thank you! The strengths were having teachers like Dr. Hoeksema being able to explain the material in a manner that students could learn. Biology classes offered were many in the elective category, which allowed students to pick up a few classes of interest other than the core classes. Weaknesses twenty years ago was not having cadavers but instead, cats. Since speaking with graduate optometrists from FSU, I have learned not long after I left cadavers were used. I was unaware of problems in the FSU applied biology program.

I was in the pharmacy program most of my time at Ferris. The applied biology program helped to give me a degree before I went back to finish my pharmacy degree. (I never did go back to finish my pharmacy degree.) I have gone on to grad school and have been very happy with my Ferris education as a background. If you have any more specific questions contact me at home (810) 695-4927 or E-mail Footerwah@webtv.net

Did not take logic--may be good class requirement. I was in Pharmacy which required more Chemistry than Biology--Chemistry also very beneficial to my field. Public speaking, writing skills, and computer skills.

The education that I received at FSU has allowed me to develop my career but only to a certain level. Last year I changed jobs and as I progressed through the interviewing process it became evident that having a Biology degree was beneficial but no one who lived outside of Michigan had a clue about Ferris. If anything, the reputation that Ferris has is one of a "party school". Having said this I should also add that I would not trade the educational experience that I had. Class sizes were smaller and this allowed me to have personal contact with instructors. In my opinion, FSU prepares excellent workers and middle managers. Hopefully, Biology students will be incentivized to take more business and leadership development classes. Instead of being in a field why not be a leader in that field?

GRADUATE SURVEY OF THE FSU APPLIED BIOLOGY PROGRAM

(EMPLOYED BUT NOT BIOLOGICALLY RELATED)

Dear graduate of the FSU Applied Biology Program. The Applied Biology Program is being reviewed this academic year and the Applied Biology Program Review Panel would appreciate your candid responses to the following questions. Please **circle your responses** and return this form as soon as possible in the post paid envelope. Thank you very much. You can elaborate on your responses, if you wish, on the backside of the questionnaire.

Are you presently employed? yes (17) no (0); If yes, are you employed **part-time (0) full-time (17)** and what is your occupation? **VARIED** - military, carpenter, corrections officer, electrical contractor, sportswriter, computer field, telephone co. tech., etc. N = 17

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Unknown	AVERAGE
1. My FSU Applied Biology Baccalaureate helped me or is helping me achieve my career goals.	1 (3)	2 (8)	3 (4)	4 (2)	5	U	2.29
2. I was satisfied with the academic preparation I received in the FSU Applied Biology Program.	1 (5)	2 (8)	3 (3)	4 (1)	5	U	2.00
3. I was satisfied with the advising I received while in the FSU Applied Biology Program.	1 (3)	2 (5)	3 (6)	4 (2)	5 (1)	U	2.59
4. I would recommend the FSU Applied Biology Program to prospective students.	1 (4)	2 (6)	3 (6)	4	5	U (1)	2.13
5. The FSU Applied Biology Baccalaureate is a quality degree.	1 (5)	2 (5)	3 (7)	4	5	U	2.12
6. The biology courses I was required to take as an applied biology student were, in general, beneficial.	1 (5)	2 (8)	3 (3)	4 (1)	5	U	2.00
7. The chemistry courses I was required to take as an applied biology student were, in general, beneficial.	1 (1)	2 (10)	3 (4)	4 (1)	5	U (1)	2.31
8. The mathematics courses I was required to take as an applied biology student were, in general, beneficial.	1 (2)	2 (9)	3 (4)	4 (1)	5	U (1)	2.25
9. More biology electives should be made available to applied biology students.	1 (7)	2 (6)	3 (4)	4	5	U	1.82
10. The biology courses I took at FSU helped me to develop critical thinking or problem solving skills in science.	1 (3)	2 (7)	3 (6)	4 (1)	5	U	2.29
11. The Applied Biology Curriculum includes enough courses which help to develop sound <u>written</u> communication skills.	1 (1)	2 (7)	3 (4)	4 (5)	5	U	2.76
12. The Applied Biology Curriculum includes enough courses which help to develop sound <u>oral</u> communication skills.	1 (1)	2 (4)	3 (3)	4 (6)	5 (3)	U	3.35

COMMENTS FROM GRADUATES EMPLOYED OUTSIDE THE FIELD OF BIOLOGY

I attended FSU in 1977 completing four terms after having attended LSSU for three years. I do not work in the field of biology but the fact that I have a Bachelors Degree has aided me greatly in the job market. The fact I have a degree in a science field has allowed me to evaluate matters in an analytical way which has been of great benefit over the years. I find in comparing the two institutions that the biological field programs at Ferris seemed to lag behind in the depth of information obtained. The block of field courses offered during the summer term were more informal in nature and thus made them more enjoyable. The chemistry courses which I encountered were good but more Organic Chemistry could be worked into the program. In and of itself, I found a degree in Applied Biology to be somewhat useless in the biology job market since many areas in biology require specialization. The counseling I received during my attendance at Ferris seemed minimal. I am basing my observations on my attendance which was twenty years ago. I am sure changes have been made and some points I have raised may no longer be germane. I must admit I did enjoy the time I was at Ferris. My only regret is I did not spend my entire college career at Ferris.

I would have liked more required math courses. In hind sight, a pre-calc or calc course would be nice. I would also require more chemistry to give the degree a little more technical edge. One thing I kept hearing when I applied for jobs is the need for more tech. classes like chemistry. Overall I like the program and even though I'm not working in a biology-related field, I use a lost of the information I learned.

The courses were too general. The only courses of any substance, in my opinion, were genetics and parasitology. Both of these courses were challenging, comprehensive and interesting. The biology classes I took at Central Michigan University, before attending Ferris, were more comprehensive. However, this may have already been changed at Ferris since Ferris is no longer on trimesters. Trimesters were definitely not conducive to science courses.

One of my advisors was using a year old syllabus which caused me to take unnecessary classes.

GRADUATE SURVEY OF THE FSU APPLIED BIOLOGY PROGRAM

(UNEMPLOYED AND NO PAST OCCUPATION STATED)

Dear graduate of the FSU Applied Biology Program. The Applied Biology Program is being reviewed this academic year and the Applied Biology Program Review Panel would appreciate your candid responses to the following questions. Please circle your responses and return this form as soon as possible in the post paid envelope. Thank you very much. You can elaborate on your responses, if you wish, on the backside of the questionnaire.

Are you presently employed? yes (0) no (7); If yes, are you employed part-time (0) full-time (0) and what is your occupation? **NOT STATED.** N = 7

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Unknown	AVERAGE
1. My FSU Applied Biology Baccalaureate helped me or is helping me achieve my career goals.	1 (1)	2 (4)	3 (1)	4 (1)	5	U	2.67
2. I was satisfied with the academic preparation I received in the FSU Applied Biology Program.	1 (1)	2 (5)	3 (1)	4	5	U	2.00
3. I was satisfied with the advising I received while in the FSU Applied Biology Program.	1	2 (4)	3 (2)	4	5 (1)	U	2.71
4. I would recommend the FSU Applied Biology Program to prospective students.	1	2 (1)	3 (5)	4 (1)	5	U	3.00
5. The FSU Applied Biology Baccalaureate is a quality degree.	1	2 (3)	3 (4)	4	5	U	2.57
6. The biology courses I was required to take as an applied biology student were, in general, beneficial.	1 (1)	2 (6)	3	4	5	U	1.86
7. The chemistry courses I was required to take as an applied biology student were, in general, beneficial.	1 (2)	2 (2)	3 (2)	4 (1)	5	U	2.67
8. The mathematics courses I was required to take as an applied biology student were, in general, beneficial.	1 (1)	2 (3)	3 (3)	4	5	U	2.67
9. More biology electives should be made available to applied biology students.	1 (3)	2	3 (4)	4	5	U	2.14
10. The biology courses I took at FSU helped me to develop critical thinking or problem solving skills in science.	1 (1)	2 (2)	3 (2)	4	5 (1)	U (1)	2.67
11. The Applied Biology Curriculum includes enough courses which help to develop sound written communication skills.	1	2 (2)	3 (3)	4 (1)	5	U (1)	2.83
12. The Applied Biology Curriculum includes enough courses which help to develop sound oral communication skills.	1	2 (1)	3 (4)	4 (1)	5	U (1)	3.00

SECTION 4

EMPLOYER SURVEY

EMPLOYER SURVEY

As many as half of the Applied Biology graduates use this B.S. degree to advance in their associate degree career. For example, Industrial Chemistry Technology students have completed this program and become eligible for opportunities which would not have been possible otherwise. Dow Chemical representatives indicated that one graduate received a promotion to chemist because of the B.S. in Applied Biology degree. This person serves on Dow's waste committee where her knowledge of environmental biology is essential. She also does many technical presentations to customers which require skills in research writing, the focus of BIOL 460 and ENGL 321, required courses in the Applied Biology curriculum.

Dow offered that another recent graduate functions productively in many areas because of his biology degree. His work on developing a hand lotion specifically depended on his knowledge of molecular biology, skin physiology and anatomy. In this project, he worked directly with plastic surgeons, whose language was biological, not chemical. He has also worked on developing naturally occurring pathogens which would be effective against rust mites; this project required his knowledge of environmental biology and microbiology gained through his baccalaureate biology program.

Dow also mentioned the big issue of human toxicity which is important to any area of chemical development. An understanding of biological processes is essential in dealing with this aspect in the development of their products.

Sports Medicine track students typically pursue careers as athletic trainers. Dave Lucey, the coordinator of sports medicine, interviewed several employers of recent graduates. Mike Stroyan from Bone and Joint Rehabilitation Center in Port Huron stated that his FSU trainer had "good basic skill, good science background, needs stronger evaluation skills and clinical skills.." Violet LeClair, the athletic trainer and assistant professor at Findlay University who employs another graduate stated that he "...teaches fitness, exercise physiology, and athletic training. He knows anatomy and physiology, (is) academically prepared for his athletic training career." Dennis Knoff from the Mid-Michigan Regional Medical Center said that his Ferris graduate has a "good basic science background, (Ferris) prepared (this student) very well for his athletic training career and also for his graduate program in physical therapy."

Pre-Professional Applied Biology Tracks

Students who aspire to become doctors, dentists, optometrists, veterinarians, podiatrists, etc., complete the Applied Biology B.S. program. Each pre-professional track has an assigned advisor and a curriculum which has been designed to offer the best preparation for a student entering that type of professional school. Our general survey of graduates included these students, but these students provide additional assessments of the Applied Biology program through their acceptances into professional schools, their performance as reflected by their grades and their professional faculty and deans, and from comments they send to us about their evaluation of FSU Applied Biology in preparing them for professional study.

Although the pre-dentistry track is a small part of the Applied Biology program, the program should be credited for the success of these students in the Dental Admission Test (DAT) and in gaining admission to outstanding dental schools. Our students' average DAT science score last spring was 17.67 (n=6); the national average was 16.29. Our students have been accepted to the dental schools at the University of Michigan, University of Detroit Mercy, University of Pennsylvania, Marquette University, Tufts University, Indiana University, Boston University and New York University.

Applied Biology '93 graduate Scott Singstock earned the DDS from the University of Detroit Mercy in 1997. He wrote "The combination of academic science with strong clinical application made my transition from undergrad to postgrad a smooth one. I would encourage all the pre-dent students to take pride in being an FSU student, and peace of mind knowing that they will be ready for dental school with a degree from Ferris."

The pre-medicine track is another small, but very important, component of the Applied Biology program. In recent years, Ferris students have been accepted for study at Michigan State University College of Human Medicine, Michigan State University College of Osteopathic Medicine, the University of Michigan School of Medicine, the University of Wisconsin-Milwaukee College of Medicine, and the Wayne State University College of Medicine.

Christina Maser, Applied Biology B.S. '95 and a medical student at Michigan State College of Human Medicine, wrote a letter to FSU pre-meds. She said that she decided to write the letter after a fellow medical student commented: "You have had a lot of classes that I wish I would have had before med school." Christina stated that "my (FSU) education more than adequately prepared me for med school. ...I am very pleased with the education I received from FSU and feel that I had many opportunities that other pre-meds do not have."

Two recent graduates, Lisa Brossia and Katheryn Schultz, were accepted by the College of Veterinary Medicine at MSU. A report from the office of the dean of this veterinary college states that both students have performed well. "Katheryn Schultz received her DVM in 1996. Lisa Brossia has just completed the second year of the program and has done very well. Her strong performance in the basic science phase of the program is reflected in a 3.53 cumulative GPA through semester 4. Her preparation was certainly very good as she is in the top quartile of her class. We are pleased with both students and appreciate the education they received at Ferris State University."

Dr. Thomas Colladay, Associate Dean of the Michigan College of Optometry, completed a study of the grade point averages of optometry graduates 1991-1996, comparing students who completed their undergraduate work in the applied biology program with those who had studied elsewhere as undergraduates. Approximately half of students admitted to the Michigan College of Optometry have been enrolled in the Ferris program. Their academic record does not differ significantly from that of students from other universities. The non-Ferris group with whom Ferris students were compared are an elite group from major universities and selective schools across the nation.

In the future, we will look into regular follow-up surveys of these pre-professional graduates. Our recent general survey of graduates produced many comments, including one from a podiatry student who will graduate next year. He mentioned that the Admissions Committee at the Chicago College of Podiatric Medicine stated at his interview that the Ferris grade point average carried more weight than gpa's from other colleges. He found that he was well prepared for medical school, "A large portion of the first year was a repeat of what I was taught at Ferris....many other students needed these courses to "catch up" with the rest of us." "Being in the medical field I use what I learned in (BIOL 460) several times a week (every time I read a journal article.)"

The acceptance of our students by such outstanding professional schools and their subsequent successes are assessments of the effectiveness of the Ferris Applied Biology program.

SECTION 5

STUDENT EVALUATION OF APPLIED BIOLOGY

STUDENT EVALUATION

All students completing the applied biology baccalaureate are required to take BIOL. 460 which is our senior capstone course. Almost all are seniors with a few juniors and are exclusively applied biology students. BIOL. 460 is offered both fall and winter semesters and is therefore an ideal place to seek out senior students' perceptions of their education in the applied biology program.

During the fall and winter semesters of academic year 1996-97, the questionnaire on the next page was given to these senior applied biology students during a regular meeting of the BIOL. 460 class. A total of 36 responses were collected and their composite responses as well as individual comments are found on the next pages.

We believe the following conclusions can be drawn from the responses:

1. The majority of currently enrolled seniors in applied biology are pre-opt., pre-med., pre-dent. and transfers from the FSU pre-pharmacy program.
2. Applied Biology seniors, in general, evaluate their program very favorably in terms of both preparation for a career or advanced education and as being intellectually stimulating.
3. The most identified strengths of the applied biology program, from a student perspective, are the development of problem solving or critical thinking skills and a biology faculty with expertise in their professional areas.
4. The most commonly identified weaknesses were the development of verbal communication skills and the development of computer skills to access scientific information.

The following uses will be made of these findings:

1. They will be reported to the applied biology advisory committee for their scrutiny, evaluation and recommendations. They, in turn, may suggest certain curricular and non-curricular changes in the applied biology program. Such recommendations will be submitted to the biology curriculum and planning committees for their recommendations.
2. Serious consideration will be given to requiring COMM. 121 (public speaking) rather than allowing a choice between COMM. 105 and COMM. 121 where most students choose COMM. 105. This addresses the student concern about the lack of development of verbal communication skills in formal presentations.
3. Many biology faculty are presently using or are considering using the world wide web as an instructional tool in their classes. Likewise, several biology course laboratories are incorporating the computer as an instructional aid. Since most applied biology students view this as a component of their education that should be strengthened, this will be communicated to all biology faculty with the specific goal of enhancing the role and use of the computer and the www in biology courses.
4. It will be reported to the biology department head that faculty with professional expertise in their subject areas is an identified strength, from a student perspective, of the applied biology program. Administrative support, primarily financial, of faculty professional development will be critical in maintaining this strength.
5. The development of critical thinking or problem solving skills is a biology department goal. It will be reported to the biology department head and biology faculty that from a student perspective we are achieving this goal. This may be important in assessment of department goals.
6. Emphasis on expertise in student advising with the development of new career tracks and advising heads for each of these tracks will continue. Presently, the program has a senior enrollment primarily headed for competitive professional and graduate programs. The success of the applied biology program at FSU is linked to the success of our students in gaining acceptance into these competitive programs. Expert academic advising is a critical component in student success and therefore also in program success.

STUDENT EVALUATION OF THE APPLIED BIOLOGY PROGRAM - COMPOSITE

(N = 36)

1. **Entering Applied Biology:** Did you enter Applied Biology at FSU as: (circle one)
- A. a freshman? If so why applied biology? 12 - for career track (pre-med, pre-dent)
 - B. from another program at Ferris? If so which one? 18 - pre-opt and pre-pharm most frequently listed. and do you plan to obtain dual degrees? 12 yes 6 no (Note: primarily associates degrees in career area)
 - C. a transfer student 6

2. **Future Plans** (circle one) NOTE: Responses are in left margin

- (30) A. I plan to attend graduate or professional school (please state program e.g. medicine, dental, opt, M.S./Ph.D)
- (0) B. I plan to continue in UNDERGRADUATE EDUCATION (please state specific program) _____
- (6) C. I plan to work or seek employment
have you accepted or had a job offer? 1 yes 5 no
what area of work are you seeking? med. tech. (1), nuclear medicine (1), OHT (1), opticianary (2) not stated (1)

3. **Evaluation of Applied Biology**

On a scale of 1 (unsatisfactory) to 5 (excellent) how do you rate your applied biology education in terms of: (Note: The number of responses are shown in parentheses)

A. preparation for a career or advanced education	(1)	(1)	(10)	(18)	(6)	
B. intellectual challenge*	1	2	3	4	5	(aver. = 3.75)
* (1 student not responding)	(1)	(1)	(2)	(21)	(10)	(aver. = 4.09)

What single biology course do you believe will be MOST BENEFICIAL to you in your career? why?

Those in health related career tracks most frequently listed physiology/anatomy (20) and microbiology (8) citing these courses as containing material most directly related to career goal.

What single biology course do you believe will be LEAST BENEFICIAL to you in your career? why?

Responses were random and tended to be courses which the students felt were not directly related (13) to their career goals. Some students either did not respond or said all biology courses were beneficial (5)

What area(s) of the applied biology curriculum are STRENGTHS?

(circle all that apply)

- a. the development of problem solving/critical thinking skills = 32 (89%)
- b. the development of writing skills = 17 (47%)
- c. the development of verbal communication skills = 11 (31%)
- d. the development of computer skills to access scientific information = 11 (31%)
- e. a broad choice of biology courses/electives relevant to my career choice and interests = 22 (61%)
- f. a faculty with expertise in their professional areas = 31 (86%)
- g. sound advice, when I sought it, about careers in biology = 16 (44%)

What area(s) of the applied biology curriculum are WEAKNESSES?

(circle all that apply)

- a. the development of problem solving/critical thinking skills = 4 (11%)
- b. the development of writing skills = 7 (19%)
- c. the development of verbal communication skills = 15 (42%)
- d. the development of computer skills to access scientific information = 14 (39%)
- e. a broad choice of biology courses/electives relevant to my career choice and interests = 9 (25%)
- f. a faculty with expertise in their professional areas = 2 (6%)
- g. sound advice, when I sought it, about careers in biology = 9 (25%)

COMMENTS FROM SENIOR APPLIED BIOLOGY STUDENTS

Internship for the pre-professional majors--> minor internship.

I think there needs to be a wider variety of biology classes, and maybe more specific areas for all biology student interests. I think the FSU biology program has very qualified instructors.

Although I plan on attending Physical Therapy school, it would be reassuring to know that I could get a job with my Bachelor's Degree in Applied Biology from FSU if I needed to. I'm not sure that would be possible.

I believe that advice on where different types of biology career fields should be more well known to freshman and sophomore students deciding on a career. I don't believe some of the advisors partake to helping undecided students on career choices enough or helping students who are in a situation of not being able to get in a program the opportunity to really see a full view of other career choices and options.

I like the courses offered and the knowledge I have obtained from them. I believe when I go to graduate school I would have had the necessary background.

I'm not even sure what a B.A. in Biology will do for me. I don't plan to use it much, except to say that I have a B.A. I wish someone would clarify what this degree could offer me!!

Biology courses could be altered a bit when people who are in OHT and want a biology degree will be able to have exception granted to them so that they can have more courses applied to plants than HUMANS.

I thought the classes I took were very interesting and have no complaints. I did not need to use a computer besides word processing until my senior year.

I'm in the Pre-Opt program graduating with the Applied Biology degree, and out of all my classes the eye hasn't been incorporated in hardly any. In BIOL 231 - A & P - we even skipped the eye.

Biology faculty and classes are interesting. My biggest complaint is the chemistry department. Some teachers were very anti-student.

I feel that for the people that are in non-human related fields don't have that many choices but then again this really is not that type of school.

Faculty is very interested and helpful.

Since I am planning a career in optometry--I wish in A & P BIOL 231 and 232 we would have studied the eye.

More biology courses that touch different and unique areas.

I think the program is a great tool for graduate school settings. I will have a great head start in optometry school with the extra Bio classes. I am very well-rounded and a confident student. I don't like chemistry classes and I hope they will be used in the future.

The program seems satisfactory. A more intensive approach involving practical activity would be welcome.

The only negative experience that I have here at FSU is in the area of advice from my guidance counselors. Not only mine, but others as well have given irrelevant/unknowledgable advice as to what courses are needed and required in order to fulfill certain requirements within the degree as well as fulfilling requirements for further education.

I had to limit my choice of graduate school because the level of physiology and anatomy offered here. I could not pick up a 300-400 level human physiology course requirement for graduate school. The faculty is supporting and helpful.

One comment about the deficiencies of the program is the lack of knowledge that advisors have about related majors such as Pre-Pharm - Opt., etc. and the correlation between them and Applied Bio. Many of the professors I have had were of great quality. Very easily approachable and helpful. I'm not a good judge of the entire FSU Applied Bio program, because I am a transfer student and did not have many of the necessary classes here at FSU.

The curriculum is well-rounded. I have learned more than I ever expected. It provided an excellent for the future. Even the courses that were required and not necessarily ones that I would have chosen were beneficial to my education. Even after all of these courses, I still feel uneasy about BIOL 460. I am not sure if I am really prepared, but I will find out soon.

There is a need for more participation in the (Freshman, Sophomore) class levels. I also think that the department as a whole should adopt an attendance policy, and push for there to be more tutors available for the Biology classes. I often found that I had poor attendance and when any attendance was good and I needed help there was no one to really spend quality time. The professors were helpful to their limits (time).

The program is good. Prerequisites are a good way to prepare a student for a course. I wish I would've went through my prereqs more intelligently. I think advisors need to talk to their students more about their classes before just letting them sign up.

I agree that the Applied Biology program at Ferris does not include calculus math. I feel that biology courses are hard enough and the calculus is just another hard class to take. I feel it is not needed. So I believe you should keep it that way.

The chemistry department is very inept in actually teaching the information, with a few exceptions (Mr. Weaver, Prof. Shetty). For applied Biology students to take advanced chemistry courses is essential to the program though the courses themselves are not adequately taught, thus students are unable to gain significant understanding of the material. I have found the Bio faculty to be very supportive, responsive, and helpful.

Diverse course offerings should be increased. FSU lacks sufficient resources to allow students to expose themselves to many areas of subsequent graduate study. The Biology curriculum must remain liberal and not get too focused upon the Ferris mission of vocational education.

I believe that probably the main problem with the program is credit given/certification at the end of one's program. After all my time studying applied biology at the end what I am only going to graduate in is an associates. I believe that my level of reading qualifies me for a B.S. not an associates.

I like the fact that you have your own counselor to help you through the process of keeping you informed of the guidelines of the program.

I think that an improvement with incoming freshman would be a seminar that outlines the possibilities that lay ahead of Applied Biology students. More contact with graduates of the program would also be beneficial. However, I do feel that one of the most powerful effects of FSU is the instructors. Almost all remember me by name (Mrs. Bacon comes to mind at the moment. Biol 122 lab) I think that speaks highly of the program.

The advising is very poor. Having to take Ecology or Environmental Biology when it is not relevant to your career.

Qualities - received a very strong education in the sciences (biology, chemistry, and math) to attend professional school with adequate knowledge. Very helpful for taking standardized tests (OAT). Very qualified faculty for assistance and support.

Deficiencies - lack of jobs in the work field with just a degree in Applied Biology. More hands on material in the real world.

I sought help from a professor and came from their office feeling as if I was not important and as if I was put down. I went to this person seeking help and direction instead I got nothing. I feel no matter what kind of student you are, or who you are, a personal point of view from a faculty member should be left at home! This was my only problem with the overall program. I believe FSU gives many students a chance to earn a B.A. in Science.

I feel Ferris needs a more "sound" chemistry department. I gained knowledge, but do not feel enough having chemistry here. I feel more natural/field study courses should be offered for those thinking of graduate study involving nature.

I would add more classes that would prepare a person for job market.

The program has a lot of strengths than weakness. However, I think it would be a great help to improve the communicative nature of some of the course instructors. e.g. I hardly got anything in the Anatomy and Physiology class.

Applied Biology Program

APRC 1997-1998

section 2

SECTION 6

FACULTY PERCEPTIONS OF APPLIED BIOLOGY

FACULTY EVALUATION

The Biology Department Faculty are the Applied Biology Program Faculty. Nearly every Biology Faculty Member teaches a biology course that can be used in the biology major component of the program and/or has mentored an Applied Biology Student through their capstone course BIOL. 460. The Biology Faculty are thus well acquainted with the Applied Biology Students and in some cases, especially where the faculty member is an advising track head, are well acquainted with the Applied Biology Program. The Applied Biology Program, because of its many tracks and individually designed curriculum, is a complex program to comprehend, even for professional biologists. A blank survey was distributed to all tenured or tenure track members of the Biology Faculty including the Biology Department Head. The results were tabulated and averaged and the results as well as the survey questions are shown on the following pages. Comments were solicited especially as to the faculty members' perceptions of strengths and weaknesses in the Applied Biology Program. These unabridged comments are also included on the following pages. Sixteen surveys were distributed and 16 were returned for an excellent 100% response; 13 of the 16 included written comments. The following conclusions and observations were drawn from these responses:

1. The Applied Biology Program is consistent with the university mission statement (Q. 1) and Biology Department Objectives and Goals (Q. 2). The program is strongly supported by the Biology Faculty (Q. 3) and is also believed to be supported by the FSU Administration (Q. 4).
2. The Applied Biology Program is viewed as being both academically sound (Q. 10 and Q. 12) and inexpensive (Q. 5).
3. The Applied Biology Program should continue to develop career tracks whenever feasible (Q.6) and the program is not seen as being academically too flexible by a majority of the Biology Faculty (Q. 7).
4. The Biology Faculty want more biology electives to be offered (Q. 8) echoing graduate responses to the same question. These electives should be guaranteed irrespective of enrollment. Most Biology Faculty believe a mandatory internship for Applied Biology Students is unnecessary (Q. 9) but in certain career tracks an internship could be valuable.
5. There is some question on the part of some Biology Faculty concerning the issues of minimum chemistry competency required of all Applied Biology Graduates, core biology requirements, what Biology Courses should count towards the biology major, what constitutes an "Applied Biology" Course, and lack of sufficient financial support for the program and advertisement of the program.

The following uses will be made of these findings:

1. They will be reported to the Applied Biology Advisory Committee and to the Biology Faculty including the department head for their scrutiny and recommendations. Their recommendations will be reported to the Biology Department Curriculum Committee.
2. It will be recommended to the Biology Department Curriculum Committee that they review the entire Applied Biology Program Review Document, the recommendations from item #1 above and the current Applied Biology Program Curriculum.

BIOLOGY FACULTY PERCEPTIONS OF THE APPLIED BIOLOGY PROGRAM - COMPOSITE

(N=16)

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Unknown	AVERAGE
1. The FSU Applied Biology Program is consistent with the FSU Mission Statement.	1 (10)	2 (4)	3	4	5	U (2)	1.29
2. The FSU Applied Biology Program is consistent with the objectives and goals of the FSU Biology Department.	1 (11)	2 (4)	3	4	5	U (1)	1.27
3. The FSU Biology Faculty support the Applied Biology Program.	1 (13)	2 (1)	3 (1)	4 (1)	5	U	1.38
4. FSU Administration supports the FSU Applied Biology Program.	1 (3)	2 (3)	3 (4)	4 (1)	5	U (5)	2.27
5. The cost of the FSU Applied Biology Program is inexpensive compared to Other FSU science-based baccalaureate programs.	1 (9)	2 (4)	3 (1)	4	5	U (2)	1.43
6. The number of tracks or options in the Applied Biology Program should be increased whenever possible.	1 (4)	2 (4)	3 (7)	4 (1)	5	U	2.31
7. The FSU Applied Biology Program is too flexible e.g. the program allows too many academic options in biology, chemistry and mathematics.	1 (1)	2 (4)	3 (1)	4 (6)	5 (4)	U	3.50
8. More biology electives, irrespective of enrollment, should be made available to FSU Applied Biology Students	1 (13)	2	3 (3)	4	5	U	1.38
9. All Applied Biology Students, regardless of career choice should be required to complete an internship.	1 (2)	2 (2)	3 (2)	4 (6)	5 (3)	U (1)	3.4
10. The academic reputation of the biology courses counting towards the biology major is sound.	1 (10)	2 (3)	3 (1)	4 (1)	5	U (1)	1.53
11. The FSU Biology Major should require more credits than the present minimum of 30 semester hours.	1 (1)	2 (5)	3 (5)	4 (4)	5	U (1)	2.80
12. The FSU Applied Biology Baccalaureate is a quality degree comparable to other baccalaureate degrees in biology at <u>similar</u> institutions.	1 (6)	2 (5)	3 (4)	4 (1)	5	U	2.00

BIOLOGY FACULTY COMMENTS

Courses required in the major (i.e. plant physiology) should be offered frequently enough for students to get them. More electives would be great but we don't have the faculty to offer them. Would we have to hire part-time to teach them or our lower division courses to allow us to teach the electives? Always comes down to money. We need to spend more to get a complete, quality degree.

The career tracks are not as clearly defined as they could be. More effort could be directed to advertising the options available in Applied Biology. We need more courses available to satisfy the needs of these expanded tracks. There is little value in offering additional tracks without added courses to support them. Internships would be a valuable addition to the curriculum.

All Applied Biology students should be required to take Cell Biology (Biol 373)

A course in cell/molecular biology should be required in this curriculum.

One of the Programs greatest strengths is also one of its weaknesses; namely, its flexibility. I would like to see the Curriculum Committee or an Ad hoc committee review the current requirements. Some thoughts that come to mind are:

- Chemistry options. If we require biochemistry, then we should require enough chemistry that students can take a real biochemistry course.
- Should we accept courses below biology 121 towards the major? If so, how are these courses different from the courses we do not accept?
- We should define what constitutes an "Applied Biology" course. For instance why is biochemistry an applied course?
- Why do we accept both levels of microbiology towards the major, but not anatomy and physiology?

Applied Biology is an excellent program. Perhaps its greatest strength is its outstanding (peerless) program coordinator.

Applied Biology is a quality program which serves a diversity of students. Its strengths are:

1. sound academically
2. great flexibility to accommodate a variety of students of very different abilities and career goals
3. effectively and inexpensively administrated

Its weaknesses are:

1. not well understood by the majority of administrators and other persons outside of the Biology Faculty
2. not enough money to support needed elective courses (e.g. entomology) or scholarships
3. the program is not well advertised inside or outside of Ferris.

per #12: There are few "similar" institutions, and fewer similar programs. A.B. is nothing like a BS in Biology at a liberal arts university, nor should it be. Increasing the number and variety of biology classes taken by the A.B. students would give us more of the positive elements of such degrees, however. I remain convinced that the elective route is doomed to failure: Ferris students seem uninterested in serious electives. Making such classes requirements, either of the general program or of new tracks, will do the job. Please let me know when/if botany options are discussed.

I am concerned that lack of organic chemistry as a requirement may make it very difficult to enter certain graduate programs. But this very lack of organic chem as a requirement does appeal to the variety of students we serve. There should be a core of biology classes required, and there is. This is a strength of the program.

- 1 & 2 1) I'm not sure we know what our mission is, either at the University or Dept. level. It seems to change with administrator.
- 4 2) Does the administration support the Applied Biology program?
- 8 3) Being able to tell a student that a course will be held at such and such a time and date is a Necessity!
- 12 4) If the comparison is between Applied Biology and a regular biology degree at some other institution, then I think we are lacking from the standpoint of total credit hours required. However, if the comparisons are for similar programs (are there any?) then I cannot comment.
- 5) I am very supportive of the degree, because it gives some students an opportunity to pick up a B.S. degree if they desire, and I am positive that this keeps some students from transferring.

- Consideration should be given to requiring ecology and not providing a choice to take environmental conservation. Ecology should be part of the “core”, environmental conservation is more of an application of that area, making it more appropriate as an elective.
- Evolution should be part of the “core” required of all majors. Evolution is a core conceptual theme in biology that provides linkages to all other disciplines in biology.
- Serious consideration should be given to requiring cell biology as part of the “core.” A student who does not have a solid background in molecular/cell biology will be limited as to the career applications of the major, or in their ability to meet the needs of industry.
- We should be more aggressive in our marketing of the “tracks’ and use them more as a recruitment tool.
- We need to be more creative and develop other tracks that meet specific employment needs for B.S. level biologists. I get students who tell me that they are interested in a research career, want to go to graduate school, and find a job in research. We might want to design a track to meet that need, then develop internship sites.
- Develop as many internship sites as possible to permit students to gain job-related work experience in application areas before graduation. Internship may be more appropriate in some tracks, but not all. I would not support an internship requirement. It might be helpful to collect information about possible internships available on a competitive basis and post them on the web page to encourage students to make application.
- Applied Biology may want to explore offering biology institutes or certificate programs (short course, 1 week, 2 day) in specific areas for teachers.

The Department of Biological Sciences at Ferris State University offers high quality instruction. The Applied Biology program, however, suffers from a lack of diversity in the courses that are offered which diminishes the value of the program. The number of 300 and 400 level courses that a student can take is very limited and thus our students graduate with a very narrow perspective of the field of Biology. I believe that this has significant implications with respect to recruitment and retention of students. I suspect that we have students who choose not to enroll at Ferris because we don’t offer what they need and I’m sure that we have students who transfer to other institutions, particularly in the environmental areas, not because of the quality of instruction, but rather, because we offer so few courses for them to take. In my view, the conversion to semesters and the policies of the administration that prevent the offering of small enrollment classes has led to this situation. The Biology Department as a whole is extremely productive considering that we offer laboratories in almost all our courses. Our service role to the University in offering 100 and 200 level courses is important, but it should not come at the expense of our majors.

I am also concerned by the lack of support for laboratory instruction on the part of the administration. Ferris has a reputation for providing hands on instruction and yet our administration apparently believes that a hands on experience consists of looking at a computer screen. The computer has an important function in science instruction, but it is no substitute for doing science. Hands on experience means using the tools of the trade. Our students need more not less of this type of experience. We need to invest heavily in equipment for our laboratories. it is inconceivable that we would design a new science building without an appropriate budget for equipping the labs, but we did.

The policies of the administration of trying to offer the fewest possible courses at the lowest possible cost have resulted in the fewest possible students choosing to attend Ferris. It is time to reverse that trend. The dedication of the Biology Department Faculty has helped prevent the precipitous drop in enrollment seen in other departments and schools. We need additional tools to be able to increase enrollment. A strong, diverse Applied Biology curriculum that had a strong emphasis on quality instruction would go a long way to accomplish that goal.

Q#7 This was designed this way (flexible) to meet needs of our students!

Q#8 If (more electives) needed by the students, then YES

Q#9 Not appropriate (internships) for many of our students e.g. pre-med, pre-dent, pre-vet, grad-school bound.

Q#11 Ideally, yes (↑ credits in major); but some students would not be well served by increasing. One of our App. Bio. strengths is tailoring courses for each individual.

SECTION 7

ADVISORY COMMITTEE PERCEPTIONS

COMMENTS FROM THE ADVISORY COMMITTEE MEMBERS

The flexible nature of the Applied Bio program is one of its strongest assets. It helps direct students who have a rather diverse background into an applied directed science area.

I would be more comfortable in advising students to enter the program if I had a better sense of their job prospects after graduation. Right now the only ones I feel comfortable with in advising to enter the program are those who plan to go on to graduate or professional school. Would it be worthwhile to contact some of the larger corporations concerning their employment practices and what they are looking for in prospective employees?

Dr. Hoeksema is an outstanding, effective coordinator who should be recognized and rewarded for his excellent, innumerable contributions. The flexibility of this program is a great strength. This is very important at Ferris where students enter through various pre-professional and allied health science programs with varied science tracks.

Strengths: great flexibility with many tracks and career options, great department (biology), low low program cost
Weaknesses: lack of scholarship money, lack of the ability to offer low enrollment biology electives e.g. entomology on a regular basis, lack of administrative understanding of the program's unique strengths and therefore the program is not effectively advertised especially outside of the university

SECTION 8

LABOR MARKET ANALYSIS

SECTION 9

EVALUATION OF FACILITIES AND EQUIPMENT

LABOR MARKET ANALYSIS

The Applied Biology Program serves students whose career and/or vocational goals will benefit from a baccalaureate degree in biology.

1. A majority of students use the degree as a prerequisite for one of the health care professions or graduate school. Seventeen of the 25 Applied Biology graduates in 1995-96 planned to continue their education in a professional or graduate school. A majority of these planned to attend optometry school.
2. The second largest group of students that the program serves are those students who have earned an A.A.S. in a vocational field (e.g., dental hygiene) or have already acquired vocational skills. These students use the degree to increase their chances for employment and advancement. Of the 25 graduates in 1995-96, 4 students earned an A.A.S., one student had training in biotechnology, and two were non-traditional students currently employed in biology related fields.
3. Students in the Sports Medicine Track use the degree to fulfill a prerequisite for certification as an athletic trainer. Very few students currently graduate in this track.
4. A few graduates enter the labor market without acquiring additional vocational skills.

This report will address the employment opportunities for graduates who pursue advanced degrees and for those who enter the labor market directly. Data for this report was gathered in early 1997. Sources of information included job-postings by the National Athletic Trainers Association, various on-line employment services, the Michigan Occupational Information Service, and the Bureau of Labor Statistics 1996-97 Occupational Outlook Handbook.

EMPLOYMENT OPPORTUNITIES FOR GRADUATES WHO PURSUE ADVANCED DEGREES

The Bureau of Labor Statistics (BLS) reports that health care services will account for almost one-fifth of all job growth from 1994-2005. Factors contributing to continued growth in this industry include the aging population, which will continue to require more services, and the increased use of innovative medical technology for intensive diagnosis and treatment. Patients will increasingly be shifted out of hospitals and into outpatient facilities, nursing homes, and home health care in an attempt to contain costs.

A majority of our graduates who continue with their education go to optometry school. According to the BLS, employment of optometrists is expected to grow about as fast as the average for all occupations through the year 2005 in response to the vision care needs of a growing and aging population. The maturing of the baby-boom generation, together with rapid growth in the oldest age group will drive this growth. As baby boomers reach the age of 45 they will be more likely to visit optometrists and ophthalmologists because of the onset of vision problems in middle age. The demand for optometric services will also increase because of growth in the oldest age group, with their increased likelihood of cataracts, glaucoma, diabetes, and hypertension. Employment of optometrists will also grow due to greater recognition of the importance of vision care, rising personal incomes, and growth in employee vision care plans.

Employment opportunities for graduates who pursue advanced graduate degrees in biological sciences are also expected to remain good. According to the BLS, employment of biological and medical scientists is expected to increase faster than the average for all occupations through the year 2005. Biological and medical scientists will continue to conduct genetic and biotechnological research and help develop and produce products developed by new biological methods. In addition, efforts to clean up and preserve the environment will also continue to add to growth.

The Michigan Occupational Information Service (MOIS) reports that employment of biological scientists is expected to increase about as fast as the average for all occupations through the year 2005. The number of biological scientists employed in Michigan is expected to grow as a result of increased interest in preserving the natural environment and continuing interest in medical research. Employment opportunities will be good for scientists with advanced degrees.

EMPLOYMENT OPPORTUNITIES FOR GRADUATES WHO ENTER THE LABOR MARKET DIRECTLY AFTER GRADUATION

Persons with a bachelor's degree in biological science generally find jobs in fields that require a basic understanding of science. Some get jobs such as technical sales or service representatives and some may work as research assistants (e.g., for pharmaceutical companies). According to the BLS, employment of science technicians is expected to increase about as fast as the average for all occupations through the year 2005. Continued growth of scientific and medical research, and development and production of technical products should spur demand for all science technicians. The growing number of agricultural and medicinal products developed using biotechnology techniques will increase the need for biological technicians in particular. Employment growth will also be fueled by the demand for science technicians to work in environmental research and testing. Technicians will be needed to help regulate waste products, collect air and water samples, to measure levels of pollutants, and clean up contaminated sites.

According to the BLS, job opportunities are expected to be very good for graduates of science technician training programs who are well-trained on the equipment currently in use in industrial and government laboratories. As the instrumentation and techniques used in industrial research and development laboratories becomes more complex, employers are seeking well trained individuals with highly developed technical and communication skills.

A search of several on-line employment services confirmed the above report. While there are many job opportunities for persons with a baccalaureate in a life science, most of them require experience with complex instrumentation and techniques.

The following job descriptions were obtained from several on-line employment services. They illustrate the range of experiences that employers require.

Media Research Technician -- The requirements include an Associate's Degree in Chemistry, Biology, Biochemistry or related field, and typically 2 years previous laboratory/experimental work experience. The applicant must have good math skills, including calculations, familiarity with sterile/aseptic techniques, knowledge of GMP regulations, and have previous computer experience. A Bachelor's Degree in Life Sciences is preferred.

Clinical Laboratory Scientist -- Educational and/or Equivalent Experience Required: Must have completed either and 4 year Medical Technologist (plus 0-3 years experience), a Medical Laboratory Technician program (plus 0-4 years experience), or a Bachelors degree program in science (plus 0-4 years experience). SCP certification is preferred.

Research Assistant -- Our Oncology group is seeking a Research Associate to work on projects to evaluate inhibitors of tumor growth. Participate in tumor model development and all aspects of in vivo efficacy experiments. BS in biological sciences preferred; 2 + yrs. in vivo experience essential. Experience with cell culture techniques & developing tumor models desirable.

Research Assistant -- Qualifications: Bachelors degree in wildlife biology, zoology, botany or related field; experience in word processing and database management; good organizational skills; willing to work in strenuous or uncomfortable field conditions; ability to read and interpret topographic maps, to use a compass; valid drivers license.

Pine Bush Preserve Ecologist -- Qualifications: Graduate degree in ecology, natural resources or related; excellent oral and written communication skills; familiarity with northeastern pine barrens flora, fauna and natural communities; familiarity with field sampling protocol, data management and analysis; experience with word processing; willing to work long hard hours; ability to use power tools.

Data Manager/Ecologist -- Qualifications: BS degree in ecology, zoology, botany or related field; experience involving research or resource management related to native flora and fauna and non-game fauna; experience working with databases; good oral and written communication skills.

Except for students who complete the A.A.S. in Industrial Chemistry or Medical Laboratory Technology, most of our students lack the skills to compete for the laboratory positions. Although the technology skills required for the ecology positions may be less rigorous, there is more competition for these positions. Most four-year colleges have a biology program and many of the larger universities have entire colleges devoted to environmental studies. MOIS reports that because the number of graduates of bachelor's degree programs in biological science will exceed the number of available positions, some graduates will have to find employment in related fields.

EMPLOYMENT OPPORTUNITIES FOR STUDENTS IN SPORTS MEDICINE

Athletic trainers can find employment opportunities in public and private secondary schools, colleges and universities and professional sports, according to the National Athletic Trainers Association (NATA). Other possible athletic training employment opportunities include corporate health programs, health clubs, clinical and industrial health care programs and sports medicine clinics. Sports medicine clinics are a fast growing field. In addition to athletic injury rehabilitation, a number of clinics provide athletic training services for secondary schools.

In an attempt to demonstrate the demand for athletic trainers, ads were gathered from the NATA Placement Vacancy Notices, which is published weekly. These postings were surveyed for a period of six months, from October 1996 to March 1997. The number of postings for the first week of each month were gathered. The average number of ads was 96 per week, with a low of 76 and high of 126. For Michigan, the average number of postings was 4.3 per week, with a low of 1 and a high of 5.

It's apparent from these postings that there are job opportunities for certified athletic trainers. Graduation with an Applied Biology degree, however, does not ensure certification as an athletic trainer. Certification by the NATA Board of Certification (NATABOC) is considered the entry level credential and is required by most employers. To be eligible to sit for the certification examination, candidates must graduate from an accredited curriculum program; or meet the internship requirements set by the NATABOC. Nearly 100 educational institutions offer athletic training curriculum programs that are accredited by the Commission on Accreditation of Allied Health Education Programs. The Applied Biology Sports Medicine Track is not accredited by this agency. Rather it offers an internship route to certification, which requires successful completion of at least 1,500 hours of athletic training experience supervised by a certified trainer.

EMPLOYMENT DATA

The employment data for Applied Biology Graduates supports the BLS and MOIS conclusion that most jobs in biology require additional education or specialized skills. The 1994-95 Study of Graduates and their Beginning Salaries reports that 28 of the 32 Applied Biology students responded to the survey. Of the 28 who responded, only 25% (7) were employed in their major field, while 40% (11) reported that they were continuing their education. Thirty-six percent (10) reported that they were employed in an unrelated field (4), still seeking employment (5), or not seeking employment (1).

Department of Biological Sciences Facilities and Equipment

The Science Building was completely refurbished as part of the Arts and Sciences Building and Renovation Project which was for the most part completed in the summer of 1997. The purpose was to: (1) improve heating, ventilation, and air conditioning; (2) add telecommunication wiring to support increased computer-based lab instruction; (3) meet safety standards for fire alarms and sprinkling systems; and (4) replace exterior walls with a more energy efficient design.

The Department of Biological Sciences occupies the entire second floor and shares a biotechnology lab with Physical Sciences on the third floor. Faculty offices were removed from the Science Building and relocated to a connecting Arts and Sciences Commons to free up space for reconfiguration into additional instructional and research laboratories. Three new instructional laboratories were built, each of which was configured with new bench work. Three of the old laboratories were also equipped with new bench work. The remaining six laboratories retained the outdated bench work that existed prior to the renovation. Laminar flow and fume hoods were added to several of the laboratories or their prep rooms. Two additional research spaces were created, each with new bench work. The Department received a grant of \$224,760 from the National Science Foundation to assist in the renovation of the biology research and biotechnology labs in addition to the funds allocated by the Michigan State Legislature.

The second floor now contains three general biology labs, two microbiology labs with a centralized stock and prep room, a genetics lab, two ecology-environmental sciences labs, three anatomy/physiology labs, one botany lab, three research areas dedicated for faculty/student use, a computer lab, and a greenhouse. All laboratories will have computers with access to the Internet. Already several new incubators, computers, and cold rooms have been purchased and installed. There was also a centralization of the instrumentation and stock rooms, and a relocation of the cold rooms.

Two new lecture halls are now in the process of being renovated and equipped for multimedia presentations. A new greenhouse has been approved and is now in the design stage. It will attach to the south wing of the existing Science Building. The greenhouse will be a living laboratory for students in the ornamental horticulture program, while the conservatory will enhance the understanding of the natural environment for all students, faculty, and visitors. Students in ecology, botany, and environmental biology courses will have opportunities for extended studies in plant propagation and plant nutrition.

There have been some significant problems in the renovation project which need to be addressed. The plan for enlargement of the stock room was eliminated late in the design process and there is a serious shortage of storage space for the department. The ventilation system was poorly designed so that there is excessive noise due to vibrations caused by air movement in most if not all of the rooms on the second floor. It is likely that faculty will be forced to change the way that they conduct laboratory sessions due to the difficulty that students have in hearing instructions or information presented from the front of the laboratory. The air filtration system is inadequate and students and faculty with allergies have expressed concern about the amount of dust and the quality of the air. It is very difficult for the support staff to prepare pure cultures due to contamination of the media with mold from the air. The original plans called for an animal care facility, however, the specifications were changed without consultation of the animal care staff and the facility as constructed does not meet even the minimal requirements for housing animals. It is unlikely that, unless significant improvements are made, animals used for instruction or research will be able to be housed there.

Equipment is also a problem. Much of the instrumentation currently used in the department is 20 years old or older. To our knowledge, there was little if any budget in the building proposal for the purchase of equipment for the new labs or replacement of equipment in the current laboratories. It is our understanding that a portion of the NSF grant mentioned above will be allotted toward the purchase of new equipment for instruction although no dollar figures have been made available to the faculty. The faculty was asked to develop a priority list of new instrumentation that will be used to purchase equipment in critical areas when funds become available. Each individual faculty member submitted a list of equipment needs and rated the importance of their request in terms of their instructional priorities. The priority categories were:

- A. The current level of instruction will be significantly compromised without the requested equipment.
- B. Instruction will be somewhat compromised if the requested equipment is not available.
- C. The requested equipment would be very helpful in improving instruction but is not absolutely essential for the time being.
- D. Should be considered for purchase in the near future.

The cost of the equipment that the faculty put in category A was over \$170,000. This means that in the view of the faculty, without this equipment, components of current laboratory instruction will have to be deleted due to a lack of equipment. The equipment requested in category B had an approximate value of over \$130,000. This means that without the equipment in this category, somewhat comparable instruction could be carried out but there would be some loss in quality of instruction and certainly no enhancement of current instruction. The total requests in these two categories is for over \$300,000, a figure significantly above that of the entire NSF grant mentioned above. The size of the high priority equipment request list is likely to grow when the faculty actually occupies the new laboratories and discovers that equipment that had been used previously is now assigned to other laboratories and as current equipment becomes inoperable. These requests do not include equipment for the General Biology program which received funding from another grant to support a redesign of the General Biology laboratory exercises.

The faculty also submitted requests for another \$160,000 for equipment items that should be purchased in the near future (categories C & D) but felt that they could get along without them for the short term future. In view of the age of much of the equipment in the Biology Department, it is inevitable that a considerable amount of equipment is going to break down and have to be replaced in the near future. For example, the department has 208 microscopes. It is possible to obtain replacement parts for only 20 of these. As a consequence, even minor equipment failures will render the microscopes inoperable. There are many other examples of this problem in the department.

It is essential that a systematic program of funding for replacement and upgrade of equipment be developed if our once strong offerings in the area of Biological Sciences are going to remain relevant for students preparing to live in today's technological society.

SECTION 10

CURRICULUM EVALUATION

CURRICULUM EVALUATION

The Ferris State University Biology Department consists of 16 tenured and/or tenure track full time faculty. As can be seen on the following page, they are a diverse group of biologists with credentials in numerous biological areas enabling them to offer a wide variety of courses not only to the programs they serve but also to the Applied Biology Curriculum. Catalog descriptions and syllabi of the biology courses applicable to the Applied Biology Program are included as well as the Applied Biology curriculum requirements document.

The major curriculum area of concern with respect to biology courses is the inability to offer certain courses or create new biology elective courses. The reason is, of course, enrollment. Elective classes with fewer than 15 students tend to be cancelled and if a class is cancelled once, students tend to stay away from it in the future. As a result biology electives such as BIOL 344 ENTOMOLOGY, BIOL 349 MEDICAL PARASITOLOGY and BIOL 373 CELL BIOLOGY have not been taught in recent years. Therefore the Applied Biology Program suffers because of its inability to offer a broad array of electives and as a result becomes less appealing to certain potential students. Another area of concern is equipment. In today's technological world, laboratories in science related courses require computers with Internet accessibility and modern equipment. To give students an edge in a highly competitive job market requires that we constantly make funds available for equipment.

Solutions to these areas of concern include guaranteed elective courses on a regular basis regardless of enrollment and a commitment to maintaining state of the art technologies in our science laboratories. The Applied Biology Curriculum has the ability to add at least 3-6 credits in the biology major without increasing total graduation credits or violating general education requirements. Such a change in the Applied Biology Curriculum may nurture certain low enrollment electives. Biology Department Head James Hoerter has and is involved in grant writing as one solution to equipment needs and lack of internal funding. Such emphasis on the acquisition of outside funds should be a major point of emphasis by this administration.

Although the biology department contributes the heart of the Applied Biology Program Curriculum, there are several other departments that the FSU Applied Biology Program draws upon and would not be successful without. Such departments include physical sciences, mathematics, languages and literature, humanities, social sciences and the colleges of pharmacy and allied health sciences. A unique curriculum strength of the FSU Applied Biology Program is the ability to use applied courses from the colleges of pharmacy and allied health sciences.

BIOLOGY FACULTY ACADEMIC CREDENTIALS

<u>NAME</u>	<u>DEGREE</u>	<u>RECEIVED FROM</u>	<u>DEGREE AREA</u>
1. Adewusi, Kemi	Ph.D.	North Texas State	Parasitology
2. Boogaard, Connie	Ph.D.	Calgary	Biochemistry/Biotechnology
3. Beetley, Bruce	M.S.	Michigan State	Ornithology/Wildlife Biology
4. Buss, Jack	Ph.D.	Minnesota	Developmental Biology
5. Fonner, Doug	Ph.D.	Michigan State	Physiology
6. Friar, Robert	Ph.D.	Purdue	Physiology
7. Gogolin, Luanne	Ph.D.	Michigan State	Anatomy
8. Hoeksema, Walt	Ph.D.	Michigan State	Microbiology and Public Health
9. Hoerter, James	Ph.D.	Penn State	Genetics
10. Mitchell, Roger	Ph.D.	Minnesota	Genetics
11. Murnik, Mary	Ph.D.	Michigan State	Genetics
12. Palmer, Robert	Ph.D.	Utah State	Physiology
13. Ryan, Michael	Ph.D.	State University of New York-Buffalo	Microbiology and Immunology
14. Stewart, David	M.S. (2)	Central Michigan, Univ. of Michigan	Water Quality Control
15. Vanderploeg, John	M.S.	Delaware	Ornamental Horticulture
16. Watson, Phillip	Ph.D.	Illinois-Urbana	Entomology/Ecology

The Biology Department's class offerings are enriched by the many disciplines represented by the biology faculty.

13/16 or 81% of the biology faculty hold earned doctorates; 14/16 or 88% hold the highest terminal degree in their degree area.

BACHELOR OF SCIENCE IN APPLIED BIOLOGY
REQUIREMENTS

(WDH, 12/95)

STUDENT NAME _____

STUDENT # _____

The goal of the Applied Biology Program is to provide a quality baccalaureate degree in biology for those whose careers and/or vocational choices will benefit from such a degree. This program is directed toward those students who have earned an A.A.S. or who have a significant amount of work in an area of biological application and who now wish to pursue a baccalaureate degree. The program is also applicable to students in Sports Medicine, Pre-Med, Pre-Dent, Pre-Opt, Pre-Vet and to those who wish to pursue graduate work. Although the graduation requirements encompass a full four years' work, enrollment might not occur until the third or fourth year, depending on individual needs. Each student should meet with an advisor in the Applied Biology curriculum to develop a program of study to meet his/her specific educational goals.

The following is a check list that may be used in building your curriculum in Applied Biology. YOU SHOULD CONSULT WITH AN APPLIED BIOLOGY ADVISOR AT LEAST ONCE A SEMESTER, IDEALLY BEFORE YOU REGISTER FOR CLASSES. THE APPLIED BIOLOGY PROGRAM REQUIRES THAT ALL ADVISEES WORK WITH AN APPLIED BIOLOGY ADVISOR FOR AT LEAST ONE ACADEMIC YEAR. YOU, AS A STUDENT, ARE RESPONSIBLE FOR MEETING THE GRADUATION REQUIREMENTS FOR YOUR CURRICULUM. YOUR ADVISOR IS AVAILABLE FOR CONSULTATION.

Because of the variations in the educational backgrounds and goals of the students entering this program, no universal curriculum is mandated. However, a student must have at least 30 credits in the biological sciences, 20 credits in the supporting sciences of chemistry and physics, 12 credits *each* in cultural enrichment and in social awareness, 12 credits in communication skills, and 8 credits in biologically related courses from Allied Health, Pharmacy, or other similar programs. In addition, a student must complete mathematics at least through trigonometry, be computer literate, have a minimum of 120 semester credits, and an honor point average of 2.0 or above.

I. COLLEGE OF ARTS AND SCIENCES REQUIREMENTS

A. COMMUNICATION COMPETENCE

<u>COURSE</u>	<u>TITLE</u>	<u>CR.</u>	<u>GRADE</u>	
ENGL 150	English 1	3	_____	
ENGL 250	English 2	3	_____	TOTAL
COMM 105/121	Interpersonal Communication OR Fundamentals of Public Speaking	3	_____	<u>CR. HRS.</u>
ENGL 311/321	Advanced Technical Writing OR Advanced Composition	3	_____	_____
				(12 minimum)

B. CULTURAL ENRICHMENT

Courses in ARCH 244, ARTS, THTR, ENGL 322, SPAN, FREN, GERM, HIST, LITR, HUMN, MUSI, COMM 231. Selection must include at least one course at the 300-level or above. Also see "D."

<u>COURSE</u>	<u>TITLE</u>	<u>CR.</u>	<u>GRADE</u>	
_____	_____	_____	_____	
_____	_____	_____	_____	
_____	_____	_____	_____	
_____	_____	_____	_____	
_____	_____	_____	_____	
_____	_____	_____	_____	
				TOTAL CR. HRS.

				(12 minimum)

C. SOCIAL AWARENESS

Choose from ANTH, ECON, GEOG (except 111, 121), PLSC, PSYC, SOCI, SSCI. Selection must be from at least two different areas and include at least one "foundations" course and at least two 300-400 level courses. Also see "D." Foundation courses are ANTH 121, 122; ECON 221, 222; GEOG 100, 112; PLSC 121, 122; PSYC 150; and SOCY 121.

<u>COURSE</u>	<u>TITLE</u>	<u>CR.</u>	<u>GRADE</u>	
_____	_____	_____	_____	
_____	_____	_____	_____	
_____	_____	_____	_____	
_____	_____	_____	_____	
_____	_____	_____	_____	
_____	_____	_____	_____	
				TOTAL CR. HRS.

				(12 minimum)

D. GLOBAL CONSCIOUSNESS

Select at least one course from "B" or "C" above which fulfills the glovel consciousness and race/ethnicity and/or gender issues requirement.

II. SCIENCE REQUIREMENTS

A. BIOLOGY MAJOR

Must total 30 credits or more with at least the minimum hours shown below for each biological area. At least half of the total hours must be at the 200 level or higher. A 2.0 minimum HPA is required in the biology major. Grades lower than C- are unacceptable toward the biology major.

<u>COURSE</u>	<u>TITLE</u>	<u>CR.</u>	<u>GRADE</u>	<u>COURSE</u>	<u>TITLE</u>	<u>CR.</u>	<u>GRADE</u>
1. General Biology (minimum of 8 credits)				5. Conservation or Ecology (minimum of 3 credits, recommended junior year)			
BIOL 121	Gen. Biology 1	4	_____	BIOL 347	Environ. Conserva.	3	_____
BIOL 122	Gen. Biology 2	4	_____	BIOL 442	Gen. Ecology	3	_____
2. Anatomy and Physiology* (minimum of 5 credits)				6. Biological Writing/Capstone Course (minimum of 2 credits)			
BIOL 205	Human Anat/Phys	5	_____	BIOL 460	Current Topics in Biology	2	_____
BIOL 231	Human Phys/Anat 1	4	_____				
BIOL 232	Human Phys/Anat 2	4	_____				
BIOL 300	Pathophysiology	3	_____				
BIOL 353	Plant Physiology	4	_____				
3. Microbiology (minimum of 3 credits)				7. Biology Electives			
BIOL 108	Medical Micro.	3	_____	BIOL 119	Birds of Michigan	3	_____
BIOL 218	Microbial Ecology	3	_____	BIOL 200	Evolution	3	_____
BIOL 286	General Micro.	3	_____	BIOL 349	Medical Parasitol.	3	_____
BIOL 308	Adv. Med. Mic/Imm	3	_____	BIOL 341	Nat. Hist. Inverts.	3	_____
BIOL 386	Micro/Immunology	5	_____	BIOL 342	Nat. Hist. Vertebr.	3	_____
4. Genetics (minimum of 3 cr.)				BIOL 344	Entomology	3	_____
BIOL 375	Genetics	3	_____	BIOL 351	Field Botany	3	_____
				BIOL 370	Developmental Biol	4	_____
				BIOL 373	Cell Biology	3	_____
				BIOL 496**	Independent Study	1-3	_____
				_____	_____	_____	_____
				_____	_____	_____	_____
				_____	_____	_____	_____

Courses not listed above must be approved.

* A maximum of 8 credits may be used. Credit in BIOL 205 cannot be used with BIOL 231 and 232.

** BIOL 496 does NOT substitute for BIOL 460.

TOTAL CREDIT HOURS _____
(30 minimum)

B. SUPPORTING SCIENCES

Supporting sciences must total 20 credits or more with at least the minimums shown below for each area.

<u>COURSE</u>	<u>TITLE</u>	<u>CR.</u>	<u>GRADE</u>	<u>COURSE</u>	<u>TITLE</u>	<u>CR.</u>	<u>GRADE</u>
1. Mathematics (minimum compt. MATH 120)				2. Chemistry (minimum of 7 credits including some biochemistry)			
MATH 115	Intermed. Algebra	3	_____	CHEM 121	General Chem 1	5	_____
MATH 120	Trigonometry	3	_____	CHEM 122	General Chem 2	5	_____
MATH 130	Adv. Alg/Anal Trig	4	_____	CHEM 211	Polymer Chem	4	_____
MATH 135	Calc/Life Sciences	3	_____	CHEM 214	Fund/Organic Chem	4	_____
MATH 220	Anal Geom/Calc 1	5	_____	CHEM 221	Organic Chem 1	5	_____
MATH 230	Anal Geom/Calc 2	5	_____	CHEM 222	Organic Chem 2	5	_____
MATH 116	Int Alg/Num Trig	4	_____	CHEM 324*	Fund of Biochem	3	_____
MATH 126	Algebra/Anal Trig	4	_____	CHEM 364*	Biochemistry	4	_____
_____	_____	_____	_____	PHCM 320*	Biochemistry	5	_____
2. Physics (minimum of 4 credits)				CHEM 114**	Intro to Inorganic	4	_____
PHYS 130	Concepts in Physics	4	_____	CHEM 124**	Intro Organ/Biochem	3	_____
PHYS 155	Radiologic Physics	3	_____	_____	_____	_____	_____
PHYS 211	Intro Physics 1	4	_____	_____	_____	_____	_____
PHYS 212	Intro Physics 2	4	_____	4. Science Electives			
PHYS 213	Phys. Computations	1	_____	ASTR 120	Stellar System	3	_____
PHYS 241	General Physics 1	5	_____	ASTR 130	Solar System	3	_____
PHYS 242	General Physics 2	5	_____	ASTR 140	The Sun	3	_____
PHYS 243	Phys. Computations	1	_____	GEOG 111	Physical Geography	4	_____
_____	_____	_____	_____	GEOL 121	Physical Geology	4	_____
				GEOL 122	Hist Geology	3	_____
				_____	_____	_____	_____

(Students who take MATH 220 and 230 should consider calculus-based PHYS 241 & 242.)

* May be used in EITHER the Supporting Sciences OR the Applied Biology area.

** Upper division chemistry is strongly recommended, but CHEM 114 & 124 may be accepted provided BIOL 373 is successfully completed, your advisor approves, and CHEM 114 and 124 are consistent with your career goals.

TOTAL CREDIT HOURS _____
(20 minimum)

C. APPLIED BIOLOGY (minimum of 8 credits)

To satisfy this requirement a course should be taught primarily as an applied science as opposed to a theoretical science. Below is a list of suggested courses from which to select. Course selection should reflect career choice.

Students who have an approved A.A.S. have satisfied this requirement.

A. SUGGESTED				B. ACCEPTABLE*			
<u>COURSE</u>	<u>TITLE</u>	<u>CR.</u>	<u>GRADE</u>	<u>COURSE</u>	<u>TITLE</u>	<u>CR.</u>	<u>GRADE</u>
HLTH 125	First Aid	2	_____	_____	_____	_____	_____
MRIS 103	Medical Terminology	4	_____	_____	_____	_____	_____
CAHS 231	D-H Nutrition	2	_____	_____	_____	_____	_____
IEHM 302	Comm Disease Cont.	2	_____	_____	_____	_____	_____
BIOL 119	Birds of Michigan	3	_____	_____	_____	_____	_____
BIOL 200	Evolution	3	_____	_____	_____	_____	_____
BIOL 300	Pathophysiology	3	_____	_____	_____	_____	_____
BIOL 301	Exercise Physiology	3	_____	_____	_____	_____	_____
BIOL 349	Medical Parasitology	3	_____	_____	_____	_____	_____
BIOL 341	Nat Hist Invertebrates	3	_____	_____	_____	_____	_____
BIOL 342	Nat Hist Vertebrates	3	_____	_____	_____	_____	_____
BIOL 344	Entomology	3	_____	*Courses in column B must be approved.			
BIOL 351	Field Botany	3	_____				
BIOL 370	Developmental Biol	4	_____				
CHEM 324	Fund of Biochemistry	3	_____				
CHEM 364	Biochemistry	4	_____				
PHCH 320	Biochemistry	5	_____				
PHED 338	Biomechanics	3	_____				

TOTAL CREDIT HOURS _____
(8 minimum)

III. COMPUTER LITERACY

Computer literacy is a graduation requirement; ISYS 105 Microcomputer Applications is specifically recommended.

<u>COURSE</u>	<u>TITLE</u>	<u>CR.</u>	<u>GRADE</u>
_____	_____	_____	_____

IV. FREE ELECTIVES: To a total requirement of 120 semester credits.

Half of the credits assembled here should be in courses beyond the freshman level, i.e. numbered 200 or above. Not more than 10 credits in this area can be from outside the College of Arts and Sciences.

<u>COURSE</u>	<u>TITLE</u>	<u>CR.</u>	<u>GRADE</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

TOTAL CREDIT HOURS _____

CATALOG DESCRIPTIONS

BIOL 108 Medical Microbiology - 3 Credit Hours

Microbial world with an emphasis on human microbial disease mechanisms and the basis of a protective immune response. Practical experience with fundamental techniques and instrumentation. Designed for allied health associate degree programs.

BIOL 121 General Biology 1 - 4 Credit Hours

The first semester of a year long sequence in introductory biology designed for the science major and as a prerequisite for advanced biology courses: scientific thinking, ecology, Mendelian genetics, evolution, and the diversity of the biological kingdoms, with concentrated study of cell theory and cell structure, the Monera, Protista, Fungi and Plantae. Designed for students in science baccalaureate programs.

BIOL 122 General Biology 2 - 4 Credit Hours

The second semester of a year long sequence in introductory biology: kingdom Animalia (invertebrates, vertebrates, embryology, homeostasis and behavior), biomolecules, and cell energetics (enzyme function, respiration and photosynthesis), and molecular genetics (gene expression, mutation, recombination, and genetic engineering). Designed for students in science baccalaureate programs.

BIOL 200 Evolution - 3 Credit Hours

The processes of evolution, including the origin of species and fossil evidence in the geological record. Designed for science and non-science students and is applicable toward the applied biology major.

BIOL 205 Human Anatomy and Physiology - 5 Credit Hours

Human anatomy and physiology: structure and function as they relate to clinical considerations. Basic concepts of structure and function at the cellular, tissue and organ system levels. Utilizes cadavers in anatomical studies. Designed for allied health associate degree programs; and science education, medical technology and sports medicine baccalaureate programs.

BIOL 218 Microbial Ecology - 3 Credit Hours

A survey of the importance of viruses, bacteria, fungi and nematodes divided into thirds by the studies of soil microbiology, food microbiology and water/waste microbiology. The importance of microorganisms in the decomposition of organic matter, food poisoning and spoilage, and water pollution control and bioremediation of hazardous wastes. For students in environmental health bachelor degree program.

BIOL 231 Human Physiology and Anatomy 1 - 4 Credit Hours

A comprehensive, integrated course in physiology and anatomy which develops logical correlations between microscopic and macroscopic structures and their functions. Molecular and cellular basis of organ system structure and function: cell physiology, principles of control mechanisms, the nervous system, the skeletal system, the muscle systems and the endocrine system. Utilizes cadavers in anatomical studies. Physiological principles through animal experimentation. For students in science baccalaureate programs.

BIOL 232 Human Physiology and Anatomy 2 - 4 Credit Hours

A continuation of BIOL 231 covering the respiratory system, digestion and metabolism, the cardiovascular system, the renal system and the reproductive system. For students in science baccalaureate programs.

BIOL 286 General Microbiology - 3 Credit Hours

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. For students in the clinical laboratory science program; open to others by permission of the professor.

BIOL 300 Pathophysiology - 3 Credit Hours

General principles and causes of disease and resultant abnormal physiological functions of the organ systems: cancer, aging, inflammation, stress, cardiovascular, nervous, respiratory, endocrine, excretory, digestive and musculoskeletal system dysfunction. For students in allied health baccalaureate programs.

BIOL 308 Adv Med Microbiology/Immunology - 3 Credit Hours

A continuation of BIOL 108; pathogenesis and epidemiology of bacterial, fungal and viral diseases. The role of humoral and cellular immunity in the host defense; the phenomenon of hypersensitivity. For students in allied health baccalaureate programs.

BIOL 341 Natural History of Invertebrates - 3 Credit Hours

Collection and identification of common invertebrates with emphasis on their natural history, ecology, and economic importance. For students in baccalaureate programs in science education and applied biology.

BIOL 342 Vertebrate Natural History - 3 Credit Hours

Recognition, collection, life history, distribution, and ecological relationships of Michigan vertebrates. Some hiking required.

BIOL 344 Entomology - 3 Credit Hours

Morphology, ecology, natural history and identification of the largest group of invertebrates, the insects. Emphasis on ecological, medical and economically important species. For students in baccalaureate programs in science education and applied biology.

BIOL 347 Environmental Conservation - 3 Credit Hours

An in-depth study of interrelationships between humans and the environment, historical perspectives, present predicaments and future outlook.

BIOL 349 Medical Parasitology - 3 Credit Hours

Basic concepts of parasitology: major types of medically important parasites; life cycle, diagnosis, treatment, immunity and control. Laboratory stresses identification of the various developmental stages of these parasites. For students in science baccalaureate programs.

BIOL 351 Field Botany - 3 Credit Hours

Collection and identification of Michigan flora including both woody and herbaceous species. Varying plant habitats studied.

BIOL 353 Plant Physiology - 4 Credit Hours

A study of the basic structure, organization, function, and physiology of vascular plants: morphological and structural aspects of plant development and differentiation, internal control in plant development, environmental controls of plant development, nutritional requirements of plants, an in-depth look at photosynthesis, respiration, transpiration, plant hormones and their mechanisms of action; plant reproduction; and factors that influence plant metabolism. For students in baccalaureate programs in science education and applied biology.

BIOL 370 Developmental Biology - 4 Credit Hours

Fundamental principles of development and the mechanisms responsible. An examination of the morphological changes which occur during development in vertebrates. For students in science baccalaureate programs.

BIOL 373 Cell Biology - 3 Credit Hours

A molecular approach to the study of cell structure, membrane transport phenomena, bioenergetics, and the regulation of gene activity. Techniques for cell research.

BIOL 375 Principles of Genetics - 3 Credit Hours

Comprehensive study of genetics: molecular aspects of gene structure, function, and control in prokaryotes and eukaryotes, transmission genetics and genes in populations. For students in science baccalaureate programs.

BIOL 386 Microbiology and Immunology - 5 Credit Hours

Fundamentals of the microbial world: medical aspects of microbiology, molecular basis of pathogenicity, chemotherapy, and the role of humoral and cellular immune responses in host protection and hypersensitivity. The laboratory provides practical experiences with fundamental concepts, techniques and instrumentation. For students in science baccalaureate programs.

BIOL 442 Ecology - 3 Credit Hours

Study of the dynamic relationships between organisms (plant and animal) and their environment. For students in baccalaureate programs in science education and applied biology.

BIOL 460 Current Topics in Biology - 2 Credit Hours

Use biological literature to interpret and analyze current topics of biological interest and collect relevant information and present it in writing as well as orally. For applied biology majors with senior standing.



BIOLOGY 108
3 CR. (2+3)

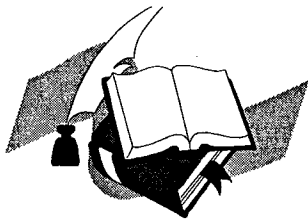


MEDICAL MICROBIOLOGY
COURSE SYLLABUS



FALL, 1996
(No Pre-requisites)

<u>DATE</u>	<u>TOPIC</u>	<u>TEXT REFERENCE</u>
Tues. 8/27 Thrs. 8/29	Introduction and History Prokaryotes and Eukaryotes	CHAP 1 CHAP 24
Tues. 9/3 Thrs. 9/5	Bacterial Structures and Functions Bacterial Structures and Functions	CHAP 4 CHAP 4
Tues. 9/10 Thrs. 9/12	Bacterial Growth and Sporulation Bacterial Taxonomy-Fungi Structure	CHAP 5 & p92-94 CHAPS 10 & 11
Tues. 9/17	Viral Structure & Replication	CHAP 13
Thrs. 9/19	FIRST EXAM	
Tues. 9/24 Thrs. 9/26	Microbial Metabolism Microbial Metabolism	CHAP 7 CHAP 7
Tues. 10/1 Thrs. 10/3	Microbial Genetics Microbial Genetics	CHAP 8 CHAP 8
Tues. 10/8 Thrs. 10/10	Antibacterial Agents Antiviral Agents	CHAP 16 CHAP 16
Tues. 10/15	Sterilization and Disinfection	CHAP 15
Thrs. 10/17	SECOND EXAM	
MON. OCT.28TH FINAL W DAY		
Tues. 10/22 Thrs. 10/24	Host Parasite Interactions The Immune Response	CHAPS 14, 17, 20 CHAP 18
Tues. 10/29 Thrs. 10/31	Allergy and Hypersensitivity Alimentary Tract Diseases	CHAP 19 CHAP 22
Tues. 11/5 Thrs. 11/7	Alimentary Tract Diseases Respiratory Tract Diseases	CHAP 22 CHAP 21
Tues. 11/12	Respiratory Tract Diseases	CHAP 21
Thrs. 11/14	THIRD EXAM	
Tues. 11/19 Thrs. 11/21	Diseases Acquired Through The Skin Diseases Acquired Through The Skin	CHAP 24 CHAP 24
Tues. 11/26	Nosocomial Infections	CHAP 25
Tues. 12/3 Thrs. 12/5	STD's STD's	CHAP 23 CHAP 23
Mon. 12/9	→FINAL EXAM -- COMPREHENSIVE←	



TEXT: *MICROBIOLOGY: ESSENTIALS AND APPLICATIONS*, First Edition by McKane and Kandel
NOTE THE HELPFUL GLOSSARY Pgs. 787-809.

EXAMS: Exams may include multiple choice, matching, short answer questions, problems and case studies.
Make-up exams for documented absences are essay.

GRADING: 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 **ALL EXAMS, IF NECESSARY, WILL BE CURVED TO 73%.**

INSTRUCTOR: W. Hoeksema, ASC 2013 (extension 2555). If I am not available please leave a message on my voice mail. Office hours are M and W 9:30 am to 10:50 pm and T and R 12:00 noon to 1:00 pm and by appointment. **Please feel welcome to ask for help outside class.**

ATTENDANCE POLICY: You are **required** to attend every lecture and to explain any absence. Attendance will be taken at my option. Unexplained absences may result in a lowering of your grade.

LECTURE LEARNING OBJECTIVES -- TO LEARN:

1. How professionals in microbiology go about the process (scientific method) of acquiring new knowledge
2. The language or terminology used in microbiology
3. The fundamental principles of microbial structure and function, microbial metabolism, microbial growth and reproduction, microbial genetics and the use of antimicrobial drugs.
4. The principles, mechanisms and theories of microbial pathogenicity in humans and the human defense mechanisms against microbial pathogens.
5. How to apply certain course material to develop problem solving and critical thinking skills in microbiology.



FOR SUCCESS IN THIS CLASS

1. **Attend class every meeting.** There is a difference in getting the material first hand or from someone else.
2. **Find a "study buddy" in this class.** Educational studies clearly demonstrate that people who study in groups do better than people who study alone. If you are looking for a time to get together with fellow students remember that everyone is free at 11 am on TUES. and THRS.
3. **Study your notes on a regular basis and keep up with textbook readings.** Avoid the temptation to "cram" a day or two before the exams. You should plan on spending two hours studying outside class for each hour in class. This is only an average as some of you, depending on your background in science, may have to spend more time.
4. **Seek help when you do not understand.** I will hold regularly scheduled office hours and you may make an appointment at other times. Academic Support Services in ASC 1017 (592-3543) provides **FREE** tutorial services open to all FSU students.

BIOL 121
Course Perspectives
Winter Semester - 1997

- I. How do I contact my teacher, Professor David A. Stewart?
- A. Phone: 592-2543, Extension 2543
 - B. My office is ASC 2117. My office hours this semester are:
 - Monday 2-3
 - Tuesday 2-3
 - Wednesday 1-3
 - Thursday 12-1
 - C. You can also make appointments with me or through my answering service. I'll get back to you. You may step into my office anytime the door is open.
- II. Do we need books?
- A. Yes, the textbook is **BIOLOGY**, by Raven and Johnson, 4th Edition. You also need a lab manual, **BIOLOGY LAB MANUAL**, by Vodopich and Moore. You also need five unfolded and non-wrinkled **SCANTRON 882-ES** answer sheets.
 - B. You should read the assignments as we proceed. Be advised that some of the lecture topics involve more reading from the text than others. Budget your time accordingly.
- III. How will I be graded?
- A. You will be graded fairly.
 - B. There will be five announced, written lecture exams, each assigned a maximum of 50 points. They will consist of questions from lecture plus any handouts. The final examination serves two functions: (1) You may use it to make-up one or two lecture exams you may have missed during the semester, and (2) You may use it to retake the lecture exam from which you received your lowest score.
 - C. Each lab period has a 10 point quiz over the material of that lab.
 - D. Your total points, converted to a percentage, will determine your final grade. based on the following scale:

A = 93-100	B- = 80-82	D+ = 67-69
A- = 90-92	C+ = 77-79	D = 63-66
B+ = 87-89	C = 77-79	D- = 60-62
B = 83-86	C- = 70-72	F = Below 60
- IV. What are the objectives of the course?
- A. I want my students to be able to apply the basic themes of biology in various situations.
 - B. Students will become more proficient microscopists and will learn various other laboratory techniques.
 - C. Students will learn the scientific method and how it is applied.
 - D. Students will learn of recent and past discoveries in biology which have greatly impacted humans on earth.
 - E. Students will gain a better appreciation of the living world.

V. Is there an attendance policy?

- A. Yes, and it is strict.
- B. I have tried to deal with "phantom" students (those that rarely attend and/or attend late), but without success.
- C. Prompt attendance to all lectures and labs is expected, required, and reasonable.
- D. If you miss more than five lectures or more than three labs, automatic course failure results. Three tardinesses are equivalent to one lecture absence.

VI. Do not present the work of another as your own. Do not give your work product to another to represent as his/her own. If so, you get zero for that project. A second offense results in course failure

BIOL 121
Laboratory Schedule
Winter Semester - 1977

DATE	LAB	LAB #
January 17	The Microscope	1
January 24	Population	16
January 31	Pollution	17
February 7	Mitosis and Meiosis	9, 10
February 14	Genetics	12
February 21	Evolution	13
February 28	Monera, Protista	18, 19
March 7	Spring Break - No Lab	
March 14	Protista, Fungi	20, 21
March 21	Bryophytes, Ferns	22, 23
March 28	Easter Break - No Lab	
April 4	Gymnosperms, Angiosperms	24, 25
April 11	Plant Anatomy	26
April 18	Plant Physiology	28
April 25	Nova - Seeds of Tomorrow	Handout
May 2	Field Trip	Handout

Monday, March 24, is the last day for dropping with an approved "W".

Be sure to read your lab exercise before you come to lab. This makes for less confusion.

BIOL 121
Lecture Schedule
Winter Semester - 1997

DATE	LECTURE TOPIC	CHAPTER
January 14	Introductions and the Scientific Method	1
16	Populations and Intraspecific Competition	24
21	Interspecific Competition	25
23	Ecosystems	26
28	Biological Communities	27
30	Exam #1	
February 4	Cellular Fission and Mitosis	11
6	Sex and Meiosis	12
11	Mendelian Crosses	13
13	Chromosomes and how they Function	13
18	Human Genetic Disorders	13
20	Exam #2	
February 25	Dynamics of Gene Frequencies in Populations	20
27	Evidence for Evolution	21
March 11	Species Formation I	22
13	Species Formation II	22
18	Theories of Human Evolution	23
20	Exam #3	
March 25	Taxonomy	29
April 1	Viruses and Bacteria	30
3	Protista	31
8	Fungi	32
10	Exam #4	
April 15	Plant Diversity	33
17	Evolution of Flower and Fruit	34
22	Seed Development and Embryology	35
24	Plant Cytology, Histology, Circulation	36
29	Hormones and Growth in Plants	36
May 1	Exam #5	

Note: Monday 24 March is the last day to drop with a "W" grade.

Note: Some of the above chapter reading assignments are longer than others. You should focus your study on those topics brought up in lecture and/or labs.

BIOL 122 GENERAL BIOLOGY

Dr. Adewusi Winter 1997

INSTRUCTOR: Dr. Kemi Adewusi
ASC 2114
Phone: 592-5628; on campus dial 5628; **NO HOME CALLS**

OFFICE HRS: Mon., Wed, Thurs. 2:00 - 3:00
Fri. 11:00 - 12:00

COURSE

OBJECTIVES: At the completion of this course the student should be able to demonstrate an understanding of:

1. the basic structure of vertebrates and invertebrates.
2. the basic concepts of reproduction in animals.
3. the structures and functions of prokaryotic and eukaryotic cells.
4. the relationships between bacterial animal and plant cells.
5. the basic principles of molecular genetics.
6. the basic principles of gene technology and biotechnology.

TEXTBOOK: BIOLOGY by Raven and Johnson (4th edition).
BIOLOGY LABORATORY MANUAL by Vodopich and Moore (4th edition).

MATERIALS: Five (5) Scantron machine grading answer sheets. A number 2 pencil.

- EXAMINATIONS:**
1. There will be five (5) scheduled exams. Exam questions will be true/false, multiple choice and fill in the blanks. Exams will be taken from the content of the lectures, class handout materials, textbook and lab materials.
 2. There will be pop quizzes. Each pop quiz will cover materials from the previous lecture.
 3. Students are required and expected to take the exams, and quizzes at the scheduled time. Failure to take exams at the scheduled time will result in a grade of zero on that exam.
 4. In the case of documented illness or extenuating circumstances, a make-up exam will be given, after a written explanation has been submitted to the instructor. The typewritten explanation must be submitted within 2 weeks of the missed exam. An explanation submitted after the two week period is considered late, as such unacceptable, resulting in a grade of zero for that exam.
 5. Students may review their examinations up to two (2) week days after the exam was given. After this period, the exams will no longer be available for viewing.

BIOL 122 GENERAL BIOLOGY
Dr. Adewusi Winter 1997

GRADES: Letter grades will be assigned according to the following scale:

A = 94-100% B = 83-86% C = 73-76% D = 63-66%
A- = 90-93% B- = 80-82% C- = 70-72% D- = 60-62%
B+ = 87-89% C+ = 77-79% D+ = 67-69% F = Below 60%

Incompletes will be given at the instructor's discretion only after a written request is submitted to the instructor.

CHEATING: Cheating will result in a grade of zero on the exam. The case may also be reported to the Dean for further action.

ATTENDANCE: Although roll will not be taken in lecture, prompt attendance to all lectures is required and expected. If you miss a lecture, you are responsible for the lecture contents and any assignments made during the lecture.

SUGGESTIONS ON HOW TO STUDY FOR THIS CLASS

1. COME TO CLASS REGULARLY AND BE ON TIME.
2. DO NOT TALK IN CLASS WHEN THE INSTRUCTOR IS ADDRESSING THE CLASS.
3. ORGANIZE YOUR NOTES IN SUCH A WAY THAT THEY ARE CLEAR.

The materials on the overhead is only an outline. Take notes as the instructor presents the material. Use your textbook to fill in any missing items.

4. ANSWER ALL OF THE REVIEW QUESTIONS AND HOMEWORKS.

Do not second-guess your instructor by selecting the questions you think she may ask on the exam. Instead, answer all the questions. Assignments are given to help you understand the subject matter.

5. ASK QUESTIONS REGULARLY. Feel free to ask questions in class or in lab at any time. You may also ask questions during my scheduled office hours or over the phone. In addition, you may make an appointment if you cannot come in during regularly scheduled office hours.
6. STUDY WITH A CLASSMATE OR A GROUP OF CLASSMATES.
7. USE STUDENT DEVELOPMENT SERVICES. Tutorial services are available free of charge for students who need it. However, see me first before you sign up with a tutor.

BIOL 122 GENERAL BIOLOGY
Dr. Adewusi Winter 1997

DATE	CHAPTERS	TOPIC
January 13	38	Evolution of the Animal Body Plan
15	39	The Noncoelomate Animals
17 40		Mollusk and Annelids
20		MARTIN LUTHER KING DAY
22, 24 41		Arthropods
27	41	Echinoderms
	42	Nonvertebrate Chordates
29	42	Vertebrates
January 31		EXAM 1
February 3	43	Organization of the Vertebrate Body
5	45	Digestion
7	46	Respiration
10	46	Circulation
12	51	Kidneys and Water Balance
February 14		EXAM 2
February 17, 19	47	Nervous System
21	50	Immunity
24	49	Hormones
26	53	Vertebrate Development
February 28		EXAM 3
March 10	2	Nature of Molecules
12, 14	3	Building Blocks of Life
17	5	Cell Structure
19	6	Membranes
21	7	Cell-Cell Interactions
March 24		EXAM 4
March 26	8	Energy and Metabolism
March 28		EASTER RECESS
April 2, 4	9	How Cells Harvest Chemical Energy
7, 9	10	Photosynthesis
April 11		EXAM 5
April 14	14	DNA: The Genetic Material
16, 18	15	Genes and How They Work
21	16	Control of Gene Expression
23	17	Cellular Mechanisms of Development
25, 28	18	Altering the Genetic Message
30	19	Gene Technology I
May 2	19	Gene Technology II
May 7 12:00 - 1:40 pm		EXAM 6 (FINAL EXAM)

This schedule is a tentative one. The instructor reserves the right to alter the sequence as need arises.

BIOL 122 GENERAL BIOLOGY
Dr. Adewusi Winter 1997

Lab Schedule

INSTRUCTOR: Mr. Cox

PHONE: (616) 972-4257

GRADING: Lab quizzes will be given as scheduled below. Make-up quizzes are not given for any reason.

LABORATORY ATTENDANCE is mandatory. More than two unexcused lab absences is grounds for a failing grade in the course.

LABORATORY MANUAL: Biology Laboratory Manual to Accompany Raven and Johnson
by Vodopich and Moore, 4th Ed. Each student must have his/her copy.

STUDY THE LAB EXERCISE BEFORE YOU COME TO EACH LAB.

DATE	EXERCISE	EXPERIMENT	QUIZ NUMBER
January 13	29	Sponges, Cnidarians	1
January 27	30 31	Flatworms, Roundworms, Segmented worms	2
February 3	31 32	Mollusks Arthropods	3
February 10	33 40	Echinoderms Vertebrate Anatomy: External Organs	4
February 17	41 42	Vertebrate Anatomy: Internal Organs Vertebrate Anatomy: Urogenital System, Circulatory System	5
February 24	43	Embryology	6
March 3	-	SPRING BREAK	
March 10	Handout	Behavior	7
March 17	3	Biomolecules	8
March 24	2 5	Cell Structure Membranes	9
April 1	4	Osmosis	10
April 7	6	Enzymes	11
April 14	7 8	Respiration Photosynthesis	12
April 21 and 28	11	DNA Isolation	13

BIOL 200 Evolution

Instructor: Dr. Mary Murnik
Office: ~~Helen Ferris 323~~ ASC 2120
Telephone: 592-2546

Office Hours: MTW— 1:00-2:00 pm. I am usually in my office when I am not in class and
-T-Th- 8:30-9:20 am. would be happy to see you.

Course Objectives:

BIOL 200 is a natural science elective course which introduces evolutionary concepts. The purpose of this course is to increase your understanding of the evidence for organic evolution, theories which have been offered to explain how evolution occurred, and the fundamental principles in the study of evolution. You will learn to apply these principles to other evolutionary problems. In addition, you will gain a broader understanding of how biologists think and you will develop your skills in expressing yourself orally and in writing. This course counts as a natural science or applied biology elective and as a writing intensive course.

General Education objectives:

1. To increase students' understanding of scientific methods and scientific reasoning.
2. To increase students' ability to read critically and to write papers on contemporary thinking about evolutionary topics.
3. To increase students' understanding of the historical development and cultural context of evolutionary concepts.

Prerequisites: two terms of college biology

Attendance and Participation:

Attendance and participation at all scheduled class sessions is required. You are expected to read assigned material before class. Absences will lower your grade because graded writing assignments are submitted on most class days. You will be given time to write a short statement about the most important concepts we have considered that day. When you read through the assigned text before class, emphasize the major principles involved and the evidence which is presented. Can you relate this material to topics which you studied in previous courses?

Your participation in class discussions is very important. We all have different backgrounds and interests which can contribute to this course. It is hoped that the lecture/listener format will only be appropriate part of the time. This is an elective course which should build on your previous knowledge and stimulate your thinking.

Texts:

History of Life, Richard Cowen, Blackwell Scientific Publications, 2nd edition, 1995
Biology of Evolution and Diversity, part 3 and chapters 1 & 2 supplement of Biology,
Sylvia S. Mader, Wm C. Brown, 4th edition, 1993

Grades:

Grades in this course will be based on the grades earned on four assigned papers, the grade earned through daily written assignments and two objective examinations.

	Maximum Points
4 Papers, 50 pts. each	200
Daily written assignments	200
Midterm & Final, 100 pts. each	200

The grading scale is:

A	93-100%	C	73-76%
A-	90-92%	C-	70-72%
B+	87-89%	D+	67-69%
B	83-86%	D	63-65%
B-	80-82%	D-	60-62%
C+	77-79%	F	below 60%

Penalties: Papers are due by 9:00 a.m. on the assigned day. Grades on papers will be lowered five points for each half-day late. For example, a paper turned in after 9:00 am but before 3 pm on the assigned day would be lowered five points. If the paper were turned in after 3 pm but before 9 am the next day, the penalty is 10 points.

Cheating:

The FSU policy on cheating is described in the Student Handbook. Cheating or plagiarism usually result in automatic failure in the course.

Materials borrowed from the instructor must be returned by the date the paper is due for which the materials were provided. Unreturned references may result in a hold on registration activity.

Papers:

You will write four edited, typewritten papers. Two of these papers will be in the format of a science review articles (described below), and two papers will be popular science articles with headlines, attention-getting introductory paragraphs and informal references within the article. Writing your papers should increase your understanding of evolutionary topics.

Topics:

Topics may be assigned for each paper. Let the instructor know if you have a particular interest. Topics should be approved at least two weeks before the paper is due. Later papers may continue and expand upon topics presented in earlier papers, or new topics may be selected.

Meetings with the instructor:

You should meet with the instructor to discuss your interests and ideas, the effectiveness of your writing, and strategies for writing for different audiences.

Drafts:

You are encouraged to submit drafts of your papers (no later than two class days before the paper is due.) The instructor will review your drafts and give suggestions.

References:

At least two references should be cited for each paper. Reference material will be available from the instructor and in the Timme Library. References should be articles in scientific journals or magazines. In some cases a science book may be chosen (not a text). You should attach copies of your reference materials to your paper.

Review Paper Format:

Each of the two review papers should be typewritten, double spaced, and contain:

1. a title page with title, course, name and date
2. a body of at least four pages (approximately 1500 words) with three parts: introduction, main section and summary.
3. a reference list
 - a. List by number, with the first article being cited as #1
eg. 1. Cavalli-Sforza, L. L. and W. F. Bodmer. 1971. The genetics of human populations. Freeman
2. Via, S., and R. Lande. 1985. Genotype-environment interaction. Evolution 3:505-522
 - b. Cite your references by their numbers within the body of the paper.
eg. Comparisons of banded metaphase chromosomes (320 to 500 bands per haploid set 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) Using high resolution G-banded chromosomes from late prophase (1000 bands per haploid set), we can now account for every nonheterochromatic G-positive and G-negative band in the four primates (2).

Popular article format:

These papers should be in the format of an article in a newspaper or popular magazine. Each of these should be typewritten, double spaced, and contain:

1. A headline, with your name underneath
2. A body consisting of approximately 1000 words, with an introductory paragraph and more specific information following.
3. General acknowledgement of references should be done informally in the text of the paper (eg. "According to Cavalli-Sforza, an internationally recognized population geneticist from Stanford,").
4. A list of references should be attached.

- 8/28 Introduction
- 8/30-9/1 **1. 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. *Mader chapter 19*
- 9/4-6 **2. Science and Critical Thinking**
All theories are flat earth models, scientific criteria, all theories have problems & puzzles, old earth evidence, geological record, The second law of thermodynamics
Mader chapter 2
- 9/8-11 **3. Origin of the solar system**
Evidence for the Big Bang, nature of the universe, origin of the earth, plate tectonics & continental drift. *Cowen pp. 1-7*
- 9/13-15 **4. Rocks, Fossils and Stratigraphy**
Fossilization, preservation time-space problem in paleontology, sedimentary environments. Dinosaur Footprints, Gastroliths, Coprolites, the Oldest Known Fossils, Chemical Indicators, Banded Iron Formations.
Cowen chapter 2, Mader pp. 345-347
- 9/18-22 **5. Origin of Life and the Precambrian Fossil Record**
Conditions on early Earth, Synthesis of Biological Molecules, Self-Replicating Molecules, Evolution of Metabolic Pathways, Evolution of Photosynthesis,
Cowen 8-25, Mader chapter 1 & pp. 355-357
- 9/25-29 **6. Emergence of Eukaryotes**
Symbiosis, endosymbiosis, organelles, evolution of sexual reproduction. *Cowen pp. 47-60, Mader p. 358-360*
- Paper 1 due 9/29** (Popular science article)
- 10/2 **7. The Organization of Life**
The "kingdoms". *Cowen pp. 60-63, Mader 360*
- 10/4-13 **8. Genetics in Evolution**
Variation, Sources of Variation , Genetic Equilibrium, Gene Flow and Genetic Drift, Natural Selection: Stabilizing, Disruptive or Directional, Group Selection, K vs r strategists, mimicry, neutral alleles *Mader chapter 20*

Biol 200**Lecture Schedule, cont'd**

- 10/13-16 **9. Speciation**
Reproductive isolating mechanisms, origin of species, evolutionary patterns and trends, homologous vs analogous structure, extinction and adaptive radiation, punctuated equilibrium vs phyletic gradualism. *Mader chapter 21*
- 10/18 **Mid-Term Examination**
- 10/20-23 **10. Evolution of Animals**
Protists, metazoans, Ediacaran fauna, evolution of skeletons, the Cambrian Event, Burgess Shale animals. *Mader chapter 26, Cowen Chapter 4*
- 10/25-27 **11. Life in a Changing World**
Global tectonics and global diversity, islands and continents, extinction patterns, *Cowen chapters 6 & 7*
- Paper 2 due 10/27** (Scientific review article 1)
- 10/30 **12. Evolution of early vertebrates**
The evolution of the Chordata, amphioxus, osteostrachans, evolution of jaws, cartilaginous fishes, placoderms, bony fishes, lobefins and lungfish, coelacanth. *Cowen chapter 7, Mader chapter 27 and pp. 448-452*
- 11/1-3 **13. Leaving the Water**
Origin of land plants, first land animals, amphibians and reptiles. *Cowen chapters 8 & 9, Mader pp. 452-453*
- 11/6-17 **14. The Dinosaurian World**
Late Triassic: The Beginning of the Age of Dinosaurs
Early-Middle Jurassic: Dinosaurs Dominate
Late Jurassic: The Dinosaurian Golden Age
Cretaceous: A Transition, then Hard Times.
Dinosaur biology and behavior. *Cowen chapters 10-12, 17, Mader pp. 452-453*
- Paper 3 due 11/13** (Popular science article 2)
- 11/20-22 **15. Evolution of Flight**
Preadaptation for flight, flying insects, early gliding vertebrates, pterosaurs, birds. *Cowen chapter 13, Mader p.454*
- 11/26-30 **16. Origin of Mammals**
Cynodonts, mammalian reproduction, *Cowen chapters 14, 18 Mader p. 455*

Biol 200

Lecture Schedule, cont'd

12/1

17. Geography and Evolution

Geographic distribution of animals and plants, impact of continental drift, islands, water balance. *Cowen chapter 19*

12/4

18. Evolution of Primates

Prosimians, anthropoids, emergence of the hominoids.
Cowen chapter 20

12/6-8

19. Human Evolution

Australopiths, the genus *Homo: habilis, erectus, sapiens*;
Neandertals; Do humans reflect secondarily aquatic
adaptations? humans in the ice ages.
Cowen chapters 21 & 22, Mader pp. 461-468

Paper 4 due 12/8 (Science Review Article 2)

BIOLOGY 205 HUMAN ANATOMY AND PHYSIOLOGY WINTER 1997

Dr. Robert Palmer Office: Commons 2113 Phone: 592-2552 Email: RPALMER@ART01.FSU.EDU
Office Hours: 9:00 AM Wed, Thur, and Fri; 3:00 PM Wed and Thur.; or drop in/call my office anytime!

SLA workshops meet on Tuesday and Thursday at 6:00-7:50 PM in Starr 223.

Lecture: IRC 002

Laboratory: Science 215

		Topic (text chapter)	Exercise (number)
Jan	13M	Introduction/Homeostasis (Chapter 1)	1. Microscope (1) and Histology (2)
	15W	Cell Structure and Function (3)	
	16Th	" " "	
	17F	Tissue Structure and Function (5)	2. Histology (2)
	20	Martin Luther King Day	
	22	Tissues (con't)	
	23	Integumentary System (6)	
	24	Skeleton (7 & 8)	
	27	Membrane Structure (3)	3. Skeleton (3)
	29	EXAM 1 - Homeostasis to Skeleton	
	30	Membrane (con't)	
	31	"	
Feb	3	Neuron (10)	4. Cell Permeability (4)
	5	"	
	6	"	5. Neural anatomy (5)
	7	Neuron transmission/ nervous pathways	
	10	Nervous System Organization (11)	
	12	" " "	
	13	Autonomic Nervous System (11)	
	14	EXAM 2 - Membrane to Nervous System Organization	6. Membrane Action Potential (7)
	17	ANS (con't)	
	19	Sensory receptors (12)	
	20	" "	
	21	Endocrine system (13)	7. Nervous System Function (6)
	24	" "	
	26	" "	
	27	Skeletal Muscle (9)	
	28	" "	
Mar	3 - 7	Spring recess	8. Skeletal Muscle Anatomy (9)
	10	" "	
	12	Smooth Muscle (9)	9. Contraction of skeletal muscle (8)
	13	Cardiac Muscle (15)	
	14	EXAM 3 - ANS to Skeletal muscle	
	17	Cardiac Muscle (con't)	
	19	" "	
	20	Vascular system (15)	No Laboratories
	21	" "	
	24	" "	
	26	" "	
	27	Easter Recess Blood and Immunity	10. Cardiovascular anatomy (10) and Internal anatomy (11)
	28	Easter Recess " "	
	31	Digestive System (17)	
Apr	2	" "	11. Cardiac Muscle Physiology (14)
	3	Metabolism (18)	
	4	"	12. Circulatory system physiology (12)
	7	Respiratory System (19)	
	9	EXAM 4 - Cardiac Muscle to Respiratory System	
	10	Respiratory System (con't)	
	11	" "	
	14	" "	13. Urinary/Reproductive anatomy (13)
	16	Excretory system (20 & 21)	
	17	" "	
	18	" "	
	21	" "	14. Laboratory practical
	23	Reproductive System - Male (22)	
	24	" "	
	25	" "	
	28	Reproductive System - Female (22 and 23)	
	30		
May	1	" "	
	2	" "	

May 7 Wed. 8:00 - 9:40AM Exam 5

Note: Dates for lecture exams are approximate and may be changed. Exact dates will be announced in lecture. The date for Exam 5 on May 7th is fixed (ie., you can't take it early except for University excused activities).

Course objectives: I have several objectives that I would like to obtain in this course, not all of which deal strictly with Biology.

1. You should understand and be able to use the basic terminology common to anatomy and physiology. This allows you and other biologists to communicate your ideas efficiently with each other, although terminology often hinders communication with non-biologists.
2. You should know basic factual information about the topics covered so that you can answer questions about structure and function, and describe processes. These would be questions like "What are the structural characteristics of arteries and veins?" or "How is carbon dioxide transported in the blood?"
3. I want you to practice analyzing data and making deductions from the data. This involves using the scientific method. When a person performs an experiment, how meaningful is the data?
4. I want you to practice comparing and contrasting the characteristics of organ and organ systems. In other words, I want you to practice synthesizing material. For instance, how does the shape of enzymes and the shape of receptors on membranes affect their functioning?
5. I want you to practice using your writing skills. Any written material submitted in the course - essays, lab reports, exam questions, or whatever - should be written as if this is an English class.

Texts: Hole's Human Anatomy and Physiology, 7th Ed. 1996, Shier, Butler, and Lewis.
Palmer's BIOLOGY 205 Laboratory Manual Winter 1997 (at FSU Bookstore)

Grades: Your final grades in the class will be determined by the percent of the total number of points that you have earned in the class. The grading scale cutoffs will be as follows:

A	93% or greater	C	73%
A-	90%	C-	70%
B+	87%	D+	67%
B	83%	D	63%
B-	80%	D-	60%
C+	77%	F	less than 60%

There will be five 100 point exams covering the lecture material so the total points that can be obtained from lecture material will be approximately 500. Quizzes on the laboratories, worth approximately ten (10) points per lab exercise, will be given in lab. The total points that can be obtained from laboratory activities will be approximately 120 to 150, based on quizzes and practical exams. Other assignments and quizzes may be assigned to the whole class, but no other source of points (extra credit) is available for individual students to improve their grade. Your grade in the course can be determined at any time by calculating your overall percentage of the total possible points given in lecture and lab and comparing it to the scale above. After each lecture exam and after major laboratory exams, grades for the whole class will be posted so that you can determine your current grade in the class.

Exams: Lecture exams will be based primarily on the material presented in lecture and will be a mixture of multiple choice, short answer, essay, and calculation type questions. Sample copies of old exams will be placed on reserve in the library. Lab quizzes will be based on lab work and will be multiple choice, short answer with a few calculations, identifications, diagrams, etc. Make up exams for missed exams and quizzes will usually be all essay.

Attendance: Attendance in lecture is optional (except for SLA Students, see below) and if you do not feel like coming to class, listening to the lecture, and taking notes, do not come. However, the lecture notes will give you a good indication of what will be emphasized on the lecture exams so obtaining a good set of notes is imperative. Copying someone else's notes is not usually as good as taking your own notes. The only time attendance at lecture is required is at the exams. If you know ahead of time that you want to be excused from an exam, please make arrangements with me before the exam. If you miss an exam because of personal illness, emergency, or other cause, you will have to have verification in order to make up a missed exam or quiz. Please contact me as soon as possible.

Attendance in laboratory is mandatory for all students and an unexcused absence from lab will result in a reduction of your course grade by ten points plus the missed quiz. The reason for this is that part of the "learning" that occurs in lab is the result of seeing the specimen or performing the exercise. Please contact me as soon as possible after missing lab. Excessive tardiness will be counted as an unexcused absence with a ten point deduction for each tardy.

SLA Students: Students enrolled in Sections 212 (Thur 12-3 PM) and 213 (Wed 6-9 PM) of this course are enrolled in the Structured Learning Assistance sections. These students attend lecture and laboratory as do the students in the other sections, but also attend an additional 2-hour workshop that meets Tuesday and Thursday evenings. The workshops are open only to the students registered in the SLA sections. The purpose of the workshop is to provide organized study time for the material from this course in order to maximize students' success in this course and to develop study skills that can be used in other classes to maximize their success there as well.

The SLA workshop facilitator is Melanie Hart, a graduate of FSU in Applied Biology. She can be contacted at lecture, laboratory, by leaving a message with me, or by sending or calling in a message to Starr 313, ext. 3528.

There are some special procedures, relevant to these sections only, that will be covered in the workshop but I want to emphasize the following features.

1. If you are enrolled in this section, you must follow the rules. If you do not want to do this, your only option is to transfer out of this section or drop the course. No exceptions!

**FAILURE TO COMPLY WITH THE SLA RULES AND REGULATIONS WILL
RESULT IN A FAILING GRADE**

2. Attendance in LECTURE and attendance and participation in the WORKSHOP are mandatory at ANY TIME that your overall class grade drops to a C minus (C-) or lower grade during the semester. Whenever your overall class grade is above a C minus, attendance at lecture and the workshop is optional. Of course, it would be beneficial for you to continue attending, but it is not mandatory. (Laboratory attendance is always mandatory.)

3. SLA students must have their own lecture notes to be admitted to the workshop. If you like to rewrite, type or photocopy your notes, bring your originals to the workshop to show that you were at lecture and took your own notes.

4. The workshop is conducted by the workshop facilitator and the facilitator may have an assistant. This facilitator has authority over the workshop and has my full support. I will be working closely with this person but she will make the decisions relevant to the course. If the facilitator tells me a student is not complying with the rules, I will give the student a failing grade for the course, regardless of their performance in lecture or laboratory.

Non SLA Students: Some students taking this course may find themselves in trouble late in the semester, too late to make any significant change in their final grade. The typical scenario goes something like this. They don't do well on the first exam and think "Oh, I'll just try harder on the next exam." If they don't, by the time the second exam is graded and returned, several weeks of the course may have passed before they find out what they are doing isn't working! At that point, the student is really at risk of failing because it is very hard to correct the problem and to compensate for the early poor grades. Too often these students give up for the semester and take a low grade, they decide to change their major, or they drop out of school when they could have succeeded. I call these students "AT RISK" students. I would like to give these students a chance to avoid this scenario.

At risk students are those that have less than a C average at any time during the semester. Students in this category should do the following:

1. Review the suggested techniques (HOW TO GET THE BEST GRADES...) below and see how your technique might be improved.
2. Review your exams to see why you missed the questions: did you misread the question or did you not know the answer?
3. Attend every lecture and review session. Use any extra time in laboratory to review lab and lecture material.
4. Come to see me for help in understanding lecture and laboratory material and for help in studying the material.
5. Investigate free services provided through the College of Arts and Sciences. All of these are FREE to the student.

Tutoring: Student Development Services, A & S Commons 1017, 592-3543

Writing: Writing Center, A & S Commons 1017, 592-2534

Study skills: Academic Skills Center: A & S Commons 1017, 592-3543

Students with disabilities: A & S Commons 1017, 592-3772

Minority Retention Program: A & S Commons 1023 or 1048, 592-2842

Career choice: Educational Counseling, , 592-3660

Personal problems: Personal Counseling, Rankin Center 221, 592-5968

It is my hope that I can provide early warning and help to those students who could pass the course but might get trapped by a poor start and can't alter their study process quickly enough to recover. It is unlikely that any student that has the ability and tries to improve will end up with less than a C grade - if they try soon enough!

HOW TO GET THE BEST GRADE POSSIBLE IN THIS CLASS

This is a rigorous course primarily because the subject matter deals with physiological functions and with a large amount of nomenclature and detail. Anatomy, especially gross anatomy, deals with the structure of the body which can be seen with the naked eye or by using a microscope. However, some anatomy is molecular in nature, and cannot be seen by eye. Physiology deals with the physics and chemistry of the cell, a processes that cannot be seen with the eye, must be deduced from experimental data, and the process must be then "pictured" in the mind. Most people find this to be more difficult than studying things that can be seen by eye and manipulated by hand.

One common reason that students have trouble in this course is that some students use old study techniques that worked in other courses or in high school but don't work well here. Here are some suggestions on how to maximize your efforts in the class.

1. **GET GOOD NOTES.** Attend lecture and write down as much as you can of what is on the overhead and what I say.
Sit close to the front so you won't be distracted by other students.
Use abbreviations and short cuts. (ie don't write in complete sentences)
Use a tape recorder.
Don't expect to understand everything the first time you hear it. Part of the learning experience in college is to be able to figure out things you don't understand.
Skim or read the chapter before lecture so you have an idea of the overall topic being covered.
Write notes on just one side of your notebook so that later, while your are studying, you can write comments/add diagrams on the other, blank side.
2. **REVIEW YOUR NOTES FOR UNDERSTANDING.** The same day, go over your notes to make sure they make sense. Mark area that don't make sense.
Read your notes over with another person from the class and fill in any information that you missed.
Read text, ask instructor, or get a tutor for areas you don't understand.

DO NOT WAIT UNTIL THE NIGHT BEFORE AN EXAM TO ATTEMPT TO DO THIS!

3. **BEGIN MEMORIZING THE MATERIAL.** Long before the first exam, begin to review small sections of the material.
Go over it until you think you've got it.
Test yourself by covering your notes and writing it down in abbreviated form, using flashcards, repeating it to a classmate, record it on a tape player and play it back while looking at your notes, etc. If you didn't get it right, go back over it again, then retest yourself.
How much time should you spend studying? A rule of thumb often heard is that you should spend two hours studying for each hour in lecture or for each lab. Some classes require more, some less. You need to spend as much time as YOU need to understand and to memorize the material. Don't worry about your friend who can look over the notes once the night before and do well. We are not all created equal so you spend as much time as is necessary for you.

4. USE STUDY GROUPS

Research shows that students do better in courses when they participate in study groups. This applies to all level of students! Unless you are an exceptional or absolutely asocial student, try to get together with a few other students and periodically (once a week?) study together. Stick to business!!!

5. TAKE THE EXAM CAREFULLY.

Read the questions carefully. If they don't make sense, ask the instructor if it can be rephrased.

On multiple choice, read the question and try to answer it before you look at the answers.

On essays, write in the margin a brief outline of the ideas you want to cover in the answer.

Don't leave multiple choice blank, take an educated guess. If you can eliminate two choices from five, your educated guess chance rises from 20% to 33%.

Go over the exam when you get it back and figure out why you missed questions. Did you misread the question or did you not remember the material? Try to adjust your study techniques to eliminate the problem.

BIOL 218
Course Perspectus
Winter Semester - 1977

- I. How do I contact my teacher, Professor David A. Stewart?
- A. My phone number is 592-2543, extension 2543. If I am not in my office, leave a message on my answering service and I'll get back to you. You may step into the office anytime the door is open.
 - B. My office is in ASC 2117. My office hours this semester are:
 - Monday 2-3
 - Tuesday 2-3
 - Wednesday 1-3
 - Thursday 12-1
 - C. If you cannot meet during the above hours, you can make an appointment.
- II. What books and materials do we need to buy?
- A. The text is MICROBIAL ECOLOGY, 3rd. edition, by Atlas and Bartha. The lab manual is CUSTOMIZED MICROBIAL APPLICATIONS, by Benson.
 - B. You will need five SCANTRON 882-ES answer sheets (50 answers on each side), unfolded and unwrinkles.
- III. Do you have any suggestions about how I should study for the course?
- A. Study the reading assignment before you come to lecture. Then take good notes during lecture. After the lecture, and before the next one, use the text to fill in your notes as you rewrite them.
 - B. After each study period you have planned for biology, put everything away, take out a blank sheet of paper, and write out the five most important things you learned from your study period and then write your own test questions over what you have learned.
 - C. Study with a classmate or a small group of classmates.
 - D. Be sure you study the lab exercises before you come to lab. The more you know about the lab activities and terminology involved, the better you will do on the weekly lab reports.
 - E. Review frequently for the exams, making extensive use of your notes and the text.
 - F. Before you obtain the use of a student tutor, see me first. Each Ferris faculty member has time reserved to help students on an individual basis. Do not hesitate to question during lecture and out of lecture.
 - G. The worst thing you can do is to be absent or tardy to lectures and/or labs. There is no way to make up a missed lecture, since the interactions cannot be repeated. A very poor second best is to get notes taken by someone else. In this way you minimize your loss. If the other lab section still works on a lab you may have missed, you may occasionally be allowed to come to that lab for make-up.

IV. How will I be graded?

- A. you will be graded fairly.
- B. Five lecture exams are awarded a maximum of 50 points each.
- C. Lab reports will be awarded a cumulative total of 100 points. No reports will be accepted unless you were present at lab to do the exercise. You may be required to rewrite a sloppy, poorly written report.
- D. Your total points made into a percent will determine your letter grade based on the following scale:

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
- E. The final examination can be used to replace one or two lecture exam scores you may have missed during the semester. You will take only that portion of the exam that covers the concepts you missed. Also, you may retake the exam that produced your lowest score.

V. What are the objectives of the course?

- A. Basic unifying themes of biology will be introduced and stressed.
- B. Recent discoveries will be translated into potential impacts upon mankind and the environment.
- C. Lab exercises will improve observational and manipulative skills.
- D. Students will learn biology according to a wholistic approach. Mathematics, chemistry and other cogent disciplines will be integrated into the study of the biology.
- E. Students will learn some of the vocabulary of biology, and be able to communicate with the new language.
- F. Scientific methods and other facets of critical thinking will be stressed.

VI. Is there an attendance policy?

- A. Yes, and it is strict.
- B. Prompt attendance to all labs and lectures is expected and required.
- C. More than four lecture absences or more than five lab absences will result in automatic course failure. More than two missed lecture exams will result in automatic course failure. Three tardinesses equal one absence.
- D. I have tried to work with "phantom" students, but could not.

VII. What policies cover academic honesty and disruptive behavior?

- A. Do not represent the work product of another as your own; do not provide work product of yours to another who you know is going to represent it as his own. Those that take part in this deception in any way get zero for that project and "F" if such dishonesty and/or sophistry is evident.
- B. Disruptive behavior will not be tolerated.
- C. Consider the attached University and School policies as pertaining to this class.

BIOL 218
Laboratory Schedule
Winter Semester - 1997

DATE	EXERCISE TOPIC
January 13-16	Brightfield Microscopy, Microscopic Measurements
January 21-23	Protozoa, Algae, Cyanobacteria, Microinvertebrates
January 27-30	Fungi: Yeasts and Molds, Bacteria
February 3-6	Negative Staining, Gram Staining
February 10-13	Pure Cultures, Bacterial Populations
February 17-20	Slide Culture: Molds, Slide Culture: Autotrophs
February 24-27	Slime Mold culture, Photosynthetic Bacteria
March 10-13	Phages from Sewage, Phages from Flies
March 17-20	Commensalism, Synergism, Microbial Antagonism
March 24-27	Temperature: Effects on Growth, Lethal Effects
March 31-Apr. 3	Growth and Osmotic Pressure, Growth and pH
April 7-10	Lethality and U-V Light, Oligodynamic Action
April 14-17	Finishing and Writing the last Reports
April 21-24	Nova
April 28-May 1	Field Trip

- ADDENDA:
1. No classes on January 20 (Monday).
 2. No classes on March 3-6 due to spring break.
 3. No classes on March 27 due to Easter break.
 4. The last day to drop with a "W" is Monday March 24.

BIOL 218
Lecture Schedule
Winter Semester - 1977

DATE	TOPIC	CHAPTER
January 13	Origins of Life: Chemical and Cellular	2
15	Origins of Life: Organelles and Genetic Basis	2
22	Intraspecific Microbial Interactions	3
27	Interspecific Microbial Interactions	3
29	Microbial Interactions with Plants	4
February 3	Exam #1	
February 5	Microbial Interactions with Animals	5
10	Microbial Communities and Ecosystems	6
12	Abiotic Factors and Microbial Growth I	8
17	Abiotic Factors and Microbial Growth II	8
19	Microbial Organisms in the Air	9
24	Exam #2	
February 26	Microbial Organisms in the Water	9
March 10	Microbial Organisms on Land	9
12	Biogeochemical Cycling: Carbon and Oxygen	10
17	Biogeochemical Cycling: Nitrogen and Phosphorus	11
19	Exam #3	
March 24	Biodeterioration of Solid "Waste"	12
26	Biodeterioration of Liquid "Waste"	12
March 31-Apr. 2	Persistence and Biomagnification of Xenobiotics	13
April 7	Microbes and Inorganic Pollutants	13
9	Biodegradation: Testing and Monitoring	14
14	Exam #4	
April 16	Microbial Recovery of Metals	15
21	Microbes and Petroleum	15
23	Environmental Modification and Control of Pests	16
28	Predatory and Pathogenic Control of Pests	16
30	Exam #5	

**HUMAN PHYSIOLOGY AND ANATOMY
BIOLOGY 231
FALL 1995**

Dr. Douglas Fonner

Phone: 592-2554

~~Helen Ferris 312~~ ASC 2011

OFFICE HOURS:

9:00 - 11:00 Tuesday
9:00 - 11:00 Thursday
10:00 - 11:00 Friday

I am also available throughout the day. Stop in any time you have questions. If you phone and I'm away from my desk, please leave a message on my phone mail and I will return your call as soon as possible.

GOALS AND OBJECTIVES

The goal of this human physiology and anatomy course is to increase your understanding of how science works and how cells and organs function in the human body. Specific objectives are:

1. To learn the major ideas, theories, principles and paradigms (models) that form the foundation of physiology and anatomy.
2. To improve rational thinking by applying the above knowledge to solve problems.
3. To promote critical thinking by examining the observations that led to several of the paradigms of cell and organ function.
4. To develop the ability to understand published information by reading and analyzing articles from relevant science publications.
5. To promote the interchange and discussion of ideas by using a team approach to solve problems and prepare assignments.

COURSE MATERIALS

Concepts of Human Anatomy and Physiology, 4th. Ed., Van De Graaff and Fox.
Medical Physiology, 8th or 9th Ed., Guyton.
Biology 231-232 Lab Manual
Lecture Outlines and Applied Questions (**Available at Kopy Korner**)

GRADES

Lecture exams (4)	300 points
Physiology lab reports (5)	50
Anatomy exams (2)	75
Medline project	50
Final exam	125
Total	600

The lecture exams will cover lecture material, reading assignments, and physiology labs. They may include multiple choice, matching, diagram, and essay questions. If you miss an exam because of an **instructor approved** excused absence, it is your responsibility to schedule a make-up exam as soon as possible after the scheduled exam time.

93%	A	87%	B+	77%	C+	67%	D+
90%	A-	83%	B	73%	C	63%	D
		80%	B-	70%	C-	60%	D-

WORKSHOP

A workshop on the *Applied Questions* will be held each Wednesday (beginning the second week of the semester) at 7:00 PM. Participants will work in small groups to answer *Applied Questions*.

FINAL EXAM

The final exam will be given in SCI 115 from 10:00 AM to 11:40 PM on Thursday, Dec. 14th. Students with a 73% or higher on each of the four lecture exams are not required to take the final. For those not taking the final, the lecture exams will be adjusted to a 425 point basis by multiplying the exam scores by 1.417 (300 multiplied by 1.417 equals 425).

ATTENDANCE

Lab attendance is required. If you miss a lab because of an excused absence, see me as soon as possible to reschedule the lab.

WEEK	DATE	LECTURE TOPIC	LABORATORY
1	August	28 Introduction	Skeletal system
		30 Tissues	
	September	1 Tissues	
2		4 Labor Day	Tissues (Except Monday's labs)
		6 Homeostasis and Feedback	
		8 Cell Function and Regulation	
3		11 Cell Function and Regulation	Tissues (Monday lab only) Review (Lab open Noon to 4:00 pm, Tuesday through Friday)
		13 Cell Function and Regulation	
		15 Cell Function and Regulation	
4		18 Cell Function and Regulation	Anatomy Exam
		20 Membrane Physiology	
		22 Membrane Physiology	
5		25 Membrane Physiology	* <i>Membrane Permeability</i>
		27 Membrane Physiology	
		29 Exam	
6	October	2 Neurons	Recording Electrical Potentials
		4 Neurons	
		6 Neurons	
7		9 Neurons	Neural Anatomy and * <i>Compound Action Potential</i>
		11 Brain	
		13 Brain	
8		16 Brain	Neural Anatomy and <i>Compound Action Potential</i>
		18 Brain	
		20 Exam	
9		23 Spinal Cord	* <i>Sensory Perception</i>
		25 Peripheral Nervous System	
		27 Peripheral Nervous System	
10	November	30 Eye	Polygraphs Muscle Anatomy
		1 Eye	
		3 Muscle	
11		6 Muscle	* <i>Skeletal Muscle Characteristics and Muscle Work</i>
		8 Muscle	
		10 Exam	
12		13 Autonomic Nervous System	* <i>Skeletal Muscle Characteristics and Muscle Work</i>
		15 Autonomic Nervous System	
		17 Autonomic Nervous System	
13		20 Autonomic Nervous System	Review
		22 Autonomic Nervous System	
		24 Thanksgiving Recess	
14		27 Endocrine System	Anatomy Exam
		29 Endocrine System	
	December	1 Endocrine System	
15		4 Endocrine System	
		6 Endocrine System	
		8 Exam	
16		Final Exam	

* *Physiology lab that requires a report*

READING ASSIGNMENTS

Authors write textbooks to meet the various demands of a multitude of instructors and courses. Consequently, they are encyclopedic and include more minutiae than anyone could be expected to learn. With certain exceptions, you will only be tested on material covered in class. This is not to say, however, that reading is not important. Quite the contrary! A person can explain new ideas faster than most listeners can understand them. You'll get more from lecture if you acquaint yourself with the subject before class. One way to do this is to read the assignments before class. Use the lecture outlines to identify the appropriate sections to read. Use the textbooks after lecture as a resource to help you resolve any questions you have regarding the material. Supplement your lecture notes with notes taken from the texts. Note taking is valuable, because it helps you to identify important points and to remember them.

Reading Sources

Concepts in Human Anatomy and Physiology (CAP) 4th edition

Medical Physiology (MP) 8th edition

Scientific American (SA)

Scientific American articles are on reserve at the Main Circulation Desk of the Ferris Library.

The magazine itself is available at the Journal Circulation Desk of the Library.

TOPIC	READINGS	SOURCE
Introduction	p. 1-16 (may skip <i>Classification and...</i> p. 6-8)	CAP
Tissues	Chapters 6 and 7	CAP
Homeostasis and Feedback	p. 16-19	CAP
Cell Function and Regulation	Chapter 3 (may skip <i>DNA Synthesis and...</i> p. 58-65)	CAP
	p. 70-75	CAP
	p. 30-31 (explains genetic regulation)	MP
	<i>Insulin Factory</i>	SA
	<i>How LDL Receptors Influence Cholesterol</i>	SA
Membrane Physiology	Chapter 5	CAP
	Chapter 4 (may skip <i>Patch-Clamp...</i> p. 42)	MP

Neurons	Chapter 14	CAP
	Chapter 5	MP
	<i>Biological Roles of Nitric Oxide</i>	SA
Brain	p. 376-401	CAP
	<i>Stroke Therapy</i>	SA

Spinal Cord	p. 401-407	CAP
	p. 437-442	CAP
Peripheral Nervous System	p. 416-436	CAP
	p. 465-474	CAP
Eye	p. 487-505	CAP
Blood Brain Barrier	<i>Blood Brain Barrier</i>	SA
	<i>Breaching the Blood - Brain Barrier</i>	SA
Muscle	Chapter 12	CAP
	Chapter 8	MP

Autonomic Nervous System	Chapter 17	CAP
	Chapter 60	MP
Endocrine system	Chapter 19	CAP

HUMAN PHYSIOLOGY & ANATOMY

BIOLOGY 232 Winter 1997

Dr. Douglas Fonner	Office Hours:	
Office: ASC 2011	Tuesday	9:00 - 11:00
Phone: 592-2554	Wednesday	1:00 - 2:00
Email: dfonner@art01.ferris.edu	Thursday	9:00 - 11:00

Above are my official office hours. I am also available throughout the day. Stop in any time you have questions. If you phone and I'm away from my desk, please leave a message on my phone mail and I will return your call as soon as possible.

Goals and objectives

The goal of this human physiology and anatomy course is to increase your understanding of how science works and how cells and organs function in the human body. Specific objectives are:

1. To learn the major ideas, theories, principles and paradigms (models) that form the foundation of physiology and anatomy.
2. To improve rational thinking by applying the above knowledge to solve problems.
3. To promote critical thinking by examining the observations that led to several of the major paradigms of cell and organ function.
4. To develop the ability to understand published information by reading and analyzing articles from relevant science publications.
5. To promote the interchange and discussion of ideas by using a team approach to solve problems and prepare assignments.

EVALUATION SYSTEM

Lecture exams will cover lecture material, reading assignments, and physiology labs. They will consist of multiple choice, matching, diagram, and essay questions. If you miss an exam because of an excused absence, you must contact me within one class day to schedule a make-up exam. Make-up exams are for excused absences only.

The final exam is optional if you score 75% or higher on each of the four lecture exams. If you don't take the final, your four lecture exams (possible 400 points) will be prorated to 500 points (multiply the sum of the four lecture exams by 1.25 or substitute the average of your four lecture exams for the final exam).

Lecture Exams	400
Comprehensive Final	100
WWW Project	50
Physiology Worksheets	75
Anatomy Quizzes	75
Investigative Lab Project	50
Total	750

GRADES	87% B+	77% C+	67% D+
93% A	83% B	73% C	63% D
90% A-	80% B-	70% C-	60% D-

SCHEDULE

Week	Topic	Lab
January 13	Digestive System	Visceral organ anatomy
January 20	Digestive System	Martin Luther King Day
January 27	Metabolism	Visceral organ microanatomy
February 3	Exam (Date to be determined)	Smooth muscle physiology
	Respiration	
February 10	Respiration	Skeletal system
February 17	Respiration and Heart	Respiratory physiology
February 24	Heart	Anatomy of the heart
	Exam Friday Feb. 28	
March 3	Spring Recess	
March 10	Cardiovascular system	Electrocardiogram
March 17	Cardiovascular system	Cardiac physiology
March 24	Cardiovascular system	Cardiac physiology
March 31	Blood	Blood Pressure
	Exam (Date to be determined)	Investigative lab
April 7	Inflammation and Renal system	Investigative lab
April 14	Renal system	Investigative lab
April 21	Reproductive system	Renal and reproductive system anatomy
April 28	Reproductive system	Investigative lab presentations
Thursday May 1	Exam	

MATERIALS NEEDED FOR COURSE

- *Concepts of Human Anatomy and Physiology*, 4th. Ed., Van De Graaff and Fox.
- *Medical Physiology*, 9th Ed., Guyton.
- *Biology 231-232 Lab Manual*
- *Lecture Notes Available on the WWW*

READING ASSIGNMENTS

Topic	<i>Concepts of Human A&P</i>	<i>Medical Physiology</i>
Digestive system	Chapter 26	Chapter 26
Metabolism	Chapter 27	Pages 865-871 and Chapter 78
Respiratory system	Chapter 24	
Heart	Chapter 21	Chapters 9, 10 and 11
Circulatory system	Chapter 22	
Blood	Chapter 20	
Inflammation		Chapter 33
Urinary system and fluid, electrolyte and acid-base balance	Chapter 25	
Male reproductive system	Chapters 28	Chapter 80
Female reproductive system	Chapter 29	Chapter 81
Pregnancy	Chapter 30	Chapter 82



DATE:	TOPIC:	CHAPTER ASSIGNMENT:
MON. 8 JAN.	Introduction and history	1, 2, 3, 15, 26, 27
WED. 10 JAN.	Prokaryotic and Eucaryotic Cells	4, 9
MON. 16 JAN.	MLK DAY NO CLASS!	
WED. 18 JAN.	Bacterial Structure and Function	4
MON. 23 JAN.	Bacterial Structure and Function	4
WED. 25 JAN.	Bacterial Structure and Function	4
MON. 30 JAN.	Bacterial Growth and Sporulation	6
WED. 1 FEB.	Bacterial Classification	10
MON. 6 FEB.	Fungal Structure, Classification, Growth	12
WED. 8 FEB.	Viral Structure and Replication	11
MON. 13 FEB.	Viral Structure and Replication	11
WED. 15 FEB.	EXAM I	
MON. 20 FEB.	Microbial Metabolism	5
WED. 22 FEB.	Microbial Metabolism	5
MON. 27 FEB.	Microbial Metabolism	5
WED. 1 MAR.	Microbial Genetics	7, 8
MON. 6 MAR.	SPRING BREAK! NO CLASS!!	
WED. 8 MAR.	SPRING BREAK! NO CLASS!!	
MON. 13 MAR.	Microbial Genetics	7, 8
WED. 15 MAR.	Microbial Genetics	7, 8
MON. 20 MAR.	EXAM II	
WED. 22 MAR.	Antimicrobial Agents	14
MON. 27 MAR.	Antimicrobial Agents	14
WED. 29 MAR.	Sterilization and Disinfection	13
MON. 3 APR.	Host/Parasite Relationships	15, 16
WED. 5 APR.	EXAM III	
MON. 10 APR.	Microbial Pathogenicity	20-25
WED. 12 APR.	Microbial Pathogenicity 2	20-25
MON. 17 APR.	Innate Immunity	17, 18
WED. 19 APR.	Humoral Immunity	17, 18
MON. 24 APR.	Cellular Immunity	17, 18
WED. 26 APR.	Hypersensitivity	19
MON. 2 MAY	COMPREHENSIVE FINAL EXAM (NOON - 1:40PM)	

TEXT: MICROBIOLOGY, Principles and Applications. 2nd Edition. 1993.
By Jacquelyn G. Black. Prentice-Hall, Inc. Englewood Cliffs, NJ

EXAMS: There will be three topic exams scheduled during the semester and one comprehensive final exam at the end of the semester. Each exam will be in a multiple choice/essay format and will be worth 100 points. All lecture exams will be curved to a class average of 75%, if necessary. Lecture exam scores will be combined with the laboratory scores for a total possible of 500 points in this course. All essay make-up exams will be available in instances of valid and documented absences.

QUIZES: Prior to each exam there will be one or two UNANNOUNCED quizzes for a total of 6 possible bonus points. The lowest possible score of a turned in quiz or an excused absence will be zero. However for a unexcused absence from lecture a -2 "bonus" points will be credited to the next exam score!

GRADING: 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-, below 60=F.

ATTENDANCE: You are REQUIRED to attend every lecture/lab and to explain any absence. Attendance will be taken randomly and unexcused absences may result in a loss of points.

OFFICE HOURS: Mon./Wed.:11:00AM-Noon and 2:20-3:20PM
Tue./Thu.:Noon-1:00pm. Or by appointment! (ext.2556)
M.Ryan, Ph.D. Sci.210-E

LEARNING OBJECTIVES:

- 1) To learn how microbiologists use the scientific method to gain knowledge and to evaluate existing paradigms.
- 2) To exercise collaborative skills by involvement in group learning activities.
- 3) To apply problem solving and critical thinking skills to the learning of microbiological concepts.
- 4) To learn the fundamental concepts related to microbial structure/function, metabolism, growth/ reproduction, genetics.
- 5) To learn the mechanisms of microbial pathogenicity and microbial control through sterilization, disinfection, antimicrobials and the human immune response.

**BIOL 300
PATHOPHYSIOLOGY
SYLLABUS
WINTER, 1996**

Goals and Objectives

The goal of this course is to increase your understanding of the interactions between and within cells and organ systems of the body as they pertain to disease states. The objectives of the course are:

1. To relate the fundamental principles and theories of physiology to the disease state.
2. To improve rational thinking through application of course materials in problem solving.
3. To promote critical thinking by examining the observations that led to several of the models explaining the disease state.
4. To develop the ability to understand published information by reading and analyzing scientific articles.
5. To promote the interchange and discussion of ideas by using the team approach to solve problems.

DAY		LECTURE TOPIC	READING ASSIGNMENT (Chapter)
JANUARY	8	Cellular Environment, Homeostasis Autonomic Nervous System	1, 3:pp.92-96 12:pp.420-428
JANUARY	15	Abnormal Cell Function, Tumor Biology	2, 10 11:pp.367-371
JANUARY	22	Abnormal Cell Function, Tumor Biology	
JANUARY	29	Inflammation	7, 9
FEBRUARY	5	Renal/Respiratory/Electrolyte Disorders	3:pp.96-122 29,32:Review 30:pp.1162-1178 33:pp.1242-1262
FEBRUARY	12	Renal/Respiratory/Electrolyte Disorders	
FEBRUARY	19	Renal/Respiratory/Electrolyte Disorders	
FEBRUARY	26	Gastrointestinal Disorders	35:Review 36:pp.1321-1362
MARCH	4	SPRING RECESS	
MARCH	11	Cardiovascular Disease	26:Review, 27
MARCH	18	Cardiovascular Disease	
MARCH	25	Cardiovascular Disease	
APRIL	1	Endocrine/Reproductive Abnormalities	17,19:Review 18,20
APRIL	8	Endocrine/Reproductive Abnormalities	

APRIL 15 Neurological and neuromuscular disorders 12:pp.402-420
38:pp.1405-1428
13:pp.438-454
15:pp.527-577
39:pp.1445-1468

APRIL 22 Neurological and neuromuscular disorders

MAY 1 Final Exam (8:00 -9:40 am)

INSTRUCTOR: Dr. Tom Oldfield, BIS 406, Phone: (616) 592-2553

TEXT: *Pathophysiology* by McCance and Huether

GRADING SCALE: 93% = A 77% = C+ 63% = D-
90% = A- 73% = C
87% = B+ 70% = C-
83% = B 67% = D+
80% = B- 63% = D

Your final grade will be based on lecture quizzes (120 points), a final exam (80 points) and classroom discussion of case studies and written reports on selected scientific articles (100 points).

LECTURE QUIZZES:

Lecture quizzes will be multiple choice/short answer format and will be based on lecture material and classroom discussions of the scientific articles/case studies. If a quiz is missed, the student may not make up the quiz. Fourteen quizzes will be given and only twelve quizzes will be counted in the final grade.

WRITTEN REPORTS:

The written reports must be typed and between 250 and 300 words in length. They must discuss the pathphysiological principles presented in the paper. These papers will be graded on content and grammar. If you are not satisfied with your initial grade on the paper, you will be allowed one rewrite to change the initial grade. You will be allowed one week after your paper is returned to submit the rewrite. No late papers will be accepted without an instructor approved absence. All articles are taken from *Scientific American* and will be on reserve in the library.

DUE DATES FOR THE PAPERS

Paper 1, "The Dilemmas of Prostate Cancer" (April, 1994) is due on January 26.

Paper 2, "Aspirin" (January, 1991) is due on February 9.

Paper 3, "Oral Rehydration Therapy" (May, 1991) is due on March 1.

Paper 4, "Stroke Therapy" (July, 1991) is due on March 22.

Paper 5, "What Causes Diabetes" (July, 1990) is due on April 12.

Applied Biology Program

APRC 1997-1998

section 3

PRE-REQUISITE: BIOL108 OR EQUIVALENT**LECTURE SCHEDULE AND COURSE INFORMATION**

<u>DATE</u>	<u>TOPIC</u>	<u>TEXT ASSIGNMENT</u>
Mon. 1/13	The Nature of Infectious Agents	SCHAECHTER BOOK Chaps. 1, 3, 10
Wed. 1/15	The Nature of Infectious Agents	Chaps. 1, 3, 10 and 30
Fri. 1/17	Antimicrobial Agents	Chap. 5, 29, 43 and Pages 539-550
Mon. 1/20	◆MLK DAY - NO CLASS◆	
Wed. 1/22	Epidemiology	Chap. 73
Fri. 1/24	QUIZ 1	
Mon. 1/27	Respiratory Tract Infections	Chaps. 12,13,15,23,44 and 56
Wed. 1/29	Respiratory Tract Infections	Chaps. 12,13,15,23,44 and 56
Fri. 1/31	GI Tract Infections	Chaps. 17, 18, 36, and 72
Mon. 2/3	Wound Infections	Chaps. 21 and 34
Wed. 2/5	CNS Infections	Chaps. 14, 15, 21, 34 and 58
Fri. 2/7	QUIZ 2	
Mon. 2/10	Lyme Disease	Chap. 25.
Wed. 2/12	STD's - Bacterial	Chaps. 14, 24, 26, and 65
Fri. 2/14	STD's - Viral	Chaps. 37, 39, 40 and 65
Mon. 2/17	Paramyxoviruses	Chap. 33
Wed. 2/19	Orthomyxoviruses	Chap. 35
Fri. 2/21	QUIZ 3	
Mon. 2/24	Orthomyxoviruses	Chap. 35
Wed. 2/26	Viral Hepatitis	Chap. 41 - Case Studies & Graphs
Fri. 2/28	Viral Hepatitis	Chap. 41 - Case Studies & Graphs
Mon. 3/3 - Fri. 3/7	◆SPRING RECESS - NO CLASS◆	
Mon. 3/10	Innate Immunity/Phagocytosis	BENJAMINI BOOK Chaps. 1-3, 8, 9
Wed. 3/12	The Immune System	Chaps. 1-3, 8, 9 & GLOSSARY p. 455
Fri. 3/14	QUIZ 4	
Mon. 3/17	The Immune System	Chaps. 1-3, 8, 9 & GLOSSARY p. 455
Wed. 3/19	Clonal Selection	Pages 55-68
Fri. 3/21	Humoral Immunity/Acute Inflammation	Chaps. 8, 9, 10 and 11
Mon. 3/24	Humoral Immunity/Acute Inflammation	Chaps. 8, 9, 10 and 11
Wed. 3/26	Cellular Immunity/Chronic Inflammation	Chaps. 8, 9, 10 and 11
Fri. 3/28	◆EASTER RECESS - NO CLASS◆	
Mon. 3/31	Cellular Immunity/Chronic Inflammation	Chaps. 8, 9, 10 and 11
Wed. 4/2	Cytokines	
Fri. 4/4	QUIZ 5	
Mon. 4/7	Immunoglobulins	Chaps. 4 and 5
Wed. 4/9	The Genetics of Antibody Diversity	Chap. 6
Fri. 4/11	Immunological Reactions	Chap. 7
Mon. 4/14	Complement	Chap. 13
Wed. 4/16	Allergy and Hypersensitivity	Chaps. 14, 15 and 16
Fri. 4/18	QUIZ 6	
Mon. 4/21	Allergy and Hypersensitivity	Chaps. 14, 15 and 16
Wed. 4/23	Immunological Disorders	Chaps. 17 and 18
Fri. 4/25	Immunological Disorders	Chaps. 17 and 18
Mon. 4/28	Immune Therapies	Chap. 22
Wed. 4/30	AIDS	Pages 345-353
Fri. 5/2	QUIZ 7	
Mon. 5/5	>COMPREHENSIVE FINAL EXAM<	

TEXTS: MECHANISMS OF MICROBIAL DISEASE, second edition 1993, by Schaechter et al for the first half of the course.

IMMUNOLOGY: A SHORT COURSE, third edition, 1996, by Benjamini et al for the second half of the course

SUMMARY OF NOTIFIABLE DISEASES, 1994, Centers for Disease Control and Prevention

INSTRUCTOR: W. Hoeksema, Office ASC 2013, Telephone: (616) 592-2555. Please leave a message, at any time, on my answering machine. Office Hours: 11:00 AM - 11:50 AM on M, W and F; 9:30 - 10:50 on T and R.

GRADING: Expect a quiz every two weeks. Your ONE LOWEST quiz grade will be dropped. If you miss a class for any reason that is the quiz that will be dropped. There are no make-up quizzes. You will also have a comprehensive final exam on 5/5. If your quiz average is higher than your final exam score the quizzes will count 2/3 of your course grade and the final 1/3. Likewise if your final is higher than your quiz average the final will count 2/3 and the quizzes 1/3. Your grade could also be affected by attendance. See below

ATTENDANCE: Attendance at ALL meetings is an absolute requirement. Any ABSENCES or TARDINESS or LEAVING CLASS EARLY must be fully explained. Failure to comply with this rule will result in a course grade of either F or I at the option of the instructor.

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

- OBJECTIVES:
1. To learn the etiology, epidemiology, and pathogenesis of representative bacterial and viral diseases of humans.
 2. To learn the structure, function, control and significance of the human immune system.
 3. To gain the ability to analyze and problem solve through the use of case studies, graphs and other clinical data.

World Wide Web Sites Related To Microbiology and Immunology

1. Microbiology <http://www.ch.ic.ac.uk/medbact/microbio.html>
2. Virology <http://www.tulane.edu/~dmsander/garryfavweb.html>
3. Hepatitis <http://cpmcnet.columbia.edu/dept/gi/disliv.html>
4. AIDS/HIV http://www.yahoo.com/Health/Diseases_and_Conditions/AIDS_HIV/
5. AIDS/Treat. <http://carebase2.jri.org/infoweb/treatment/library/beta/beta26.htm>
<http://www.yamanashi-med.ac.jp/~microbio/microbiology.html>
6. Herpes <http://raccoon.com/newhpx.html>
7. Influenza(WHO) <http://www.who.ch/programmes/emc/flu/flu.htm>
8. CDC Home Page <http://www.cdc.gov/>
9. WHO Home Page <http://www.who.ch/Welcome.html>
10. Medical News <http://www.pslgroup.com/mednews.htm>
also see Infect. Diseases web site below for medical news
11. Infect.Disease <http://www.medscape.com/> (NOTE:you will have to register, it's free)
12. Infect.Disease [gopher://gopher.health.state.ny.us/11/.consumer/.factsheets](http://gopher.health.state.ny.us/11/.consumer/.factsheets)
13. Clinical Med. <http://www.avicenna.com/>
(NOTE:you will have to register, it's free)
14. Immunology <http://www.primenet.com/~vohnout/immunology.html>
15. Immunology <http://www.cc.emory.edu/WHSC/medweb/immunology.html>
16. Immunology <http://www-micro.msb.le.ac.uk/immunology.html>
17. Antibody Page <http://www-chem.ucsd.edu/Faculty/goodman/antibody.html/abpage.html>
18. Cytokines http://www.ocms.ox.ac.uk/~smb/cyt_web/
19. Autoimmunity <http://web.cps.msu.edu/~keyesdav/ms/>
20. Vaccines <http://www.eden.com/~via/>
21. Vaccine Weekly <http://www.holonet.net/homepage/1v.htm>
22. Test Banks <http://fiona.umsmc.edu/~yar/tests.html>
(mainly virology questions)
23. Case Studies http://edcenter.med.cornell.edu/Pathophysiology_Cases/Pulmonary/Pulm_TOCs.html
(lower respiratory tract infections)
24. Search Program <http://altavista.digital.com/>

If you need help in accessing these sites, please check with me for instructions, Remember to capitalize where ever you see capital letters in a web address

NATURAL HISTORY OF INVERTEBRATES

Rin 341



Dr. P.L. Watson
Temporary office
Helen Ferris 320
592-2558

	<u>Time</u>	<u>Room</u>	<u>DAYS</u>
<u>Lecture:</u>	10:30-12:45	Starr 216	Tuesday Thursday
<u>Lab:</u>	1:30-> 5	Starr 216	Tuesday and Thursday

Books required

Invertebrate Zoology

Ruppert / Barnes

Course Requirements

3 lecture tests * @ 100 pts each	= 300 pts
1 Collection @ 100 pts	= 100 pts.
2 lab practicals @ 50 pts each	= 100 pts.
1 <u>optional final</u> ** @ 100 pts.	= (100pts.)

	= 500 pts.

Grading scale

A	= 462	C	= 362
A-	= 447	C-	= 347
B+	= 432	D+	= 332
B	= 412	D	= 312
B-	= 397	D-	= 297
C+	= 382	F	= 296 & below

* There are no made up exams except for documented excuses.

** The optional test can replace your lowest or missing test score.

Grade Postings

Grades will be posted by the last 5 digits of your student number. Please report any errors

Labs

Will be weather dependent. if it is not rainy. we will go out MOST lab PERIODS

Some collecting equipment can be checked out over the weekend with permission

Invertebrate collection

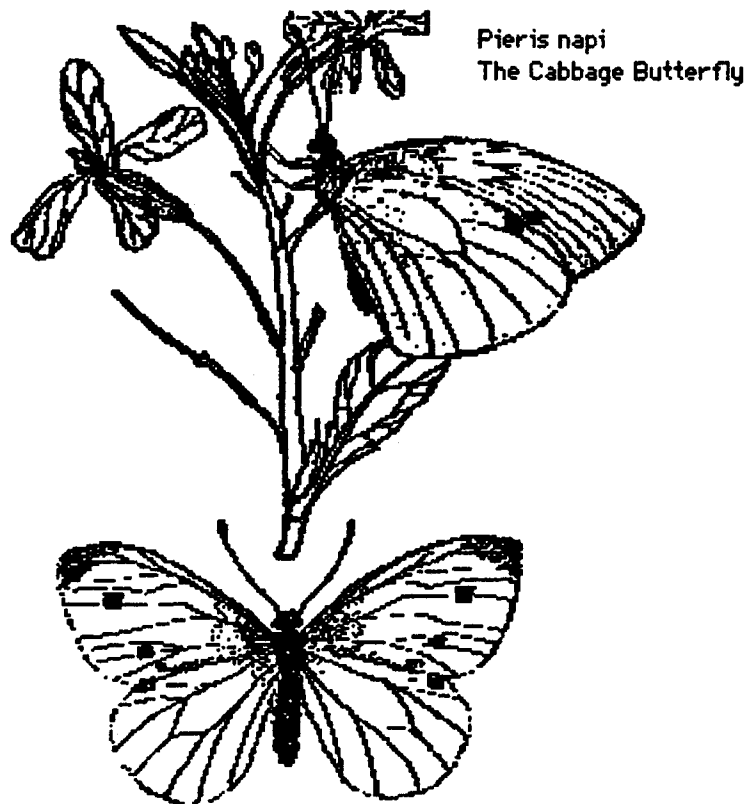
Each student is required to complete an invertebrate collection. There are a few endangered invertebrates in Michigan but we will avoid collecting in those habitats where they occur so we will not endanger them. The minimum collection needed for full credit is 50 families or orders depending on the key and group identified. Specimens must be macroscopic. Extra credit of 2 points for each additional correctly identified specimens over the 50 required is allowed with a maximum of 126 points. Misidentified specimens carry a 1 point penalty. Since there are over over 1,000,000 possible specimens out there, the possibilities are endless. Special collecting techniques will be discussed in lab.

Note: Since identification is the hardest part of the exercise, it is suggested that you begin collecting immediately and worry about identification later. We will be discussing identification of groups in lecture and in lab. Identification keys will be available in the lab for your use.

Lecture Outline and Test Schedule

chaps

May.	14	INTRODUCTION----PROTOZOA-----	1 & 2
	16	PORIFERA, CNIDARIA-----	3 & 4
	21	BILATERAL ANIMALS, PLATYHELMINTHS, ASCHELMINTHES	5,6, & 8
	23	<u>TEST 1/ Mollusca</u>	
	28	MOLLUSCA	11
June	30	ANNELIDA / INTRO TO ARTHROPODA	12
	4	CHELICERATA, CRUSTACEANS & MYRIAPODS	13,14 & 15
	6	<u>TEST 2/ Intro to insects</u>	
	11	INTRO to INSECTS & SELECT ORDER OF INSECTS	16
	13	INSECTS	16
	18	ECINODERMATA	18
	20	<u>TEST 3 / Review for final</u>	
	25	CUMULATIVE OPTIONAL FINAL	



Come to lab rain or shine. We will be outside unless the weather is dangerous (tornado, lightning, etc.). If the weather is horrendous, we will meet in the lab.

The prep room (SCI 217) will often be open for study purposes. If it is locked, Ella or I will open it for you.

Field Trip Etiquette: I have learned over the years that if you want to learn on a field trip, stay close to the instructor, severely limit conversation with your peers, and ask questions of the instructor. Any other behavior is detrimental to you and your fellow students.

Some Wednesday lecture and laboratory times will be switched so that we can travel to different habitats. You will be notified in lecture of changes.

Regularly Scheduled Field Trips: Note: This schedule is tentative and subject to change due to weather or other reasons.

Wednesday, May 18	Orientation (First hour will be indoors.) Lecture will be 1-3, instead of 10:30-12:20. Birds
Monday, May 23	Birds
Wednesday, May 25	Birds. We will be travelling to Ludington State Park
Monday, May 30	Fish
Wednesday, June 1	Howard Cristianson Nature Center
Monday, June 6	Fish
Wednesday, June 8	Allegan State Game Area or Kellogg Biological Station
Monday, June 13	Local for reptiles/amphibians
Wednesday, June 15	John Ball Park Zoo and Blandford Nature Center
Monday, June 20	Skin mammals, prepare specimens
Wednesday, June 22	Local
Monday, June 27	Final lab exam Cumulative quiz on specimen identification
Monday, June 27	Final Lecture Exam

PURPOSE

During the six-week period, the student will be introduced to the life history and ecological significance of common Michigan fish, amphibians, reptiles, birds, and mammals. The student will also learn identification characteristics of these animals both in the laboratory and in the field. Efforts will be made to relate classwork to actual teaching situations in a middle school or high school classroom. In essence, BIO 342 is a combination of four areas of study in vertebrate biology: ichthyology (study of fish), herpetology (study of reptiles and amphibians), ornithology (study of birds), and mammalogy (study of mammals). The student should keep in mind that in nature all organisms (plant and animal) have complex ecological relationships with one another and with their environment. Only biologists put organisms into separate, discrete categories.

MATERIALS NEEDED BY EACH STUDENT

1. Binoculars. The student should have a pair of binoculars as part of his professional responsibility, but if a pair is not available, the student may obtain a pair before field trips from Ella in the biology stockroom. The student is responsible for proper care of the instrument; if the binocular is damaged, the student will be charged replacement value. This charge must be paid before grades will be processed.
2. Insect repellent. This will be an excellent year for biting insects!
3. Field clothing. Most people learn from experience (not all of it pleasant) what is comfortable in the field. Dress accordingly.
4. Textbook. The textbooks for this course are:

Fishes of the Great Lakes by Hubbs and Lagler
Michigan Frogs, Toads, and Salamanders by Harding and Holman
Michigan Turtles and Lizzards by Harding and Holman
Michigan Snakes by Holman, et al.
Reptiles of North America by Smith and Brodie
An Audubon Handbook of Eastern Birds by Farrand
Michigan Mammals by Baker

All of these books may not be available at this time, as some may be temporarily out of print. The student may substitute the following:

How to Know the Freshwater Fishes by Eddy
Field Guide to the Freshwater Fishes by McClane
Field Guide to the Freshwater Fishes by Page and Burr
Guide to Reptiles and Amphibians by Tying
Amphibians of North America by Smith and Barlowe
Peterson's Field Guide to the Birds by Peterson
Birds of North America by Robbins, Bruun, and Zien
Birds of North America National Geographic Society
A Field Guide to the Mammals by Burt
The Mammals of Michigan by Burt

You will find that the library has many excellent reference books available in addition to these suggested titles.

WHAT IS REQUIRED OF EACH STUDENT

Each student must:

1. prepare a small mammal skin. Specimens should be obtained from fresh road kills or by trapping (see me first). The best mammal for the initial try at this experience are chipmunks, 13-lined ground squirrels, or red squirrels.
2. prepare one songbird specimen. Bird specimens will be supplied by the instructor.

TESTING AND GRADING PROCEDURES

1. Testing will be of two basic types: 1) identification quizzes
2) hourly exams.
2. There will be three hourly exams including the final. Exams will be given after the completion of each unit, i.e. birds, exam, fish, exam, etc. Exams will be of the matching, true/false, short answer variety.
3. Identification quizzes will be much more frequent and as needed. Identification quizzes will use slides, pictures and prepared specimens.
4. Extra credit. The student can obtain extra credit by preparing a reptile or amphibian specimen. The student will receive five points for each specimen, but only selected species are acceptable. See the instructor before you collect, as many reptiles are on the Michigan Species of Concern List and MAY NOT be collected.
5. Grades. To determine his/her grade for BIO 342, the student should total all the points accumulated for lecture exams, identification quizzes, special projects and extra credit. This should then be compared to the total points possible (all sources excluding extra credit). Divide your total points by the total points possible to get your percent of total points.

Percent of total points

100-96	=	A	76-74	=	C
95-90	=	A-	73-70	=	C-
89-87	=	B+	69-67	=	D+
86-84	=	B	66-64	=	D
83-80	=	B-	63-60	=	D
79-77	=	C+	59-below	=	F

Students whose scores fall on the borderline should be aware of Beetley's Fudge Factor. This is based on attendance, promptness, class participation, and attitude. Score high in these areas and your grade will go up. Score low and you stay where your point total falls.

ATTENDANCE

Most of the lecture material does not appear in the assigned text, so regular attendance is necessary if you want a good grade. Attendance in laboratory sessions is mandatory. If you miss a laboratory session, you must have a signed health excuse.

MAKE-UP

The student may make up missed lecture exams within three days if a proper medical excuse is presented. A missed identification quiz cannot be made up.

OFFICE HOURS: 8:00-10:30 Monday and Friday; unless otherwise notified

Since most of you are block scheduled, it may be difficult to find time to see me. For this reason, make an appointment first, or just drop in any time you see me in the office. I am teaching an environmental health block that will take up most of my afternoons and all day Tuesday and Thursday, so if you have an urgent problem, call to make sure I'm here. If necessary, I will make evening appointments. My office phone is 592-2548. My summer home phone is 867-3837. My office is in ~~661-222-0~~: *ASC 2015*.

HINTS

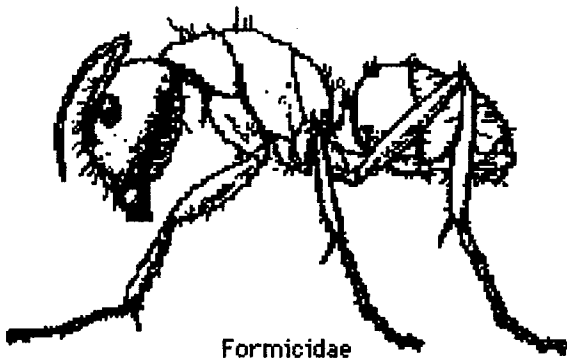
My intention is to make BIO 342 a challenging but fun course. We will spend as much time in the field as possible. If you have any physical disabilities that might hinder hiking, please let me know. Also, if you have serious allergies, please prepare yourself for outdoor activity (bee sting kit, hay fever shots). We will also spend considerable time in the water, so have a set of spare, dry, tennis shoes available. I'll let you know in advance when to bring them.

When collecting road kills, collect only fresh ones. Ripe animals smell, have maggots and maggot eggs in their fur, and their hair falls off easily. Try to avoid picking up dead raccoons for your study skin. They are quite difficult for a first-timer to prepare.

Included in the syllabus are some hints on how to prepare and maintain aquaria and terraria. These instructions should be very helpful for you in the future, since most young people prefer to look at live things instead of dead ones. Be aware, however, that recent rules governing the handling of vertebrates in enclosures of any kind may make the display of vertebrates (particularly warm-blooded ones) very difficult in the future. You may want to check with the DNR before you bring certain caged vertebrates to your classroom.

COLLECTING INFORMATION

Animal	Collection Devices	How to Kill	Fixative	Preservative
Fish	nets, seines hook & line	drop into full strength formalin	10% formalin	8% formalin
Frogs	nets, hands	drop into 80% alcohol	inject 5% formalin into body	5% formalin
Salamanders	hooks & line, nets, hands	drop into 80% alcohol	5% formalin	5% formalin
Reptiles	snare, nets, hands	drop into 70% alcohol	10% formalin	8% formalin (some injected into body cavity)
Birds	snare, shooting		freeze	study skin
Mammals	trap, shooting, road kill		freeze	study skin



Entomology Bio 344

Dr. P.L. Watson
Office 2007 ASC
592-2558

	<u>Time</u>	<u>Room</u>	<u>DAYS</u>
Lecture:	12 noon	214 Science	Mon., Wed., Thur.
Lab:	2-> 5	202 Science	Tuesday

Books required
Fundamentals of Entomology by R.J. Elzinga
Entomology Lab Book by Watson

Course Requirements

3 lecture tests * @ 100 pts each	= 300 pts
1 Insect Collection @ 100 pts	= 100 pts.
2 lab practicals @ 50 pts each	= 100 pts.
1 <u>optional final</u> ** @ 100 pts.	= (100pts.)
	<hr/>
	= 500 pts.

Grading scale

A = 462	C = 362
A- = 447	C- = 347
B+ = 432	D+ = 332
B = 412	D = 312
B- = 397	D- = 297
C+ = 382	F = 296 & below

- * There are no made up exams except for documented excuses.
 ** The optional test can replace your lowest or missing test score.

Grade Postings Grades will be posted (2007 ASC) by the last 5 digits of your student number. Please report any errors .

Labs

Will be weather dependent, if it is not rainy, we will go out the first 5 labs where-collecting techniques will be discussed and used.

Insect Collection

Each student is required to **complete** an entomology collection. There are only five endangered insects in Michigan and they are spring species, so we are not endangering any wildlife. The minimum collection needed for full credit is 50 families. Extra credit of 2 points for each additional over 50 is allowed with a maximum of 150 points. Misidentified specimens carry a 1 point penalty. Aquatic immatures can be used for up to 10 specimens. Since there are over 1,000,000 possible specimens out there, the possibilities are endless. Special collecting techniques will be discussed in lab.

note: Since weather changes quickly in the fall, it is suggested that you begin collecting immediately and worry about identification later.

Lecture Outline and Test Schedule **chaps**

Introduction		
Arthropod diversity	-----	1
External Anatomy	-----	2
External Anatomy	-----	2
Internal Anatomy	-----	3
Post embryonic development	-----	4
Test 1		
Ecological Relationships	-----	5
Population Dynamics	-----	5
Behavior	-----	6
Mimicry & deception	-----	6
Social relationships	-----	7
Parasitism	-----	8
Pollination & Herbivory	-----	9
Insects & vertebrates	-----	9
Insect control & environmental concerns	---	9
Test 2		
Classification	-----	10
Protura -> Ephemeroptera	-----	10
Odonata -> Dermaptera	-----	10
Plecoptera -> Thysanoptera	-----	10
Hemiptera -> Neuroptera	-----	10
Coleoptera	-----	10
Hymenoptera	-----	10
Mecoptera -> Tricoptera	-----	10
Lepidoptera	-----	10
Siphonaptera -> Diptera	-----	10
Test 3		
Cumulative review		
Cumulative Final		

BIOL 347
Environmental Conservation
Fall Semester 1995
Course Perspectus

- I. How do I contact my teacher, Professor David A. Stewart?
- A. Phone: 592-2543, Extension 2543
 - B. My office is Science 223F. My office hours this semester are:
 - Monday: 9-10
 - Wednesday: 10-12
 - Thursday: 12-1
 - Friday: 9-10
 - C. You can also make appointments with me or leave a message on my answering service. I'll get back to you. You may step into my office anytime the door is open.
- II. Do we buy a textbook?
- A. Yes, NATURAL RESOURCE CONSERVATION, by Owen and Chiras.
 - B. You should read the assignments as we proceed. Be advised that some of the lecture topics involve more reading from the text than others. Budget your time accordingly.
 - C. You will need four SCANTRON sheets, unfolded and unwrinkled.
- III. How will I be graded?
- A. You will be graded fairly.
 - B. There will be four announced, written tests, each assigned 100 points. They will consist of questions from lectures, labs, and reading assignments. The final exam will consist of four units, each unit recapitulating the four lecture units. If you miss one or two lecture exams they will be made up by using the score for that unit from the final exam. If you miss more than two exams failure for the course will result.
 - C. Each student will be required to write field reports based on data or other information their small group obtains from field projects. The field projects will collectively be awarded a maximum of 200 points. Course failure will result if more than three laboratory sessions are missed. Each laboratory missed will receive points

equal to the average of the remaining attended sessions.

D. Your total points, converted to a percentage, will determine your final grade based on the following scale:

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

IV. What are the objectives of the course?

- A. I want students to gain in appreciation of the fragility and resilience of the natural environment.
- B. I want students to gain in appreciation of what it takes to collect, analyze, and report data from field work.
- C. I want my students to consider the notion that we are part of the natural environment, and not just subduers of it. We do not own the earth, it owns us.
- D. The student should gain in appreciation of the importance of our natural resources and consider ways to conserve them.
- E. Students should be able to apply laws of biology to the current human situation.
- F. I want to provide a forum for student expression of individual opinions about the direction we should take in relating to issues of the environment. Student participation is important. All questions or comments are of highest value.
- G. Students should gain in scientific writing skills and critical thinking.
- H. Students should approach their studies wholistically, drawing and processing information from across discipline lines, pursuant to problem solving.

V. Is there an attendance policy?

- A. Yes, there is.
- B. Prompt attendance to all lectures and labs is expected and required.
- C. More than three missed labs or five lectures results in course failure. I have tried, but I cannot relate to "phantom" students.

VI. Do not present as your own the work of another.

BIOL 347
 Environmental Conservation
 Lecture Schedule
 Fall Semester 1995

DATE	TOPIC	CHAPTER
Aug. 29	Historical Considerations	1
31	Biogeochemical Cycles	3
Sep. 5	Energy Flow through Ecosystems	3
7	Other Ecological Laws	3
12	Biomes	3
14	Human Population Dynamics	4
19	Exam #1	
Sep. 21	The Nature of Soils	5
26	Conservation Management of Soils	6
28	Feeding the Planet	7
Oct. 3	Use and Movement of Water	8
5	Eutrophication	9
10	Toxic Water Pollution	9
12	Exam #2	
Oct. 17	Freshwater Fisheries Management	10
19	Forest Management	13
24	Wildlife Extinctions	14
26	Wildlife Management	15
31	Chemical Control of Pests	16
Nov. 2	Biological Control of Pests	16
7	Waste Management	17
9	Exam #3	
Nov. 14	Air Pollution Sources	18
16	Air pollution Effects	18
21	Air Pollution-Global Problems	19
28	Biological Effects of using Fossil Fuels	21
30	Alternate Sources of Energy	21
5	Creating a Sustainable Syster	22
7	Exam #4	

BIOL 347
Environmental Conservation
Laboratory - Field Trip Schedule
Fall Semester 1995

DATE	TOPIC
Aug. 28	Water Quality Project Design
Sep. 4	Labor- Day - No Classes
Sep. 11	Macroinvertebrate Sampling
Sep. 18	Processing Species Diversity
Sep. 25	Dissolved Gases Measurements
Oct. 2	Nutrient Sampling
Oct. 9	River Flow Analysis
Oct. 16	Biological Oxygen Demand
Oct. 23	Water Quality Analysis, Discussion, Conclusions
Oct. 30	Wildlife Management - Deer
Nov. 6	Soil Conservation
Nov. 13	Biological Effects of Acid Rain
Nov. 20	Nova on Seed Banks
Nov. 27	Nova on Coastal Pollution
Dec. 4	Pending

NOTE: While the above schedule is a good approximation of what we will do, there will be some variations due to weather, speaker availability, student progress, etc.

BIOL 349: MEDICAL PARASITOLOGY
Dr. Adewusi

Winter 1994

PREREQUISITE: One year of college biology

COURSE OBJECTIVES

At the completion of this course the student should be able to demonstrate an understanding of:

1. the basic concepts of parasitology
2. the major types of medically important parasites
3. the control, treatment, and identification of medically important parasites

TEXTBOOK: Human Parasitology by Bogitsh & Cheng, W.B. Saunders Co.
Medical Parasitology: Lecture Guide and Laboratory Manual for BIOL 349,
by Olukemi Adewusi, purchase at the Biology Office

COURSE REQUIREMENTS:

Lecture

Prompt attendance to all lectures is required and expected. If you miss a lecture, you are responsible for the contents and assignments made during lecture. Please ask questions at any time during the lectures.

LABORATORY: Attendance in lab is mandatory.

Exams

There will be three (3) lecture exams, six lab quizzes and one lab exam. Exam dates will be announced later. Examination questions will be taken from the contents of the lectures, textbook and class handouts. Laboratory quizzes will be mostly identification and life cycles. Laboratory examination is open-book and comprehensive. You must take the exams at the designated time. Make-up exams will be given only after a valid excuse has been provided; these exams may be more difficult. There will be no make-up lab quizzes.

Grades: Students will be graded on a curve, however, letter grades will be assigned according to the standard protocol.

INSTRUCTOR: Dr. Kemi Adewusi
Biology 223D

Telephone: 592-2545 (NO HOME CALLS, PLEASE)

Office Hours: Monday 9:00-11:00
Tuesday 3:00- 4:00
Friday 11:00-12:00

MEDICAL PARASITOLOGY

Lecture Schedule

I. The Nature of Parasitism

II. Survey of Parasitic Nematodes

- A. Intestinal nematodes infective in the egg stage
- B. Intestinal nematodes infective in the larval stage
- C. Blood and tissue dwelling nematodes

III. Survey of Parasitic Cestodes

- A. Intestinal cestodes
- B. Tissue cestodes

IV. Survey of Parasitic Trematodes

- A. Trematodes infective in metacercarial stage
- B. Trematodes infective in cercarial stage

V. Survey of Parasitic Protozoans

A. Intestinal and Atrial Protozoans

Sarcodina
Mastigophora
Ciliophora

B. Blood and Tissue Protozoans

Mastigophora
Sporozoa

LABORATORY SCHEDULE

DATE	
Jan. 12	The Microscope
Jan. 14, 19	Diagnostic Procedures
Jan. 21, 26	<i>Enterobius vermicularis</i> <i>Trichuris trichiura</i> <i>Necator americanus</i> and <i>A. caninum</i> <i>Trichinella spiralis</i> <i>Wuchereria bancrofti</i>
Jan. 28	Quiz 1 (nematodes)
Feb. 2, 4, 9	<i>Hymenolepis nana</i> <i>Hymenolepis diminuta</i> <i>Dipylidium caninum</i> <i>Taenia solium</i> <i>Taenia saginata</i> <i>Diphyllobothrium latum</i> <i>Echinococcus granulosus</i>
Feb. 11	Quiz #2 (cestodes)
Feb. 16, 18, 23	<i>Schistosoma japonicum</i> , <i>S. mansoni</i> , <i>S. haematobium</i> <i>Fasciola hepatica</i> <i>Clonorchis sinensis</i> <i>Paragonimus westermani</i>
Feb. 25	Quiz #3 (trematodes)
March 2, 4, 6	<i>Entamoeba histolytica</i> <i>Entamoeba coli</i> <i>Balantidium coli</i> <i>Giardia lamblia</i> <i>Chilomastix mesnili</i> <i>Trichomonas vaginalis</i>
March 18	Quiz #4 (protozoans)
March 23, 25, 30	Trypanosomes <i>Leishmania</i> <i>Plasmodium</i>
April 6	Quiz #5 (protozoans)
April 13, 15	Parasite Identification
	Laboratory Final Examination (Cummulative)

BIO 349 - MEDICAL PARASITOLOGY

I. CATALOG DESCRIPTION:

4 Cr.

The basic concepts of parasitology with emphasis on the major types of medically important parasites. Includes life cycle, diagnosis, treatment, immunity and control. Laboratory stresses identification of the various developmental stages of these parasites. 3 + 2 + 1

Prerequisite: BIO 122 or Consent of Instructor

II. STATEMENT OF OBJECTIVES:

The student will:

1. learn the basic concepts of parasitology including the terminology.
2. learn the basic immune responses to some medically important parasites.
3. develop writing skills.
4. develop laboratory skills which will improve their observational powers.

Biol 351 Field Botany

Course: Biol 351 Field Botany 3 credits

Instructor: Prof. John Vanderploeg

Office: Science 223-B Phone 592-2547

Office Hours: 10-10:50 M-W

Lecture 8-9:50 M-W
8-8:50 Tu

Lab 9-11:50 Tu.-Th
12-2:50 Tu.

Course Objectives: To make the student aware of and familiar with the woody and herbaceous vascular plant materials that are common in our area. Through the utilization of taxonomic keys, observation and instruction, students will learn to recognize trees, shrubs, weeds and wildflowers that represent various plant families. This information will make the student more aware of the role plants play in our environment. Students will be better prepared to make decisions about our environment through increased knowledge, critical reading and thinking and the ability to search out this knowledge.

Textbook: Newcomb's Wildflower Guide by Lawrence Newcomb Little, Brown Publishers Various optional texts.

Grading Policy: (Tentative, subject to change)
Points Possible

Identification	225
(dates to be determined)	
Characteristics	150
Herbarium Collection	100
	475

The identification exams will require field and/or lab identification of trees, shrubs, weeds and wildflowers. The characteristics exams will cover lectures that cover plant anatomy and the characteristics of specific plant families. The herbarium collection requirements are described on an attached page.

The grading scale will be as follows:

94-100% - A	80-82% - B-	67-69% - D+
90-93% - A-	77-79% - C+	63-66% - D
87-89% - B+	73-76% - C	60-62% - D-
83-86% - B	70-72% - C-	< 60% - F

Attendance Policy: You are expected to be at every lecture and lab. Be prepared to begin at the appointed time. Your failure to attend will seriously affect your abilities to do well in this course. Since tardiness is disruptive, please be on time.

If you miss any exam or quiz, you have the option to make it up only if you have a medical doctors statement or have a pre-approved excused absence. Early finals will not be provided.

Since the number of weeks that we meet is limited, it is our goal to go outside for most labs. Be sure that you dress appropriate for the weather.

Student Conduct Policy: It is the instructors intent to provide an atmosphere that is conducive to learning. Students should involve themselves in the lecture and lab discussions. In field courses it is critical to remain together and within close proximity of the instructor. It is important that you are attentive in class. No sleeping, rude, disruptive or combative behavior will be tolerated. Student academic misconduct will not be tolerated. Cheating on exams will result in a zero for that exam and a failing grade in the course.

**BIOLOGY 353 PLANT PHYSIOLOGY
FALL 1993**

Instructor: Mr. Michael Hendricks
Office: 223B Science Building Phone: 592-2547
Lecture: 2:00 - 2:50pm Monday, Thursday
Lab Hours: Monday 11:00 - 12:50 Room 202
Office Hours: Monday 9:05 - 10:05
Tuesday 12:0 - 1:00
Wednesday 10:05 - 11:05
Friday 9:05 - 10:05
Also by appointment.

TEXTBOOKS: Plant Structure and Function Sixth Edition.
C. Starr and R. Taggart
Plant Physiology L. Taiz and E. Zeiger

Some Scientific American articles by various authors.

No lab manual is required all lab exercises will be given out prior to the lab period.

Grade for the course will be based on four hour exams and lab grade. Hour exams will be over materials covered in lecture, lab, and from various readings.

Lab grade will be based on class participation, attendance and lab reports. Each week we will carry out a number of experiments/observations examining various aspects of plant physiology. You will be required to hand in four lab reports. Each lab report will be worth 25 pts towards your lab grade. For three of the four lab reports you will be able to choose from those lab exercises conducted prior to the due date. Each student is to write up the lab report on mineral nutrition .

Due dates for lab reports are as follows:

October 1, 1993
October 29, 1993
November 19, 1993
December 10, 1993

The format to be used for the lab report is similar to that of all scientific papers and is as follows:

Purpose: State the purpose of the exercise in a clear and precise manner. What are you trying to show, what hypothesis are you basing your experiment on? Explain the background behind the experiment what others may have done or found to support your experiment.

Materials and Methods: List all materials and techniques used to carry out the experiments. Especially note where the procedures you performed deviates from the instructions given in the lab handout (this may help explain your results later).

Results: Tell what happened. What observations, measurements did you take. For long term experiments observations should be made at least on a weekly basis. Results may be expressed in a variety of ways charts, graphs, figures, or written.

Conclusions: What did you determine from the experiment. (Conclusions are not just simply restating the observations made). What did you determine about your original hypothesis? Your conclusions need to be supported by your data, but provide the only place in a scientific paper where you can be creative and speculate (as long as you can support what you say by the data). All lab reports are worth ten points and are a considerable contribution to your lab grade and your overall course grade.

Each lab report should be researched in the library, using the information to help develop your hypothesis, support your observations, and to help formulate your conclusions.

GRADING SCALE FOR THE COURSE

A	100 - 96%	B	85 - 83%	C	75 - 73%	D	65 - 63%
A-	95 - 90%	B-	82 - 80%	C-	72 - 70%	D-	62 - 60%
B+	89 - 86%	C+	79 - 76%	D+	69 - 66%	F	< 60%

Because I like to give questions which require though (and usually some writing) all exams will be given during a scheduled lab period.

EXAM SCHEDULE (TENTATIVE)

EXAM I	OCTOBER 1, 1993
EXAM II	OCTOBER 29, 1993
EXAM III	NOVEMBER 19, 1993
EXAM IV	DECEMBER 15, 1993

TENTATIVE LAB SCHEDULE

DATE	TOPIC
9/3	How to Write a Scientific Paper
9/10	Plant Cell/Cell Wall
9/17	Anatomy
9/24	Mineral Nutrition
10/1	Exam I
10/8	Water Relations/Movement
10/15	Aseptic Culture (Tissue Culture)
10/22	Pigment Extraction
10/29	Exam II
11/5	Photosynthesis
11/12	Starch Isolation
11/19	Stress Physiology
11/26	TBA
12/3	TBA
12/10	Phytochrome

TENTATIVE TOPIC SCHEDULE

DATE	TOPIC	CHAPTER
Aug. 29	Introduction Class Survey	
Sept. 1	Plant and Cell Architecture	T1 *
3	Plant and Cell Architecture	T1
8	Plant Tissues	S27 **
10	Plant Tissues	S27
13	Plant Shoots	S27
15	Plant Shoots	S27
17	Plant Roots	S27
20	Plant Roots	S27
22	Woody Plants	S27
24	Woody Plants	S27
27	Plant Reproduction	S29
29	Plant Reproduction	S29
Oct. 1	Water and Plant Cells	S28 T3
4	Water and Plant Cells	S28 T3
6	Water Balance	S28 T4
8	Water Balance	S28 T4
11	Mineral Nutrition	S28 T5
13	Mineral Nutrition	S28 T5
15	Assimilation of Mineral Nutrients	T12
18	Assimilation of Mineral Nutrients	T12
20	Assimilation of Mineral Nutrients	T12
22	Stress Physiology	T14
25	Stress Physiology	T14
27	Stress Physiology	T14
29	Photosynthesis: The Light Reactions	T8
Nov. 1	Photosynthesis: The Light Reactions	T8
3	Photosynthesis: The Light Reactions	T8
5	Photosynthesis: Carbon Metabolism	T9
8	Photosynthesis: Carbon Metabolism	T9
10	Photo: Phy. and Eco. Considerationd	T10
12	Respiration and Lipid Metabolism	T11
15	Respiration and Lipid Metabolism	T11
17	Respiration and Lipid Metabolism	T11
19	Auxins: Growth and Tropisms	T16
22	Auxins: Growth and Tropisms	T16
24	Auxins: Growth and Tropisms	T16
26	No Class	
29	Gibberellins	T17
Dec. 1	Gibberellins/Cytokinins	T17/T18
3	Cytokinins	T18
6	Ethylene and Abscisic Acid	T19
8	Phytochrome Photomorphogenesis	T20/T21
10	Phytochrome Photomorphogenesis	T20/T21

* Indicates the textbook Plant Physiology by Taiz and Zeigler.

** Indicates the textbook Plant Structure and Function by Starr and Taggart.

COURSE SYLLABUS
DEVELOPMENTAL BIOLOGY
BIOL 370
WINTER SEMESTER 1997

CATALOGUE LISTING:

A study of the fundamental principles of development and the mechanisms responsible. An examination of the morphological changes which occur during development in vertebrates. Designed for students in science bachelor's degree programs. Prerequisite:BIOL 122 Semester offered: W

FACULTY INFORMATION:

Instructor: Dr. Jack Buss
Office: 2009 Arts and Sciences Commons
Telephone: 592-5639
e-mail JBUSS@ART01.FERRIS.EDU
Office hours: Tuesday: 12:00pm-2:00pm
Thursday: 12:00am-2:00pm

MAJOR OBJECTIVES OF THE COURSE:

Upon completion of this course:

1. The student will demonstrate a knowledge of anatomical terminology and of vertebrate anatomical structure.
2. The student will demonstrate knowledge concerning the relationships between developmental events and the definitive adult structure.
3. The student will demonstrate a knowledge of experimental design.
4. The student will demonstrate an understanding of the basic concepts regarding the control of developmental events.

COURSE FORMAT:

The study of development not only attempts to answer the question "Where did I come from?" but also, "Why am I like I am?" The members of the class will be organized into discussion groups which, using the text as a basis, will explore the basic concepts of embryonic development. These discussion groups will explore not only the morphological changes which occur during development, but also the mechanisms responsible for these changes. Particular emphasis will be placed on the experimental framework upon which our understanding of developmental processes is based. The laboratory will focus primarily on the morphological changes which take place during development. On occasion, living materials will be used to observe these processes.

It is important that you attend every class session, read the textbook and laboratory manual assignments in advance, and review course material on a daily basis. Many studies have shown that class attendance is one of the most important factors in obtaining academic success.

As a student in this course, you should recognize that embryonic development is complex and that numerous new terms and concepts will be introduced during this semester. If for some reason you find that you are having problems with the material covered in discussions or in the laboratory, please do not hesitate to ask your instructor for assistance. It is not uncommon for a student to feel overwhelmed by the volume of information presented in this course, however, with diligent effort, the seemingly unrelated concepts will fall together into a coherent pattern and the study of development will become a fascinating and rewarding endeavor.

TEXTS:

Carlson, B.M., Patten's Foundations of Embryology, McGraw-Hill, Inc., 1996
 Schoenwolf, G.C., Laboratory Studies of Vertebrae and Invertebrate Embryos, 7th ed., Prentice Hall, 1995.

EXAMINATIONS AND QUIZZES:

Three unit examinations based on the discussion topics and three laboratory examinations will be given during the course of the semester. The dates of these exams are listed in the course schedule.

Each unit exam score will be converted to a percentage and account for 100 points in the course. A written final examination will be given during finals week. This exam will consist primarily of questions taken from previous exams and quizzes. The score on the final examination will be converted to a percentage and account for 200 points. Laboratory practical examinations will consist primarily of identification of embryonic structures and demonstration of a knowledge of their function and relationship to adult structures. Each laboratory exam score will be converted to percentage and will account for 100 points. The total possible points for discussion exams, laboratory exams, and the final exam is 800 points.

Quizzes will be given in most discussion periods. These will normally account for 9 points each for a total of approximately 360 points. The quiz will consist of two parts. The individual quiz will focus on terminology and definitions. The individual quizzes will typically consist of five questions that require one or two word answers and will be worth 5 points. The group quiz will focus on concepts, relationships, mechanisms, and developmental implications of the material presented in the reading. Group quizzes will consist of 1 to 3 questions and will be in the short essay or diagram format. The group quiz will be worth 4 points. For each quiz the student will receive a score that is equal to the sum of the his or her individual quiz score and the group quiz score. However, the group quiz score for an individual may be lowered if the other members of the group and the instructor determine that the contribution of that individual to the group effort is not adequate.

If a student has an unexcused absence, the student will receive a 0 for the quiz that day. If the student must miss class for a reason acceptable to the instructor, the quiz may be taken ahead of time. The student will take the both the individual and group quizzes as an individual. A copy of that students' group quiz answers will given to the other members of the group during the time they take the group quiz.

Points may be awarded for other activities such as outside written assignments and evaluation of individual performance in group discussions. The points for such activities will be added to the total possible for the course.

All points accumulated during the semester will be totaled, converted to percentage and the course grade assigned will be based on the scale listed below. The instructor will not raise the following standards but retains the option to lower the standard required to achieve a particular grade.

GRADING SCALE:

92 - 100 = A	72 - 77.9 = C
90 - 91.9 = A-	70 - 71.9 = C-
88 - 89.9 = B+	68 - 70.9 = D+
82 - 87.9 = B	62 - 67.9 = D
78 - 80.9 = B-	60 - 61.9 = D-
78 - 80.9 = C+	Below 60 = F

OTHER POLICIES:

Students are responsible for any assignments made during the class session whether they are in attendance or not. If you must miss a class, please notify the instructor in advance if possible.

Unexcused absences will result in the loss of points.

For an absence to be excused, the student's name must appear on a memo from the office of the Vice-President of Academic Affairs (e.g. field trip, sporting event, concert tour) or on a memo from the Associate Dean of Students of the College of Arts and Sciences explaining the reason for the absence. The instructor reserves the right to excuse an absence if the reason is justified.

Make up of unit exams is permitted only in cases of an excused absence. Prior notification must be given to the instructor if it is necessary to miss a unit exam. Failure to do so may result in point deduction from the total achieved on the exam.

Only in cases of extreme emergency will a student be allowed to make up a laboratory examination. In cases in which the absence from a laboratory exam is considered justified by the instructor, a different exam, typically more difficult and in the form of an oral examination will be given.

Discussion group quizzes and in-class assignments may not be made up unless the absence is excused.

It is expected that each student will come to the laboratory session prepared to maximize his/her learning experience. This can only be accomplished by reading the laboratory materials and studying the appropriate illustrations in the laboratory text prior to the start of the laboratory session.

Out of class writing assignments must be submitted on the due date. Failure to do so may result a zero on the assignment or a significant point deduction from the total achieved.

It is a University policy that children are not permitted in the laboratories.

**CLASS SCHEDULE
DEVELOPMENTAL BIOLOGY**

BIOL 370
WINTER SEMESTER 1997

Month	Date	Topic	Text	Pages	
Jan	13	Introduction			
	14	33 hour chick embryo whole mount	S*	027-030	
	15	Historical Background	C**	001-008	
	16	33 hour chick embryo serial x.s.	S	020-041	
	17	The Cell and Its Environment		009-020	
	20	No Class - Martin Luther King Birthday			
	21	33 hour chick embryo serial x.s.	S	034-037	
	22	Fundamental Concepts in Development	C	020-030	
	23	33 hour chick embryo serial x.s.	S	034-037	
	24	Fundamental Concepts in Development	C	030-041	
	27	Methods in the Study of Embryonic Development	C	041-056	
	28	33 hour chick embryo serial sag.s.	S	037-039	
	29	Reproductive Organs	C	057-063	
	30	Embryo recovery - 33 hour chick.	S	053-054	
	31	The Sexual Cycle		064-073	
	Feb	03	Gametogenesis	C	075-085
		04	Grasshopper testis		
05		EXAMINATION I			
06		Frog ovary			
07		Spermatogenesis	C	085-094	
10		Oogenesis	C	094-103	
11		4 mm frog embryo sections			
12		Gene Expression	C	103-113	
13		LABORATORY EXAMINATION I			
14		Accessory Membranes	C	113-120	

*Schoenwolf, G.C., Laboratory Studies of Vertebrate and Invertebrate Embryos, 7th ed., Prentice-Hall, 1995

**Carlson, B.M., Patten's Foundations of Embryology, 6th edition, McGraw-Hill, Inc, 1996

Month	Date	Topic	Text	Pages
Feb	17	Invertebrate Fertilization	C	121-131
	18	Ascaris fertilization		
	19	Mammalian Fertilization	C	131-141
	20	Sea Urchin cleavage and gastrulation		
	21	Sex Determination and Polarity	C	141-149
	24	Invertebrate Cleavage	C	151-161
	25	18 hour chick embryo	S	039-049
	26	Amphibian and Mammalian Cleavage	C	161-175
	27	24-hour chick embryo	S	050-053
	28	Sex Determination and Polarity	C	175-188
Mar	10	Gastrulation	C	189-204
	11	48-hour chick embryo whole mount	S	067-069
	12	Gastrulation in Birds	C	204-218
	13	48 hour chick embryo serial x.s.	S	072-078
	14	Germ Layer Origin; Neural Induction	C	218-232
	17	Neurulation in Amphibians	C	232-240
	18	48 hour chick embryo serial x.s.	S	072-078
	19	Mesoderm and Axial Structures	C	240-254
	20	48 hour chick embryo serial x.s.	S	072-078
	21	The Mammalian Body Plan	C	291-310
	24	Cell diversity	C	311-320
	25	48 hour chick embryo serial x.s.	S	072-078
	26	EXAMINATION II	C	
	27	Easter Recess	S	
28	Easter Recess			
Apr	31	Gene Expression; Muscle Formation	C	320-328
	01	48 hour chick embryo serial sag.s.	S	078-079
	02	Muscle Formation	C	329-338
	03	Embryo recovery - 48 hour chick.	S	069-070
	04	Formation of Skeletal Tissue	C	339-353
Apr	07	Skin Formation	C	355-365
	08	LABORATORY EXAMINATION II		
	09	Tissue Interactions in Skin Formation	C	365-375
	10	72 hour chick embryo whole mount	S	082-083
	11	Epidermal Differentiation and Pigmentation	C	375-391

Month	Date	Topic	Text	Pages
Apr	14	Establishment of the Nervous System	C	427-438
	15	72 hour chick embryo serial x.s.	S	085-089
	16	Organization of the Nervous System	C	438-451
	17	72 hour chick embryo serial x.s.	S	085-089
	18	Peripheral Nerves	C	451-467
	21	The Neural Crest	C	469-484
	22	72 hour chick embryo serial x.s.	S	085-089
	23	The Eye	C	485-495
	24	72 hour chick embryo serial x.s.	S	085-089
	25	EXAMINATION III		
	28	The Eye	C	496-505
	29	72 hour chick embryo serial sag.s.	S	089-090
	30	The Ear	C	505-512
	01	LABORATORY EXAMINATION III		
May	02	Development of the Face and Jaws	C	513-519
May	08	FINAL EXAMINATION		

BIOLOGY 373: Cell Biology

INSTRUCTOR: Dr. Kemi Adewusi

SCI 223D

Telephone: 592-2545 If on campus dial 2545 NO HOME CALLS

Office hours: Monday 9:00 - 11:00 am

Wednesday 1:30 - 2:30 pm

Friday 9:00 - 11:00 am And by appointment.

PRE-REQUISITES: One year of college biology and CHM 124 or equivalent.

COURSE OBJECTIVES

AT THE COMPLETION OF THIS COURSE THE STUDENT SHOULD:

1. be able to demonstrate an understanding of the selected principles and theories of cell biology.
2. understand the structure-function relationship of components of prokaryotic and eukaryotic cells.
3. understand the basic techniques used in cell and molecular research.
4. be able to solve some basic problems in cellular biology.
5. express their knowledge of cell biology both orally and in writing.

TEXTBOOK: The World of the Cell, 2nd Ed., by Wayne Becker & David Deamer

(1991) Benjamin\Cummings Publishing Co., Inc.

A Lecture Guide for BIO 400, Dr. Adewusi (Great Lakes bookstore)

EXAMINATIONS: There will be four (4) cumulative exams. Examination questions will be taken from the content of the textbook, the lectures and class handout material. Failure to take a scheduled examination at the appointed time without valid reason will result in a grade of zero. A make-up exam will be given to students with valid reasons for missing the scheduled exam, after the student has submitted a typewritten explanation for missing the exam. The explanation must be submitted within 2 weeks of the missed exam. An explanation submitted after the two-week period is late and as such unacceptable, resulting in a grade of zero for that exam. Students may review their examinations up to two weeks after the exam was given. After this period, the exams will no longer be available for viewing. Lecture exams will cover three areas: memory, comprehension and application of the subject matter.

GRADES: Your grade in this course will be based on three components:

60% Four cumulative exams (10%, 10%, 15%, 25%)

10% Class quizzes

30% Homework and group projects

Letter grades will be assigned according to the standard protocol (A, A- etc.)

CHEATING: Cheating will not be tolerated and will be reported to the Dean for disciplinary action. (See Honesty Policy).

ATTENDANCE: Although roll will not be taken, students are responsible for lecture content and for any assignments made during the lecture.

Topics	Chapter
Preview of the Cell	1
Chemistry of the Cell	2
Biological Molecules	3
Cells and Organelles	4
EXAM I (CHPS. 1-4)	
Bioenergetics	5
Enzymes	6
Membranes	7
Transport System	8, 9
EXAM II (CHPS. 1-9)	
Energy Conversion: Anaerobic Option	10
Energy Conversion: Anaerobic Option	11
Photosynthesis	12
Information Flow	13, 14
EXAM III (CHPS. 1-14)	
Protein Synthesis	16
Regulation of Gene Expression	17
EXAM IV (CHPS. 1-17)	

BIOL 375 Principles of Genetics
Winter 1997

Instructor: Dr. Mary R. Murnik
Office: ASC 2120
Telephone: 592-2546
Office Hours: W-F 8:00-8:50 am
W 11-11:50am, 2-2:50pm

I am usually in my office when I am not in class and would be happy to see you.

Course Objectives: BIOL 375 introduces genetics to students who are science majors. The purpose of this course is to increase your understanding of the mechanisms of the transmission and expression of genetic information. You will gain factual knowledge about genetics and learn to apply genetic principles and concepts. After completion of this course, you should have a good understanding of inheritance patterns and the molecular mechanisms by which genes control cell metabolism, growth and differentiation, and the evolutionary implications of genes in populations. Problem solving and critical thinking are emphasized.

Prerequisites: Biology 122 or equivalent and a course in biological chemistry

Attendance and Participation: Attendance and participation at all lectures is required. If you miss a lecture, it is your responsibility to obtain information which was presented. You are expected to read assigned material in the text and lecture guide before class and to do assigned problems. Lectures will not repeat all assigned readings and problems.

Texts: Genetics, Weaver and Hedrick, Wm. C. Brown, Publishers, third edition, 1995 (including cytoplasmic inheritance supplement)
Genetics: A Lecture Guide for BIOL 375, Mary R. Murnik, 1995. available only at Great Lakes Book and Supply

Grades: There will be 10 unannounced quizzes, four scheduled tests and a final examination. The final is optional for those who have earned at least 70% on the four scheduled tests. The grading scale is:

A	93% and above	C	73-76%
A-	90-92%	C-	70-72%
B+	87-89%	D+	67-69%
B	83-86%	D	63-66%
B-	80-82%	D-	60-62%
C+	77-79%	F	below 60%

Make-Up Tests: Make-up tests will be offered only to students with documentation for valid reasons for missing the regular exam (e.g. illness, death in the family). There are no make-up quizzes. Any quiz grade may be replaced by a four page review paper which considers a genetics topic assigned by the instructor. The required format for a paper is on the last page of this syllabus. These papers must be turned in by April 19. None will be accepted after that date.

Cheating: The FSU policy on cheating is described in the Student Handbook. Cheating on a test or quiz usually results in automatic failure in the course. If a grade of zero is given as a penalty for cheating on a quiz, this grade may not be replaced by a paper.

Help: Dr. Murnik will be happy to help you during regular office hours (listed above) or during any other available time. You are also encouraged to attend the scheduled tutoring sessions, which will be announced the first week of class.

Quiz Replacement Paper

There are no make-up quizzes. Any quiz grade may be replaced by a four-page review paper which considers a topic in genetics assigned by the instructor. These papers are due on April 24. None will be accepted after that date.

The paper should be typewritten, double-spaced, and contain:

1. A title page with title, course, name and date
2. A body of at least four pages with three sections
 - a. introduction
 - b. discussion
 - c. summary
3. Reference list
 - a. At least two references should be cited.
 - b. List the references by number, with the first article being cited as #1.
 - c. Cite your references by their numbers within the body of the paper. If all the information in a paragraph can be attributed to one reference, you may just give the reference number at the end of the paragraph.

Lecture Schedule

Date

Jan. 13	Introduction to Mendelian Genetics
Jan. 15, 17	Probability and the Chi-Square Test
Jan. 20, 22, 24	Independent Assortment and Modification of Mendelian Ratios
Jan. 27, 29	Sex Linkage and Pedigree Analysis
Jan. 31, Feb. 3	Polygenic Inheritance and Quantitative Traits
Feb. 5	Mitosis and Meiosis
Feb. 7	TEST 1
Feb. 10, 12	Chromosomal Changes: Aneuploidy and Polyploidy
Feb. 14, 17	Chromosomal Rearrangements
Feb. 19, 21, 24	Linkage
Feb. 26, 28	Population Genetics: genetic equilibrium
Mar. 10, 12	Population Genetics and Evolution
Mar. 14	TEST 2
Mar. 17, 19	DNA
Mar. 21	Genes and Proteins
Mar. 24, 26	Transcription and Translation
Mar. 31, Ap. 2	Transcription and its Control in Prokaryotes
Apr. 4, 7	Gene Structure and Expression in Eukaryotes
Apr. 9	Mutations
Apr. 11	TEST 3
Apr. 14, 16	Genetics of Bacteria and Viruses
Apr. 18, 21	Transposable Elements; Genetic Engineering
Apr. 23, 25	Extranuclear Inheritance
Apr. 28, 30	Genes and Cancer
May 2	TEST 4
May 6 (Tuesday)	10:00-11:40am Final Exam Starr 126

MICROBIOLOGY AND IMMUNOLOGY

Biol 386
5 CR. (4+3)

Winter, 1997

PREREQUISITES: BIOL 232 AND PREVIOUS OR CONCURRENT BIOCHEMISTRY

COURSE SYLLABUS

<u>DATE</u>	<u>TOPIC</u>	<u>REFERENCE</u>
1. Mon. 1/13	Introduction and History	Zinsser ch. 1
2. Tues. 1/14	Prokaryotic and Eukaryotic Cells	Z. ch 2
3. Wed. 1/15	Bacterial Structure and Function	Z. ch. 3 & 6
4. Thrs. 1/16	Bacterial Structure and Function	Z. ch. 3 & 6
5. Mon. 1/20	M.L.K. DAY--NO CLASSES	
6. Tues. 1/21	Bacterial Structure and Function	Z. ch. 3 & 6
7. Wed. 1/22	Bacterial Growth and Sporulation	Z. ch. 3 & 5
8. Thrs. 1/23	Bacterial Taxonomy	Z. ch. 2
9. Mon. 1/27	Viral Structure and Replication	Z. ch. 52 & 53
10. Tues. 1/28	Viral Structure and Replication	Z. ch. 52 & 53
11. Wed. 1/29	Fungal Structure and Taxonomy	Z. ch. 80
12. Thrs. 1/30	EXAM I	
13. Mon. 2/3	Microbial Metabolism	Z. ch. 4 & 6
14. Tues. 2/4	Microbial Metabolism	Z. ch. 4 & 6
15. Wed. 2/5	Microbial Metabolism	Z. ch. 4 & 6
16. Thrs. 2/6	Microbial Genetics	Z. ch. 7 & 8
17. Mon. 2/10	Microbial Genetics	Z. ch. 7 & 8
18. Tues. 2/11	Microbial Genetics	Z. ch. 7 & 8
19. Wed. 2/12	Antibacterial Agents	Z. ch. 9
20. Thrs. 2/13	Antiviral Agents	Z. ch. 58
21. Mon. 2/17	Sterilization and Disinfection	Z. ch. 10
22. Tues. 2/18	Host Parasite Interactions	Z. ch. 21 & 22
23. Wed. 2/19	Mech. of Bacterial Pathogenicity	Z. ch. 21
24. Thrs. 2/20	Mech. of Bacterial Pathogenicity	Z. ch. 21
25. Mon. 2/24	Mech. of Viral Pathogenicity	Z. ch. 61
26. Tues. 2/25	Mech. of Viral Pathogenicity	Z. ch. 61
27. Wed. 2/26	EXAM II	
28. Thrs. 2/27	Respiratory Tract Infections	Z. ch. 25 & 27
29. 3/1 - 3/9	SPRING RECESS NO CLASSES	
30. Mon. 3/10	Respiratory Tract Infections	Z. ch. 25 & 27
31. Tues. 3/11	Respiratory Tract Infections	Z. ch. 25 & 27

32. Wed. 3/12	Skin & Mucous Membrane Infections	Z. ch. 23
33. Thrs. 3/13	Oral Cavity Infections	Z. ch. 47
34. Mon. 3/17	G.I. Tract Infections	Z. ch. 33-36
35. Tues. 3/18	G.I. Tract Infections	Z. ch. 44 & 68
36. Wed. 3/19	Wound Infections	Z. ch 37 & 44
37. Thrs. 3/20	Wound Infections	Z. ch. 74

LAST DAY FOR A "W" GRADE IS MONDAY MARCH 24TH

38. Mon. 3/24	Viral Hepatitis	Z. ch. 76
39. Tues. 3/25	STD's - Bacterial	Z. ch. 26 & 50
40. Wed. 3/26	STD's - Viral	Z. ch. 64 & 66
41. 3/27 - 3/28	NO CLASSES - EASTER RECESS	
42. Mon. 3/31	AIDS	Z. ch. 77
43. Tues. 4/1	Childhood Infections	Z. ch. 63, 72, & 74
44. Wed. 4/2	Nosocomial Infections	Z. ch. 22 & 34
45. Thrs. 4/3	EXAM III	
46. Mon. 4/7	Immune System, Innate Immunity	Kuby ch. 1 & 3
47. Tues. 4/8	Phagocytosis, Humoral Immunity	K. ch. 3-5, 20-23
48. Wed. 4/9	Humoral Immunity, Acute Inflammation	K. ch. 3-5, 14
49. Thrs. 4/10	Humoral immunity, Acute Inflammation	K. ch. 3-5, 14
50. Mon. 4/14	Complement	K. ch. 17
51. Tues. 4/15	Cellular Immunity/Chronic Inflamm.	K. ch. 9-15
52. Wed. 4/16	Cellular Immunity/Chronic Inflamm.	K. ch. 9-15
53. Thrs. 4/17	Cellular Immunity/Chronic Inflamm.	K. ch. 9-15
54. Mon. 4/21	Hypersensitivity	K. ch. 18-19
55. Tues. 4/22	EXAM IV	
56. Wed. 4/23	Hypersensitivity	K. ch. 18-19
57. Thrs. 4/24	Hypersensitivity	K. ch. 18-19
58. Mon. 4/28	Hypersensitivity	K. ch. 18-19
59. Tues. 4/29	Immunological Diseases	K. ch. 20-23
60. Wed. 4/30	Autoimmunity	K. ch. 19
61. Thrs. 5/1	Transplantation Immunity	K. ch. 24

62. TUES. 5/6 ♣ FINAL EXAMINATION - COMPREHENSIVE ♣
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TEXTS: 1) Zinsser MICROBIOLOGY, 20TH edition, 1992, by Joklik et. al.
 2) IMMUNOLOGY, 2ND EDITION, 1994, by Kuby (Glossary p. 605-614)
 3) LIFE, DEATH, AND THE IMMUNE SYSTEM, SCIENTIFIC AMERICAN, September, 1993

EXAMS: There will be 4 regularly 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 in the course. Exam format may include multiple choice, matching, essay, and problem solving. Make up exams, for valid and documented absences, are essay.

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 **REQUIRED** to attend every lecture and to explain any absence. Attendance will be taken at our option and unexcused absences may result in a loss of points.

INSTRUCTORS: M. Ryan, Ph.D., ASC-2115, extension #5892. Office hours are 9:20 - 9:50 AM on M and W, 12:20 - 12:50 PM on M and W and 12:00 - to 12:50 PM on T and R by appointment.

W. Hoeksema, Ph.D., ASC-2013, extension #2555. Office hours are 11:00 AM 11:50 AM on M, W and F; 9:30 - 10:50 on T and R or by appointment.

If the instructor is not available, please leave a message on his telephone answering machine.

LEARNING OBJECTIVES:

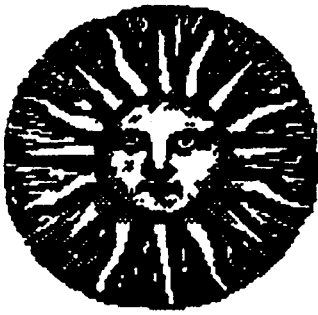
- 1) To learn how professionals in microbiology and immunology use the scientific method to gain new knowledge and modify or eliminate existing paradigms.
- 2) To learn collaborative skills by working in groups for some assignments.
- 3) To learn how to apply certain course material to develop problem 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.

PLEASE SEE REVERSE SIDE

World Wide Web Sites Related To Microbiology and Immunology

1. Microbiology <http://www.ch.ic.ac.uk/medbact/microbio.html>
2. Virology <http://www.tulane.edu/~dmsander/garryfavweb.html>
3. Hepatitis <http://cpmcnet.columbia.edu/dept/gi/disliv.html>
4. AIDS/HIV http://www.yahoo.com/Health/Diseases_and_Conditions/AIDS_HIV/
5. AIDS/Treat. <http://carebase2.jri.org/infoweb/treatment/library/beta/beta26.htm>
<http://www.yamanashi-med.ac.jp/~microbio/microbiology.html>
6. Herpes <http://raccoon.com/newhpx.html>
7. Influenza (WHO) <http://www.who.ch/programmes/emc/flu/flu.htm>
8. CDC Home Page <http://www.cdc.gov/>
9. WHO Home Page <http://www.who.ch/Welcome.html>
10. Medical News <http://www.pslgroup.com/mednews.htm>
also see Infect. Diseases web site below for medical news
11. Infect.Disease <http://www.medscape.com/> (NOTE:you will have to register,it's free)
12. Infect.Disease <gopher://gopher.health.state.ny.us/11/.consumer/.factsheets>
13. Clinical Med. <http://www.avicenna.com/>
(NOTE:you will have to register, it's free)
14. Immunology <http://www.primenet.com/~vohnout/immunology.html>
15. Immunology <http://www.cc.emory.edu/WHSC/medweb.immunology.html>
16. Immunology <http://www-micro.msb.le.ac.uk/immunology.html>
17. Antibody Page <http://www-chem.ucsd.edu/Faculty/goodman/antibody.html/abpage.html>
18. Cytokines http://www.ocms.ox.ac.uk/~smb/cyt_web/
19. Autoimmunity <http://web.cps.msu.edu/~keyesdav/ms/>
20. Vaccines <http://www.eden.com/~via/>
21. Vaccine Weekly <http://www.holonet.net/homepage/1v.htm>
22. Test Banks <http://fiona.umsmed.edu/~yar/tests.html>
(mainly virology questions)
23. Case Studies http://edcenter.med.cornell.edu/Pathophysiology_Cases/Pulmonary/Pulm_TOCs.html
(lower respiratory tract infections)
24. Search Program <http://altavista.digital.com/>

If you need help in accessing these sites, please check with us for instructions.
Remember to capitalize where ever you see capital letters in a web address



Ecology Bio 442

Dr. P.L. Watson
2007 ASC
phone 592-2558
email pwatson@art01.ferris.edu



Lecture: **Time** **Room** **DAYS**
3-> 3:50 136 Starr Tues & Thurs.

Lab: 3 ->5:50 208 Science Wednesday

Books required Elements of Ecology by R.L. Smith Harper & Row
Ecology Lab Book by Watson

Course Requirements

4 lecture tests @ 100 pts each = 400 pts
10 lab reports @ 20 pts each = 200 pts.
1 research project @ 100 pts = 100 pts.
optional final @ 100 pts. = (100pts.)
= 700pts.

Grading scale

A	= 648	C	= 508
A-	= 627	C-	= 487
B+	= 613	D+	= 473
B	= 578	D	= 445
B-	= 557	D-	= 417
C+	= 543	F	= 416 or below

Grade Postings Grades will be posted (2007 ASC) weekly by the last 5 digits of your student number .
Please report any errors in the points posted.

- * There are no made up exams except for documented excuses.
- ** There are no make up labs except for documented excuses.
- *** The optional test can replace your lowest or missing test score, it will not replace the research report.

Labs: Labs will follow the labs outlined in the book but will be weather dependant later in the semester
???? Questions, see me during office hours, before or after class, or call 592-2558 and leave a clear message as
the question or problem. *Please do not ask me to call you, telephone tag waste time.*



Independent research project

Each student is required to **complete** an ecological research project from the research ideas to be distributed. The project will either a field or a lab study but must follow the example shown in Exercise 1 of the lab book. The following information is due at the **last lecture** in the week indicated below. An written original idea for a research project must be submitted by the deadline listed below . The material will be evaluated and returned. All projects must have the following points expressed in the research proposal. See the lab book for more information

- Week 3 A Hypothesis --- to identify your hypothesis (1 per student)
- The Materials --- the materials you will need to carry out the experiment (be specific)
- Experimentation --- What methods you will use to carry out the experiment?
- Data handling--- how are you going to determine if the data is significant?

The projects will be judged on the scientific approach and methodology, not on the whether you prove or disprove your Hypothesis. Data must be analyzed statistically, statistical programs will be discussed in class.

<u>Lecture Outline and Test Schedule</u>		<u>l chaps.</u>
Jan	14 Introduction-----	1
	16 Evolution, ecology and distribution-----	2
	21 Evolution, ecology and distribution-----	2
	23 Speciation-----	2
	28 Limiting factors (energy, moisture, light)-----	3
	30 Limiting factors (energy, moisture, light)-----	4,5
Feb	4 Soil-----	6,7,8,9
	6 TEST 1	
	11 Population dynamics -----	10
	13 density and distribution-----	10
	18 Population growth-----	11,12
	20 Population regulation	13
	25 Life history patterns-----	14
	27 Test 2	
March	4,5,6 <u>Spring Break</u>	
	11 Interspecific competition -----	15
	13 Intraspecific competition-----	16
	18 Predation-----	16
	20 Herbivory and coevolution-----	17
	25 Photosynthesis, secondary production & decomposition-----	18,19
	27 Food Chains, trophic levels & energy-----	20
April	1 Nutrient cycling	21
	3 Test 3	
	8 Succession & Community changes-----	22,23
	10 Succession & Community changes-----	22,23
	15 Ecosystem diversity (Terrestrial)	24
	17 Ecosystem diversity (fresh water)	25
	22 Ecosystem diversity (marine water)	26
	24 Ecosystem diversity (Tropical)	notes
	29 Ecosystem diversity (Temperate)	notes
1 Test 4 & reports due		
May	5-9 Cumulative Optional Final Date to be announced	



CURRENT TOPICS IN BIOLOGY

BIOLOGY 460

COURSE SYLLABUS

WINTER SEMESTER - 1997

CATALOGUE LISTING:

Student will use biological literature to interpret and analyze current topics of biological interest and collect relevant information and present it in writing as well as orally. This course is intended for applied biology majors with senior standing. Semester offered: FW

FACULTY:

Coordinator: Dr. Jack Buss
Office: 2009 Arts and Sciences Commons
Telephone: 592-5639
E-mail: JBUSS@ART01.FERRIS.EDU
Office hours: Tuesday: 12:00pm-2:00pm
Thursday: 12:00am-2:00pm
Mentors: See attached list

TEXTBOOK:

McMillan, VE. 1997. Writing Papers in the Biological Sciences. 2nd ed. Boston: Bedford Books

COURSE OBJECTIVES:

At the completion of this course, the student will have:

1. carried out an extensive literature search on a particular topic.
2. collected relevant information and presented them in his/her own words, in the form of a monograph
3. made an oral and poster presentation of the results of the literature research to the class and the Biology department faculty.
4. met assigned deadlines in an expedient manner.

COURSE EXPECTATIONS:

Students will select a topic of interest to them and find a mentor willing to assist them in preparing a monograph. **The monograph must represent more than a simple summary of the subject.** It must contain some element of analytical or synthetic thought on the part of the student. One way to achieve this is to choose an issue in the scientific literature about which there is a disagreement. The student would then take a position, based on the scientific literature with regard to that issue. For example, a monograph that is simply a discussion of the symptoms of Parkinson's disease is not acceptable however, one discussing the arguments in the literature concerning the merits of fetal transplants vs. Pallidotomy in the treatment of Parkinson's disease would be appropriate as long as the student favored one treatment over the other and provided adequate data and rationale for her/his choice. In addition to the monograph, the results of the literature research by the student will be presented to the class and the Biology Department Faculty in the form of a poster and a short oral presentation.

GRADING PROCEDURES:

- | | |
|---|---------------------|
| 1. Abstracts, Outlines, Class Assignments and Class Attendance. | 100 points possible |
| 2. Oral/Poster Presentation | 100 points possible |
| 3. Monograph (score to be awarded by mentor) | 300 points possible |

GRADING SCALE:

92 - 100 = A	72 - 77.9 = C
90 - 91.9 = A-	70 - 71.9 = C-
88 - 89.9 = B+	68 - 70.9 = D+
82 - 87.9 = B	62 - 67.9 = D
78 - 80.9 = B-	60 - 61.9 = D-
78 - 80.9 = C+	Below 60 = F

ATTENDANCE:

Attendance is mandatory. Any absence without a University excuse (as defined below) is an unexcused absence. For an absence to be University excused, your name must appear on a memorandum from the Vice-President of Academic Affairs office showing that you are a participant in a University-sponsored activity (e.g., a field trip, sporting event, concert tour, etc.). **All other absences are unexcused unless designated otherwise by the instructor. FOR EACH CLASS SESSION MISSED, THERE WILL BE A DEDUCTION OF 25 POINTS FROM THE FINAL POINT TOTAL (please note that tardiness counts as an absence.)**

DEADLINES:

Failure to meet a deadline will result in a deduction of 25 points from the final point total for each 24 hour period starting from 1:00 PM of the day the assignment was due. Saturdays and Sundays will not be included in the total.

DEFINITIONS AND GUIDELINES:

Mentor Mentors are faculty whose expertise is relevant to the study being done by the student. Mentors must be approached by the student and agree to advise them on the selected project. **Mentors are under no obligation to accept a particular student or topic.** Mentors will meet with and guide the student in their choice of topic, literature search, draft preparation, poster presentation, and final monograph. The mentor will assign a grade for the final draft of the monograph. **A mentor approval form must be signed and submitted to the course coordinator indicating that the mentor is willing to work with the student by the deadline indicated in the course schedule.**

- Title selection** The **title**, a **brief description** of your **subject**, and an **approval form** signed by your **mentor** must be submitted by the **deadline** listed on the schedule. Your topic area must not be too narrow or too broad to prevent you from completing an acceptable monograph. For example, global warming is too broad to be covered adequately in a short monograph.
- Relating ideas** You will submit **evidence** that you have thoroughly considered the various ways of relating your ideas. One way to see relationships is to use clustering, a simple and natural way to write and discover your thoughts. Write a phrase summarizing the subject of your writing . Draw a circle around that phrase. Then write your ideas that relate to the subject. Draw a circle around each idea and connect it with a line to related ideas or to the initial phrase. This **relating ideas diagram** must be submitted by the **deadline** listed on the course schedule and must be accompanied by an **approval form** signed by your **mentor**.
- Outline draft** You will submit an **outline draft** of the **monograph** to the **course coordinator** by the **deadline** listed on the schedule. This outline draft is the skeleton of your monograph. The outline draft should include the **purpose** of the monograph, the **issue** about which there is disagreement in the scientific literature, and the expected **general flow** of the monograph. **This outline draft must be accompanied by an approval form signed by your mentor..**
- First draft** You will submit a **first draft** of your **monograph** to the **course coordinator** by the **deadline** listed on the schedule. This should be an **expansion** of the outline draft already prepared. A monograph is an objective paper on a particular subject. Although it is based on a literature review, it is not a compilation of information on that subject, but rather a defense of a particular position. For example, a position on elephant density in Zimbabwe would be that it has direct correlation with *Acacacia spp.* plant density. Your task is to take a position and use the literature to prove or disprove your position by demonstrating the scientific merit of the articles that are in defense of your position and pointing out the faulty logic of articles that are in contrast to your position. **This first draft must be accompanied by an approval form signed by your mentor.**
- Second draft** You will submit a **second draft** of your **monograph** to the **course coordinator** by the **deadline** listed on the schedule. This should be an **expansion** of the **first draft** previously prepared and should incorporate the corrections and suggestions offered by your mentor. **This final draft must be accompanied by an approval form signed by your mentor.**
- Third draft** You will submit a **third draft** of your **monograph** to the **course coordinator** by the **deadline** listed on the schedule. This should be an **refinement** of the **second draft** and should incorporate the corrections and suggestions offered by your mentor. **This third draft must be accompanied by an approval form signed by your mentor.**

- Monograph** You will submit a **final copy** of your **monograph** and photocopies of all references to the **course coordinator** by the deadline listed on the schedule. This paper should be a refinement of the third draft with all spelling and grammatical errors eliminated and ideas clearly expressed. **The monograph and references will not be returned to the student**
- Poster/Oral Presentation** Each student will prepare a **poster** for presentation to the class and the Biology Faculty. A poster is a visual summary of the information you are trying to convey with your monograph. The poster must be typed and designed for positive visual impact. It must be presented in such a way that an observer who views the poster will gain an overview of the topic you have researched and have sufficient data available to understand the scientific basis for the conclusion that you have drawn. Your poster must include:
- a **title**
 - an **abstract**
 - an **introduction**
 - a **discussion** and evaluation of the data presented
 - tables, charts or diagrams** prepared by the student that **present scientific data obtained from the results published in the scientific literature.** Photocopies of published material are not acceptable.
 - conclusions** based data presented
 - a list of **references**
- On the assigned date, a draft of the poster must be submitted to the course coordinator and it must be accompanied by an approval form signed by your mentor.
- The poster will be submitted to the course coordinator on the assigned date and will be displayed for students and faculty to observe.
- Each student will give a short (no longer than 3 minutes) oral presentation introducing the poster to the class and biology faculty.

SUGGESTIONS CONCERNING CHOICE OF TOPIC

Defining the subject and purpose of your writing is the most important decision you will make for it will influence how you will write your paper. When choosing your subject, remember that it is easier to write about something that interests you than some thing that bores you. The purpose is the goal or your writing, i.e., what information are you trying to convey to your readers?

THE SUBJECT YOU CHOOSE TO WRITE ABOUT SHOULD MEET THE FOLLOWING SPECIFICATIONS:

1. It should fit the assignment. Does the subject fall within the scope of the course and within the limits established by the assignment?
2. It should be of interest to you. To the extent possible, begin with a question you genuinely want to answer. If you are to spend a lot of time researching and writing a paper, you should feel some intellectual excitement about the subject.

3. It should be limited to allow adequate depth and breadth of coverage. For a 10 to 15 page paper, a topic like the complications of diabetes is doomed to failure since there is so much information in the scientific literature. However, limiting that broad topic could yield some very workable subjects such as investigating ideas concerning the role of glucose in complications of diabetes.
4. You should understand the research related to your subject. If you cannot understand the research, you will be simply mouthing other people's interpretations and thoughts.
5. It should have adequate and available references.
6. It should be of current interest.

SUGGESTIONS CONCERNING THE WRITING OF THE DRAFTS AND FINAL COPY OF THE MONOGRAPH.

A. First draft

1. To write the first draft, all you need to do is expand and build up each section of the outline, one section at a time. Don't worry about grammar, details or style. Parts will be vague while others will seem disjointed and thin. Just get your ideas into a logically arranged text. At this stage, writing is a means of thinking. Any trouble you have with the first draft probably results for "science block" rather than from "writers block"

B. Subsequent drafts

1. Revise.
The first draft you wrote was primarily for yourself. Writers revise their work to communicate with their audience. Revising involves rethinking and rewriting what you have already written (then rewriting what you've rewritten while constantly and carefully studying every word, sentence, and paragraph to determine if they say exactly what you mean.)
2. Delete clutter.
 - a. Whenever possible use simple words and sentences.
 - b. Delete unnecessary words.
 - c. Replace large words and phrases with simple words.
3. Precision and Clarity.
 - a. Use the correct word (know the definition of every word you use)
 - b. Avoid double speak (writing that pretends to communicate, but does not e.g., **environmentally stable**) and jargon (language used to impress, not communicate: e.g., atmospheric deposition of anthropogenetically derived acid substances)
 - c. Avoid stacked modifiers (e.g., more nourishing food) and dangling modifiers (e.g., After killing the rat, the diet was tested.)
 - d. Avoid clichés (e.g., advanced technology and marked contrast)
 - e. Write positively (e.g., lacks instead of do~~es~~^{es} not have)

- f. Avoid abbreviations and foreign words
- g. Express similar ideas in similar ways (parallelism)
- h. Meet the expectations of your readers
 - Follow the subject as soon as possible with its verb
 - Place material you want to emphasize at the end of the sentence
 - Place familiar information at the beginning of a sentence.

4. Cohesion

- a. Organize sentences in a logical order
- b. Make smooth transitions
- c. Try not to hedge
- d. Know when to stop writing
- e. Punctuate your writing correctly
- f. Have someone else read what you have written

MONOGRAPH PARAMETERS:

Length	Must be 10 to 16 pages in length
Typing	Typing must be double spaced using standard type face (10 or 12) on one side of the 8 1/2 by 11 inch paper. Use 1 inch margins on all the top and bottom of the page and 1.25 inch margins on the right and left sides. Indent each paragraph five spaces. Use Arabic numerals to number the pages starting with the title page (do not put actual numbers on the title page) and put the numbers in the upper right hand corner. The title page, abstract, literature cited, tables and figures do not count towards the total page requirement.
Title Page	The title page should be centered in the middle of the page and include your name, the course title, the semester and year. Your mentors' name should also be included on the title page. An abstract should be at the bottom of the title page.
Abstract	The abstract is a concise statement on the purpose of the monograph, the results of the literature research, and the conclusion drawn.
Tables and Figures	The monograph must include tables, figures, or graphs presenting the results of original investigations. The tables, figures, or graphs must be done by the student, numbered consecutively, titled correctly and referenced appropriately. They must appear on separate pages from the typed text. Photocopies of published work will not be accepted

Literature Citation Monographs must be based on at least **8 original research articles** with a total of at least **10 research and review articles**. You may (and sometimes should) cite specialized references (e.g. scientific dictionaries) and general publications (e.g., newspaper articles), but these citations will not be counted as a part of the 10 source requirement. Information or articles obtained via the World Wide Web will not be accepted as one of the 10 required sources. Literature should be cited in the text and in the bibliography as per chapter 6 of V.E. McMillan (1997). **Any article which is cited must be photocopied and submitted with the monograph.** On the photocopied article, the location of information cited in the monograph must be **highlighted or underlined** and the **page number** in the **monograph of the citation indicated**. The copies of the articles submitted with the monograph will **not** be returned to the student.

Symbols and Acronyms: Define all symbols and spell out all acronyms the first time they are used.

REASONS FOR REJECTING THE MONOGRAPH

1. Failure to meet the above deadlines
2. Plagiarism
3. Failure to follow the documentation guidelines, including photocopies of references with cited sections clearly marked and indexed
4. Failure to use "primary" sources of information to support your ideas.
5. Failure to follow the manuscript preparation guidelines.

OTHER HINTS AND SUGGESTIONS

1. Decide on a topic and mentor quickly. If you cannot decide, see me so that I may assist you in your decision.
2. Once you have a topic and mentor, meet on a weekly basis with your mentor to discuss your topic and the feasibility of that topic. If your mentor feels that the topic can be done, begin your literature search. At the same time have your mentor sign the approval slip and submit it with the topic and summary to the coordinator by the deadline listed in the course schedule.
3. Collect some references on that topic and begin to read them. Once you have a feel for that topic after reading several of the references, begin to pull form each of the papers the important points. Collate these points into and outline draft, and submit it to your mentor for approval. At the same time have your mentor sign the approval slip and submit it with the topic and summary to the coordinator by the deadline listed in the course schedule.
4. Begin work on your first draft after you have received the comments from your mentor on the submitted outline draft. Submit your first draft to the coordinator on the date indicated.
5. Begin work on your final monograph and your oral or poster presentation and have them ready by the assigned dates.

CURRENT TOPICS IN BIOLOGY

BIOLOGY 460

COURSE SCHEDULE

WINTER SEMESTER - 1997

The class will meet on all days listed on the following schedule unless notified in advance by the coordinator. During some class sessions, topics from the text will be discussed. During other class sessions, Biology Faculty or Faculty from other institutions will be presenting the results of their research. On other dates, students will be asked to present a synopsis of one of the original research papers that they have obtained as a part of the research for their paper. The dates for these presentations have not been finalized as yet.

Jan.	17	Introduction to Research Papers and Abstracts (Chapter 1)
	24	Timme Library and Library Searches. Meet on 1st floor. Deadline - Approval form from mentor agreeing to accept student.
	31	Use of the Internet. Meet on 1st floor of Timme Library
Feb.	07	Writing a Research Paper Deadline - Statement on the Subject and Purpose of Paper
	14	Class Activity
	21	Deadline - Relating Ideas Diagram
	28	Class Activity
Mar.	07	SPRING RECESS - NO CLASS
	14	Deadline - Outline of Monograph
	21	Class Activity
	28	EASTER RECESS - NO CLASS
Apr.	04	Deadline - First Draft of Monograph
	11	Deadline - Second Draft of Monograph
	18	Deadline - Draft of poster
	25	Deadline - Third Draft of Monograph
Apr.	30	Deadline - Submission of Poster
May	02	Poster Presentation Deadline - Monograph

SECTION 11

ENROLLMENT TRENDS

ENROLLMENT TRENDS

The following data on enrollment in the Applied Biology Program was obtained from the Office of Academic Affairs

	1992-93	1993-94	1994-95	1995-96	1996-97
Applied Biology	98	106	92	82	71
Pre-Dental Track	0	0	0	0	15
Pre-Medical Track	0	0	0	0	21
Pre-Veterinary Track	0	0	0	0	9
Sports Medicine Track	0	0	0	0	3
Pre-Physical Therapy Track	0	0	0	0	2
TOTALS:	98	106	92	82	121

NOTE: defined tracks in the applied biology program were established in 1995-96. Prior to this the tracks listed were separate programs

We believe this reflects a reasonably stable enrollment in the FSU Applied Biology Program. Prior to 1996-97 pre-dental, pre-medical, pre-veterinary, pre- physical therapy and sports medicine did not exist as defined tracks in the applied biology program. Pre-med, pre-dent and pre-veterinary existed as 2 year associates degree programs which would ladder into applied biology beginning with the third or junior year. Sports medicine was a non-degree, non-certificate 1500-hour internship program with most students also completing the applied biology baccalaureate degree as a requirement for certification as an athletic trainer at the national level. Pre-physical therapy did not exist at all as a defined program at Ferris prior to 1996-97. In essence students choosing one of the tracks now become officially enrolled as applied biology students beginning as soon as the first semester of their freshman year. There are, however, still students who graduate from the applied biology program without ever officially being enrolled in the program. Applied biology may be the only program on the Ferris campus that allows this. Examples would be certain transfer students with considerable credits who enroll in Ferris 2 year programs such as Industrial Chemistry Technology, Ornamental Horticulture or Dental Hygiene. This is not at all unusual and therefore the enrollment numbers should always be considered minimums. A simple solution which I have asked for repeatedly is to allow the computer to officially enroll these students in both programs simultaneously. Clearly this would give a more accurate indication of actual enrolment in the applied biology program.

We, the applied biology program advisors, have our own data which reflects senior enrollment in the program. This data is shown below. The following data presents the most accurate picture of senior enrollment in the applied biology program. The table below shows the enrollment in BIOL 460 Current Topics in Biology. Biology 460 is taken only by students pursuing the applied biology baccalaureate and is almost exclusively seniors with a few juniors.

<u>Year</u>	<u>Enrollment in Biol 460</u>
1996-97	46
1995-96	32
1994-95	43
1993-94	35
1992-93**	39

** In 1992-93 (quarter system), Biol 460 existed as BIO 450 and BIO 451

Compare this data with the graduation profile chart below for the last five years.

Year	Graduates	Male	Female	Distinction or Higher
1996-97	30(est.)	NA	NA	NA
1995-96	25	12	13	36%
1994-95	33	16	17	27%
1993-94	21	9	12	14%
1992-93	34	21	13	24%
Average	28	14	14	25%

If this data from the above 2 charts is extrapolated back it suggests that there is at least 100 students enrolled in the applied biology program each of the last 5 years. It also suggests reasonable retention in the applied biology program in that there is no significant drop in the number of graduates/seniors compared as a percentage to overall enrollment in the program e.g. graduating seniors comprise at least 25% of the total enrollment for any given year with the exception of 1993-94.

SECTION 12

PROGRAM PRODUCTIVITY AND COSTS

ADMINISTRATIVE PROGRAM REVIEW AND PROGRAM COSTS

Program/Department: **Applied Biology**

Date Submitted: 1/15/97

Dean: Dr. Sue Hammersmith

	Fall 1992	Fall 1993	Fall 1994	Fall 1995	Fall 1996
Tenure Track FTE		.39	.39	.39	.39
Overload/Supplemental FTEF					
Adjunct/Clinical FTEF (unpaid)					
Enrollment on-campus total*	98	106	92	82	121
Freshman		27	20	17	34
Sophomore		20	17	12	28
Junior		29	20	21	29
Senior		30	35	32	30
Masters					
Doctoral					
Enrollment off-campus*					

*Use official count (7-day count for semesters, 5-day count for quarters).

Financial

Expenditures*	FY 92	FY 93	FY 94	FY 95	FY 96
Supply & Expense*		0	0	0	0
Equipment	N/A	N/A	N/A	N/A	N/A
Gifts & Grants	N/A	N/A	N/A	N/A	N/A

*Use end of fiscal year expenditures.

Other

	AY 91/92	AY 92/93	AY 93/94	AY 94/95	AY 95/96
Number of Graduates* - Total	34	34	22	33	36
- On campus	34	34	22	33	36
- Off campus	0	0	0	0	0
Placement of Graduates **	82%	87%	94%	79%	not avail.
Average Salary	not avail.	\$24,925	\$26,000	\$26,342	not avail.
Productivity - Academic Year Average					
- Summer					
Summer Enrollment					

*Use total for academic year (F, W, S)

**Based upon data supplied by graduates to career placement. Data does not include students/graduates not responding to the survey.

Applied Biology Program Costs as supplied by the Office of Academic Affairs. The costs are based upon a 120-semester credit baccalaureate degree program.

Total teaching Cost (1995-96 Data):	\$11,297.28
Total teaching Cost/Cr. Hrs.:	\$94.14
Applied Biology Program teaching Costs per Student Credit Hours Ranked by Program from High to Low:	119 out of 134 programs or in the bottom 12% with respect to cost.

We believe the FSU Applied Biology Program is an even better bargain than the above data indicates in that the applied biology program uses existing courses (except for BIOL 460) and has no program faculty exclusive to the program.

Approved by Academic Senate June 20, 1996
adminrev.doc

SECTION 13

CONCLUSIONS

SUMMARY - MAJOR CONCLUSIONS

1. The FSU Applied Biology Program is a stable, inexpensive and valuable program. It is consistent with the newly adopted mission statement in that the program provides professional education and to a lesser extent career-oriented education especially when combined with a vocational associates degree. The program serves its students and the university well.
2. The Program Review Panel found the FSU Applied Biology Program to be favorably rated, and in some cases exemplary, by all groups surveyed including the FSU Biology Faculty, applied biology graduates, currently enrolled applied biology seniors, employers and this program review panel. We believe this reflects the teaching and advising skills of the FSU Biology Faculty. The FSU Biology Faculty have won numerous teaching awards and hold advanced degrees, in most cases doctorates, in a variety of biology disciplines. The program is administrated effectively and inexpensively by a program coordinator with 25% release time and several biology faculty as part of their normal advising load.
3. From the labor market analysis and the employer survey we recognize that the FSU Applied Biology Program is not vocational per se nor is there a great demand for baccalaureate degree biologists. This is not a new finding nor does it make the program inconsistent with the mission statement but simply reaffirms what we have already known. The program best serves its students, the university and the state when used as a credential for professional or graduate studies or combined with an associates degree in a vocational area such as Industrial Chemistry Technology. The name "Applied" Biology is, in part, a recognition of this fact and the need to apply ones biological education to a specific career track. It is also a reminder of the continued need for skilled advising in the FSU Applied Biology Program as well as the development of specific career tracks to allow career success for those students interested in biology. From data supplied by Career Planning/Placement Services most applied biology graduates (over 80%) find placement in the job market or graduate/professional school. We believe this speaks well of the advising and teaching skills of the biology faculty. From limited information, starting salaries appear to be around \$26,000 which is competitive with starting salaries in business and education.
4. We have learned from our graduates, senior students and the FSU Biology Faculty that we must examine the current Applied Biology Curriculum. Consideration must be given to incorporating courses that emphasize the development of oral presentation skills. Consideration must also be given to increasing the number of credits required in the biology major component of the program, from its present minimum of 30, without increasing the total graduation requirement of 120 semester credits. The biology faculty with its impressive academic diversity can and should be allowed to offer a broad range of biology electives on a regular basis. This will enrich both the FSU Applied Biology Program and the university and help to better serve FSU students both now and tomorrow.
5. The FSU Applied Biology Program is unique because of its applied nature and its ability to tailor the program to individual student needs matching academic abilities with career interests. The advisory board believes the program is not well advertised or made visible especially externally. In part, articulation agreements with community colleges will help as well as a newly created department home page on the world wide web.
6. Enrollment in the FSU Applied Biology Program is stable over the last several years at approximately 100 total students which suggests that demand by students is good. The program has averaged 30 graduates over the last 10 years with nearly 25% graduating with honors.
7. The FSU Applied Biology Program is very inexpensive ranking 119 out of 134 FSU programs or in the bottom 12% with respect to cost. While equipment in biology is presently adequate there is some concern about future equipment needs in an increasingly technological society. To maintain quality science offerings FSU must incorporate newer technologies into its pedagogy. Seniors in applied biology extensively use the research capabilities of the library as they complete their senior project as part of BIOL 460. The library appears to be able to adequately support such projects and as information is increasingly digitalized this support should continue as long as there is a commitment to computers and Internet access by the university.

RECOMMENDATIONS

1. The major recommendation for the FSU Applied Biology Program is to engage in a curriculum review. This should begin with the Biology Department Curriculum Committee and should address the concerns of the senior students, graduates, employers and faculty about the need for greater emphasis on the development of oral presentation skills and more biology electives in the program. The Biology Department Curriculum Committee may also wish to recommend additional career tracks for the Applied Biology Program to maintain enrollment and serve future needs.
2. It is also recommended that the Applied Biology Program examine ways to better advertise the program both internally and primarily externally. The teaching and advising skills of the Biology Faculty, as documented in this report, along with the ability of the Applied Biology Program to accommodate students of widely differing abilities make the FSU Applied Biology Program both novel and attractive to a wide range of students. Good placement of graduates into both the job market and graduate/professional schools as well as the ability to combine the Applied Biology Baccalaureate with a variety of vocational associates degrees at FSU are other attractive and unique features of the FSU Applied Biology Program. This advertising process could begin by meeting with Margaret Avritt, Director of University Relations and Marketing.
3. It is also recommended that the Applied Biology Program examine the projected equipment and computer needs for biology courses in the next 5 years. For the program to maintain its present high evaluation by its graduates will require biology courses that meet the technological challenges of tomorrow. The Biology Department Planning Committee and the Biology Department Head should perform integral roles in this evaluation.
4. It is recommended that the continuation of problem solving and critical thinking skills development be maintained as a primary Biology Department Goal and continue to be incorporated into biology courses. Both alumni and Applied Biology Seniors cite problem solving and critical thinking skills as a strength of the Applied Biology Program.
5. It is recommended that the Biology Faculty be both encouraged and well supported in their professional development activities such as professional travel, consulting and research. Applied Biology Seniors see, as a strength of the program, a Biology Faculty with expertise in their professional areas. To maintain this strength requires a financial commitment on the part of administration as well as a valuing of the faculty member as a skilled professional in terms of both academic credentials and continuing professional development.

SECTION 15

APPENDIX

Appendix I

PROGRAM REVIEW PANEL EVALUATION

Program: Applied Biology

Instructions: Circle the number which most closely describes the program you are evaluating.

1. Student Perception of Instruction Average Score 4.33



Currently enrolled students rate instructional effectiveness as extremely high.

Currently enrolled students rate the instructional effectiveness as below average.

2. Student Satisfaction with Program Average Score 4.00



Currently enrolled students are very satisfied with the program faculty, equipment, facilities, and curriculum.

Currently enrolled students are not satisfied with program faculty, equipment, facilities, or curriculum.

3. Advisory Committee Perceptions of Program Average Score 4.00



Advisory committee members perceive the program curriculum, facilities, and equipment to be of the highest quality.

Advisory committee members perceive the program curriculum, facilities, and equipment needs improvement.

4. Demand for Graduates Average Score 3.33



Graduates easily find employment in field.

Graduates are sometimes forced to find positions out of their field.

5. Use of Information on Labor Market Average Score 3.67



The faculty and administrators use current data on labor market needs and emerging trends in job openings to systematically develop and evaluate the program.

The faculty and administrators do not use labor market data in planning or evaluating the program.

6. Use of Profession/Industry Standards

Average Score 4.33 (Based upon MCAT, OCAT, and DAT results)



Profession/industry standards (such as licensing, certification, accreditation) are consistently used in planning and evaluating this program and content of its courses.

Little or no recognition is given to specific profession/industry standards in planning and evaluating this program.

7. Use of Student Follow-up Information

Average Score 3.67



Current follow-up data on completers and leavers are consistently and systematically used in evaluating this program.

Student follow-up information has not been collected for use in evaluating this program.

8. Relevance of Supportive Courses

Average Score 4.33



Applicable supportive courses are closely coordinated with this program and are kept relevant to program goals and current to the needs of students.

Supportive course content reflects no planned approach to meeting needs of students in this program.

9. Qualifications of Administrators and Supervisors

Average Score 5.00



All persons responsible for directing and coordinating this program demonstrate a high level of administrative ability.

Persons responsible for directing and coordinating this program have little administrative training and experience.

10. Instructional Staffing

Average Score 4.67



Instructional staffing for this program is sufficient to permit optimum program effectiveness.

Staffing is inadequate to meet the needs of this program effectively.

11. Facilities (Building)

Average Score 5.00



Present facilities are sufficient to support a high quality program.

Present facilities are a major problem for program quality.

12. Scheduling of Instructional Facilities

Average Score 4.00



Scheduling of facilities and equipment for this program is planned to maximize use and be consistent with quality instruction.

Facilities and equipment for this are significantly under-or-over scheduled.

13. Equipment

Average Score 3.00



Present equipment is sufficient to support a high quality program.

Present equipment is not adequate and represents a threat to program quality.

14. Adaption of Instruction

Average Score 4.67



Instruction in all courses required for this program recognizes and responds to individual student interests, learning styles, skills, and abilities through a variety of instructional methods (such as, small group or individualized instruction, laboratory or "hands on" experiences, credit by examination).

Instructional approaches in this program do no consider individual student differences.

15. Adequate and Availability of Instructional Materials and Supplies

Average Score 3.33



Faculty rate that the instructional materials and supplies as being readily available and in sufficient quantity to support quality instruction.

Faculty rate that the instructional materials are limited in amount, generally outdated, and lack relevance to program and student needs.

