MEMORANDUM

DATE: November 19, 2003

TO: Academic Senate

FROM: Academic Program Review Council

RE: Recommendations for:

Bachelor of Science Degree in Applied Biology

CC: Walter Hoeksema, James Hoerter, Matthew Klein, Laurie Chesley, Thomas Oldfield,

RECOMMENDATION OF ACADEMIC PROGRAM REVIEW COUNCIL:

We recommend that this program be continued.

DESCRIPTION OF PROGRAM:

CATALOG DESCRIPTION:

Why Choose Applied Biology?

The Applied Biology program provides a quality bachelor's degree in biology. Ferris is a recognized leader in vocational education, and students take 36 or more credit hours in biology courses plus eight or more semester credit hours in biology-related courses. The Applied Biology program is individually designed, matching each student's abilities with his/her academic interests.

Get a Great Job

The Applied Biology program at Ferris is flexible, allowing students of differing abilities and interests to choose a program of study that best fits them. The program also incorporates applied courses from the Ferris College of Allied Health Sciences and College of Pharmacy, creating a unique bachelor's degree in biology. Graduates of the Applied Biology program are in high demand in the science and technology industry and may enter highly competitive professional programs.

Admission Requirements

First year student admission is open to high school graduates (or equivalent) who demonstrate academic preparedness, maturity and seriousness of purpose with educational backgrounds appropriate to their chosen program of study. High school courses and grade point average, ACT composite score, and ACT reading and mathematics sub-scores will be considered in the admission and placement process. Transfer students must have at least 12 credits at the time of

application with a minimum 2.0 overall GPA including an English and mathematics course, or they must provide their high school records and ACT scores for admission review.

Graduation Requirements

The Applied Biology program leads to a Bachelor of Science degree. Graduation requires a minimum 2.0 GPA overall and a minimum of 127 credits including completion of all general education requirements as outlined in the General Education section of the University Catalog. No grade lower than a 'C' is acceptable in the Biology major.

BACKGROUND INFORMATION OBTAINED FROM THE REVIEW PROCESS:

The Applied Biology Program is housed in the Department of Biological Sciences of College of Arts and Sciences. It is one of three programs offered by that department. Departments in the College of Arts and Sciences have a major responsibility of providing general education courses for students enrolled in programs in other colleges in the University. No full time faculty is assigned exclusively to this program. With the exception of BIOL 460, the capstone course, no course in the Department of Biological Sciences is taken exclusively by Applied Biology Students.

There has been a steady increase in enrollment in the Applied Biology program over the last five years. Enrollment was 133 in the fall of 1998 and 184 this fall which is an increase of 24 students from a year ago. Interest in the new tracks in Environmental Biology and Forensic Biology (currently 17 students have enrolled in this track in its first semester of existence) is high. In addition, enrollment in general education courses and courses that are taken by pre-professional students offered by the Department of Biological Sciences has increased dramatically in the last few years taxing the facilities, equipment and faculty. These enrollment pressures have a direct impact on the quality of the education that students majoring in Applied Biology receive.

University Advancement and Marketing identified 143 Applied Biology graduates from 1997-2002. Eight of these were out of the country so 135 surveys were sent out, 9 of which were undeliverable. Of the 126 surveys that probably reached the Applied Biology alumni, 36 (29%) were returned. The composite responses and individual comments were included in the report. According to the panel, since most Applied Biology majors continue their education, no employer survey was made. The student survey was given to students in the capstone course, BIOL 460 in fall and winter semesters 2002-2003. A total of 35 responses were collected. The composite responses and individual comments were included in the report.

COST INFORMATION:

According to the 2000-2001 report from institutional research:

	Total cost per SCH
Applied Biology BS	$146.38
Applied Biology (Environmental Track) BS	$159.16
Applied Biology (Pre-Dentistry Track) BS	$149.47
Applied Biology (Pre-Medicine Track) BS	$147.35
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	Total program cost
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Applied Biology (Pre-Physical Therapy Track) BS	$18,817.37
Applied Biology (Pre-Veterinary Medicine Track) BS	$17,691.88

ASSESSMENT OF THE APPLIED BIOLOGY PROGRAM:

(1) The program has a number of important strengths:

- The inclusion of the term "Applied" in the name of this program serves to emphasize the focus of this degree on the application of an education in biology to a specific career. Many students use a combined AAS degree that was obtained in some other career oriented field such as industrial chemistry technology with a BS in Applied Biology as a means for career advancement. This program is directly related to the mission of Ferris State University.
- Graduates of this program have been very successful in gaining admission to professional schools such as medical (50% of applicants) and dental schools (93% of applicants) and optometry schools.
    - In recent years, over half of the students enrolled in the Michigan College of Optometry received a significant portion of their undergraduate education in biology courses at Ferris State University.
        - Some of these were enrolled in the pre-optometry curriculum.
        - Others completed the Applied Biology degree prior to admission to optometry school.

  - Graduates of the Applied Biology program have been admitted to optometry schools in Florida, Tennessee, Illinois, Pennsylvania, and Massachusetts.
  - Graduates have been admitted to physical therapy and physician assistant programs.
- All of the graduates of the new environmental track have successfully obtained paid internships with state or national environmental agencies.
- The quality of instruction as rated by current students and alumni is high.
  - A high percentage of Applied Biology students graduate with academic honors (47%)
  - The levels of placement of students majoring in Applied Biology in professional and graduate school attest to the quality of the education that these students receive.
- There are fourteen tenured faculty who teach in this program and one tenure track faculty who started at the University last year. Fourteen out of fifteen of the tenured or tenure track faculty hold the highest terminal degree in their degree area. Four current faculty are past recipients of the distinguished teaching award.
- During the last five years:
  - Eleven of the fourteen tenured faculty have received a promotion or merit award.
  - Five of the fourteen tenured faculty have been awarded a sabbatical leave.
  - All of the fifteen tenured or tenure track faculty have attended a regional or national professional meeting. Some of these individuals hold offices in national organizations.
  - Nine of the fifteen tenured or tenure track faculty have had a paper published and/or given a presentation/poster session at a professional meeting.
- The renovation of the Science Building and several major equipment purchases has resulted in improvements in many of the labs and the creation of additional research spaces for faculty.
- The construction of the Arts and Sciences Commons has increased the available office space for full time faculty.
  - Some of the one year temporary faculty and part time faculty have their offices in another part of the Arts and Sciences commons away from the rest of the Faculty in the Department.
- Historically the instructor in large lecture classes taken by Applied Biology majors has also taught labs in that course.
  - This allowed faculty to get to know students individually (particularly those who are majoring in the program) very early in their educational experience.

- Advising for Applied Biology majors and pre-professional students is done by experienced faculty who teach the courses that the majors take and who have a thorough knowledge of the curriculum.
- The Interim Dean of the College of Arts and Sciences has expressed strong support for this program.

(2) The Academic Program Review Council has the following concerns:

- Due to the increased enrollment in many of the Biology Department courses taken by Applied Biology majors, the large lecture sections have become even larger (5 or 6 lab codes in a lecture sections instead of 4).
  - The department is often unable to offer courses for which the lecturer also instructs the labs.
  - The Council considers this to be a reduction in the quality of the educational experience of the students in this program.
- The heavy dependence upon 1 year temporary faculty, one semester temporary and part-time faculty not only results in a loss of uniformity in labs but results in a loss of continuity for students moving from introductory courses into more advanced courses taught by full time faculty.
- The number of upper division specialty courses offered in this program is extremely limited.
  - In the entire Biology curriculum there are only two four hundred level courses offered and one of those is the capstone course.
  - The increased enrollment in the lower level courses general education and introductory courses siphons faculty away from teaching smaller specialty courses.
  - Upper division courses are important for the diversity and quality of the educational experience of majors in the Applied Biology Program.
  - A common complaint in student and alumni surveys is the lack of availability of and diversity in upper division courses.
- Although renovation of the Science Building and several major equipment purchases has resulted in improvements in many of the labs, facilities and equipment remain a concern.
  - Some labs have the aging bench ware that existed prior to the renovation.
  - The increased enrollment in biology courses has resulted in additional wear and tear on equipment.
- Although the faculty is very productive professionally, they did express a concern about inadequate funding for professional development.
- The program panel has identified oral communication and critical thinking skills as areas of weakness in graduates of this program.

- The Administrative Program Review was inaccurate and not completely filled out. This deprives the University Administration and the Academic Program Review Council of vital information that is necessary for making informed decisions and recommendations.

(3) The Academic Program Review Council recommends that the following steps need to be taken to maintain the quality of this program:

- The University and the College of Arts and Sciences should support the requests of the Biology Department for additional full time positions to, at minimum, return the number of full time tenure track faculty to the level that existed prior to the time of fiscal restructuring when enrollment in biology courses was significantly less than current levels.
    - There has been a significant increase in students majoring in Applied Biology, the pre-professional programs, and in the general education courses taught by Applied Biology faculty.
        - The high level of interest in the pre-pharmacy has and will continue to increase the number of high caliber students who wish to obtain a degree in Applied Biology and will increase the demand for additional upper division courses.
    - Enrollment in the Honors Program is increasing and the majority of these students major in science related programs.
    - The Department of Biological Sciences and Applied Biology faculty provide low cost Applied Biology education instruction for all segments of the University and low cost instruction through more advanced classes for a variety of programs in other Colleges in the University.
    - Additional faculty would allow a return to the format in which an instructor in an introductory course taken by Applied Biology majors also teaches the labs in that course.
    - Additional faculty would bring new expertise to the program and allow the introduction of new upper division courses that would increase the educational options of students in the Applied Biology program.
- If the Department of Biological Sciences is allowed to hire additional faculty, University Marketing and Advancement, the College of Arts and Sciences and the Applied Biology program should examine ways to better advertise the program both internally and externally.
    - This is a strong program and there is capacity for additional students if additional faculty resources are available.
    - The Applied Biology program should investigate ways to obtain additional funding for scholarships for Applied Biology majors as a means to increase the number of high quality students enrolling in the program.

- The program should continue to investigate the addition of other tracks such as genetic counseling which would also increase the number of high quality students who are attracted to Ferris.
- The University and the College of Arts and Sciences, and the Department of Biology should continue developing plans to provide for the systematic replacement of aging equipment and the purchase of new equipment as technology changes. They should continue to seek outside resources to fund those plans.
- The University and the College of Arts and Sciences should continue to support the professional development for faculty in this program.
- The Applied Biology program should investigate and implement methods for increasing oral communication and critical thinking experiences into the curriculum.

College of Arts and Sciences
Memorandum

To: Academic Program Review Council
From: Matthew Klein, Interim Dean, College of Arts and Sciences
Subject: Applied Biology Review
Date: September 11, 2003

The Applied Biology B.S degree has been one of the strongest programs in the College of Arts and Sciences. We have a high quality faculty and excellent facilities that make the program highly successful. Because most of the courses in the program also service other areas, program costs are low. Additionally, the variety of tracks within the program offer flexibility to students as do the two year programs that can easily ladder into the Four year B.S. The enrollments have remained stable with 64 students enrolled Fall 2003.

This past year we celebrated the opening of the renovated Smith Greenhouse which has added to the visibility of the science options within the college. The new Forensic track in the B.S has also attracted attention, with 17 students enrolled in the first year.

Our facilities and technological capabilities rival any of our sister institutions. Biology 300: Pathophysiology is currently internet-based and a wide variety of courses are web-assisted: forensic biology, forensic pathology, genetics, entomology, natural history of invertebrates, ecology.

The program employs a wide variety of assessment measures and considers the results of those measures when making program modifications. For example, professional admissions tests have indicated that students need to improve subject comprehension in molecular biology and interpretation of scientific data. As a result, the program is recommending an expansion of research opportunities for students, increased use of computer analysis of data in labs and a greater emphasis on use of state-of-the-art instrumentation in teach labs.

I support the needs as identified by the advisory board and faculty. We are in critical need of tenure line faculty as well as relief from the strain on the Supply and Expense budget incurred by increased costs of lab supplies. The other needs that are identified are also reasonable and well documented.

The B.S in Applied Biology is a productive, academically sound program that is worthy of University support and acknowledgement.

Questions for Applied Biology Program Review Panel Fall 2003

The bulleted items found under item 5 pages 15-16 of the document Academic Program Review: A Guide for Participants are the primary basis of the evaluation of the Applied Biology Program. The following questions are directly related to these criteria. The bullet number to which the question refers is cited prior to the question.

Bullet

2 **What are the unique features this program? How many four year Colleges and Universities in the State offer equivalent programs?**

Name: Applied. Individually tailored tracks.

Zero, but everyone has a traditional biology major.

3 **Please characterize the service provided by this program and its graduates to the state, country, and/or world.**

Provides students and eventually professionals in the areas of optometry, medicine, dentistry, physican assistant, physical therapy

8 **Please discuss the role of the Biology Department and Applied Biology program in serving non-majors. Explain the relationship between this degree and pre-professional degrees such as those for pre-optometry or pre-pharmacy students. What is the relationship between the Applied Biology BS degree and the BA degree in Biology.**

Biology department supplies many non-majors courses – BIOL 103, BIOL 101, BIOL 111. Applied Biology does not serve non majors directly. Pre professional programs take many of the same courses that biology majors do and these programs ladder directly into Applied Biology

No relationship between B.S. and B.A. programs.

B.A. in biology as a separate program is a mistake. Confusing to students. Make B.A. an option in Applied Biology or name a biology faculty member as program coordinator.

12 **How many full time tenured and tenure track faculty teach in this program?**

15 – Entire Department of Biology

12 **With regard to the professional activities and accomplishments of the full time tenured or tenure track faculty who currently teach in this program:**

How many have received a promotion or merit award in the last 5 years? All but Friar, Palmer, Adewusi ?

How many have had a publication in a professional journal and/or presented a paper/poster at a professional meeting in the last 5 years? See CV's
How many have attended a regional or national professional meeting in the last 5 years? Almost Everyone

12 **How many part-time and one year temporary faculty teach in this program? What percentage of course sections in this program are taught by part-time or one year temporary faculty?**

Some labs but very few lecture sections are taught by part timers or one year temporary. However, Biology Department as a whole is needing of more tenure track positions

13 **Please comment on administrative effectiveness with respect to this program.**

Matt Klein and Rick Kowalkoski have been most helpful over the years.

The following questions or requests for information are the result of our discussion concerning specific statements or material within the Applied Biology Program Review Panel document. The page number containing the material upon which the question is based is cited prior to the question.

Page

2 **What is the rationale for maintaining the name Applied Biology rather than Biology as the name for this degree?**

Historical. Done originally (1970's) to disguise a traditional major

7 **In the Administrative Program Review document, please clarify what is meant by .39 Tenure track FTE indicated in table 1. What are the overload/supplemental FTEF numbers for the last five years?**

See Dr. Hoerter

7 **Do you have an explanation for the fact the number of seniors enrolled in the program seems to be significantly higher than the number of juniors enrolled the previous year?**

Many pre optometry students enter as seniors (first 3 years in pre optometry, last year as Applied Biology)

7 **Please explain how the number for the capacity in the program of 200 was determined. Please discuss the factors that limit program capacity.**

Arbitrarily. Size is limited only by man power and physical limitations of Biology Department

8 **Please explain the discrepancy in numbers between total graduates and on campus graduates in AY 98/99, AY 90/00, Ay 00/01.**

See Dr. Hoerter

8 **What is the productivity for the Applied Biology Program for academic years 97/98 through 01/03?**

See Dr. Hoerter (also see graduates for these years on pg. 3)

8, 33 **How visible do you consider this program to be within the University and within the State? Have any steps been taken to increase the visibility of this program? What progress has been made on improving the department Website? See Dr. Hoerter**

Ferris in general does not promote its programs within the state as effectively as it should.
Expanding the Honors College has been helpful.

9 **Please discuss internships in the program. Approximately how many students in this program are involved in an internship in a given year? Are they paid or unpaid? How many credits are given for an internship? How are internships supervised? Should they be required?**

No internships except in Environmental Biology track
Four total so far to date
Paid
1 credit – BIOL 496
Supervised by e-mail

9 **Why is there no list of achievements by students and/or faculty in the Administrative Program Review?**

Ask Dr. Hoerter

10 **Please discuss the basis of the statement concerning the need of students to improve comprehension in molecular biology and interpretation of scientific data. On what testing data is this statement based? How has this concern been addressed in specific courses in the curriculum?**

Ask Dr. Hoerter

20 **We recognize that in your program, unlike many career oriented degrees, an employer survey is difficult to do. Have you considered surveying graduate and professional schools to obtain additional information?**

See p. 41 of report for data from MCO
Dental and medical schools have not released similar data to us

26 **In the student comments it is mentioned that Applied Biology BS is the only BS degree that requires 12 credits of social awareness and 12 credits of cultural enrichment. Is this correct? If so, why does this program exceed the University general education requirements?**

Yes
Historical – strong bias towards liberal arts component of Applied Biology program.

29 **Question 6 of the faculty survey, inquires about the number of tracks or options that should be offered in this degree? What was the rationale for asking this question and what is your interpretation of faculty response?**

Asked because it's the Biology Department's degree. Do we – Biology Department want to continue to expand program by adding more tracks or not?

Interpretation: Neutral to slightly favoring adding more tracks.

31 **Do you believe that there is sufficient diversity in advisory committee? Have you considered expanding the committee to include additional members representing graduate or professional schools, the medical professions, and/or the pharmaceutical industry?**

Yes
Prefer to not have an external advisory committee.
Prefer to report directly to Biology Department curriculum and planning committee.
Applied Biology has no budget, no full time faculty, no accreditation, no licensure and few required internships. Also it has no program specific faculty for courses (except for BIOL 460)

35 **The labor market analysis in this document suggests that there is a good market for graduates of this program. On page 88 it is stated that there is not a great demand for baccalaureate degree biologists. Please clarify.**

Applied Biology is not vocational per se unless combined with a vocational associates e.g. INCT.
Employment at Baccalaureate level usually requires additional training or skills

37 **The labor market analysis comments on job opportunities for environmental science and protection technicians. How does the environmental track differ from the environmental safety and management track in allied health? Would students in these tracks be competing for the same jobs?**

Totally different programs, no competition.
Environmental track set up with consultation with Mike Ells
Environmental safety and management is more sanitarian oriented

39 **A concern was expressed about air quality in the Science Building. Is this a significant problem? What steps have been taken to address this issue.?**

Tested by EPA and found to meet minimal standards.

39 **How important is having an animal facility in the Science building to the operation of the Applied Biology Program? What recommendations does the panel have in the event of increased USDA control over animals that are not currently covered by USDA regulations?**

Only important to those courses that use animals in lab – physiology.
Use simulations rather than animal.

40 **What is the current status of storage space for the Applied Biology Program? What recommendations does the panel have to address this problem?**

Storage space is viewed as inadequate by some Biology faculty – I'm not sure as enrollment increases that there is an easy solution

43 **Please discuss the status of grant applications for equipment for the Biology Department.**

See Dr. Hoerter

43 **It is mentioned on this page that elective classes with fewer than 15 students tend to be canceled. Is this true even if the class is required by a student to complete a track in a program? Have these elective courses been offered in an alternate year format? Does this practice have an impact on the ability of the program to recruit students?**

We need more tenure track faculty and a commitment to small enrollment elective courses suitable to Biology major.

52 **Of the list of biology courses that a student may take in this program, only 2 carry a 400 level designator. Is this an adequate number of senior level courses for a program such as this? Does this have an impact on the ability of the program to recruit students? NO**

Numbering is somewhat artificial, several 300 level Biology courses are either senior level or carry junior level pre-requisites.
BIOL 386 and BIOL 370 could easily be justifiably renumbered at 400 level.

56 **What is the enrollment in the Applied program for 2002-2003? 2003-2004?**

See page 56
2001 – 2002 is Fall 2002 enrollment for this fall 2003 it is 186 or up 24

88 **The issue of oral presentation skills is raised in conclusion 4. Would decreasing the requirements for cultural enrichment and social awareness allow more time in the curriculum for addressing this issue? Could this concern and one about data processing skills be addressed by increasing the number of oral presentations and data analysis projects in upper division courses designed specifically for Applied Biology majors?**

We always encourage faculty to have students give oral presentations. However, high enrollment makes this difficult. Would like to have option of reducing cultural enrichment by 3 credits and adding 2nd oral communication class.

91 **Please supply us with the department planning priorities that have been submitted to the College of Arts and Sciences for last five years.**

See Dr. Hoerter.

CRITERIA SUMMARY FOR:
BS DEGREE IN APPLIED BIOLOGY

CATALOG DESCRIPTION:

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There has been a commensurate increase in enrollment in 100 and 200 level courses that are taken by pre-professional students who are not enrolled in the Applied Biology program but take many of the same courses as Applied Biology majors. These enrollment pressures have a direct impact on the quality of the education that students majoring in Applied Biology receive.

The only course in Applied Biology that is specifically designed for students enrolled in the Applied Biology Program is the capstone course, BIOL 460 – Current Topics in Biology.

The survey data in this report from current students is quite complete since all students taking the capstone course are surveyed. University Advancement and Marketing identified 143 Applied Biology graduates from 1997-2002. Eight of these were out of the country so 135 surveys were sent out, 9 of which were undeliverable. Of the 126 surveys that probably reached the Applied Biology alumni, 36 (29%) were returned. The composite responses and individual comments were included in the report. According to the panel, since most Applied Biology majors continue their education, no employer survey was made. The student survey was given to students in the capstone course, BIOL 460 in fall and winter semesters 2002-2003. A total of 35 responses were collected. The composite responses and individual comments were included in the report.

SPECIFIC CRITERIA:

- **CENTRALITY TO FSU MISSION:**

  Ferris State University will be a national leader in providing opportunities for innovative teaching and learning in career-oriented, technological and professional education.

  The inclusion of the term Applied in the name of this program serves to emphasize the focus of this degree on the application of an education in biology to a specific career. Many of the students enrolled in and graduating from this program go on to professional education in fields such as optometry, medicine, and dentistry or graduate school. Others combine an AAS degree obtained in some other career oriented field such as industrial chemistry technology with a BS in Applied Biology as a means for career advancement.

  This program is directly related to the mission of Ferris State University.

- **UNIQUENESS AND VISIBILITY OF PROGRAM:**

  All Colleges and Universities in the State have a traditional biology major but none of them have the applied component that is a part of this degree.

  The administrative program review and the advisory committee survey indicate that visibility is an area of concern. The panel comments that Ferris State University in general does not promote its programs within the state as effectively as it should. The Administrative Program Review indicates that workshops that serve to bring prospective students to campus are offered on a regular basis.

The panel report recommends that the Applied Biology program should continue to explore new career tracks (such as genetic counseling) which can attract good students and provide good career routes for them.

- **SERVICE TO STATE, NATION, WORLD:**

  The panel states that this program provides a service by producing students and eventually professionals in the areas of optometry, medicine, dentistry, physician assistant, and physical therapy.

- **DEMAND BY STUDENTS:**

  The program report indicates that enrollment in the program has increased over the last five years. On campus enrollment in this program has risen from 133 in the fall of 1998 to 184 in the fall of 2003. This is an increase of 24 students from a year ago. Interest is high in the new tracks in Environmental Biology and Forensic Biology (currently 17 students have enrolled in this track in its first semester of existence).

- **DEMAND FOR, PLACEMENT OF, AND AVERAGE SALARY OF GRADUATES:**

  According to the administrative program review, during the last five years all graduates have been admitted to professional or graduate school or found employment. The same document indicates that, during the last five years, the average salary of graduates who obtained employment ranged from $32,000 to $36,000 per year.

  According to the panel report, over the last five years, graduates have been successful in gaining admission to professional schools, such as Medical (50% of applicants) and Dental Schools (93% of applicants). In recent years over half of the students enrolled in the Michigan College of Optometry received a significant portion of their undergraduate education in the Biology Department at Ferris State University. Some, but not all of these students were officially enrolled in the Applied Biology program. Most of them were advised by Applied Biology faculty. Other Applied Biology students have been admitted to Optometry Schools in Florida, Tennessee, Illinois, Pennsylvania, and Massachusetts.

  Some graduates have been admitted to physical therapy and physician assistant programs. All of the graduates of the new environmental track have successfully obtained paid internships with state or national environmental agencies. Still other students have used the BS in Applied Biology in conjunction with their technical AAS degree (such as dental hygiene) to obtain higher level positions in their chosen field.

- SERVICE TO NON-MAJORS:

  The panel reports that the Biology department teaches a number of courses to non-majors e.g. BIOL 101, Genetics – Human Aspects, BIOL 103 - Biological Concepts, and BIOL 111 – Environmental Biology. The Applied Biology Program does not serve non-majors directly. However, essentially all of the courses taken by Applied Biology majors will also include students from pre-professional programs and programs from colleges such as the College of Allied Health. The pre-professional and Allied Health programs ladder directly into Applied Biology.

- **QUALITY OF INSTRUCTION:**

  The quality of instruction as rated by current students and alumni is high. The high percentage of Applied Biology students graduating with academic honors (47%) and the levels of placement of students majoring in Applied Biology in professional and graduate school attest to the quality of the education that these students receive.

- **FACILITIES AND EQUIPMENT:**

  The facilities and equipment are currently adequate. The panel indicates that many Biology Department faculty members believe several of the concerns with regard to facilities and equipment which were expressed in the last Applied Biology Program Review have not been satisfactorily addressed. Prominent among these is the lack of storage space (exacerbated by increased enrollment in several lab-intensive courses) and the perceived failure to establish a systematic adequately funded program for the replacement of aging equipment/furnishing and acquisition of new equipment. This concern has been addressed in the Department of Biological Sciences Planning Priorities for Fiscal Years 2002-2004 which lists equipment replacement on a rotational basis that constantly replaces or updates current scientific equipment as a priority in its base budget support requests.

  In the last few years, the Biology Department has received allotments of $20,000 and $36,000 respectively for the purchase of new microscopes to replace aging and inoperative microscopes. A new $300,000 greenhouse was recently completed which will service the Ornamental Horticulture Program and courses taken by Applied Biology majors.

  In view of the dramatic increase in enrollment in Biology courses which results in filling of current lecture spaces to their designed capacity, the panel report encourages consideration of the provision of additional lecture space to the department.

- **LIBRARY INFORMATION RESOURCES:**

  The new library appears to be able to adequately support projects in biology such as those associated with BIOL 460 - Current topics in Biology. As information is increasingly digitalized it is important that the University maintain its commitment to providing ready access to computers and the internet.

- **COST:**

  According to the 2000-2001 report from institutional research:

  Total cost per SCH

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- **FACULTY:**
  - **QUALIFICATIONS**
    - There are fourteen tenured and one tenure track faculty in the Biology Department that teach courses in the Applied Biology Program. One of the tenured faculty is currently on Sabbatical Leave and the tenure track faculty joined the University last year. This year there are 3 one year temporary faculty teaching courses in the Applied Biology Program.
    - Fourteen faculty hold the highest terminal degree in their degree area. Four current faculty members are past recipients of the distinguished teaching award.
  - **PROFESSIONAL AND SCHOLARLY ACTIVITIES:**
    - Eleven of the fourteen tenured faculty have received a promotion or merit award during the last five years.
    - Five of the fourteen tenured faculty have been awarded a sabbatical leave during the last five years.

- The panel, reports that almost all of the fifteen faculty have attended a regional or national professional meeting in the last 5 years, some holding offices in national organizations.
- Nine of the fifteen faculty have had a paper published and/or made a presentation/poster session at a professional meeting during the last five years.

- **ADMINISTRATIVE EFFECTIVENESS:**

According to the panel report, Dr. Matt Klein and Mr. Rick Kowalkoski have been most helpful over the years. The panel report states that the program is administered effectively and inexpensively by a program coordinator with 25% release time and by several biology faculty members as a part of their normal advising load.

The administrative program review was not filled out completely and none of the requested data concerning these omissions was supplied to the council.

In 1999 the Biology Department had the same number of full time faculty and 2.85 FTE were taught as overload or taught by adjuncts. In the fall of 2003, subtracting released time and sabbatical leave, 9 FTE were taught as overload or by adjuncts

Historically, one of the strengths of Ferris State University and the Biology Department has been that full time faculty both lecture and teach the labs in the large lecture courses. In the past a lecture course might include students from 4 laboratory sections for a total of approximately 100 students. Currently students from 5 or 6 lab sections totaling approximately 150 students are taught in one lecture session and as many as 3 other individuals are assigned to teach the labs in those courses. There is little doubt that such conditions reduce the quality of education that students in Biology classes receive, including those majoring in Applied Biology.

The pressure to assign faculty to teach lower general education courses in some cases has prevented the offering of higher level elective courses which limits the educational opportunities for Applied Biology majors. Good advising, which is crucial to the success of Applied Biology students, is also compromised when so many faculty are on short term or part-time contracts.

The continued reliance on overload assignments and a large number of adjunct faculty members has the potential to decrease the quality of instruction and advising to students in this program.

APPLIED BIOLOGY PROGRAM

PROGRAM REVIEW PANEL REPORT

AUGUST 1, 2003

PROGRAM REVIEW PANEL MEMBERS

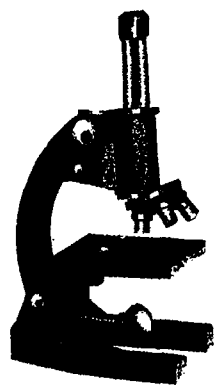
1. **Walter Hoeksema, Chair, Applied Biology Program Coordinator, Professor of Biology**

2. **Douglas Fonner, Applied Biology Program Faculty, Professor of Biology**

3. **Frank Hartley, Applied Biology Alumnus, Applied Biology Advisory Board Member**

4. **Mary Murnik, Applied Biology Program Faculty, Professor of Biology**

5. **Mary Steeno, Applied Biology Advisory Board Member, College of Allied Health Sciences Educational Counselor**



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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 30 years Applied Biology has evolved into a program with several career tracks (pre-medicine, pre-dentistry, pre-optometry, pre-veterinary medicine, pre-physical therapy, environmental biology, forensic biology and graduate school entry) with others being actively explored (e.g. genetic counseling 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. Dr. Mary Murnik is the pre-dentistry 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.

The 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 associate's degree such as in industrial chemistry technology or ornamental horticulture. The associate's degree provides the technology necessary for entering the job market while the Applied Biology baccalaureate provides a career advancement credential. 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, 4 current members of the biology faculty; namely, Robert Friar, Bruce Beetley, Douglas Fonner and Walt Hoeksema 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.

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 name APPLIED means that each student, as part of their Applied Biology baccalaureate, completes at least 8 semester hours of course work which reflects their career choice. Historically the use of "applied" was necessary to gain administrative approval for the Ferris Biology Department to offer a non-vocational/liberal arts program. Today, with many traditional majors at Ferris, such as psychology, the term "applied" is probably no longer significant. To give the reader a brief insight into the diversity of the Applied Biology program, the chart below shows the career tracks of the Helen Ferris Vartan Scholarship winners in the Applied Biology program since 1997.

YEAR(S)	RECIPIENT(S)	ACADEMIC ACCOMPLISHMENT
1997-2000	Marc S. Harmon	Gained acceptance into U of M Dental School
2000-2001	Dawn L. Sikarskie	Gained acceptance into MCO
2001-2003	Jamie Wachtor	Gained acceptance into U of M Dental School
2003-2004	Victoria Sheridan	FSU senior pre-medical student

The following chart shows the diversity of career choices of the 2001-2002 Applied Biology graduates

APPLIED BIOLOGY GRADUATES 2001-02

STUDENT NAME	STUDENT #	HONORS	VOCATION/VOCATIONAL GOAL
Ajijo, Folarin O.	000-14-2295		FSU College of Pharmacy
Anderson, Matthew J.	374-02-1678	High Distinction	Michigan College of Optometry
Brossman, Michael B.	235-35-5128		Graduate School
Brown, Kristen	383-86-2175		Univ. of Michigan Dental School
Burrell, Michael D.	374-04-4059	High Distinction	Univ. of Detroit Dental School
Burzyynski, Ashley L.	385-86-3750		Michigan College of Optometry
Ellis, Robert J.	384-92-5517	Highest Distinction	Dean Foods, Evart MI (INCT)
Haney, Josh M.	368-86-6771		Michigan College of Optometry
Holt, Elizabeth M.	381-02-5247	High Distinction	Physical Therapy at GVSU
Holt, Nancy A.	372-82-5911		Regional Manager Medical Sales.
Jackson, Catalina L.	384-80-8467		Physical Therapy
Jakubowski, Jennifer L.	376-02-2517		Forensic Science Lab

Kingsbury, Kelly E.	374-11-6221	Highest distinction	Michigan College of Optometry
Kirkland, Tianna	362-04-5788		CMU Assistant Basketball Coach
Kovatch, Laura A.	306-98-1898	Highest Distinction	US Fisheries & Wildlife, Panama City
Lebaron, Troy J.	382-94-5771	High Distinction	Nova SE (FL) College of Optometry
Lee, Travis E.	373-90-5941		Pharmacy
McCoy, Simon J.	380-86-8082	High Distinction	Pre Medicine
Mengistu, Bethel T.	367-21-7351		Pre Medicine
Messing, Kelly	364-94-5587		Dow Corning (INCT)
Nelson, Jeffry M.	345-78-3558		Pre Medicine
Patel, Vijay K.	324 90 1058		Graduate School
Peiffer, Paul M.	382-88-3751	Distinction	Pre Optometry
Reed, Nathan P.	485-08-8007	Highest Distinction	Pre Medicine
Riutta, Adam	371-88-1881	Highest Distinction	Wayne State Medical School
Roberge, Matthew J.	386-94-0656	Highest Distinction	Pre Medicine
Sikarskie, Dawn L.	367-88-2815	Highest distinction	Michigan College of Optometry
Smith, Rhonda M.	381-86-8476		Pre Veterinary
Tekle, Samrawit	367-23-6146	High Distinction	NIH Fellowship

Both previous charts accurately reflect the fact that the majority of Applied Biology students, in recent years, use the degree as a credential for advanced study with perhaps optometry being the most popular choice.

The following chart demonstrates the 10-year graduation rate and other demographic data.

Year	Graduates	Male	Female	Distinction or Higher
2001-02	29	16	13	48%
2000-01	27	14	13	37%
1999-00	29	16	13	69%
1998-99	25	13	12	48%
1997-98	31	12	19	35%
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%
Average	28	14	14	38%

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 28.

The following are concerns of the Applied Biology program as identified from graduate surveys from program review in 1996-97.

1. An inability to offer a number of biology elective courses because of low enrollment.

2. The lack of courses in the program to develop oral and written communication skills.

The following are concerns of the Applied Biology program from the perspective of the program's administrators and biology faculty.

1. 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 650 Applied Biology alumni.

2. Advising complexities as new tracks such as forensic biology are added to the Applied Biology program. We have addressed this problem, in part, by establishing an advising chair for each defined track.

3. 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 has helped in this latter regard. Annual meetings with academic advisors and admissions counselors would also help alleviate this problem.

4. 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.

5. The lack of sufficient funds for supplies, equipment, faculty travel and more tenure track positions.

APPLIED BIOLOGY PROGRAM

Degree Awarded: B.S. in Applied Biology

Program Review Panel:

Chair and Program Coordinator: Walt Hoeksema
Program faculty: Doug Fonner
Program faculty: Mary Murnik
Individual with special interest in the program: Frank Hartley
Faculty member outside the College of Arts and Sciences: Mary Steeno

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. Since the Applied Biology Program was reviewed in 1996-97 this evaluation will focus on the years 1997-2002.

DATA COLLECTION TECHNIQUES:

1. Graduate surveys from 1997-2002 graduates
2. Employer surveys from 2002-03
3. Student evaluations of program from academic year 2002-03
4. Faculty perceptions of the program from surveys to all tenured and tenure track biology faculty
5. Advisory Committee perceptions of program from questionnaire to advisory board members
6. Labor Market analysis from current market indicators of career opportunities for biology majors
7. Evaluation of facilities and equipment from Biology Department Planning Committee data and survey of current resources in the department
8. Curriculum evaluation from Biology Curriculum Committee data and current course offerings

SCHEDULE OF EVENTS:

Activity	Leader	Target Date
Graduate Survey	Hoeksema	May 1st, 2003
Employer Survey	Murnik	May 1st, 2003
Student Evaluation	Hoeksema	February 1st, 2003
Faculty Perceptions of Program	Hoeksema	March 1st, 2003
Advisory Committee Perceptions	Hoeksema	March 1st, 2003
Labor Market Analysis	Fonner	May 1st, 2003
Evaluation of Facilities	Hartley	May 1st, 2003
Curriculum Evalautions	Hoeksema	May 1st, 2003

TO: Jack Buss, Chair, Academic Program Review Committee

FROM: Walt Hoeksema, Applied Biology Program Coordinator and PRP Chair

SUBJECT: Proposed Budget for the Applied Biology Program Review Panel

DATE: November 22, 2002

Graduate Surveys from 1997-2002 ~ 200 graduates

Copying costs:	$30
Mail Room costs:	$85
Return envelope printing:	$15
Return mailing costs (assume 50% return of surveys):	$37

Advisory Board/Faculty/Student surveys

Copying costs:	$10
Phone expenses (primarily for employer follow up survey)	$35
Final document copying costs and cost of ring binders	$200
TOTAL:	**$ 412**

ADMINISTRATIVE PROGRAM REVIEW 2002

Program/Department: **APPLIED BIOLOGY**

Enrollment

	Fall 1998	Fall 1999	Fall 2000	Fall 2001	Fall 2002
Tenure Track FTE	.39	.39	.39	.39	.39
Overload/Supplemental FTEF					
Adjunct/Clinical FTEF (unpaid)					
Enrollment on-campus total*	133	152	149	153	187
Freshman	34	41	47	50	52
Sophomore	42	46	24	26	26
Junior	28	31	31	29	56
Senior	29	34	47	48	53
Masters					
Doctoral					
Pre-Professional Students					
Enrollment off-campus*					
Traverse City					
Grand Rapids					
Southwest					
Southeast					

*Use official count (7-day)

If there has been a change in enrollment, explain why:

Capacity:

Estimate program capacity considering current number of faculty, laboratory capacity, current equipment, and current levels of S&E. 200 students

What factors limit program capacity? Lab section capacity, current equipment, lab supplies and expense budget, FTEF.

Financial

Expenditures*	FY 98	FY 99	FY 00	FY 01	FY 02
Supply & Expense	$5,985	$7,600	$7,450	$8,320	$9,380
Faculty Prof. Development					
General Fund				$4,307	$3,482
Non-General Fund					
UCEL Incentives				$1,884	$1,569
Equipment					
Voc. Ed. Funds					
General Fund		$20,850	$6,400	$7,800	$5,680
In-Kind					
Non-General Fund					
UCEL Incentives				$2,100	$1,340

*Use end of fiscal year expenditures.

Revenues	FY98	FY99	Fy 00	FY01	FY02
Net Clinic Revenue					
Scholarship Donations					
Gifts, Grants, Cash Donations					
Endowment Earnings					
Institute Program/Services					
In-kind					

Other

	AY 97/98	AY 98/99	AY 99/00	AY 00/01	AY01/02
Number of Graduates* - Total	31	27	23	34	28
- On campus	31	25	29	27	28
- Off campus					
Placement of Graduates	31	25	29	27	28
Average Starting Salary					
Productivity - Academic Year Average	$33,400	$35,500	$34,000	$36,500	$32,000
- Summer					
Summer Enrollment					

* Use total for full year (S, F, W)

1. a) Areas of Strength:

- Program costs are low, there are very few courses taught that are used exclusively to serve applied biology majors. Most courses in the applied biology program service other areas.
- Program requirements offer flexibility to design "tracks" to meet specific careers such as environmental biology, forensic biology, genetic counseling
- 2-yr programs can easily ladder into Applied Biology

b) Areas of Concern and Proposed Action to Address Them:

- Increased visibility to prospective students of the different tracks and career potential; we are now offering workshops in various areas of science. This has proven to be attractive, and we will expand offerings next year to bring prospective students to campus to explore specific careers.
- We will expand the department's website so it will be more student friendly, and include more information about careers and programs

2. Future goals (please give time frame)

- Invite community college department heads in biology to our campus
- Re-design department's website

Other Recommendations:

- Increase number of scholarships in biology that the department could use for recruitment and hosting scholarship competitions.
- Implement an internship tuition scholarship.
- Coordinate with the honors program in recruiting better prepared student

4. Does the program have an advisory committee?

a) If yes, when did it last meet? Yes, every year in the winter semester

b) If no, why not? By what other means do faculty receive advice from employers and outside professionals?

c) When were new members last appointed? Last year

d) Are there non-alumni/ae on the committee? How many? Yes, two.

5. Does the program have an internship or other cooperative or experiential learning course?

a) If yes, is the internship required or recommended? Internships are recommended

b) If no, what is the reason for not requiring such an experience? Do many diverse internship sites would have to be established. In some areas, an internship would not be appropriate.

6. Does the program offer courses through the web?

a) Please list the web-based (fully delivered through the internet) courses the program offered last year?

- Yes, Biol 300 Pathophysiology

b) Please list the web-assisted (e.g., WebCT) courses the program offered last year.

Forensic Biology, pathophysiology, forensic pathology, genetics, entomology, natural history of invertebrates, ecology, environmental biology

7. What is unique about this program?

a) For what distinctive characteristics is it known in the state or nation?

b) What are some strategies that could lead to (greater) recognition?

- Increased recognition of accomplishments of current students and graduates.

8. Is the program accredited? No.

9. What have been some of the major achievements by students/graduates of programs. By faculty in program?

10. Questions about Program Outcomes Assessment (attach additional sheets, if necessary):

a) What are the program's learning outcomes?

- Understanding of the fundamental concepts, principles, and theories of the life sciences relevant to a student's career choice.
- Write and communicate effectively, and solve problems
- Increased awareness of career opportunities that match interests and abilities.

b) What assessment measures are used, both direct and indirect?

- Scientific Understanding Assessment Exam
- Education subject certification exams
- Job placement; employer satisfaction
- College Board Advanced Biology Exams
- Professional school entrance exams
- Course grades
- Senior paper and seminar presentation

c) What are the standards for assessment results?

- National standardized test scores
- Professional school requirements and acceptances

d) What were the assessment results for 2001-2002?

- Professional admissions tests indicate that students need to improve subject comprehension in molecular biology and interpretation of scientific data.

e) How will / how have the results been used for pedagogical or curricular change?

- Revision of general biology labs to reflect more experimentation
- Expansion of research opportunities for students
- Increased use of computer analysis of data in labs
- Greater emphasis on use of state-of-the-art instrumentation in teaching labs

11. Questions about Course Outcomes Assessment:
    a) Do all multi-sectioned courses have common outcomes? Yes

    b) If not, how do you plan to address discrepancies?

    c) Do you keep all course syllabi on file in a central location? Yes

*If you have questions about the outcomes assessment portions of this survey, please contact Laurie Chesley (x2713).

Form Completed by Jim Hoerter, Biological Sciences Department Head
Name and Title

Reviewed by Dean_____
Name and Date

GRADUATE EVALUATION

The Applied Biology program has nearly 700 graduates listed on the data base of the alumni office. Graduates from 1997-2002 were mailed, in early December 2002, a blank questionnaire or survey shown on the following pages and asked to complete and return it along with their comments as soon as possible in the enclosed post paid envelope. The survey restricted itself to graduates from 1997 because previous graduates had been surveyed in program review in 1997. We wished to see if certain curriculum changes that were implemented in response to comments from earlier graduates had an effect as measured by the responses of graduates since 1997. University Advancement and Marketing identified 143 Applied Biology graduates and their addresses from 1997-2002. Eight of these were out of the country and 135 surveys were mailed out in early December. Nine were returned as not deliverable leaving 126 that probably reached Applied Biology alumni. Thirty six were completed and returned to me or about 29%. As can be seen from the composite, the Applied Biology graduates are a very diverse group with respect to occupation. About one third are students in typical biology related graduate programs and the remaining two thirds are employed primarily full-time (83%) in careers ranging from science and science related to business and service related.

For each of the 12 questions on the survey a response of "1" or strongly agree is the most desirable response from the perspective of the Applied Biology program. Clearly, any responses lower than "3" or neutral connote from the perspective of the Applied Biology program an unfavorable response. It is also possible to calculate an overall or summary evaluation by graduates of the Applied Biology program by adding the averages for each question and dividing by 12. This gives the Applied Biology program a final evaluation, by its graduates, of 2.22 which is very favorable and compares favorably to the 2.10 final evaluation from graduates surveyed through 1997 program review. Current graduates gave slightly less favorable responses to questions 1-8, slightly more favorable responses to questions 10-12 and an identical response to question 9 as compared to earlier graduates.

Questions 1-5 on the survey sent out to all graduates relate to the value and quality of the Applied Biology degree. The composite response, on the following pages, shows that these are very favorably rated by graduates. This is also borne out by the individual comments from the graduates. Questions 6-12 relate to curriculum specifics of the Applied Biology program. Two major curriculum changes were made in response to 1997 program review. We now require COMM 121 public speaking of all graduates and we increased the number of biology major credits from 30 to 36. The composite response to the 12 questions shows that the lowest rating was to question 12 with a rating of 2.61. Graduates of the Applied Biology program are telling us we still need to emphasize the development of oral communication skills in the program but the COMM 121 requirement apparently has helped as the 1997 rating was 2.84. Graduates are also telling us that they would have liked more biology elective courses (question 9) and that the supporting sciences of chemistry and mathematics were beneficial in their program. The biology courses that were required by these graduates were seen as being very beneficial (question 6) and represent the highest rating given to any of the 12 questions. The Applied Biology program from the perspective of its graduates appears to be doing a good job of instilling problem solving or critical thinking skills into biology courses (question 10).

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 additional communication courses where oral communication skill development is emphasized.

3. The number of credit hours in the biology major was increased from 30 to 36 in response to program review in 1997. Our graduates rated the biology courses taken as beneficial with a rating of 1.92 (question #6). This tells us that we should continue with the requirement of 36 credits minimum in the biology major.

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 writing requirements in the capstone course BIOL. 460 and in the general education requirements implemented in the recent past we have begun to address this issue.

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** **no**; If yes, are you employed **part-time** **full-time** and what is your **occupation?**_____. If you are a student please tells us where and in what area (medicine etc).

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

strengths, weaknesses and problems in the FSU Applied Biology Program. If possible, please prioritize your comments. Thank You Very Much!

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. You can elaborate on your responses, if you wish, on the backside of the questionnaire.

Are you presently employed? yes (19) no (4); If yes, are you employed **part-time (0) full-time (19)** and what is your **occupation?_Optometrist (2), Physician's assistant (1), Epidemiologist (1), Researcher (2), Forensics (1), Chemist (1), Med. Tech. (1), Optician (1), Phlebotomist (1), Teacher (1), Dental Hygienist (1), Direct care (1), Claims adjustor (1), Admin. Assist. (1), Builder (1), Waitress (1), Business (1)**

If you are a student **(13)** please tells us where and in what area (medicine etc). **Optometry (7), Medicine (3), Master's program (1), Dentistry (1), Physical Therapy (1)**

	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 (7)	2 (15)	3 (6)	4 (6)	5	U (2)	2.32
2. I was satisfied with the academic preparation I received in the FSU Applied Biology Program.	1 (9)	2 (20)	3 (4)	4 (3)	5	U	2.03
3. I was satisfied with the advising I received while in the FSU Applied Biology Program.	1 (14)	2 (8)	3 (7)	4 (5)	5 (2)	U	2.25
4. I would recommend the FSU Applied Biology Program to prospective students.	1 (9)	2 (13)	3 (8)	4 (2)	5 (3)	U (1)	2.34
5. The FSU Applied Biology Baccalaureate is a quality degree.	1 (7)	2 (13)	3 (11)	4 (2)	5 (1)	U (2)	2.32
6. The biology courses I was required to take as an applied biology student were, in general, beneficial.	1 (8)	2 (23)	3 (5)	4	5	U	1.92
7. The chemistry courses I was required to take as an applied biology student were, in general, beneficial.	1 (8)	2 (17)	3 (7)	4 (2)	5 (1)	U (1)	2.17
8. The mathematics courses I was required to take as an applied biology student were, in general, beneficial.	1 (5)	2 (17)	3 (6)	4 (5)	5 (1)	U (2)	2.41
9. More biology electives should be made available to applied biology students.	1 (10)	2 (16)	3 (10)	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 (9)	2 (21)	3 (4)	4 (2)	5	U	1.97
11. The Applied Biology Curriculum includes enough courses which help to develop sound written communication skills.	1 (6)	2 (16)	3 (9)	4 (3)	5 (1)	U (1)	2.34
12. The Applied Biology Curriculum includes enough courses which help to develop sound oral communication skills.	1 (4)	2 (14)	3 (11)	4 (6)	5 (1)	U	2.61

Please comment below on any of your responses. The PRP is most interested in identifying what you perceive as strengths, weaknesses and problems in the FSU Applied Biology Program. If possible, please prioritize your comments. Thank You Very Much!

Twenty three of the thirty six returned surveys contained the following written comments. The comments are unabridged.

I am very pleased with the education I received at Ferris. I am planning to return to school in the physician's assistant program in the next couple of years.

I received my BS in route to going on to optometry school. I was also a transfer student into FSU in my junior year so many questions I cannot answer fully.

Strengths
- Drs. Hoeksema & Ryan, Adewusi
- advisors
- lab time

I think that from the beginning students should be informed that this degree is only a stepping stone for graduate school, medical or dental school.

I feel that I had to waste a great deal of time and money in elective courses that serve no purpose in my career goal of optometry. Now that I am in my 2nd year of optometry school, I find that I am being overwhelmed with huge quantities of information that I'm learning for the first time- and actually have to retain! Would it have not made more sense to have some of these basics (in a general ocular elective) in undergrad instead of geography, etc.?

I feel I have a strong background in anatomy, physiology and patho-physiology. This has enabled me to do well in my current masters program. Current topics in biology class also very beneficial.

I think that there should be more electives available, within Biology courses. I also think that its crucial for the counselor to make the student aware of which classes are fall term only or winter term only. I also have a question about the degree itself. Why is it called "Applied" Biology & not just Biology?

My advisor was a math instructor how (sic) was useless in the area of optometry/pre-optometry or even the biology degree. More care should have been taken to match students more appropriately.

1. The genetics class has been very helpful – it is well taught & highlights important concepts.
2. The Microbiology class is also helpful – its hard to cover everything in one semester, but its another good course.
3. Embryology is a class that needs some help – simply testing on many definitions isn't helpful. Compared to other schools, I'm behind in my embryo knowledge.
4. Revamp the entire Biochem dept. That class was absolutely useless to me in my 1st year of osteopathic medicine. It is probably a good class for the Biotech students, but is severely lacking for the rest of us.
5. It would be helpful if the applied Bio program would have a "career day" so that dentists, optometrists, D.O., M.D., DVM, DPM etc could attend & explain their field. I think this would help the freshmen get a better direction of where they want to go with their degree.

Thanks for the Survey & your interest

weaknesses

- Need a histology class
- Need more human electives instead of ecology requirement
- Business class – running a small business elective
- Intro to Pharmacology
- Make Pathophys requirement for Pre med/Pre dent

strengths

- Biochem with Ms. Kim Colburn (sic). She has great notes & textbook helped me pass Part I of my national Dental Boards!!
- Micro
- Immunology
- Faculty
- Ability to take Pharm classes
- Genetics
- Gross anatomy/Physiology
- Pathophys.

I believe the Applied bio program was especially beneficial for pre-optometry and/or Pre-pharmacy. I think there should be more alternatives to biology courses. Also I was challenged in Robert Friar, Ph.D's anatomy class as well as Microbiology (Hoeksema/Ryan). Weakness: To build on the reputation of the biology program to MSU & U of M so that future students can be more readily accepted into their medical programs, since this degree is mandatory for that.

Because of some of the things I have experienced, I perceive the Chemistry department to be a weakness. The instructors are very unprofessional and that may be due to the fact that the majority of them are only Assistant Professors. Some of the instructors play favoritism toward race and sex. I have experienced an "Instructor" giving answers to an exam. I've experienced being cheated of my grade and not receive justice when I took it through the chain of command. The next semester the problem was used against me. I've experienced an instructor lecturing and trying to teach a course that he lacked about 60% of the required knowledge. I perceive the Biology Department to be a strength with flaws. You have instructors who devote themselves to the students by being organized, seeing the students understand & learn the course material. They are more interested in passing students if they have earned it whether (sic) than trying to discourage them and cheat them. Then you have instructors like Dr. Palmer who can use some advise from Dr. Friar and others. My advisor wasn't very honest with me nor was he very helpful. My time at FSU could have been lesser & my GPA higher. (**Editorial note:** This was one of four returned surveys where the graduate was nether employed nor enrolled in graduate/professional school.)

FSU biology program help me prepare for graduate school for physical therapy in which I'm scheduled to receive my doctorate degree in April 2003. Weakness of the program include:

- Lack of communication skills in the biology course, not enough presentation projects to develop communication skills
- Critical thinking skills and problem solving: need to improve a tremendous amount in this area in order to prepare for the graduate level post-baccalaureate degree

I'm satisfied with my applied biology degree from FSU & would recommend it to future students. Thanks, FSU biology staff.

I feel as though I received a quality education in the Applied Biology program; I couldn't have gotten into medical school otherwise. One major weakness that I had a hard time with was the lack of help from my advisor in setting up the extracurricular activities that are required to get into medical school. I believe that it should be part of the advisor's responsibility to help the students set up job shadowing experiences or appropriate volunteer activities. It's hard for a student with no connections to get things like that started. Many other pre-medical programs provide services like that, and I honestly considered transferring for that very reason.

I found, compared to other students in my graduate program, my anatomy and physiology skills and understanding are far inferior. I had performed well at Ferris, however I feel that I was un-prepared for graduate school. The biology courses which have proved valuable are; General Biology, Micro, Developmental, and Genetics. All of my math courses were valuable except statistics. I use Trig everyday and find that class was the most valuable. Anatomy/physiology & statistics if taught by well trained, competent, enthusiastic professors may have proven useful! Biology 460 could prove to be useful if I decided to work in a laboratory. More emphasis should be brought to practical applications. Comm 121 needs to be split into perspective careers i.e. Biology & Science majors – Tech. Students – others. Automotive, welding, HVAC student are not interested in nor do they have the background for advanced Bio speeches. Like wise for Bio students with tech speeches. One suggestion for Micro or possibly another class, Mycology and Parasitology. Also you might want to look at Dr. Bacon's physics class. His teaching style, or lack thereof, is ineffective. He needs to be more involved in the teaching process. Professors who deserve a raise and special recognition Dr. Hoeksema, Dr. Ryan, Dr. Buss, Dr. Adewusi, Dr. Colvert, Mr. McCullough (should get an honorary doctorate), Dr. Murnik, Dr. Card, Dr. Cullen (English)

Questions

#1. The degree has given me confidence in doing other jobs. It showed me I can complete a task such as getting a degree
#5. I do not know anybody with the same degree out there. Quality? Don't know.
#8. Hate math!! Period.
#12. The only class I can recall that required oral presentations was the Bio 460. Ferris (Biology) needs more oral presentation projects. It allows the student to dive into the material and it helps you learn more effectively when you must present what you know.

Go Dogs!!

I would strongly recommend that an internship be instituted. Although I received several interviews during my final semester for PA programs, I was not accepted and had no idea what to do following graduation. Without any practical work experience, I was left with few options → accept a laboratory position for ≤ $10/hr. or attend graduate school. I would also recommend that graduate study be brought to the forefront of advising.

The Applied biology Program is a great start for continuing an education in a biological/medical field but in itself is rather generic/empty for job prospects. It has neither strengths nor weaknesses but can be an effective tool for further educational goals if one is advised of its short-comings if that someone plans to stop schooling with just this degree. Thanks for your help while I attended: Dr. Fonner, Dr. Hoeksema, Mr.Killian.

I feel that the education I received at Ferris was very good. I really feel that the academic program that I went through was very well organized and taught, and would be competitive with the Biology program at any other school. In applying to med schools, what I found was not a bad reputation in having gone to Ferris but a lack of a reputation. Ferris Student (sic) seem to be quite low in numbers at these schools. I think perhaps these schools viewed Ferris a little lower than other programs because of what they perceive to be a lack of research opportunities, but I was never interested in being a gopher for someone elses (sic) experiments, and am glad profs at Ferris are dedicated to teaching. That said, I am not sure I would choose A.B. if I had to do it over again. While I was successful in getting into med-school, I see how it could happen that one would not be. I think there would be merits in going to Med-school via Nursing or some non-science major. Where a person go (sic) choose another career if they needed. I, though, am very happy with the way that things worked out, I think that I am very prepared for what I will face. Thanks.

In late 80's professors of biology were excellent (chemistry fair). The choices were very good then, but I have heard that with the semester program (instead of trimester) that there are fewer choices. I feel a great strength of the program was the good diversity of biology courses which were offered while I was there.

My advisor Mary Murnik was extremely helpful in my college experience. I can only hope that all faculty advisors are as strong as her. Out of the 6 semesters of Chem classes I took I would say only one semester was taught by a prof who was able (to) really make the class as beneficial (as it) should be. The inorganic & organic classes were not as strong as they could have been. I was happy with the Biochem class. I am also happy with my A & P education. I handle injury claims with my job now & my education has helped my (sic) develop a good basis of knowledge to handle this line of work in medical related claims.

The course which required the presentation/paper/poster would be the only course I feel is not beneficial. Dr. Hoeksema was extremely helpful and always ready to talk and guide me through the program. He was instrumental in my finishing it. The degree has enabled me to teach at the community college level on a part time basis in my field of dentistry. I have only positive remarks on my entire education at Ferris State University including the Dental Hygiene Program.

This is probably too late because I wanted to write out something great, I put this aside. The first strong point that I have always commented on to people is the labs we had especially the cadavers. The individual help and willingness of professors to be approachable and willing to help was also very strong. The one class that needed help in my opinion was the statistics because we weren't taught statistics we were given open book tests and I learned nothing. Microbiology though I had trouble with the multiple multiple choice tests was one of my favorite classes and I still use in every day life a lot of what I learned. Environmental conservation was great because it got us outside to learn hands on. Bio 460 comes to mind however that could be wrong but our final project on researching a topic was key. Strong classes, Organic Chem., Anatomy, Micro, Biochem, Genetics, Envir Conserv, Medical Terminology, Chemistry. When I got out the most important aspect for employers next to overall GPA was the amount of lab work. All jobs pertaining to biology expect lab and I want to think I was short some lab time so if possible maybe an extra lab with more detailed experiments or something could be useful. Sorry this is so late. Thank you.

EMPLOYER SURVEY

Indications of quality of Applied Biology Graduates

We can assess the quality of Applied Biology graduates in part by looking at indications of the acceptance of these students by professional schools and biology-related professions.

During the past five years, approximately 75% of Applied Biology graduates have pursued graduate studies, seeking admission to schools of optometry, medicine, dentistry, physical therapy, physician assistants and traditional masters/doctoral programs. Admission to these professional and graduate schools is very competitive. They select students based on their academic record, scores on national assessment tests and interviews. Most Applied Biology students who apply are accepted by professional schools, one indication of the quality of our graduates.

Dental Schools accepted 93% of Ferris applicants during the past five years. Dr. Michael Ryan, FSU chair of pre-medical advising, reports that about 50% of our pre-meds are successful in gaining admission to medical schools, compared to a national average of about 30%. He attributes this above-average success rate to our intrusive advising. Students are advised from their enrollment in the track concerning the rigorous curriculum, the extracurricular expectations, the demands of the profession, and alternative options in health-related careers. Dr. Thomas Colladay, Associate Dean of the Michigan College of Optometry, reported that "on average, undergraduates from FSU carried a slightly higher GPA within the professional degree program than those who completed their undergraduate education at another institution".

Moreover, every year the Applied Biology program successfully educates and advises pre-professional students who do not graduate from the program. Sometimes these students have earned a B.S. elsewhere and choose to pursue our pre-professional program. For example, four such students were accepted into Dental Schools in the past three years. In other cases such as pre physical therapy, Ferris students have been accepted by the professional schools before they have fulfilled the requirements for the B.S. These students are not reflected in our statistics, but they surely are an indication of the quality of our program.

Letters from professional schools are rare. We were very pleased to receive an unsolicited letter from Central Michigan University's Physician Assistant Program, praising our graduate as a "fine student" and thanking Ferris for its recommendation. Central Michigan University continued by asking Ferris to send them more such students and volunteered to come to the Ferris campus to aid in recruiting.

Environmental Biology track coordinator Bruce Beetley indicates that all three graduates of the new Environmental Biology track have experienced wonderful success in obtaining competitive internships with the U.S. Fish and Wildlife Service, Mears State Park and the U.S. Forest Service. He thinks that these agencies particularly appreciate the curriculum's strong background in chemistry.

Graduates of the Industrial Chemistry Technology (ICT) A.A.S. program sometimes choose to complete the Applied Biology B.S. degree for career advancement. The ICT coordinator, Bill Killian, indicates that earning the Applied Biology degree has been "a great help" for these students in their careers.

Mary J. Steeno, Educational Counselor in the College of Allied Health Sciences, reported that the "...Applied Biology degree has proven to be a very valuable degree for our students in Dental Hygiene considering Dental school... students in Radiography considering a career in Chiropractic Medicine, and our students in Nuclear Medicine who are considering Medical school. Some of our ADN Nursing students have also pursued the Applied Biology degree. The combination of the practical AAS degree with the science-grounded BS has given these students a way to get to the next step in their present field....or to .. shift direction ..into an alternative career path.....I am always confident in the high quality of advising and instruction associated with the Applied Biology degree. It has been a wonderful degree for our students."

One such Allied Health Sciences A.A.S./ Applied Biology B.S .graduate replied on our Program Review survey: "The Applied Biology degree has enabled me to teach at the community college level on a part time basis in my field of dentistry. I have only positive remarks on my entire education at Ferris State University, including the Dental Hygiene program."

Such responses from our graduates, and the record of their acceptance by professional schools and biology-related professions, are submitted as indications of the quality of the Applied Biology program and employer satisfaction.

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 2002-03, the questionnaire on the following pages was given to these senior Applied Biology students during a regular meeting of the BIOL. 460 class. A total of 35 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., and 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. These responses have been stable over the years.

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. This was very similar to the results obtained last year 2001-2002.

4. The most commonly identified weaknesses were the development of verbal communication skills and a broad choice of biology courses/electives However these weaknesses were identified by less than 50% of the senior students surveyed.

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 a second communications class in addition to the presently required COMM. 121 (public speaking). This could be easily done by dropping 3 credits of cultural enrichment as the Applied Biology program presently requires 12 credits in this area while the general education requirement in this area is 9 semester credits.

3. Certain biology faculty are presently using or are considering using computer assisted instruction 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 computer assisted instruction in biology courses.

4. It will be reported to the biology department head that, from a student perspective, faculty with professional expertise in their subject areas is an identified strength 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.

SENIOR STUDENT EVALUATION OF THE APPLIED BIOLOGY PROGRAM 2002-2003 – COMPOSITE
(N = 35)

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-opt.), interesting to me**
   B. from another program at Ferris? If so which one? **14 – pre-opt, pre-pharm most frequently listed.**
   And do you plan to obtain dual degrees? **8 yes** **6 no**
   C. a transfer student **9**

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

(22) A. I plan to attend graduate or professional school (please state program e.g. medicine, dental, opt, M.S./Ph.D.) **Optometry, medical school, dental school, physical therapy, & physician's assist. most frequently mentioned**

(3) B. I plan to continue in UNDERGRADUATE EDUCATION (PLEASE state specific program) **arts, education, psychology**

(10) C. I plan to work or seek employment
have you accepted or had a job offer? **0** yes **10*** no (*one student had accepted an internship)
what area of work are you seeking? **lab/research (3), conservation (2), pharmaceutical sales (3), no preference (2)**

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)**

	(0)	(1)	(6)	(24)	(4)	
	1	2	3	4	5	
A. preparation for a career or advanced education						(aver. = 3.89) *
B. intellectual challenge						(aver. = 4.20)**
	(0)	(0)	(5)	(18)	(12)	

* (last year = 3.91)
** (last year = 4.19)

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

Most frequently listed courses were physiology/anatomy (18) and microbiology (8). These courses were cited as containing material most directly related to career goals.

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 were not directly related to the student's career goals. Several students said all biology courses taken were beneficial in some way or listed no courses in this area.

What area(s) of the applied biology curriculum are **STRENGTHS**?
(circle all that apply)

		last year
a. the development of problem solving/critical thinking skills	= 28 (80%)	(85%)
b. the development of writing skills	= 17 (49%)	(58%)
c. the development of verbal communication skills	= 11 (31%)	(36%)
d. the development of computer skills to access scientific information	= 16 (46%)	(27%)
e. a broad choice of biology courses/electives relevant to my career choice and interests	= 15 (43%)	(70%)
f. a faculty with expertise in their professional areas	= 30 (86%)	(79%)
g. sound advice, **when I sought it**, about careers in biology	= 18 (51%)	(39%)

What area(s) of the applied biology curriculum are **WEAKNESSES**?
(circle all that apply)

		last year
a. the development of problem solving/critical thinking skills	= 3 (9%)	(9%)
b. the development of writing skills	= 6 (17%)	(21%)
c. the development of verbal communication skills	= 15 (43%)	(33%)
d. the development of computer skills to access scientific information	= 10 (29%)	(33%)
e. a broad choice of biology courses/electives relevant to my career choice and interests	= 14 (40%)	(18%)
f. a faculty with expertise in their professional areas	= 1 (3%)	(3%)
g. sound advice, **when I sought it**, about careers in biology	= 6 (17%)	(12%)

WRITTEN COMMENTS FROM THE SENIOR STUDENTS IN BIOL 460

Senior Applied Biology students enrolled in BIOL. 460 were asked to comment about the qualities and/or deficiencies of the FSU Applied Biology Program and to give suggestions for improvement. Twenty-one out of thirty-five students responded with the unabridged written comments listed below.

Some courses tried to cram too much information into one semester – may have been helpful for students if there were two semesters instead of one.

I would like the Ferris program to provide more advisers and set up an internship program for students that think to pursue post graduate studies or become professionals. Ferris should also provide more interesting courses.

I believe this is a challenging program that has many good qualities and few deficiencies. The selection of biology electives offered each semester could be better. I feel the best quality of this program is the professors in the biology department. I have went (sic) to many of my professors for help during my time in the program and they were always willing to help. The instructors are genuinely interested in the subjects they teach.

I have no real complaints, my time spent here has been worthwhile. I feel maybe a slight lack of outreach to students on seeking careers. I believe that Dr. Murnik has been one of the best teachers I have had thus far. Genetics is an awesome class.

Good program!

I have taken several classes in Biology that haven't benefited me in the area of Biology I am going to pursue. Also, some classes I have taken I didn't need.

I've only been in the program for 1 semester.

I found it very difficult to get information on graduate school and applying to graduate schools. I feel that there were a lot of aspects of the application process that I wasn't aware of. It would have been so helpful and beneficial as far as getting things in early (or at least on time) if the pre-graduate (dental/med) advisors knew and passed along the relevant information.

As a member of the environmental biology tract, I see the program as very effective. In my search for an internship, employers were very impressed with the skills and experience I obtained from the summer block. I would recommend offering entomology again for the students in my program.

If (sic) found that meeting with my advisor was a struggle. I was assigned to an advisor not in my field. When I was sent to the correct advisor, he I (sic) to talk me in to another field.

Qualities: very educated faculty who know what they are teaching.
I was disappointed with a few teachers in the faculty soley (sic) to them being new and very unprepared for class, and unwilling to answer questions. Overall I feel my education is definitely a success; at least I feel more educated! ☺

They need to let students know about pharmaceutical sales.

To better notify students where they stand & certain things they need to do or sign in order to graduate. Be more open about certain information.

Pre-med majors should receive written information regarding the whole medical school application process. This should be given out in the Freshman or Sophomore years. I feel that I missed valuable information because I did not know the correct questions to ask. Be more pro-active.

I would like to see more human biology classes along the lines of anatomy/physiology. There also needs to be more guidance for the students in these programs. Everybody always has to check with someone. Straight answers are hard to come by. Prerequisites need to be clearly communicated.

I think that the faculty at FSU is extremely helpful and knowledgeable. I feel that freshman courses like chemistry should have more SLA's. The more difficult instructors did not have these services with their classes, which was difficult at times. Other than that, I feel the program has prepared me well for professional school. One more suggestion would be having only one professor for Chem 121, 122, Organic 221, 222, etc. Some times professors skip information, or have teaching styles that are completely different from others. It is hard to continue a course with a different professor.

I believe that Ferris has a good Applied Biology program mainly because I think most of the professors genuinely care about the students achieving their full potential.

I don't understand why Applied Bio is the only BS degree at Ferris which requires 12 credits in Social Awareness & 12 credits in Cultural Enrichment when all other BS degrees require only 9 credits in each area. It's partially my fault for not checking my status earlier, but I was under the assumption that the General Ed requirements were pretty much the same for all the BS degrees at FSU. This puts me a ½ semester behind & I don't understand why the extra credits are needed for this degree when I have over 200 credits total in various areas.

I liked how helpful & willing the profs. were to spend time outside of class to help me. The general classes were pretty cold ie Chem & Bio 121/122 they were dry and not very interesting.

Most profs are very knowledgeable with regards to their courses, some aren't so much (or at least don't explain well).

Possibly a few less general electives from Social Awareness etc. (maybe 6-9 credits instead of 12) and also for Humanities – allowing for a few more elective classes in Biology. I believe that the faculty here is extremely good and could offer more to the students as far as research classes and lab focused classes in Biology. More hands on kind of classes would be helpful – Techniques etc. (offered as electives for those who want it).

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 14 were returned for an excellent 88% response; one biology faculty member is out of the country. Only 3 of the 14 returned surveys 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 (also see comments).

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 (see editorial response in comments section).

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.

(N=14 respondents out of 16 faculty = 88%)

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Unknown	AVERAGE
1. The FSU Applied Biology Program is consistent with the FSU Mission Statement.	1 (12)	2 (2)	3	4	5	U	1.14
2. The FSU Applied Biology Program is consistent with the objectives and goals of the FSU Biology Department.	1 (13)	2	3	4	5	U (1)	1.00
3. The FSU Biology Faculty support the Applied Biology Program.	1 (11)	2 (3)	3	4	5	U	1.21
4. FSU Administration supports the FSU Applied Biology Program.	1 (3)	2 (5)	3 (3)	4 (1)	5	U (2)	2.17
5. The cost of the FSU Applied Biology Program is inexpensive compared to Other FSU science-based baccalaureate programs.	1 (12)	2 (2)	3	4	5	U	1.14
6. The number of tracks or options in the Applied Biology Program should be increased whenever possible.	1 (2)	2 (4)	3 (6)	4 (1)	5 (1)	U	2.64
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 (3)	3 (2)	4 (5)	5 (3)	U	3.43
8. More biology electives, irrespective of enrollment, should be made available to FSU Applied Biology Students	1 (9)	2 (4)	3	4 (1)	5	U	1.50
9. All Applied Biology Students, regardless of career choice should be required to complete an internship.	1	2 (1)	3 (5)	4 (5)	5 (3)	U	3.71
10. The academic reputation of the biology courses counting towards the biology major is sound.	1 (9)	2 (5)	3	4	5	U	1.36
11. The FSU Biology Major should require more credits than the present minimum of 36 semester hours.	1 (1)	2 (2)	3 (6)	4 (1)	5 (4)	U	3.36
12. The FSU Applied Biology Baccalaureate is a quality degree comparable to other baccalaureate degrees in biology at similar institutions.	1 (8)	2 (4)	3 (2)	4	5	U	1.57

BIOLOGY FACULTY COMMENTS

It's an excellent program – inexpensive because it uses existing courses commonly with large enrollment, flexible to meet the needs of many diverse career options and supported by the finest teaching department on the FSU campus.

Internships are great for certain options such as environmental biology but are not necessary for students entering medical or dental school.

All applied biology students should be required to take Chem 121 & 122, plus additional organic and biochemistry.
(**EDITORIAL NOTE**: Of last years 29 applied biology graduates 25/29 or 86% completed Chem 121 and 122, Chem 321 and 322 (organic chemistry) and a 300 level biochemistry course. Two graduates (7%) completed Chem 121 and 122 plus Chem 124 which is an introduction to organic and biochemistry. One graduate (3%) completed Chem 121 and Chem 124 and one graduate (3%) completed Chem 121 and 122 and Chem 321 and 322 but no biochemistry.)

ADVISORY COMMITTEE EVALUATION

The Applied Biology advisory committee was formed in academic year 1996-97, primarily in response to the provost's recommendation that all programs at Ferris have an advisory committee. This committee, which should be considered to be dynamic in that it can add or delete members as the need arises, consists of the following individuals who were chosen because of their familiarity with the Ferris Applied Biology Program or their expertise in an area relevant to the program.

Walter Hoeksema	Applied Biology Program Coordinator
Douglas Fonner	Applied Biology Program Faculty
Mary Murnik	Applied Biology Program Faculty
Frank Hartley	Applied Biology Alumnus
Peter Kailing	Mid-Michigan Environmental Consulting
William Killian	ICT Program Coordinator
Mary Steeno	Educational Counselor, Allied Health Sciences

These committee members were sent the 10 question survey shown on the following page. They were also given a copy of the 2002 Applied Biology annual report to help familiarize themselves with the current status of the Applied Biology program. The survey on the following page also shows a summary of the responses of the 7 advisory committee members (100%) who responded and their written comments as well. The following conclusions were drawn from their responses.

1. They rate the program very favorably in terms of educational value, quality, cost and program administration (questions 1, 2, 3, 4, 9 and 10).

2. They also rate the program favorably on the issues of adequate equipment/facilities and establishing internships (questions 5 and 6). They are basically neutral on program advertisement/promotion throughout FSU (question 7).

3. They do <u>not</u> believe the program is well advertised and promoted outside of Ferris (question 8).

4. There is some uncertainty about the aging microscopes still being used in certain biology laboratory courses (see comments).

The following uses will be made of these findings.

1. The Applied Biology advisory committee will be asked to evaluate the entire program review document and to suggest changes in the program for the purposes of improvement. These suggestions will be forwarded to the biology department's curriculum and planning committees.

2. The issue of program marketing will be brought to the attention of the Director of University Relations and Marketing for an analysis of how to better market, especially off campus, the Applied Biology program. I recently became aware that the university strategic marketing committee is going to be reactivated and will make the committee chair aware of these findings as well.

(N = 7 = 100%)

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** to Walt Hoeksema, PRP Chair, Biology Dept., ASC 2004.

Your opinions are important to the Program Review Panel. Thank you for your time and willingness to serve on the advisory committee. Please feel free to refer to the Applied Biology Annual Report you received in late October.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Unknown	AVERAGE
1. The Applied Biology Program serves a valuable function at FSU.	1 (SEVEN)	2	3	4	5	U	1.0
2. I would\have refer(red) students into the FSU Applied Biology Program.	1 (FIVE)	2 (ONE)	3 (ONE)	4	5	U	1.43
3. In general, the FSU Biology courses and faculty have a sound academic reputation.	1 (FOUR)	2 (THREE)	3	4	5	U	1.43
4. The FSU Applied Biology Program is administered effectively.	1 (SIX)	2 (ONE)	3	4	5	U	1.14
5. The facilities and equipment in the FSU Biology Department are sufficient to support quality education.	1 (TWO)	2 (THREE)	3	4 (ONE)	5	U (ONE)	2.0
6. The FSU Applied Biology Program should establish internships for its students when feasible.	1 (TWO)	2 (TWO)	3 (THREE)	4		U	2.14
7. The FSU Applied Biology Program is well advertised and promoted throughout FSU.	1	2 (THREE)	3 (TWO)	4 (ONE)	5	U (ONE)	2.67
8. The Applied Biology Program is well advertised and promoted outside of FSU.	1	2 (ONE)	3 (TWO)	4 (THREE)	5 (ONE)	U	3.57
9. The FSU Applied Biology Program costs are in line with other science based programs at FSU.	1 (FOUR)	2 (ONE)	3	4	5	U (TWO)	1.2
10. The FSU Applied Biology Baccalaureate is a quality degree comparable to other baccalaureate degrees in biology at similar institutions.	1 (FIVE)	2 (ONE)	3	4	5	U (ONE)	1.17

COMMENTS FROM THE ADVISORY COMMITTEE MEMBERS

A good program that fills an obvious need based upon the high numbers of students, both past and present, in the program. The entire Biology Faculty can be proud of the traditionally high acceptance rates of applied biology program graduates into dental schools, medical schools and more recently into physician's assistant programs. The CMU physician's assistant program has volunteered to come to Ferris to recruit our graduates for their program.

The Ferris Applied Biology program offers students one of the most flexible and rigorous biology baccalaureates in the Midwest. Our students enjoy an excellent rate of acceptance to professional schools; some choose options such as environmental studies or forensics, and they readily find appropriate positions.

Because much of the AB curriculum already exists to support programs in Education, Pharmacy, Allied health Sciences, etc., the program is very efficient and cost effective.

We do need to replace our aging microscopes (more than 20 years old. Those that can still be used are few.) Students in biology laboratory courses must be provided with adequate functioning equipment.

I believe internships would prove extremely valuable for students who seek employment after they graduate. I would question the value of an internship for a student heading directly into a further degree.

I am sure that there are entities across campus who know and respect and promote the Applied Biology program, but I'm not sure whether there is any particular emphasis placed on promoting any one program on or off campus. For on campus personnel, maybe we all should be about the business of seeing that there are opportunities for people to learn about the academic program here – for off-campus – I'm not sure what programmatic efforts will be made. It seems the efforts are to promote the university as a whole. Maybe that is sufficient.

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. Twenty-three of the 29 Applied Biology graduates in 2001-02 planned to continue their education in a professional or graduate school. A majority of these planned to attend optometry school.
2. A second group of students that the program serves is those students who have earned an A.A.S. in a vocational field (e.g., Industrial Chemistry Technology). These students use the degree to increase their chances for employment and advancement. Of the 29 graduates in 2001-02, two students earned an A.A.S. in Industrial Chemistry Technology, and one student earned an A.A.S. in Medical Laboratory Technology.
3. A third group of students that the program serves is those students who plan to enter the labor market without acquiring additional vocational skills. Relatively few students generally are in the group. Of the 29 graduates in 2001-02, three students entered the labor market without an A.A.S. in a vocational field.

This report will address the employment opportunities for graduates who pursue advanced degrees and for those who enter the labor marked directly. Sources of information included job-postings by on-line employment services and the Bureau of Labor Statistics.

EMPLOYMENT OPPORTUNITIES FOR GRADUATES WHO PURSUE ADVANCED DEGREES

The Bureau of Labor Statistics (BLS) reports that health services is one of the largest industries in the country. About 13 percent of all wage and salary jobs created between 2000 and 2010 will be in health services, and nine out of 20 occupations projected to grow the fastest are concentrated in health services. Wage and salary employment in the health services industry is projected to increase more than 25 percent through 2010, compared with an average of 16 percent for all industries.

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 the BLS, employment of optometrists is expected to grow about as fast as the average for all occupations through 2010 in response to the vision care needs of a growing and aging population. As baby boomers age, they will be more likely to visit optometrists and ophthalmologists because of the onset of vision problems in middle age, including those resulting from the extensive use of computers.

The demand for optometric services also will increase because of growth in the oldest age group, with their increased likelihood of cataracts, glaucoma, diabetes, and hypertension. Employment of optometrists also will grow due to greater recognition of the importance of vision care, rising personal incomes, and growth in employee vision care plans.

According to the BLS, for biological scientists, the Ph.D. degree usually is necessary for independent research and for advancement to administrative positions. A master's degree is sufficient for some jobs in applied research or product development and for jobs in management, inspection, sales, and service. The bachelor's degree is adequate for some nonresearch jobs. For example, some graduates with a bachelor's degree start as biological scientists in testing and inspection, or get jobs related to biological science, such as technical sales or service representatives. Some with a bachelor's degree may also work as research assistants.

Despite prospects of faster-than-average job growth for biological and medical scientists over the 2000-10 period, doctoral degree holders can expect to face considerable competition for basic research positions. The Federal Government funds much basic research and development, including many areas of medical research. Recent budget tightening has led to smaller increases in Federal basic research and development expenditures.

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, research assistants, and biological technicians.

According to the BLS, opportunities for graduates with a bachelor's degree in biological science are expected to be better than those with advanced degrees. The number of science-related jobs in sales, marketing, and research management, for which non-Ph.D.s usually qualify, are expected to be more plentiful than independent research positions. Non-Ph.D.s also may fill positions as biological technicians, environmental science and protection technicians, or health technologists and technicians.

Overall, employment of biological technicians is expected to increase about as fast as the average for all occupations through the year 2010. Continued growth of scientific and medical research, as well as the development and production of technical products, should stimulate demand for science technicians in many industries. In particular, the growing number of agricultural and medicinal products developed from using biotechnology techniques will increase the need for biological technicians. In addition, stronger competition among drug companies and an aging population are expected to contribute to the need for innovative and improved drugs, further spurring demand for biological technicians. Fastest employment growth of biological technicians should occur in the drug manufacturing industry and research and testing service firms.

Overall, employment growth will also be fueled by demand for environmental technicians to help regulate waste products; to collect air, water, and soil samples for measuring levels of pollutants; to monitor compliance with environmental regulations; and to clean up contaminated sites.

The following job descriptions were obtained from several on-line employment services in April 2003. They illustrate the range of employment opportunities for persons with a bachelor's degree in biology and experiences that employers require.

> *Biologist* -- Education: BS in Biology or related field. Primary Responsibilities: Responsibilities include resource inventories and impact assessments, writing of resource reports, communication with state and federal agency personnel, data collection, literature review, wetland inventory and general support of NEPA documentation.
>
> *Biologist* – With working knowledge of vegetation and habitat communities and biological analyses for environmental documents. The following qualifications are required: Bachelor's degree in Biology or closely related scientific discipline. At least 2 years relevant experience, including field surveys and knowledge of listed species. Familiarity with GIS. Strong research and analytical skills and ability to work with technical and quantitative materials. Excellent written and verbal communication skills. Flexibility and ability to work in a team. The following qualifications are desirable, but not required: Experience with wetlands delineation and species specific permits. Experience in permit processing pursuant to federal and state regulatory requirements. Ability to coordinate with government agencies and subconsultants. Knowledge of Adobe Illustrator, Photoshop, and Acrobat/Distiller (PDF). Familiarity with AutoCAD and Microstation files.
>
> *Research Assistant* -- Responsibilities will include basic molecular techniques including PCR and electrophoresis as well as statistical data analysis using EXCEL. Candidates must have a BS in a biological science, with recent academic experience in molecular biology or biochemistry, and excellent computer skills- including EXCEL.
>
> *Research Assistant* -- The candidate should have experience as a veterinary technician, or a B.A./B.S. in biology (or related field). A basic knowledge of computers is required. The position involves work on a federally funded study involving an animal model of neurodegenerative disease. Preference will be given to candidates with previous laboratory experience, animal handling experience, and/or proficiency in data analysis.
>
> *Pharmaceutical Sales Representatives* -- The aggressive yet highly polished individuals we select for these important roles will interact with physicians, healthcare organizations and pharmacists to sell our highly successful products and establish long-term relationships essential to success. To qualify, a Bachelor's degree, preferably in life sciences or business, is required. Pharmaceutical sales experience is a plus.
>
> *Ecologists* -- Johnson Engineering is seeking Ecologist I and II DOQ. Four-year degree in biology or environmental science required. Position requires ability to work in the field in varying weather and terrain conditions. MS degree preferred.
>
> *Science positions* -- Have you had experience in the Science Industry? Are you looking to further your career by exploring new opportunities? Have you obtained a degree and are looking to start your science career? We are currently seeking professional lab technicians, R&D Chemists, Biologists, and Microbiologists for the Chicago Land area. Pay and benefits are based on position.

Research assistant positions generally require specific technology skills that students can acquire by completing the A.A.S. in Industrial Chemistry or Medical Laboratory Technology. The baccalaureate degree in Biotechnology is available for students whose career goals are in cell and molecular biology. Although technology skills required for ecology positions are generally less rigorous, there is more competition for these positions. Most four-year colleges have a biology program and large universities have colleges devoted to environmental studies and natural resources.

There are an a large number of sales and marketing positions in the health care industry. These positions generally require a baccalaureate degree in the sciences or business. An area of historical interest to students has been pharmaceutical sales. Despite the consolidation of the pharmaceutical industry in recent years, employment opportunities in this area remain strong. A search of Monster.com's database on April 22, 2003, using the key words "pharmaceutical sales" listed 23 positions in Grand Rapids and western Michigan. Although a baccalaureate degree is the minimum education requirement for many of these positions, they also require leadership skills and business or sales experience.

Department of Biological Sciences Facilities and Equipment

The last Applied Biology Program Review was completed shortly after renovation of the Science Building. At that time several concerns were expressed regarding the facilities and equipment. These concerns were the focus of a Biology Department faculty/staff survey taken in March of 2003 (attached) designed to determine to what extent these concerns have been addressed - 9 of 18 surveys were returned. Survey items and a brief summary of the comments made about each follow:

1. Six laboratories retain the outdated bench work that existed prior to the 1997 renovation.
>In general, faculty that teach in these laboratories continue to have concerns about the aging bench work and its configuration as well as inadequate shelving, lack of fume hoods, and too few computer ports.

2. Two new lecture halls are being renovated and equipped for multimedia presentations.
>Most respondents are pleased with the renovations, but there is a concern that increasing enrollments and concurrent lecture sections require additional well-equipped lecture facilities.

3. There is a serious shortage of storage space for the department.
>Several respondents pointed out that student collections and other materials for regular lab instruction are currently stored under the lab benches or on top of what would ideally be available work surfaces. Some respondents who use the research labs pointed out that new projects and/or new faculty bringing their equipment and supplies have placed a strain on available space in the research labs. There was a suggestion that better use might be made of the available space.

4. The ventilation system generates excessive noise in most, if not all, of the rooms on the 2nd floor of the Science Building.
>Though physical plant engineers have done their best to resolve this problem, most respondents indicated that to a greater or lesser degree it is still a problem. There is some indication that the ventilation noise issue is an original design problem and not likely amenable to correction at this time.

5. The air filtration system is inadequate.
>The ventilation system has been tested and meets EPA standards for air quality.

6. The animal care facility in the Science Building is inadequate.
>Under current USDA regulations the animal care facility is adequate for housing turtles, frogs, birds, rats, and mice. Should any or all of these animals become covered under more stringent USDA regulations the animal care facility will require significant upgrades.

7. Equipment previously used in one laboratory has been moved to another and not been replaced in the original laboratory.
>Faculty commenting on this item universally sited a shortage of microscopes; they also pointed out that increased utilization of older equipment (due to increased enrollments) is rapidly diminishing its usefulness – repairs are more frequent and sometimes can not be made because parts are no longer available.

8. A systematic program for replacement and upgrade of equipment should be developed.
>Though equipment request lists are regularly generated and prioritized, and funding becomes available for some of the requested items, respondents generally commented that procedures for equipment replacement and acquisition of new equipment have not been clearly defined nor has adequate funding been allocated on a regular basis.

It is evident from these survey items and comments that many Biology Department faculty members believe several of the concerns expressed in the last Applied Biology Program Review have not been satisfactorily addressed. Prominent among these is the lack of storage space (exacerbated by increased enrollment in several lab-intensive courses) and the perceived failure to establish a systematic adequately funded program for the replacement of aging equipment/furnishings and acquisition of new equipment. (As regards this last, the Department of Biological Sciences Planning Priorities for Fiscal Years 2002-2004 lists equipment replacement on a rotational basis that constantly replaces or updates current scientific equipment as a priority in its base budget support requests.)
The faculty is generally pleased with the renovations in Science 126 and Science 120 but encourage serious consideration of additional lecture space (lecture sections in some courses fill the current space to design capacity).

Currently:

1. Completion of the new greenhouse has tripled the available floor space and now allows for three zones of independent climate control. Automated lighting and watering systems have been installed. The Department of Biological Sciences Planning Priorities for FY 2002-2004 includes a base budget support request to maintain and staff the greenhouse.

2. A new steam sterilizer has been purchased at a cost of $26,000 to replace a nearly 30 year-old unit. This purchase has greatly enhanced the efficiency and safety in the microbiology preparation area.

3. The supply and equipment budget for the Biology Department has been tight, but with few exceptions, has allowed support staff to supply materials sufficient to maintain quality laboratory experiences for our students. Despite declining state funding to Ferris, the department has been assured that funding an adequate supply and equipment budget remains a College of Arts and Sciences priority.

4. The University has allocated $33,000 to fund an upgrade of the computer compatible physiological recording systems in one of the anatomy/physiology labs. This upgrade includes an increase from the current six workstations to ten.

5. The Academic Affairs Academic Equipment Request List for FY 2003-2004 ranks the $36,000 cost of new microscopes to support the Applied Biology Program as 2nd on the list of 28 items.

6. The Biology Department continues to actively pursue grant funding for equipment replacement and new equipment acquisition initiatives.

7. The configuration of laboratory facilities in the Science Building remains essentially as reported in the last Applied Biology Program Review: three general biology, two microbiology, one genetics, two ecology-environmental biology, three anatomy/physiology, and one botany lab.

8. The computer lab on the second floor of the Science building is being converted to a research lab, bringing the total number of faculty/student research labs in the department to four.

CURRICULUM EVALUATION

The single 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." Given the fact that most Applied Biology students are using the degree as a stepping stone to graduate and professional schools the clearest evidence that the Applied Biology curriculum is meeting that goal is the acceptance rate and success of our graduates into these very competitive programs,

The single most popular career choice of recent Applied Biology graduates is optometry with most seeking to attend the Michigan College of Optometry as their first choice. I recognize that not all Ferris students entering MCO are Applied Biology graduates but even those that are not have completed at least 3 years of course work in the Applied Biology curriculum. Dr.Thomas Colladay supplied me with the following information.

1. Beginning with 1996 to 1998, the number of FSU students who were admitted to MCO and went on to graduate:

1996 = 10/32. Seven graduated and 3 either dropped out or were dismissed.
1997 = 9/32. Nine graduated.
1998 = 10/32. Ten graduated.

2. Beginning with 1999 to 2002, the number of FSU students who were admitted to MCO and are still enrolled:

1999 = 13/32. Thirteen are currently enrolled.
2000 = 14/34. Thirteen are currently enrolled. One dropped out due to a military obligation. (That student is planning to return to the college.)
2001 = 18/34. Eighteen are currently enrolled.
2002 = 19/34. Nineteen are currently enrolled.

3. Performance of FSU undergraduates in the MCO professional program as compared to undergraduates from other institutions.
The last time an analysis of this nature was conducted was approximately three years ago. That analysis showed that, on average, undergraduates from FSU carried a slightly higher GPA within the professional degree program than those who completed their undergraduate education at another institution.

I would conclude from the above data that Ferris students compose approximately half of the entering MCO freshman class, have an excellent retention/graduation rate and in the MCO perform academically at a level slightly higher than non Ferris students. Clearly the Applied Biology curriculum is meeting the above stated goal with respect to pre-optometry students in the Applied Biology program. I would also add that in the past we have had FSU Applied Biology graduates accepted into optometry programs in Philadelphia, Florida, Memphis, Illinois and Boston.

In the past 3 years I have had 5 students accepted into masters and doctoral programs in physical therapy. This represents 5 out of 7 graduates who cited physical therapy as a career goal. The 2 that were not accepted are really unknowns as to their status into physical therapy and may well have been accepted somewhere after leaving Ferris. This is not uncommon especially with pre-medical students who not infrequently gain acceptance years after completing their undergraduate degree. The accepted students are attending professional physical therapy programs at GVSU, U of M Flint, St. Augustine (Florida), and Pennsylvania. One student (Pennsylvania) received a full ride scholarship turning down similar offers from Northwestern and Columbia.

Central Michigan University's Physician Assistant Program was so pleased with an FSU Applied Biology graduate that they asked me by letter to send them more students like him and have volunteered to come down to the Ferris campus to recruit Applied Biology graduates for their PA program. A 2003 Applied Biology graduate will attend the PA program at CMU this fall.

Both pre-medicine and pre-dentistry tracks in the Ferris Applied Biology program enjoy an acceptance rate above the national average.

Bruce Beetley has been able to obtain internships for all 4 environmental biology track Applied Biology students that have applied. These internships include 2 at Mears State Park, 1 at the department of Fisheries and Wildlife in Florida and 1 with the US Forest Service in California. These are all paying internships and are competitively obtained by FSU Applied Biology graduates. Bruce reports that feedback from the internship employers has been very positive.

I have also in the past 3 years given a science reasoning assessment test to Applied Biology seniors as part of the BIOL 460 course. These completed examinations are available in the office of the Applied Biology program coordinator. Senior Applied Biology students are also asked for their evaluation of the Applied Biology curriculum and the results are included as part of the program's annual report as well as in the graduate survey section of this document.

In summary from empirical observation of the acceptance and success of our graduates into competitive graduate and professional programs, the success of our graduates in obtaining competitive internships and program assessment tools, the Applied Biology curriculum is achieving its stated goal of providing a quality baccalaureate degree in biology for those whose careers and/or vocational choices will benefit from such a degree.

The Ferris State University Biology Department consists of 16 tenured and/or tenure track full time faculty. As can be seen on the following pages, 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 (pages 46-49) and syllabi (section 15) of the biology courses applicable to the Applied Biology Program major are included as well as the Applied Biology curriculum requirements document (pages 50-55).

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 308 ADVANCED MEDICAL MICROBIOLOGY AND IMMUNOLOGY have either not been taught or taught less frequently 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 and equipment replacement.

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. 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.

In response to Applied Biology program review in 1997, the following curriculum changes were implemented. We increased the total number of hours required for graduation from 120 to 127. We increased the number of credits required in the biology major from 30 to 36. We now require COMM 121 Fundamentals of Public Speaking by all our graduates rather than giving a choice between COMM 105 Intrapersonal Communication and COMM 121.

Additionally, the program has added, since the last program review, 2 new tracks; namely, environmental biology and forensic biology thus opening up the Applied Biology program to many new students.

BIOLOGY FACULTY ACADEMIC CREDENTIALS

NAME	DEGREE	RECEIVED FROM	DEGREE AREA
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. Strasser, Karren	Ph.D.	Louisiana	Environmental Biology
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.

14/16 or 88% of the biology faculty hold earned doctorates; 15/16 or 94% hold the highest terminal degree in their degree area.

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 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 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 321 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 322 Human Physiology and Anatomy 2 - 4 Credit Hours

A continuation of BIOL 321 covering the respiratory system, digestion and metabolism, the cardiovascular system, the renal system and the reproductive system. For students in science baccalaureate programs.

BIOL 340 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 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.

REQUIREMENTS

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 is consistent with the Ferris Mission Statement which states that Ferris State University will be a national leader in providing opportunities for innovative teaching and learning in career-oriented, technological and professional education. The Applied Biology 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 Environmental Biology, Pre-Med, Pre-Dent, Pre-Opt, Pre-Vet, Pre-Physical Therapy and to those who wish to pursue graduate work. Although the graduation requirements encompass a full four years' work, enrollment might occur as late as the end of the third 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 36 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 Sciences, Pharmacy, or other similar programs. In addition, a student must complete mathematics at least through trigonometry, be computer literate, have a minimum of 127 semester credits, and an honor point average of 2.0 or above.

I. COLLEGE OF ARTS AND SCIENCES REQUIREMENTS

A. COMMUNICATION COMPETENCE

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

B. CULTURAL ENRICHMENT

Courses in ARCH 244, ARTH, ARTS, THTR, ENGL 322, SPAN, FREN, GERM, HIST, LITR, HUMN, MUSI, COMM 231. Selection should be from at least two different areas and include at least one course at the 300-level or above. Also see "D."

COURSE	TITLE	CR.	GRADE	
_____	_____	___	_____	
_____	_____	___	_____	
_____	_____	___	_____	
_____	_____	___	_____	
_____	_____	___	_____	TOTAL CR. HRS.
_____	_____	___	_____	_____
				(12 minimum)

C. SOCIAL AWARENESS

Choose from ANTH, ECON, GEOG (except 111, 121), PLSC, PSYC, SOCY, 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.

COURSE	TITLE	CR.	GRADE	
_____	_____	___	_____	
_____	_____	___	_____	
_____	_____	___	_____	
_____	_____	___	_____	
_____	_____	___	_____	TOTAL CR. HRS.
_____	_____	___	_____	_____
				(12 minimum)

D. GLOBAL CONSCIOUSNESS

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

II. SCIENCE REQUIREMENTS

A. BIOLOGY MAJOR

Must total 36 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.**

COURSE	TITLE	CR.	GRADE
1. General Biology (minimum of 8 credits)			
BIOL 121	Gen. Biology 1	4	
BIOL 122	Gen. Biology 2	4	
2. Anatomy and Physiology* (minimum of 5 credits)			
BIOL 205	Human Anat/Phys	5	
BIOL 321	Human Phys/Anat 1	4	
BIOL 322	Human Phys/Anat 2	4	
BIOL 300	Pathophysiology	3	
BIOL 353	Plant Physiology	4	
3. Microbiology (minimum of 3 credits)			
BIOL 108	Medical Micro.	3	
BIOL 218	Microbial Ecology	3	
BIOL 286	General Micro.	3	
BIOL 308	Adv.Med.Mic/Imm	3	
BIOL 386	Micro/Immunology	5	
4. Genetics (minimum of 3 cr.)			
BIOL 375	Genetics	3	
5. Conservation or Ecology (minimum of 3 credits, recommended junior year)			
BIOL 347	Environ. Conserva.	3	
BIOL 442	Gen. Ecology	3	
6. Biological Writing/Capstone Course (minimum of 2 credits)			
BIOL 460	Current Topics in Biology	2	
7. Biology Electives			
BIOL 119	Birds of Michigan	4	
BIOL 340	Evolution	3	
BIOL 349	Medical Parasitol.	3	
BIOL 341	Nat. Hist. Inverts.	3	
BIOL 342	Nat. Hist. Vertebr.	3	
BIOL 344	Entomology	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 _____
(36 minimum)

B. SUPPORTING SCIENCES

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

COURSE	TITLE	CR.	GRADE
1. Mathematics (minimum compt. MATH 120)			
MATH 115	Intermed. Algebra	3	
MATH 120	Trigonometry	3	
MATH 130	Adv. Alg/Anal Trig	4	
MATH 135	Calc/Life Sciences	3	
MATH 220	Anal Geom/Calc 1	5	
MATH 230	Anal Geom/Calc 2	5	
MATH 116	Int Alg/Num Trig	4	
MATH 126	Algebra/Anal Trig	4	
2. Physics (minimum of 4 credits)			
PHYS 130	Concepts in Physics	4	
PHYS 155	Radiologic Physics	3	
PHYS 211	Intro Physics 1	4	
PHYS 212	Intro Physics 2	4	
PHYS 213	Phys. Computations	1	
PHYS 241	General Physics 1	5	
PHYS 242	General Physics 2	5	
PHYS 243	Phys. Computations	1	

COURSE	TITLE	CR.	GRADE
2. Chemistry (minimum of 7 credits including some biochemistry)			
CHEM 121	General Chem 1	5	
CHEM 122	General Chem 2	5	
CHEM 211	Polymer Chem	4	
CHEM 214	Fund/Organic Chem	4	
CHEM 321	Organic Chem 1	5	
CHEM 322	Organic Chem 2	5	
CHEM 324*	Fund of Biochem	3	
CHEM 364*	Biochemistry	4	
PHCM 320*	Biochemistry	5	
CHEM 114**	Intro to Inorganic	4	
CHEM 124**	Intro Organ/Biochem	3	
4. Science Electives			
ASTR 120	Stellar System	4	
ASTR 130	Solar System	4	
ASTR 140	The Sun	3	
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*			
COURSE	TITLE	CR.	GRADE	COURSE	TITLE	CR.	GRADE
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	4	_____	_____	_____	___	_____
BIOL 340	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	_____				
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	_____				

*Courses in column B must be approved.

TOTAL CREDIT HOURS _____
(8 minimum)

III. COMPUTER LITERACY

Computer literacy is a graduation requirement; ISYS 105 Microcomputer Applications or other approved ISYS courses are recommended.

COURSE	TITLE	CR.	GRADE
_____	_____	___	_____

IV. FREE ELECTIVES: **To a total program requirement of 127 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.**

COURSE	TITLE	CR.	GRADE
_____	_____	___	_____
_____	_____	___	_____
_____	_____	___	_____
_____	_____	___	_____
_____	_____	___	_____
_____	_____	___	_____
_____	_____	___	_____
_____	_____	___	_____

TOTAL CREDIT HOURS _____

NOTE: At least 40 semester credits, out of the total of 127 credits, must be in courses at the 300 or higher level.

ENROLLMENT TRENDS

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

	1997-98	1998-99	1999-2000	2000-01	2001-02
Applied Biology	133	51	48	51	50
Pre-Dental Track	NA	21	16	12	23
Pre-Medical Track	NA	42	53	58	50
Pre-Veterinary Track	NA	17	12	12	17
Sports Medicine Track*	NA	1	1	0	0
Pre-Physical Therapy Track	NA	16	14	15	12
Environmental Biology Track**	NA	3	5	4	8
Vision Science Track***	NA	0	0	1	2
Forensic Track****	NA	NA	NA	NA	NA
TOTALS:	133	151	149	153	162

* No longer available
** New Track in 1997
*** Track combines 3-year pre-optometry with 1st year of MCO
**** New Track in 2003

NOTE: defined tracks in the Applied Biology program were established in 1996. Prior to this the tracks listed were separate programs

We believe the above data reflects a reasonably stable enrollment in the FSU Applied Biology Program. Prior to 1996 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. Environmental biology track was new in 1997 and forensic biology track is new in 2003. Other tracks which have been examined and may yet be developed would include genetic counseling. 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.

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 have also recently seen Applied Biology students gaining acceptance into dental school and physical therapy without finishing their Applied Biology baccalaureate. This is not at all unusual and therefore the enrollment numbers should always be considered minimums.

We, the Applied Biology program advisors, have our own data which reflects senior enrollment in the program. This 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 primarily taken by seniors with a few juniors.

Year	Enrollment in Biol 460
1997-98	36
1998-99	39
1999-00	39
2000-01	33
2001-02	32

Compare this data with the graduation profile chart below for the last five years.

Year	Graduates	Male	Female	Distinction or Higher
1997-98	31	12	19	35%
1998-99	25	13	12	48%
1999-00	29	16	13	69%
2000-01	27	14	13	37%
2001-02	29	16	13	48%
Average	28	14	14	47%

All the preceding data tells us that there are approximately 150 students enrolled in Applied Biology (5 year average) with an average graduating class of 28 (about 19% of total enrollment). This suggests a reasonable retention rate in the Applied Biology program. The high academic achievements of the graduating seniors is reflected in 47% achieving distinction or higher (a GPA of at least 3.25) as well as a good acceptance rate into graduate and professional schools. In addition Applied Biology educates but does not graduate a few students each year. The program never receives credit for educating these students because they do not appear as graduates of the program yet the program has been instrumental in their success.

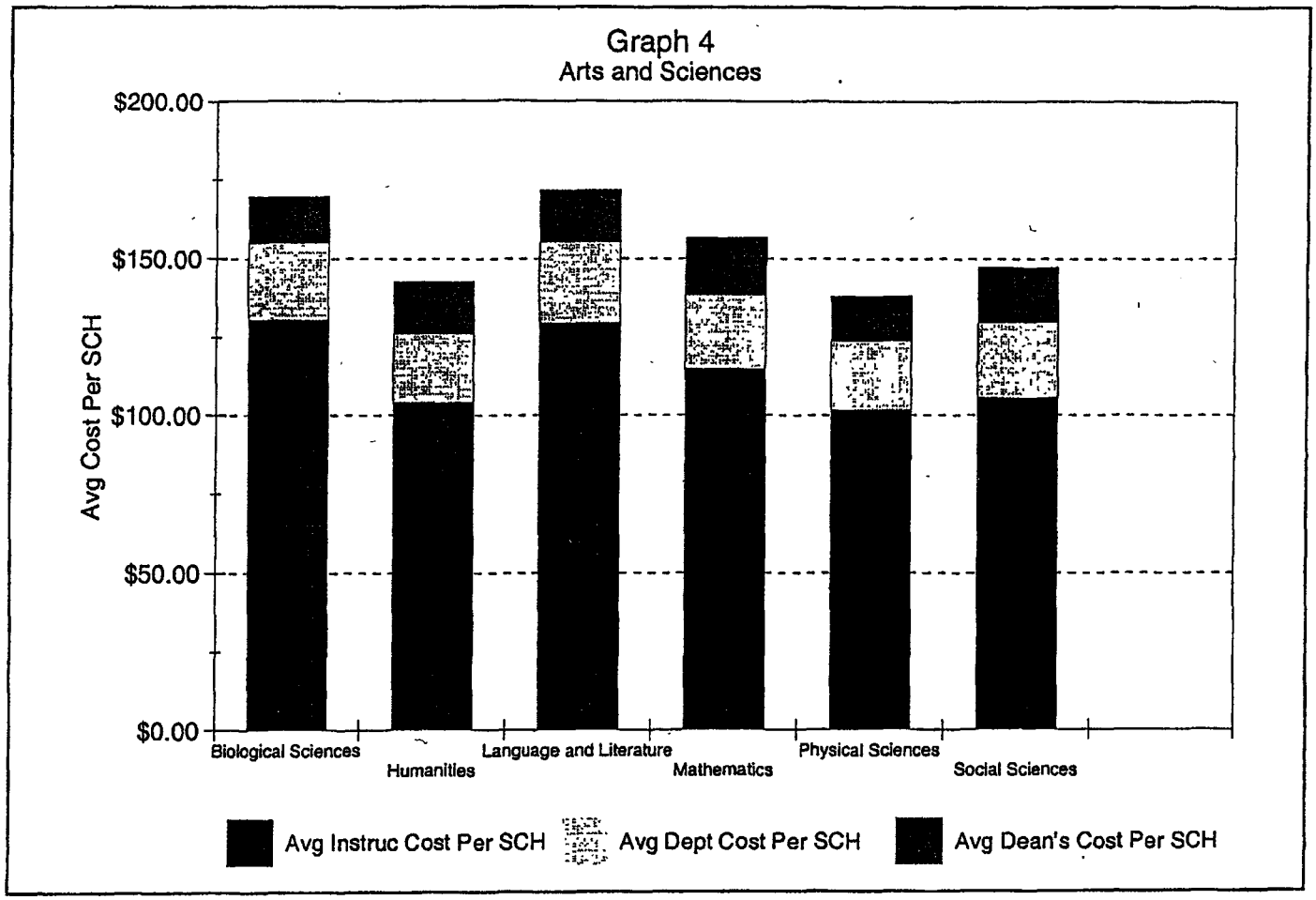
As the following 2000-01 data from the Office of Institutional Research clearly demonstrates the Applied Biology Program is a bargain in terms of costs. Of the 3 programs in the Biology Department (Biotechnology, Ornamental Horticulture and Applied Biology) the Applied Biology Program is the cheapest in total avg. cost/sch at $143.84-$159.16 depending upon the track. The environmental biology track is the most expensive and the pre-veterinary medicine track is the least expensive according to this data.

When this data is examined for total program costing ranked high to low, where all Ferris programs are listed, the following conclusions can be drawn. The FSU Applied Biology BS Program is very inexpensive ranking tenth lowest in total program cost (total program cost = $18,589.64) out of 81 FSU programs requiring 120 or more total credits or in the bottom 12% with respect to cost.

In part, this low cost is due to the fact that with the exception of BIOL 460, no courses unique to the Applied Biology Program exist. The program uses existing courses which also service other typically large enrolment programs such as pre-pharmacy and pre-optometry. Likewise, equipment servicing students enrolled in the Applied Biology Program is not unique to Applied Biology but is shared, so to speak, by students in other programs such as pre-pharmacy and pre-optometry. In addition the only administrative cost is the 25% release time given during fall and winter semesters to the program coordinator. Also the reasonably high and stable enrollment in the Applied Biology Program helps keep costs low. Given the fact that most biology courses are laboratory based and utilize expensive equipment, such as microscopes, the cost figures are truly admirable.

Program productivity as measured by enrollment and graduates is stable over the last several years at approximately 150 total students which suggests that demand by students is good. The program has averaged 28 graduates over the last 5 years with about 47% graduating with academic honors. The high percentage graduating with academic honors probably reflects the tendency of recent graduates to pursue competitive graduate programs such as medical school, dental school, physical therapy and physician's assistant all of which require high academic achievement for entry. Ferris Applied Biology students have done very well in gaining admission into these competitive programs.

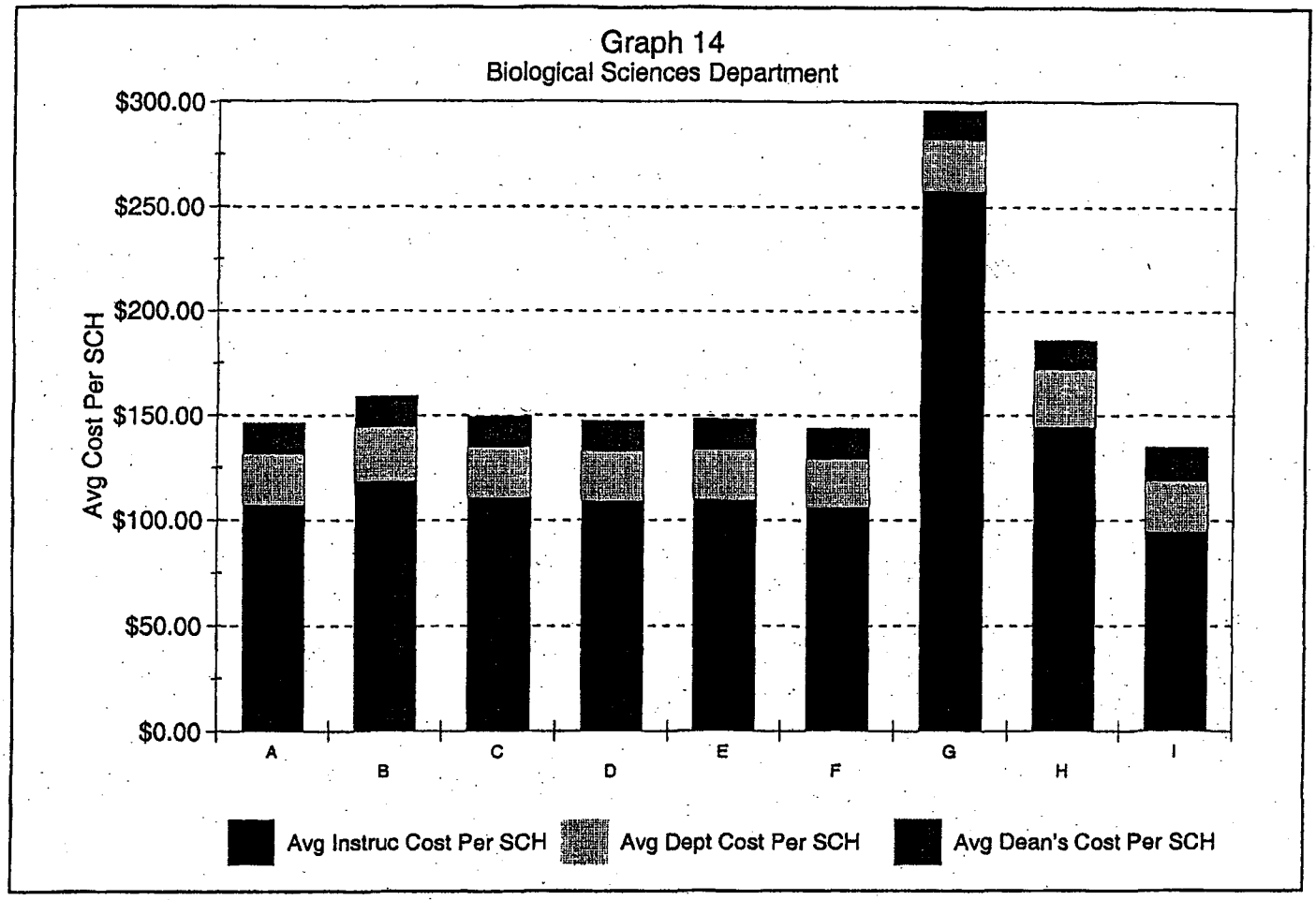
Ferris State University
Average Instructor, Department and Dean's Cost Per SCH for Degree Programs
Departments in the College of Arts and Sciences
2000 - 2001 Data



Departments	Avg Instructor Cost/SCH	Avg Dept Cost/SCH	Avg Dean's Cost/SCH	Total Avg Cost/SCH
Biological Sciences	$130.38	$24.40	$14.57	$169.35
Humanities	$103.94	$22.02	$16.54	$142.49
Language and Literature	$129.37	$25.67	$16.47	$171.50
Mathematics	$114.79	$23.43	$18.26	$156.48
Physical Sciences	$101.62	$22.00	$14.32	$137.94
Social Sciences	$105.48	$24.01	$17.50	$147.00

Source: Office of Institutional Research, g:\...\progcost\0001\avgdptas.rsl

Ferris State University
Average Instructor, Department and Dean's Cost Per SCH for Degree Programs
Biological Sciences Department
2000 - 2001 Data



	Programs	Avg Instructor Cost/SCH	Avg Dept Cost/SCH	Avg Dean's Cost/SCH	Total Avg Cost/SCH
A	Applied Biology BS	$107.25	$24.36	$14.77	$146.38
B	Applied Biology (Environmental Biology Track) BS	$118.78	$25.54	$14.84	$159.16
C	Applied Biology (Pre-Dentistry Track) BS	$110.84	$24.09	$14.54	$149.47
D	Applied Biology (Pre-Medicine Track) BS	$108.98	$23.94	$14.43	$147.35
E	Applied Biology (Pre-Physical Therapy Track) BS	$109.73	$23.93	$14.51	$148.17
F	Applied Biology (Pre-Veterinary Medicine Track) BS	$106.11	$23.21	$14.52	$143.84
G	Biotechnology BS	$257.47	$24.44	$13.93	$295.85
H	Ornamental Horticulture Technology AAS	$144.48	$27.31	$13.97	$185.77
I	Pre-Science AS	$94.50	$24.11	$16.23	$134.84

Source: Office of Institutional Research, g:\...\progcost\0001\avgp2bs.rsl

Table II

Degree Program Costing
Total Program Cost Ranked High to Low
2000-01

Program Name	Program Credits Required	Total Instructor Cost*	Total Dept Cost**	Total Dean's Cost***	Total Program Cost
Optometry OD (Professional Yrs 1,2,3 & 4)	163	$60,252.41	$8,381.99	$20,306.79	**$88,941.19**
Environmental Hlth & Safety Mgmt (Haz Material Mgmt o	124	$40,625.77	$4,647.22	$2,945.97	**$48,218.97**
Environmental Hlth & Safety Mgmt (Indust Safety option)	124	$39,400.79	$4,646.07	$2,955.99	**$47,002.85**
Environmental Hlth & Safety Mgmt (Indust Hygiene optior	124	$37,856.48	$4,440.85	$2,825.63	**$45,122.97**
Environmental Health & Safety Mgmt (Env Health option)	131	$34,328.24	$5,027.18	$3,141.25	**$42,496.67**
Doctor of Pharmacy Pharm.D. (Professional Yrs 1,2,3 &	149	$30,820.63	$5,964.40	$5,368.33	**$42,153.36**
Biotechnology BS	130	$33,471.23	$3,177.66	$1,811.13	**$38,460.02**
Television Production BS	128	$16,697.23	$12,845.66	$2,800.11	**$32,343.00**
Pharmacy BS (Professional Yrs 1,2 & 3)	94	$23,062.25	$4,400.38	$4,039.56	**$31,502.19**
Surveying Engineering BS	137	$19,224.49	$6,428.96	$2,767.54	**$28,420.99**
Business Education/Marketing/Distributive Edu BS	156	$18,537.74	$6,521.55	$3,230.68	**$28,289.96**
Computer Networks & Systems (Embedded Systems Tra	136	$20,249.47	$4,910.67	$2,649.43	**$27,809.57**
Business Education/General Business BS	159	$18,584.46	$5,825.86	$3,226.41	**$27,636.74**
Medical Laboratory Technology AAS	69	$21,365.66	$4,184.55	$1,848.60	**$27,398.81**
Computer Networks & Systems (Indust Automation Track	136	$19,823.86	$4,910.67	$2,649.43	**$27,383.97**
Computer Networks & Systems (Info Systems Track) BS	137	$19,821.00	$4,790.08	$2,586.77	**$27,197.85**
Computer Networks & Systems (Communications Track)	136	$19,416.03	$4,832.92	$2,650.78	**$26,899.73**
Computer Information Systems/Management BS	159	$19,879.18	$3,936.84	$2,452.52	**$26,268.54**
Elementary Education BS	162	$17,855.89	$4,537.35	$3,008.15	**$25,401.38**
Accountancy/Computer Information Systems BS	139	$20,122.15	$3,167.41	$2,063.02	**$25,352.58**
International Business BS	127	$20,597.94	$2,645.46	$1,997.44	**$25,240.84**
Tech & Professional Comm (Publication Mgmt Track) BS	121	$18,984.91	$3,919.72	$2,050.60	**$24,955.23**
Medical Record Administration BS	124	$16,873.08	$4,892.82	$3,147.34	**$24,913.25**
Computer Information Systems/Marketing BS	148	$18,246.54	$4,144.49	$2,250.54	**$24,641.57**
Construction Management (Highway/Bridge Track) BS	131	$15,538.58	$6,512.99	$2,576.09	**$24,627.66**
Accountancy/Finance BS	137	$20,064.21	$2,433.40	$2,061.14	**$24,558.75**
Construction Management (Commercial/Indust Track) BS	131	$15,085.58	$6,896.80	$2,573.05	**$24,555.43**
Health Care Systems Administration BS	124	$16,228.77	$4,688.98	$2,986.03	**$23,903.78**
Resort Mgmt/Lodging Management Concentration BS	127	$17,455.00	$3,494.71	$1,994.13	**$22,943.84**
Tech & Professional Comm (Automotive Writing Track) B	121	$17,188.98	$3,604.58	$2,106.85	**$22,900.41**
Nuclear Medicine Technology BS	125	$15,393.30	$4,761.78	$2,635.45	**$22,790.53**
Mathematics Education BS	144	$15,053.22	$4,638.56	$2,769.50	**$22,461.27**
Chemistry Education BS	152	$14,598.63	$5,030.09	$2,783.87	**$22,412.59**
Accountancy (Cost/Managerial Track) BS	124	$17,083.36	$2,806.49	$2,107.84	**$21,997.69**
Music Industry Management BS	124	$16,694.76	$3,420.49	$1,847.92	**$21,963.17**
Recreation Leadership & Mgt/Corp Fitness-Well Track B	128	$14,380.13	$4,451.65	$2,866.77	**$21,698.56**

* Instructor Cost - ***Salary & Fringe***
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment***
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipmen***

Table II

Degree Program Costing
Total Program Cost Ranked High to Low
2000-01

Program Name	Program Credits Required	Total Instructor Cost*	Total Dept Cost**	Total Dean's Cost***	**Total Program Cost**
Accountancy (Public Accounting Track) BS	124	$17,234.74	$2,434.47	$2,026.95	**$21,696.16**
Resort Mgmt/Facilities Operations Mgmt Concentration E	128	$15,349.70	$4,097.76	$2,143.20	**$21,590.66**
Recreation Leadership & Mgt/Outdoor-Adv Edu Track BS	128	$14,279.74	$4,383.33	$2,867.97	**$21,531.04**
Accountancy (Professionally Directed Track) BS	124	$16,808.47	$2,498.18	$2,038.96	**$21,345.62**
Tech & Professional Comm (Multimedia Writing Track) B	121	$16,115.55	$3,104.22	$1,965.80	**$21,185.57**
Recreation Leadership & Mgt/Leisure Service Track BS	128	$14,058.83	$4,322.05	$2,791.46	**$21,172.34**
Tech & Professional Comm (Computer Info Writing Track	121	$16,120.07	$3,050.66	$1,936.52	**$21,107.25**
Integrated Resource Management BS	125	$15,329.26	$3,542.09	$2,224.60	**$21,095.95**
Printing & Digital Graphic Imaging Technology AAS	63	$14,802.29	$4,798.56	$1,368.51	**$20,969.36**
Recreation Leadership & Mgt/Sports Management Track	128	$13,960.65	$4,242.79	$2,761.89	**$20,965.33**
Automotive Service Technology AAS	68	$15,816.44	$3,615.19	$1,489.13	**$20,920.76**
Computer Information Systems BS	124	$15,819.19	$3,212.40	$1,808.85	**$20,840.45**
Nursing AAS	72	$13,469.31	$5,442.42	$1,787.73	**$20,699.46**
Respiratory Care AAS	79	$13,693.05	$4,788.56	$2,208.44	**$20,690.05**
Psychology BS	124	$14,755.96	$3,545.14	$2,236.93	**$20,538.02**
Tech & Professional Comm (Technical Journalism Track)	121	$15,549.69	$2,773.19	$1,952.39	**$20,275.26**
Applied Biology (Environmental Biology Track) BS	127	$15,084.76	$3,243.31	$1,885.21	**$20,213.29**
Insurance BS	124	$14,833.78	$3,116.46	$2,136.72	**$20,086.96**
Tech & Professional Comm (Sci & Medical Writing Track)	121	$14,962.92	$3,044.37	$2,025.69	**$20,032.98**
English Education BS	144	$13,019.97	$4,355.29	$2,656.17	**$20,031.42**
Resort Mgmt/Facilities Planning Mgmt Concentration BS	125	$14,222.12	$3,707.88	$2,071.19	**$20,001.19**
Insurance/Real Estate BS	124	$14,820.25	$2,825.83	$2,028.33	**$19,674.40**
Technical and Professional Communication BS	121	$15,144.04	$2,596.74	$1,887.79	**$19,628.57**
Applied Mathematics (Statistics Track) BS	120	$14,635.57	$2,770.34	$2,218.11	**$19,624.01**
Applied Mathematics (Actuarial Science Track) BS	120	$14,665.86	$2,757.68	$2,180.59	**$19,604.13**
Resort Mgmt/Marketing Concentration BS	126	$14,035.87	$3,477.51	$2,008.87	**$19,522.26**
Public Administration BS	124	$13,909.05	$3,081.50	$2,364.25	**$19,354.80**
Finance BS	125	$15,000.55	$2,401.61	$1,921.99	**$19,324.15**
Human Resource Management BS	122	$15,041.82	$2,394.65	$1,857.75	**$19,294.22**
Public Relations BS	124	$14,360.38	$3,039.88	$1,881.31	**$19,281.57**
Applied Speech Communication BS	126	$14,174.94	$2,884.58	$2,168.84	**$19,228.36**
Resort Mgmt/Rec & Leadership Mgmt Concentration BS	125	$13,469.06	$3,499.62	$2,165.10	**$19,133.77**
Biology Education BS	122	$12,079.52	$4,687.23	$2,344.67	**$19,111.42**
Advertising BS	125	$13,796.25	$3,315.92	$1,906.85	**$19,019.02**
Applied Biology (Pre-Dentistry Track) BS	127	$14,076.66	$3,059.93	$1,846.02	**$18,982.60**
Applied Mathematics BS	120	$13,671.07	$2,938.46	$2,252.10	**$18,861.63**

* Instructor Cost - ***Salary & Fringe***
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment***
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipmen***

Source: Office of Institutional Research, g:\...\progcost\0001\tpcrank.rsl

EMPLOYER SURVEY

Indications of quality of Applied Biology Graduates

We can assess the quality of Applied Biology graduates in part by looking at indications of the acceptance of these students by professional schools and biology-related professions.

During the past five years, approximately 75% of Applied Biology graduates have pursued graduate studies, seeking admission to schools of optometry, medicine, dentistry, physical therapy, physician assistants and traditional masters/doctoral programs. Admission to these professional and graduate schools is very competitive. They select students based on their academic record, scores on national assessment tests and interviews. Most Applied Biology students who apply are accepted by professional schools, one indication of the quality of our graduates.

Dental Schools accepted 93% of Ferris applicants during the past five years. Dr. Michael Ryan, FSU chair of pre-medical advising, reports that about 50% of our pre-meds are successful in gaining admission to medical schools, compared to a national average of about 30%. He attributes this above-average success rate to our intrusive advising. Students are advised from their enrollment in the track concerning the rigorous curriculum, the extracurricular expectations, the demands of the profession, and alternative options in health-related careers. Dr. Thomas Colladay, Associate Dean of the Michigan College of Optometry, reported that "on average, undergraduates from FSU carried a slightly higher GPA within the professional degree program than those who completed their undergraduate education at another institution".

Moreover, every year the Applied Biology program successfully educates and advises pre-professional students who do not graduate from the program. Sometimes these students have earned a B.S. elsewhere and choose to pursue our pre-professional program. For example, four such students were accepted into Dental Schools in the past three years. In other cases such as pre physical therapy, Ferris students have been accepted by the professional schools before they have fulfilled the requirements for the B.S. These students are not reflected in our statistics, but they surely are an indication of the quality of our program.

Letters from professional schools are rare. We were very pleased to receive an unsolicited letter from Central Michigan University's Physician Assistant Program, praising our graduate as a "fine student" and thanking Ferris for its recommendation. Central Michigan University continued by asking Ferris to send them more such students and volunteered to come to the Ferris campus to aid in recruiting.

Environmental Biology track coordinator Bruce Beetley indicates that all three graduates of the new Environmental Biology track have experienced wonderful success in obtaining competitive internships with the U.S. Fish and Wildlife Service, Mears State Park and the U.S. Forest Service. He thinks that these agencies particularly appreciate the curriculum's strong background in chemistry.

Graduates of the Industrial Chemistry Technology (ICT) A.A.S. program sometimes choose to complete the Applied Biology B.S. degree for career advancement. The ICT coordinator, Bill Killian, indicates that earning the Applied Biology degree has been "a great help" for these students in their careers.

Mary J. Steeno, Educational Counselor in the College of Allied Health Sciences, reported that the "...Applied Biology degree has proven to be a very valuable degree for our students in Dental Hygiene considering Dental school... students in Radiography considering a career in Chiropractic Medicine, and our students in Nuclear Medicine who are considering Medical school. Some of our ADN Nursing students have also pursued the Applied Biology degree. The combination of the practical AAS degree with the science-grounded BS has given these students a way to get to the next step in their present field....or to .. shift direction ..into an alternative career path.....I am always confident in the high quality of advising and instruction associated with the Applied Biology degree. It has been a wonderful degree for our students."

One such Allied Health Sciences A.A.S./ Applied Biology B.S .graduate replied on our Program Review survey: "The Applied Biology degree has enabled me to teach at the community college level on a part time basis in my field of dentistry. I have only positive remarks on my entire education at Ferris State University, including the Dental Hygiene program."

Such responses from our graduates, and the record of their acceptance by professional schools and biology-related professions, are submitted as indications of the quality of the Applied Biology program and employer satisfaction.

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 2002-03, the questionnaire on the following pages was given to these senior Applied Biology students during a regular meeting of the BIOL. 460 class. A total of 35 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., and 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. These responses have been stable over the years.

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. This was very similar to the results obtained last year 2001-2002.

4. The most commonly identified weaknesses were the development of verbal communication skills and a broad choice of biology courses/electives However these weaknesses were identified by less than 50% of the senior students surveyed.

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 a second communications class in addition to the presently required COMM. 121 (public speaking). This could be easily done by dropping 3 credits of cultural enrichment as the Applied Biology program presently requires 12 credits in this area while the general education requirement in this area is 9 semester credits.

3. Certain biology faculty are presently using or are considering using computer assisted instruction 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 computer assisted instruction in biology courses.

4. It will be reported to the biology department head that, from a student perspective, faculty with professional expertise in their subject areas is an identified strength 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.

SENIOR STUDENT EVALUATION OF THE APPLIED BIOLOGY PROGRAM 2002-2003 – COMPOSITE
(N = 35)

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-opt.), interesting to me**
   B. from another program at Ferris? If so which one? **14 – pre-opt, pre-pharm most frequently listed.**
   And do you plan to obtain dual degrees? **8 yes** **6 no**
   C. a transfer student **9**

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

(22) A. I plan to attend graduate or professional school (please state program e.g. medicine, dental, opt, M.S./Ph.D.) **Optometry, medical school, dental school, physical therapy, & physician's assist. most frequently mentioned**

(3) B. I plan to continue in UNDERGRADUATE EDUCATION (PLEASE state specific program) **arts, education, psychology**

(10) C. I plan to work or seek employment
have you accepted or had a job offer? **0** yes **10*** no (*one student had accepted an internship)
what area of work are you seeking? **lab/research (3), conservation (2), pharmaceutical sales (3), no preference (2)**

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)**

	(0)	(1)	(6)	(24)	(4)	
	1	2	3	4	5	
A. preparation for a career or advanced education						(aver. = 3.89) *
B. intellectual challenge						(aver. = 4.20)**
	(0)	(0)	(5)	(18)	(12)	

* (last year = 3.91)
** (last year = 4.19)

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

Most frequently listed courses were physiology/anatomy (18) and microbiology (8). These courses were cited as containing material most directly related to career goals.

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 were not directly related to the student's career goals. Several students said all biology courses taken were beneficial in some way or listed no courses in this area.

What area(s) of the applied biology curriculum are **STRENGTHS**?
(circle all that apply)

		last year
a. the development of problem solving/critical thinking skills	= 28 (80%)	(85%)
b. the development of writing skills	= 17 (49%)	(58%)
c. the development of verbal communication skills	= 11 (31%)	(36%)
d. the development of computer skills to access scientific information	= 16 (46%)	(27%)
e. a broad choice of biology courses/electives relevant to my career choice and interests	= 15 (43%)	(70%)
f. a faculty with expertise in their professional areas	= 30 (86%)	(79%)
g. sound advice, **when I sought it**, about careers in biology	= 18 (51%)	(39%)

What area(s) of the applied biology curriculum are **WEAKNESSES**?
(circle all that apply)

		last year
a. the development of problem solving/critical thinking skills	= 3 (9%)	(9%)
b. the development of writing skills	= 6 (17%)	(21%)
c. the development of verbal communication skills	= 15 (43%)	(33%)
d. the development of computer skills to access scientific information	= 10 (29%)	(33%)
e. a broad choice of biology courses/electives relevant to my career choice and interests	= 14 (40%)	(18%)
f. a faculty with expertise in their professional areas	= 1 (3%)	(3%)
g. sound advice, **when I sought it**, about careers in biology	= 6 (17%)	(12%)

WRITTEN COMMENTS FROM THE SENIOR STUDENTS IN BIOL 460

Senior Applied Biology students enrolled in BIOL. 460 were asked to comment about the qualities and/or deficiencies of the FSU Applied Biology Program and to give suggestions for improvement. Twenty-one out of thirty-five students responded with the unabridged written comments listed below.

Some courses tried to cram too much information into one semester – may have been helpful for students if there were two semesters instead of one.

I would like the Ferris program to provide more advisers and set up an internship program for students that think to pursue post graduate studies or become professionals. Ferris should also provide more interesting courses.

I believe this is a challenging program that has many good qualities and few deficiencies. The selection of biology electives offered each semester could be better. I feel the best quality of this program is the professors in the biology department. I have went (sic) to many of my professors for help during my time in the program and they were always willing to help. The instructors are genuinely interested in the subjects they teach.

I have no real complaints, my time spent here has been worthwhile. I feel maybe a slight lack of outreach to students on seeking careers. I believe that Dr. Murnik has been one of the best teachers I have had thus far. Genetics is an awesome class.

Good program!

I have taken several classes in Biology that haven't benefited me in the area of Biology I am going to pursue. Also, some classes I have taken I didn't need.

I've only been in the program for 1 semester.

I found it very difficult to get information on graduate school and applying to graduate schools. I feel that there were a lot of aspects of the application process that I wasn't aware of. It would have been so helpful and beneficial as far as getting things in early (or at least on time) if the pre-graduate (dental/med) advisors knew and passed along the relevant information.

As a member of the environmental biology tract, I see the program as very effective. In my search for an internship, employers were very impressed with the skills and experience I obtained from the summer block. I would recommend offering entomology again for the students in my program.

If (sic) found that meeting with my advisor was a struggle. I was assigned to an advisor not in my field. When I was sent to the correct advisor, he I (sic) to talk me in to another field.

Qualities: very educated faculty who know what they are teaching.
I was disappointed with a few teachers in the faculty soley (sic) to them being new and very unprepared for class, and unwilling to answer questions. Overall I feel my education is definitely a success; at least I feel more educated! ☺

They need to let students know about pharmaceutical sales.

To better notify students where they stand & certain things they need to do or sign in order to graduate. Be more open about certain information.

Pre-med majors should receive written information regarding the whole medical school application process. This should be given out in the Freshman or Sophomore years. I feel that I missed valuable information because I did not know the correct questions to ask. Be more pro-active.

I would like to see more human biology classes along the lines of anatomy/physiology. There also needs to be more guidance for the students in these programs. Everybody always has to check with someone. Straight answers are hard to come by. Prerequisites need to be clearly communicated.

I think that the faculty at FSU is extremely helpful and knowledgeable. I feel that freshman courses like chemistry should have more SLA's. The more difficult instructors did not have these services with their classes, which was difficult at times. Other than that, I feel the program has prepared me well for professional school. One more suggestion would be having only one professor for Chem 121, 122, Organic 221, 222, etc. Some times professors skip information, or have teaching styles that are completely different from others. It is hard to continue a course with a different professor.

I believe that Ferris has a good Applied Biology program mainly because I think most of the professors genuinely care about the students achieving their full potential.

I don't understand why Applied Bio is the only BS degree at Ferris which requires 12 credits in Social Awareness & 12 credits in Cultural Enrichment when all other BS degrees require only 9 credits in each area. It's partially my fault for not checking my status earlier, but I was under the assumption that the General Ed requirements were pretty much the same for all the BS degrees at FSU. This puts me a ½ semester behind & I don't understand why the extra credits are needed for this degree when I have over 200 credits total in various areas.

I liked how helpful & willing the profs. were to spend time outside of class to help me. The general classes were pretty cold ie Chem & Bio 121/122 they were dry and not very interesting.

Most profs are very knowledgeable with regards to their courses, some aren't so much (or at least don't explain well).

Possibly a few less general electives from Social Awareness etc. (maybe 6-9 credits instead of 12) and also for Humanities – allowing for a few more elective classes in Biology. I believe that the faculty here is extremely good and could offer more to the students as far as research classes and lab focused classes in Biology. More hands on kind of classes would be helpful – Techniques etc. (offered as electives for those who want it).

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 14 were returned for an excellent 88% response; one biology faculty member is out of the country. Only 3 of the 14 returned surveys 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 (also see comments).

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 (see editorial response in comments section).

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.

(N=14 respondents out of 16 faculty = 88%)

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Unknown	AVERAGE
1. The FSU Applied Biology Program is consistent with the FSU Mission Statement.	1 (12)	2 (2)	3	4	5	U	1.14
2. The FSU Applied Biology Program is consistent with the objectives and goals of the FSU Biology Department.	1 (13)	2	3	4	5	U (1)	1.00
3. The FSU Biology Faculty support the Applied Biology Program.	1 (11)	2 (3)	3	4	5	U	1.21
4. FSU Administration supports the FSU Applied Biology Program.	1 (3)	2 (5)	3 (3)	4 (1)	5	U (2)	2.17
5. The cost of the FSU Applied Biology Program is inexpensive compared to Other FSU science-based baccalaureate programs.	1 (12)	2 (2)	3	4	5	U	1.14
6. The number of tracks or options in the Applied Biology Program should be increased whenever possible.	1 (2)	2 (4)	3 (6)	4 (1)	5 (1)	U	2.64
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 (3)	3 (2)	4 (5)	5 (3)	U	3.43
8. More biology electives, irrespective of enrollment, should be made available to FSU Applied Biology Students	1 (9)	2 (4)	3	4 (1)	5	U	1.50
9. All Applied Biology Students, regardless of career choice should be required to complete an internship.	1	2 (1)	3 (5)	4 (5)	5 (3)	U	3.71
10. The academic reputation of the biology courses counting towards the biology major is sound.	1 (9)	2 (5)	3	4	5	U	1.36
11. The FSU Biology Major should require more credits than the present minimum of 36 semester hours.	1 (1)	2 (2)	3 (6)	4 (1)	5 (4)	U	3.36
12. The FSU Applied Biology Baccalaureate is a quality degree comparable to other baccalaureate degrees in biology at similar institutions.	1 (8)	2 (4)	3 (2)	4	5	U	1.57

BIOLOGY FACULTY COMMENTS

It's an excellent program – inexpensive because it uses existing courses commonly with large enrollment, flexible to meet the needs of many diverse career options and supported by the finest teaching department on the FSU campus.

Internships are great for certain options such as environmental biology but are not necessary for students entering medical or dental school.

All applied biology students should be required to take Chem 121 & 122, plus additional organic and biochemistry.
(**EDITORIAL NOTE**: Of last years 29 applied biology graduates 25/29 or 86% completed Chem 121 and 122, Chem 321 and 322 (organic chemistry) and a 300 level biochemistry course. Two graduates (7%) completed Chem 121 and 122 plus Chem 124 which is an introduction to organic and biochemistry. One graduate (3%) completed Chem 121 and Chem 124 and one graduate (3%) completed Chem 121 and 122 and Chem 321 and 322 but no biochemistry.)

ADVISORY COMMITTEE EVALUATION

The Applied Biology advisory committee was formed in academic year 1996-97, primarily in response to the provost's recommendation that all programs at Ferris have an advisory committee. This committee, which should be considered to be dynamic in that it can add or delete members as the need arises, consists of the following individuals who were chosen because of their familiarity with the Ferris Applied Biology Program or their expertise in an area relevant to the program.

Walter Hoeksema	Applied Biology Program Coordinator
Douglas Fonner	Applied Biology Program Faculty
Mary Murnik	Applied Biology Program Faculty
Frank Hartley	Applied Biology Alumnus
Peter Kailing	Mid-Michigan Environmental Consulting
William Killian	ICT Program Coordinator
Mary Steeno	Educational Counselor, Allied Health Sciences

These committee members were sent the 10 question survey shown on the following page. They were also given a copy of the 2002 Applied Biology annual report to help familiarize themselves with the current status of the Applied Biology program. The survey on the following page also shows a summary of the responses of the 7 advisory committee members (100%) who responded and their written comments as well. The following conclusions were drawn from their responses.

1. They rate the program very favorably in terms of educational value, quality, cost and program administration (questions 1, 2, 3, 4, 9 and 10).

2. They also rate the program favorably on the issues of adequate equipment/facilities and establishing internships (questions 5 and 6). They are basically neutral on program advertisement/promotion throughout FSU (question 7).

3. They do <u>not</u> believe the program is well advertised and promoted outside of Ferris (question 8).

4. There is some uncertainty about the aging microscopes still being used in certain biology laboratory courses (see comments).

The following uses will be made of these findings.

1. The Applied Biology advisory committee will be asked to evaluate the entire program review document and to suggest changes in the program for the purposes of improvement. These suggestions will be forwarded to the biology department's curriculum and planning committees.

2. The issue of program marketing will be brought to the attention of the Director of University Relations and Marketing for an analysis of how to better market, especially off campus, the Applied Biology program. I recently became aware that the university strategic marketing committee is going to be reactivated and will make the committee chair aware of these findings as well.

(N = 7 = 100%)

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** to Walt Hoeksema, PRP Chair, Biology Dept., ASC 2004.

Your opinions are important to the Program Review Panel. Thank you for your time and willingness to serve on the advisory committee. Please feel free to refer to the Applied Biology Annual Report you received in late October.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Unknown	AVERAGE
1. The Applied Biology Program serves a valuable function at FSU.	1 (SEVEN)	2	3	4	5	U	1.0
2. I would\have refer(red) students into the FSU Applied Biology Program.	1 (FIVE)	2 (ONE)	3 (ONE)	4	5	U	1.43
3. In general, the FSU Biology courses and faculty have a sound academic reputation.	1 (FOUR)	2 (THREE)	3	4	5	U	1.43
4. The FSU Applied Biology Program is administered effectively.	1 (SIX)	2 (ONE)	3	4	5	U	1.14
5. The facilities and equipment in the FSU Biology Department are sufficient to support quality education.	1 (TWO)	2 (THREE)	3	4 (ONE)	5	U (ONE)	2.0
6. The FSU Applied Biology Program should establish internships for its students when feasible.	1 (TWO)	2 (TWO)	3 (THREE)	4		U	2.14
7. The FSU Applied Biology Program is well advertised and promoted throughout FSU.	1	2 (THREE)	3 (TWO)	4 (ONE)	5	U (ONE)	2.67
8. The Applied Biology Program is well advertised and promoted outside of FSU.	1	2 (ONE)	3 (TWO)	4 (THREE)	5 (ONE)	U	3.57
9. The FSU Applied Biology Program costs are in line with other science based programs at FSU.	1 (FOUR)	2 (ONE)	3	4	5	U (TWO)	1.2
10. The FSU Applied Biology Baccalaureate is a quality degree comparable to other baccalaureate degrees in biology at similar institutions.	1 (FIVE)	2 (ONE)	3	4	5	U (ONE)	1.17

COMMENTS FROM THE ADVISORY COMMITTEE MEMBERS

A good program that fills an obvious need based upon the high numbers of students, both past and present, in the program. The entire Biology Faculty can be proud of the traditionally high acceptance rates of applied biology program graduates into dental schools, medical schools and more recently into physician's assistant programs. The CMU physician's assistant program has volunteered to come to Ferris to recruit our graduates for their program.

The Ferris Applied Biology program offers students one of the most flexible and rigorous biology baccalaureates in the Midwest. Our students enjoy an excellent rate of acceptance to professional schools; some choose options such as environmental studies or forensics, and they readily find appropriate positions.

Because much of the AB curriculum already exists to support programs in Education, Pharmacy, Allied health Sciences, etc., the program is very efficient and cost effective.

We do need to replace our aging microscopes (more than 20 years old. Those that can still be used are few.) Students in biology laboratory courses must be provided with adequate functioning equipment.

I believe internships would prove extremely valuable for students who seek employment after they graduate. I would question the value of an internship for a student heading directly into a further degree.

I am sure that there are entities across campus who know and respect and promote the Applied Biology program, but I'm not sure whether there is any particular emphasis placed on promoting any one program on or off campus. For on campus personnel, maybe we all should be about the business of seeing that there are opportunities for people to learn about the academic program here – for off-campus – I'm not sure what programmatic efforts will be made. It seems the efforts are to promote the university as a whole. Maybe that is sufficient.

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. Twenty-three of the 29 Applied Biology graduates in 2001-02 planned to continue their education in a professional or graduate school. A majority of these planned to attend optometry school.
2. A second group of students that the program serves is those students who have earned an A.A.S. in a vocational field (e.g., Industrial Chemistry Technology). These students use the degree to increase their chances for employment and advancement. Of the 29 graduates in 2001-02, two students earned an A.A.S. in Industrial Chemistry Technology, and one student earned an A.A.S. in Medical Laboratory Technology.
3. A third group of students that the program serves is those students who plan to enter the labor market without acquiring additional vocational skills. Relatively few students generally are in the group. Of the 29 graduates in 2001-02, three students entered the labor market without an A.A.S. in a vocational field.

This report will address the employment opportunities for graduates who pursue advanced degrees and for those who enter the labor marked directly. Sources of information included job-postings by on-line employment services and the Bureau of Labor Statistics.

EMPLOYMENT OPPORTUNITIES FOR GRADUATES WHO PURSUE ADVANCED DEGREES

The Bureau of Labor Statistics (BLS) reports that health services is one of the largest industries in the country. About 13 percent of all wage and salary jobs created between 2000 and 2010 will be in health services, and nine out of 20 occupations projected to grow the fastest are concentrated in health services. Wage and salary employment in the health services industry is projected to increase more than 25 percent through 2010, compared with an average of 16 percent for all industries.

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 the BLS, employment of optometrists is expected to grow about as fast as the average for all occupations through 2010 in response to the vision care needs of a growing and aging population. As baby boomers age, they will be more likely to visit optometrists and ophthalmologists because of the onset of vision problems in middle age, including those resulting from the extensive use of computers.

The demand for optometric services also will increase because of growth in the oldest age group, with their increased likelihood of cataracts, glaucoma, diabetes, and hypertension. Employment of optometrists also will grow due to greater recognition of the importance of vision care, rising personal incomes, and growth in employee vision care plans.

According to the BLS, for biological scientists, the Ph.D. degree usually is necessary for independent research and for advancement to administrative positions. A master's degree is sufficient for some jobs in applied research or product development and for jobs in management, inspection, sales, and service. The bachelor's degree is adequate for some nonresearch jobs. For example, some graduates with a bachelor's degree start as biological scientists in testing and inspection, or get jobs related to biological science, such as technical sales or service representatives. Some with a bachelor's degree may also work as research assistants.

Despite prospects of faster-than-average job growth for biological and medical scientists over the 2000-10 period, doctoral degree holders can expect to face considerable competition for basic research positions. The Federal Government funds much basic research and development, including many areas of medical research. Recent budget tightening has led to smaller increases in Federal basic research and development expenditures.

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, research assistants, and biological technicians.

According to the BLS, opportunities for graduates with a bachelor's degree in biological science are expected to be better than those with advanced degrees. The number of science-related jobs in sales, marketing, and research management, for which non-Ph.D.s usually qualify, are expected to be more plentiful than independent research positions. Non-Ph.D.s also may fill positions as biological technicians, environmental science and protection technicians, or health technologists and technicians.

Overall, employment of biological technicians is expected to increase about as fast as the average for all occupations through the year 2010. Continued growth of scientific and medical research, as well as the development and production of technical products, should stimulate demand for science technicians in many industries. In particular, the growing number of agricultural and medicinal products developed from using biotechnology techniques will increase the need for biological technicians. In addition, stronger competition among drug companies and an aging population are expected to contribute to the need for innovative and improved drugs, further spurring demand for biological technicians. Fastest employment growth of biological technicians should occur in the drug manufacturing industry and research and testing service firms.

Overall, employment growth will also be fueled by demand for environmental technicians to help regulate waste products; to collect air, water, and soil samples for measuring levels of pollutants; to monitor compliance with environmental regulations; and to clean up contaminated sites.

The following job descriptions were obtained from several on-line employment services in April 2003. They illustrate the range of employment opportunities for persons with a bachelor's degree in biology and experiences that employers require.

> *Biologist* -- Education: BS in Biology or related field. Primary Responsibilities: Responsibilities include resource inventories and impact assessments, writing of resource reports, communication with state and federal agency personnel, data collection, literature review, wetland inventory and general support of NEPA documentation.
>
> *Biologist* – With working knowledge of vegetation and habitat communities and biological analyses for environmental documents. The following qualifications are required: Bachelor's degree in Biology or closely related scientific discipline. At least 2 years relevant experience, including field surveys and knowledge of listed species. Familiarity with GIS. Strong research and analytical skills and ability to work with technical and quantitative materials. Excellent written and verbal communication skills. Flexibility and ability to work in a team. The following qualifications are desirable, but not required: Experience with wetlands delineation and species specific permits. Experience in permit processing pursuant to federal and state regulatory requirements. Ability to coordinate with government agencies and subconsultants. Knowledge of Adobe Illustrator, Photoshop, and Acrobat/Distiller (PDF). Familiarity with AutoCAD and Microstation files.
>
> *Research Assistant* -- Responsibilities will include basic molecular techniques including PCR and electrophoresis as well as statistical data analysis using EXCEL. Candidates must have a BS in a biological science, with recent academic experience in molecular biology or biochemistry, and excellent computer skills- including EXCEL.
>
> *Research Assistant* -- The candidate should have experience as a veterinary technician, or a B.A./B.S. in biology (or related field). A basic knowledge of computers is required. The position involves work on a federally funded study involving an animal model of neurodegenerative disease. Preference will be given to candidates with previous laboratory experience, animal handling experience, and/or proficiency in data analysis.
>
> *Pharmaceutical Sales Representatives* -- The aggressive yet highly polished individuals we select for these important roles will interact with physicians, healthcare organizations and pharmacists to sell our highly successful products and establish long-term relationships essential to success. To qualify, a Bachelor's degree, preferably in life sciences or business, is required. Pharmaceutical sales experience is a plus.
>
> *Ecologists* -- Johnson Engineering is seeking Ecologist I and II DOQ. Four-year degree in biology or environmental science required. Position requires ability to work in the field in varying weather and terrain conditions. MS degree preferred.
>
> *Science positions* -- Have you had experience in the Science Industry? Are you looking to further your career by exploring new opportunities? Have you obtained a degree and are looking to start your science career? We are currently seeking professional lab technicians, R&D Chemists, Biologists, and Microbiologists for the Chicago Land area. Pay and benefits are based on position.

Research assistant positions generally require specific technology skills that students can acquire by completing the A.A.S. in Industrial Chemistry or Medical Laboratory Technology. The baccalaureate degree in Biotechnology is available for students whose career goals are in cell and molecular biology. Although technology skills required for ecology positions are generally less rigorous, there is more competition for these positions. Most four-year colleges have a biology program and large universities have colleges devoted to environmental studies and natural resources.

There are an a large number of sales and marketing positions in the health care industry. These positions generally require a baccalaureate degree in the sciences or business. An area of historical interest to students has been pharmaceutical sales. Despite the consolidation of the pharmaceutical industry in recent years, employment opportunities in this area remain strong. A search of Monster.com's database on April 22, 2003, using the key words "pharmaceutical sales" listed 23 positions in Grand Rapids and western Michigan. Although a baccalaureate degree is the minimum education requirement for many of these positions, they also require leadership skills and business or sales experience.

Department of Biological Sciences Facilities and Equipment

The last Applied Biology Program Review was completed shortly after renovation of the Science Building. At that time several concerns were expressed regarding the facilities and equipment. These concerns were the focus of a Biology Department faculty/staff survey taken in March of 2003 (attached) designed to determine to what extent these concerns have been addressed - 9 of 18 surveys were returned. Survey items and a brief summary of the comments made about each follow:

1. Six laboratories retain the outdated bench work that existed prior to the 1997 renovation.
>In general, faculty that teach in these laboratories continue to have concerns about the aging bench work and its configuration as well as inadequate shelving, lack of fume hoods, and too few computer ports.

2. Two new lecture halls are being renovated and equipped for multimedia presentations.
>Most respondents are pleased with the renovations, but there is a concern that increasing enrollments and concurrent lecture sections require additional well-equipped lecture facilities.

3. There is a serious shortage of storage space for the department.
>Several respondents pointed out that student collections and other materials for regular lab instruction are currently stored under the lab benches or on top of what would ideally be available work surfaces. Some respondents who use the research labs pointed out that new projects and/or new faculty bringing their equipment and supplies have placed a strain on available space in the research labs. There was a suggestion that better use might be made of the available space.

4. The ventilation system generates excessive noise in most, if not all, of the rooms on the 2nd floor of the Science Building.
>Though physical plant engineers have done their best to resolve this problem, most respondents indicated that to a greater or lesser degree it is still a problem. There is some indication that the ventilation noise issue is an original design problem and not likely amenable to correction at this time.

5. The air filtration system is inadequate.
>The ventilation system has been tested and meets EPA standards for air quality.

6. The animal care facility in the Science Building is inadequate.
>Under current USDA regulations the animal care facility is adequate for housing turtles, frogs, birds, rats, and mice. Should any or all of these animals become covered under more stringent USDA regulations the animal care facility will require significant upgrades.

7. Equipment previously used in one laboratory has been moved to another and not been replaced in the original laboratory.
>Faculty commenting on this item universally sited a shortage of microscopes; they also pointed out that increased utilization of older equipment (due to increased enrollments) is rapidly diminishing its usefulness – repairs are more frequent and sometimes can not be made because parts are no longer available.

8. A systematic program for replacement and upgrade of equipment should be developed.
>Though equipment request lists are regularly generated and prioritized, and funding becomes available for some of the requested items, respondents generally commented that procedures for equipment replacement and acquisition of new equipment have not been clearly defined nor has adequate funding been allocated on a regular basis.

It is evident from these survey items and comments that many Biology Department faculty members believe several of the concerns expressed in the last Applied Biology Program Review have not been satisfactorily addressed. Prominent among these is the lack of storage space (exacerbated by increased enrollment in several lab-intensive courses) and the perceived failure to establish a systematic adequately funded program for the replacement of aging equipment/furnishings and acquisition of new equipment. (As regards this last, the Department of Biological Sciences Planning Priorities for Fiscal Years 2002-2004 lists equipment replacement on a rotational basis that constantly replaces or updates current scientific equipment as a priority in its base budget support requests.)
The faculty is generally pleased with the renovations in Science 126 and Science 120 but encourage serious consideration of additional lecture space (lecture sections in some courses fill the current space to design capacity).

Currently:

1. Completion of the new greenhouse has tripled the available floor space and now allows for three zones of independent climate control. Automated lighting and watering systems have been installed. The Department of Biological Sciences Planning Priorities for FY 2002-2004 includes a base budget support request to maintain and staff the greenhouse.

2. A new steam sterilizer has been purchased at a cost of $26,000 to replace a nearly 30 year-old unit. This purchase has greatly enhanced the efficiency and safety in the microbiology preparation area.

3. The supply and equipment budget for the Biology Department has been tight, but with few exceptions, has allowed support staff to supply materials sufficient to maintain quality laboratory experiences for our students. Despite declining state funding to Ferris, the department has been assured that funding an adequate supply and equipment budget remains a College of Arts and Sciences priority.

4. The University has allocated $33,000 to fund an upgrade of the computer compatible physiological recording systems in one of the anatomy/physiology labs. This upgrade includes an increase from the current six workstations to ten.

5. The Academic Affairs Academic Equipment Request List for FY 2003-2004 ranks the $36,000 cost of new microscopes to support the Applied Biology Program as 2nd on the list of 28 items.

6. The Biology Department continues to actively pursue grant funding for equipment replacement and new equipment acquisition initiatives.

7. The configuration of laboratory facilities in the Science Building remains essentially as reported in the last Applied Biology Program Review: three general biology, two microbiology, one genetics, two ecology-environmental biology, three anatomy/physiology, and one botany lab.

8. The computer lab on the second floor of the Science building is being converted to a research lab, bringing the total number of faculty/student research labs in the department to four.

CURRICULUM EVALUATION

The single 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." Given the fact that most Applied Biology students are using the degree as a stepping stone to graduate and professional schools the clearest evidence that the Applied Biology curriculum is meeting that goal is the acceptance rate and success of our graduates into these very competitive programs,

The single most popular career choice of recent Applied Biology graduates is optometry with most seeking to attend the Michigan College of Optometry as their first choice. I recognize that not all Ferris students entering MCO are Applied Biology graduates but even those that are not have completed at least 3 years of course work in the Applied Biology curriculum. Dr.Thomas Colladay supplied me with the following information.

1. Beginning with 1996 to 1998, the number of FSU students who were admitted to MCO and went on to graduate:

1996 = 10/32. Seven graduated and 3 either dropped out or were dismissed.
1997 = 9/32. Nine graduated.
1998 = 10/32. Ten graduated.

2. Beginning with 1999 to 2002, the number of FSU students who were admitted to MCO and are still enrolled:

1999 = 13/32. Thirteen are currently enrolled.
2000 = 14/34. Thirteen are currently enrolled. One dropped out due to a military obligation. (That student is planning to return to the college.)
2001 = 18/34. Eighteen are currently enrolled.
2002 = 19/34. Nineteen are currently enrolled.

3. Performance of FSU undergraduates in the MCO professional program as compared to undergraduates from other institutions.
The last time an analysis of this nature was conducted was approximately three years ago. That analysis showed that, on average, undergraduates from FSU carried a slightly higher GPA within the professional degree program than those who completed their undergraduate education at another institution.

I would conclude from the above data that Ferris students compose approximately half of the entering MCO freshman class, have an excellent retention/graduation rate and in the MCO perform academically at a level slightly higher than non Ferris students. Clearly the Applied Biology curriculum is meeting the above stated goal with respect to pre-optometry students in the Applied Biology program. I would also add that in the past we have had FSU Applied Biology graduates accepted into optometry programs in Philadelphia, Florida, Memphis, Illinois and Boston.

In the past 3 years I have had 5 students accepted into masters and doctoral programs in physical therapy. This represents 5 out of 7 graduates who cited physical therapy as a career goal. The 2 that were not accepted are really unknowns as to their status into physical therapy and may well have been accepted somewhere after leaving Ferris. This is not uncommon especially with pre-medical students who not infrequently gain acceptance years after completing their undergraduate degree. The accepted students are attending professional physical therapy programs at GVSU, U of M Flint, St. Augustine (Florida), and Pennsylvania. One student (Pennsylvania) received a full ride scholarship turning down similar offers from Northwestern and Columbia.

Central Michigan University's Physician Assistant Program was so pleased with an FSU Applied Biology graduate that they asked me by letter to send them more students like him and have volunteered to come down to the Ferris campus to recruit Applied Biology graduates for their PA program. A 2003 Applied Biology graduate will attend the PA program at CMU this fall.

Both pre-medicine and pre-dentistry tracks in the Ferris Applied Biology program enjoy an acceptance rate above the national average.

Bruce Beetley has been able to obtain internships for all 4 environmental biology track Applied Biology students that have applied. These internships include 2 at Mears State Park, 1 at the department of Fisheries and Wildlife in Florida and 1 with the US Forest Service in California. These are all paying internships and are competitively obtained by FSU Applied Biology graduates. Bruce reports that feedback from the internship employers has been very positive.

I have also in the past 3 years given a science reasoning assessment test to Applied Biology seniors as part of the BIOL 460 course. These completed examinations are available in the office of the Applied Biology program coordinator. Senior Applied Biology students are also asked for their evaluation of the Applied Biology curriculum and the results are included as part of the program's annual report as well as in the graduate survey section of this document.

In summary from empirical observation of the acceptance and success of our graduates into competitive graduate and professional programs, the success of our graduates in obtaining competitive internships and program assessment tools, the Applied Biology curriculum is achieving its stated goal of providing a quality baccalaureate degree in biology for those whose careers and/or vocational choices will benefit from such a degree.

The Ferris State University Biology Department consists of 16 tenured and/or tenure track full time faculty. As can be seen on the following pages, 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 (pages 46-49) and syllabi (section 15) of the biology courses applicable to the Applied Biology Program major are included as well as the Applied Biology curriculum requirements document (pages 50-55).

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 308 ADVANCED MEDICAL MICROBIOLOGY AND IMMUNOLOGY have either not been taught or taught less frequently 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 and equipment replacement.

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. 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.

In response to Applied Biology program review in 1997, the following curriculum changes were implemented. We increased the total number of hours required for graduation from 120 to 127. We increased the number of credits required in the biology major from 30 to 36. We now require COMM 121 Fundamentals of Public Speaking by all our graduates rather than giving a choice between COMM 105 Intrapersonal Communication and COMM 121.

Additionally, the program has added, since the last program review, 2 new tracks; namely, environmental biology and forensic biology thus opening up the Applied Biology program to many new students.

BIOLOGY FACULTY ACADEMIC CREDENTIALS

NAME	DEGREE	RECEIVED FROM	DEGREE AREA
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. Strasser, Karren	Ph.D.	Louisiana	Environmental Biology
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.

14/16 or 88% of the biology faculty hold earned doctorates; 15/16 or 94% hold the highest terminal degree in their degree area.

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 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 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 321 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 322 Human Physiology and Anatomy 2 - 4 Credit Hours

A continuation of BIOL 321 covering the respiratory system, digestion and metabolism, the cardiovascular system, the renal system and the reproductive system. For students in science baccalaureate programs.

BIOL 340 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 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.

REQUIREMENTS

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 is consistent with the Ferris Mission Statement which states that Ferris State University will be a national leader in providing opportunities for innovative teaching and learning in career-oriented, technological and professional education. The Applied Biology 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 Environmental Biology, Pre-Med, Pre-Dent, Pre-Opt, Pre-Vet, Pre-Physical Therapy and to those who wish to pursue graduate work. Although the graduation requirements encompass a full four years' work, enrollment might occur as late as the end of the third 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 36 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 Sciences, Pharmacy, or other similar programs. In addition, a student must complete mathematics at least through trigonometry, be computer literate, have a minimum of 127 semester credits, and an honor point average of 2.0 or above.

I. COLLEGE OF ARTS AND SCIENCES REQUIREMENTS

A. COMMUNICATION COMPETENCE

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

B. CULTURAL ENRICHMENT

Courses in ARCH 244, ARTH, ARTS, THTR, ENGL 322, SPAN, FREN, GERM, HIST, LITR, HUMN, MUSI, COMM 231. Selection should be from at least two different areas and include at least one course at the 300-level or above. Also see "D."

COURSE	TITLE	CR.	GRADE	
_____	_____	___	_____	
_____	_____	___	_____	
_____	_____	___	_____	
_____	_____	___	_____	
_____	_____	___	_____	TOTAL CR. HRS.
_____	_____	___	_____	_____
				(12 minimum)

C. SOCIAL AWARENESS

Choose from ANTH, ECON, GEOG (except 111, 121), PLSC, PSYC, SOCY, 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.

COURSE	TITLE	CR.	GRADE	
_____	_____	___	_____	
_____	_____	___	_____	
_____	_____	___	_____	
_____	_____	___	_____	
_____	_____	___	_____	TOTAL CR. HRS.
_____	_____	___	_____	_____
				(12 minimum)

D. GLOBAL CONSCIOUSNESS

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

II. SCIENCE REQUIREMENTS

A. BIOLOGY MAJOR

Must total 36 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.**

COURSE	TITLE	CR.	GRADE
1. General Biology (minimum of 8 credits)			
BIOL 121	Gen. Biology 1	4	
BIOL 122	Gen. Biology 2	4	
2. Anatomy and Physiology* (minimum of 5 credits)			
BIOL 205	Human Anat/Phys	5	
BIOL 321	Human Phys/Anat 1	4	
BIOL 322	Human Phys/Anat 2	4	
BIOL 300	Pathophysiology	3	
BIOL 353	Plant Physiology	4	
3. Microbiology (minimum of 3 credits)			
BIOL 108	Medical Micro.	3	
BIOL 218	Microbial Ecology	3	
BIOL 286	General Micro.	3	
BIOL 308	Adv.Med.Mic/Imm	3	
BIOL 386	Micro/Immunology	5	
4. Genetics (minimum of 3 cr.)			
BIOL 375	Genetics	3	
5. Conservation or Ecology (minimum of 3 credits, recommended junior year)			
BIOL 347	Environ. Conserva.	3	
BIOL 442	Gen. Ecology	3	
6. Biological Writing/Capstone Course (minimum of 2 credits)			
BIOL 460	Current Topics in Biology	2	
7. Biology Electives			
BIOL 119	Birds of Michigan	4	
BIOL 340	Evolution	3	
BIOL 349	Medical Parasitol.	3	
BIOL 341	Nat. Hist. Inverts.	3	
BIOL 342	Nat. Hist. Vertebr.	3	
BIOL 344	Entomology	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 _____
(36 minimum)

B. SUPPORTING SCIENCES

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

COURSE	TITLE	CR.	GRADE
1. Mathematics (minimum compt. MATH 120)			
MATH 115	Intermed. Algebra	3	
MATH 120	Trigonometry	3	
MATH 130	Adv. Alg/Anal Trig	4	
MATH 135	Calc/Life Sciences	3	
MATH 220	Anal Geom/Calc 1	5	
MATH 230	Anal Geom/Calc 2	5	
MATH 116	Int Alg/Num Trig	4	
MATH 126	Algebra/Anal Trig	4	
2. Physics (minimum of 4 credits)			
PHYS 130	Concepts in Physics	4	
PHYS 155	Radiologic Physics	3	
PHYS 211	Intro Physics 1	4	
PHYS 212	Intro Physics 2	4	
PHYS 213	Phys. Computations	1	
PHYS 241	General Physics 1	5	
PHYS 242	General Physics 2	5	
PHYS 243	Phys. Computations	1	

COURSE	TITLE	CR.	GRADE
2. Chemistry (minimum of 7 credits including some biochemistry)			
CHEM 121	General Chem 1	5	
CHEM 122	General Chem 2	5	
CHEM 211	Polymer Chem	4	
CHEM 214	Fund/Organic Chem	4	
CHEM 321	Organic Chem 1	5	
CHEM 322	Organic Chem 2	5	
CHEM 324*	Fund of Biochem	3	
CHEM 364*	Biochemistry	4	
PHCM 320*	Biochemistry	5	
CHEM 114**	Intro to Inorganic	4	
CHEM 124**	Intro Organ/Biochem	3	
4. Science Electives			
ASTR 120	Stellar System	4	
ASTR 130	Solar System	4	
ASTR 140	The Sun	3	
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*			
COURSE	TITLE	CR.	GRADE	COURSE	TITLE	CR.	GRADE
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	4	_____	_____	_____	___	_____
BIOL 340	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	_____				
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	_____				

*Courses in column B must be approved.

TOTAL CREDIT HOURS _____
(8 minimum)

III. COMPUTER LITERACY

Computer literacy is a graduation requirement; ISYS 105 Microcomputer Applications or other approved ISYS courses are recommended.

COURSE	TITLE	CR.	GRADE
_____	_____	___	_____

IV. FREE ELECTIVES: **To a total program requirement of 127 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.**

COURSE	TITLE	CR.	GRADE
_____	_____	___	_____
_____	_____	___	_____
_____	_____	___	_____
_____	_____	___	_____
_____	_____	___	_____
_____	_____	___	_____
_____	_____	___	_____
_____	_____	___	_____

TOTAL CREDIT HOURS _____

NOTE: At least 40 semester credits, out of the total of 127 credits, must be in courses at the 300 or higher level.

ENROLLMENT TRENDS

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

	1997-98	1998-99	1999-2000	2000-01	2001-02
Applied Biology	133	51	48	51	50
Pre-Dental Track	NA	21	16	12	23
Pre-Medical Track	NA	42	53	58	50
Pre-Veterinary Track	NA	17	12	12	17
Sports Medicine Track*	NA	1	1	0	0
Pre-Physical Therapy Track	NA	16	14	15	12
Environmental Biology Track**	NA	3	5	4	8
Vision Science Track***	NA	0	0	1	2
Forensic Track****	NA	NA	NA	NA	NA
TOTALS:	133	151	149	153	162

* No longer available
** New Track in 1997
*** Track combines 3-year pre-optometry with 1st year of MCO
**** New Track in 2003

NOTE: defined tracks in the Applied Biology program were established in 1996. Prior to this the tracks listed were separate programs

We believe the above data reflects a reasonably stable enrollment in the FSU Applied Biology Program. Prior to 1996 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. Environmental biology track was new in 1997 and forensic biology track is new in 2003. Other tracks which have been examined and may yet be developed would include genetic counseling. 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.

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 have also recently seen Applied Biology students gaining acceptance into dental school and physical therapy without finishing their Applied Biology baccalaureate. This is not at all unusual and therefore the enrollment numbers should always be considered minimums.

We, the Applied Biology program advisors, have our own data which reflects senior enrollment in the program. This 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 primarily taken by seniors with a few juniors.

Year	Enrollment in Biol 460
1997-98	36
1998-99	39
1999-00	39
2000-01	33
2001-02	32

Compare this data with the graduation profile chart below for the last five years.

Year	Graduates	Male	Female	Distinction or Higher
1997-98	31	12	19	35%
1998-99	25	13	12	48%
1999-00	29	16	13	69%
2000-01	27	14	13	37%
2001-02	29	16	13	48%
Average	28	14	14	47%

All the preceding data tells us that there are approximately 150 students enrolled in Applied Biology (5 year average) with an average graduating class of 28 (about 19% of total enrollment). This suggests a reasonable retention rate in the Applied Biology program. The high academic achievements of the graduating seniors is reflected in 47% achieving distinction or higher (a GPA of at least 3.25) as well as a good acceptance rate into graduate and professional schools. In addition Applied Biology educates but does not graduate a few students each year. The program never receives credit for educating these students because they do not appear as graduates of the program yet the program has been instrumental in their success.

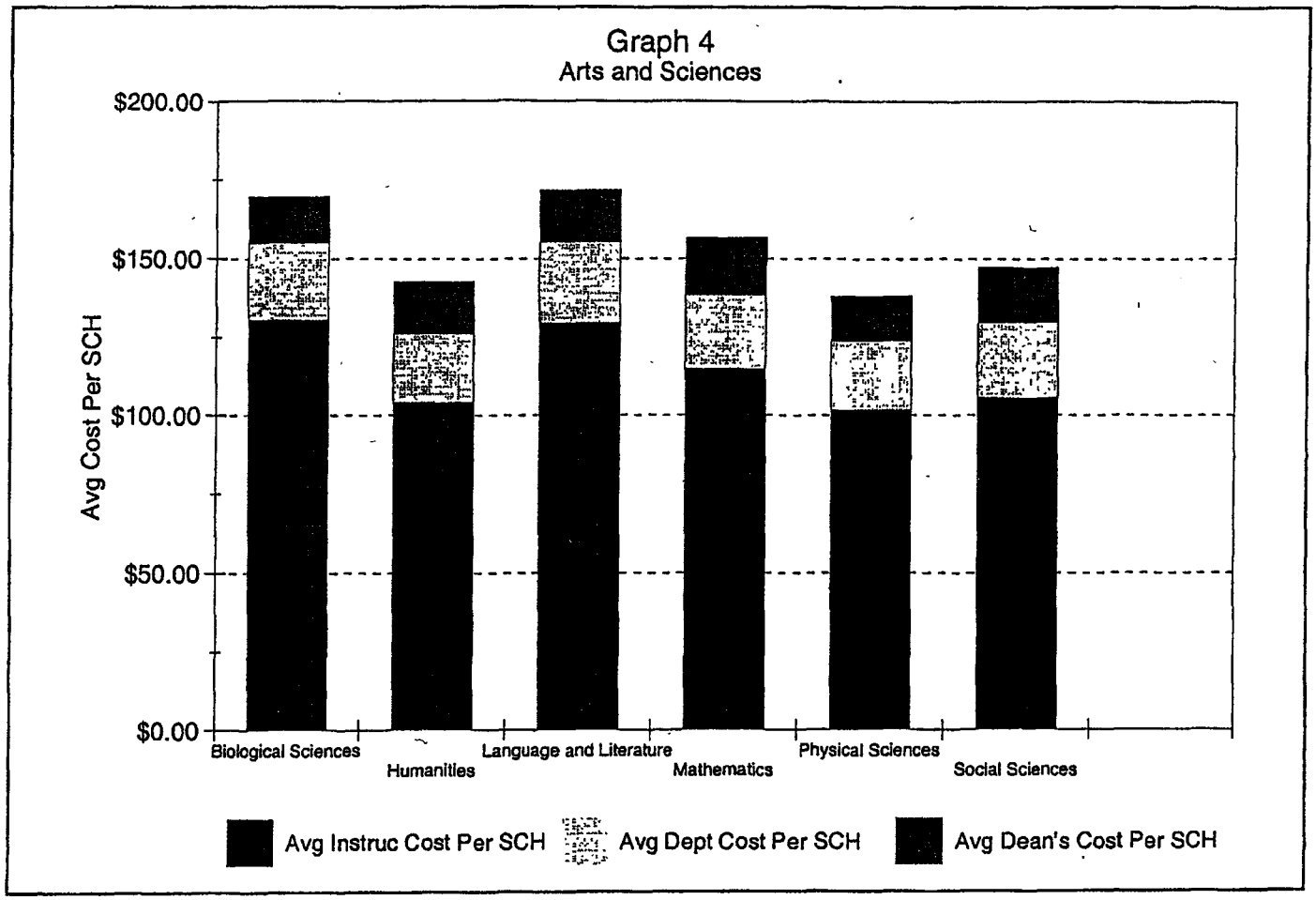
As the following 2000-01 data from the Office of Institutional Research clearly demonstrates the Applied Biology Program is a bargain in terms of costs. Of the 3 programs in the Biology Department (Biotechnology, Ornamental Horticulture and Applied Biology) the Applied Biology Program is the cheapest in total avg. cost/sch at $143.84-$159.16 depending upon the track. The environmental biology track is the most expensive and the pre-veterinary medicine track is the least expensive according to this data.

When this data is examined for total program costing ranked high to low, where all Ferris programs are listed, the following conclusions can be drawn. The FSU Applied Biology BS Program is very inexpensive ranking tenth lowest in total program cost (total program cost = $18,589.64) out of 81 FSU programs requiring 120 or more total credits or in the bottom 12% with respect to cost.

In part, this low cost is due to the fact that with the exception of BIOL 460, no courses unique to the Applied Biology Program exist. The program uses existing courses which also service other typically large enrolment programs such as pre-pharmacy and pre-optometry. Likewise, equipment servicing students enrolled in the Applied Biology Program is not unique to Applied Biology but is shared, so to speak, by students in other programs such as pre-pharmacy and pre-optometry. In addition the only administrative cost is the 25% release time given during fall and winter semesters to the program coordinator. Also the reasonably high and stable enrollment in the Applied Biology Program helps keep costs low. Given the fact that most biology courses are laboratory based and utilize expensive equipment, such as microscopes, the cost figures are truly admirable.

Program productivity as measured by enrollment and graduates is stable over the last several years at approximately 150 total students which suggests that demand by students is good. The program has averaged 28 graduates over the last 5 years with about 47% graduating with academic honors. The high percentage graduating with academic honors probably reflects the tendency of recent graduates to pursue competitive graduate programs such as medical school, dental school, physical therapy and physician's assistant all of which require high academic achievement for entry. Ferris Applied Biology students have done very well in gaining admission into these competitive programs.

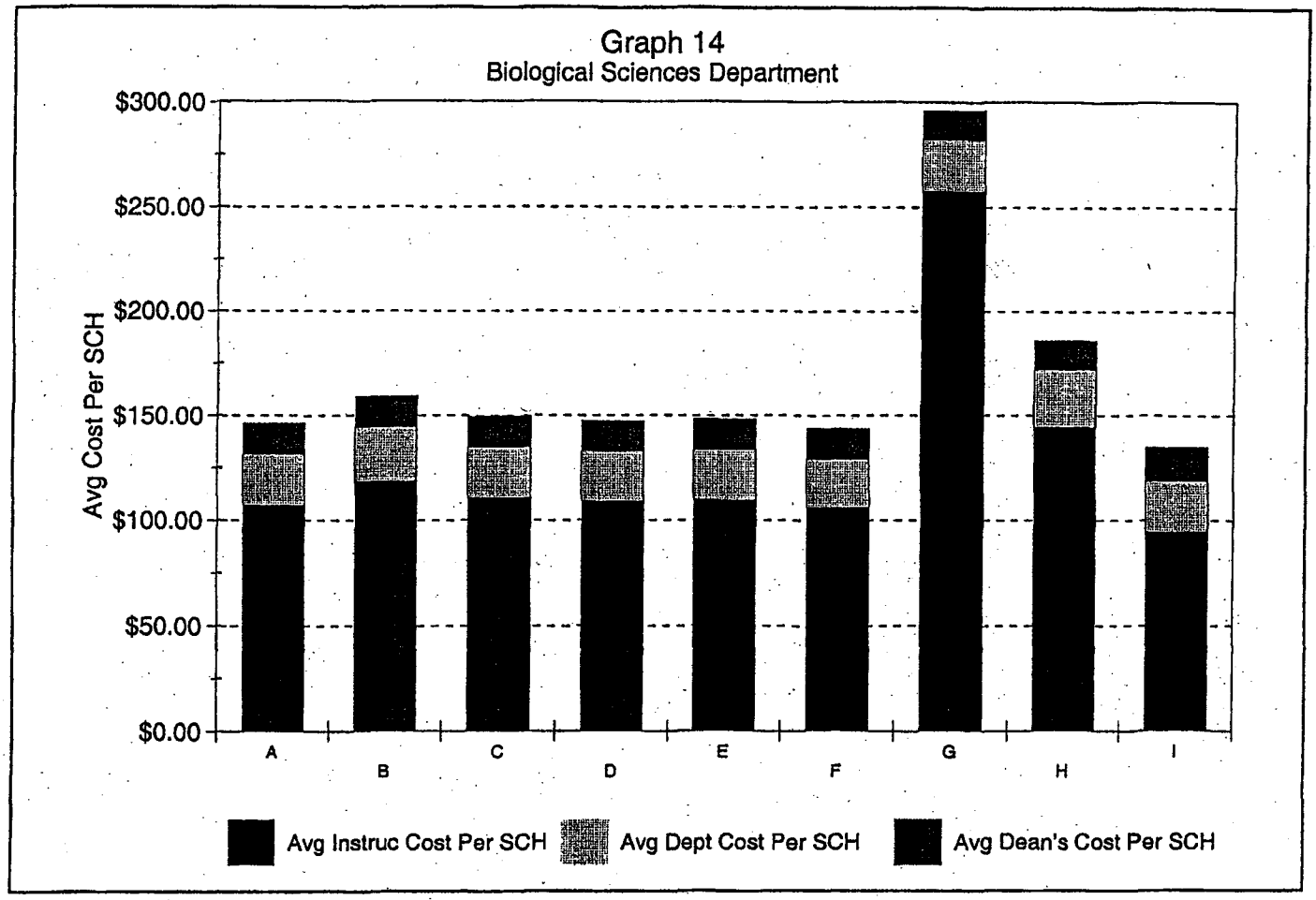
Ferris State University
Average Instructor, Department and Dean's Cost Per SCH for Degree Programs
Departments in the College of Arts and Sciences
2000 - 2001 Data



Departments	Avg Instructor Cost/SCH	Avg Dept Cost/SCH	Avg Dean's Cost/SCH	Total Avg Cost/SCH
Biological Sciences	$130.38	$24.40	$14.57	$169.35
Humanities	$103.94	$22.02	$16.54	$142.49
Language and Literature	$129.37	$25.67	$16.47	$171.50
Mathematics	$114.79	$23.43	$18.26	$156.48
Physical Sciences	$101.62	$22.00	$14.32	$137.94
Social Sciences	$105.48	$24.01	$17.50	$147.00

Source: Office of Institutional Research, g:\...\progcost\0001\avgdptas.rsl

Ferris State University
Average Instructor, Department and Dean's Cost Per SCH for Degree Programs
Biological Sciences Department
2000 - 2001 Data



	Programs	Avg Instructor Cost/SCH	Avg Dept Cost/SCH	Avg Dean's Cost/SCH	Total Avg Cost/SCH
A	Applied Biology BS	$107.25	$24.36	$14.77	$146.38
B	Applied Biology (Environmental Biology Track) BS	$118.78	$25.54	$14.84	$159.16
C	Applied Biology (Pre-Dentistry Track) BS	$110.84	$24.09	$14.54	$149.47
D	Applied Biology (Pre-Medicine Track) BS	$108.98	$23.94	$14.43	$147.35
E	Applied Biology (Pre-Physical Therapy Track) BS	$109.73	$23.93	$14.51	$148.17
F	Applied Biology (Pre-Veterinary Medicine Track) BS	$106.11	$23.21	$14.52	$143.84
G	Biotechnology BS	$257.47	$24.44	$13.93	$295.85
H	Ornamental Horticulture Technology AAS	$144.48	$27.31	$13.97	$185.77
I	Pre-Science AS	$94.50	$24.11	$16.23	$134.84

Source: Office of Institutional Research, g:\...\progcost\0001\avgp2bs.rsl

Table II

Degree Program Costing
Total Program Cost Ranked High to Low
2000-01

Program Name	Program Credits Required	Total Instructor Cost*	Total Dept Cost**	Total Dean's Cost***	Total Program Cost
Optometry OD (Professional Yrs 1,2,3 & 4)	163	$60,252.41	$8,381.99	$20,306.79	**$88,941.19**
Environmental Hlth & Safety Mgmt (Haz Material Mgmt o	124	$40,625.77	$4,647.22	$2,945.97	**$48,218.97**
Environmental Hlth & Safety Mgmt (Indust Safety option)	124	$39,400.79	$4,646.07	$2,955.99	**$47,002.85**
Environmental Hlth & Safety Mgmt (Indust Hygiene optior	124	$37,856.48	$4,440.85	$2,825.63	**$45,122.97**
Environmental Health & Safety Mgmt (Env Health option)	131	$34,328.24	$5,027.18	$3,141.25	**$42,496.67**
Doctor of Pharmacy Pharm.D. (Professional Yrs 1,2,3 &	149	$30,820.63	$5,964.40	$5,368.33	**$42,153.36**
Biotechnology BS	130	$33,471.23	$3,177.66	$1,811.13	**$38,460.02**
Television Production BS	128	$16,697.23	$12,845.66	$2,800.11	**$32,343.00**
Pharmacy BS (Professional Yrs 1,2 & 3)	94	$23,062.25	$4,400.38	$4,039.56	**$31,502.19**
Surveying Engineering BS	137	$19,224.49	$6,428.96	$2,767.54	**$28,420.99**
Business Education/Marketing/Distributive Edu BS	156	$18,537.74	$6,521.55	$3,230.68	**$28,289.96**
Computer Networks & Systems (Embedded Systems Tra	136	$20,249.47	$4,910.67	$2,649.43	**$27,809.57**
Business Education/General Business BS	159	$18,584.46	$5,825.86	$3,226.41	**$27,636.74**
Medical Laboratory Technology AAS	69	$21,365.66	$4,184.55	$1,848.60	**$27,398.81**
Computer Networks & Systems (Indust Automation Track	136	$19,823.86	$4,910.67	$2,649.43	**$27,383.97**
Computer Networks & Systems (Info Systems Track) BS	137	$19,821.00	$4,790.08	$2,586.77	**$27,197.85**
Computer Networks & Systems (Communications Track)	136	$19,416.03	$4,832.92	$2,650.78	**$26,899.73**
Computer Information Systems/Management BS	159	$19,879.18	$3,936.84	$2,452.52	**$26,268.54**
Elementary Education BS	162	$17,855.89	$4,537.35	$3,008.15	**$25,401.38**
Accountancy/Computer Information Systems BS	139	$20,122.15	$3,167.41	$2,063.02	**$25,352.58**
International Business BS	127	$20,597.94	$2,645.46	$1,997.44	**$25,240.84**
Tech & Professional Comm (Publication Mgmt Track) BS	121	$18,984.91	$3,919.72	$2,050.60	**$24,955.23**
Medical Record Administration BS	124	$16,873.08	$4,892.82	$3,147.34	**$24,913.25**
Computer Information Systems/Marketing BS	148	$18,246.54	$4,144.49	$2,250.54	**$24,641.57**
Construction Management (Highway/Bridge Track) BS	131	$15,538.58	$6,512.99	$2,576.09	**$24,627.66**
Accountancy/Finance BS	137	$20,064.21	$2,433.40	$2,061.14	**$24,558.75**
Construction Management (Commercial/Indust Track) BS	131	$15,085.58	$6,896.80	$2,573.05	**$24,555.43**
Health Care Systems Administration BS	124	$16,228.77	$4,688.98	$2,986.03	**$23,903.78**
Resort Mgmt/Lodging Management Concentration BS	127	$17,455.00	$3,494.71	$1,994.13	**$22,943.84**
Tech & Professional Comm (Automotive Writing Track) B	121	$17,188.98	$3,604.58	$2,106.85	**$22,900.41**
Nuclear Medicine Technology BS	125	$15,393.30	$4,761.78	$2,635.45	**$22,790.53**
Mathematics Education BS	144	$15,053.22	$4,638.56	$2,769.50	**$22,461.27**
Chemistry Education BS	152	$14,598.63	$5,030.09	$2,783.87	**$22,412.59**
Accountancy (Cost/Managerial Track) BS	124	$17,083.36	$2,806.49	$2,107.84	**$21,997.69**
Music Industry Management BS	124	$16,694.76	$3,420.49	$1,847.92	**$21,963.17**
Recreation Leadership & Mgt/Corp Fitness-Well Track B	128	$14,380.13	$4,451.65	$2,866.77	**$21,698.56**

* Instructor Cost - ***Salary & Fringe***
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment***
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipmen***

Table II

Degree Program Costing
Total Program Cost Ranked High to Low
2000-01

Program Name	Program Credits Required	Total Instructor Cost*	Total Dept Cost**	Total Dean's Cost***	**Total Program Cost**
Accountancy (Public Accounting Track) BS	124	$17,234.74	$2,434.47	$2,026.95	**$21,696.16**
Resort Mgmt/Facilities Operations Mgmt Concentration E	128	$15,349.70	$4,097.76	$2,143.20	**$21,590.66**
Recreation Leadership & Mgt/Outdoor-Adv Edu Track BS	128	$14,279.74	$4,383.33	$2,867.97	**$21,531.04**
Accountancy (Professionally Directed Track) BS	124	$16,808.47	$2,498.18	$2,038.96	**$21,345.62**
Tech & Professional Comm (Multimedia Writing Track) B	121	$16,115.55	$3,104.22	$1,965.80	**$21,185.57**
Recreation Leadership & Mgt/Leisure Service Track BS	128	$14,058.83	$4,322.05	$2,791.46	**$21,172.34**
Tech & Professional Comm (Computer Info Writing Track	121	$16,120.07	$3,050.66	$1,936.52	**$21,107.25**
Integrated Resource Management BS	125	$15,329.26	$3,542.09	$2,224.60	**$21,095.95**
Printing & Digital Graphic Imaging Technology AAS	63	$14,802.29	$4,798.56	$1,368.51	**$20,969.36**
Recreation Leadership & Mgt/Sports Management Track	128	$13,960.65	$4,242.79	$2,761.89	**$20,965.33**
Automotive Service Technology AAS	68	$15,816.44	$3,615.19	$1,489.13	**$20,920.76**
Computer Information Systems BS	124	$15,819.19	$3,212.40	$1,808.85	**$20,840.45**
Nursing AAS	72	$13,469.31	$5,442.42	$1,787.73	**$20,699.46**
Respiratory Care AAS	79	$13,693.05	$4,788.56	$2,208.44	**$20,690.05**
Psychology BS	124	$14,755.96	$3,545.14	$2,236.93	**$20,538.02**
Tech & Professional Comm (Technical Journalism Track)	121	$15,549.69	$2,773.19	$1,952.39	**$20,275.26**
Applied Biology (Environmental Biology Track) BS	127	$15,084.76	$3,243.31	$1,885.21	**$20,213.29**
Insurance BS	124	$14,833.78	$3,116.46	$2,136.72	**$20,086.96**
Tech & Professional Comm (Sci & Medical Writing Track)	121	$14,962.92	$3,044.37	$2,025.69	**$20,032.98**
English Education BS	144	$13,019.97	$4,355.29	$2,656.17	**$20,031.42**
Resort Mgmt/Facilities Planning Mgmt Concentration BS	125	$14,222.12	$3,707.88	$2,071.19	**$20,001.19**
Insurance/Real Estate BS	124	$14,820.25	$2,825.83	$2,028.33	**$19,674.40**
Technical and Professional Communication BS	121	$15,144.04	$2,596.74	$1,887.79	**$19,628.57**
Applied Mathematics (Statistics Track) BS	120	$14,635.57	$2,770.34	$2,218.11	**$19,624.01**
Applied Mathematics (Actuarial Science Track) BS	120	$14,665.86	$2,757.68	$2,180.59	**$19,604.13**
Resort Mgmt/Marketing Concentration BS	126	$14,035.87	$3,477.51	$2,008.87	**$19,522.26**
Public Administration BS	124	$13,909.05	$3,081.50	$2,364.25	**$19,354.80**
Finance BS	125	$15,000.55	$2,401.61	$1,921.99	**$19,324.15**
Human Resource Management BS	122	$15,041.82	$2,394.65	$1,857.75	**$19,294.22**
Public Relations BS	124	$14,360.38	$3,039.88	$1,881.31	**$19,281.57**
Applied Speech Communication BS	126	$14,174.94	$2,884.58	$2,168.84	**$19,228.36**
Resort Mgmt/Rec & Leadership Mgmt Concentration BS	125	$13,469.06	$3,499.62	$2,165.10	**$19,133.77**
Biology Education BS	122	$12,079.52	$4,687.23	$2,344.67	**$19,111.42**
Advertising BS	125	$13,796.25	$3,315.92	$1,906.85	**$19,019.02**
Applied Biology (Pre-Dentistry Track) BS	127	$14,076.66	$3,059.93	$1,846.02	**$18,982.60**
Applied Mathematics BS	120	$13,671.07	$2,938.46	$2,252.10	**$18,861.63**

* Instructor Cost - ***Salary & Fringe***
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment***
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipmen***

Source: Office of Institutional Research, g:\...\progcost\0001\tpcrank.rsl

Table II

Degree Program Costing
Total Program Cost Ranked High to Low
2000-01

Program Name	Program Credits Required	Total Instructor Cost*	Total Dept Cost**	Total Dean's Cost***	Total Program Cost
Applied Mathematics (Computer Science Track) BS	120	$13,569.50	$3,011.04	$2,273.63	$18,854.17
Applied Biology (Pre-Physical Therapy Track) BS	127	$13,935.52	$3,039.01	$1,842.84	$18,817.37
Marketing BS	124	$13,577.27	$3,240.13	$1,974.63	$18,792.03
Professional Golf Management BS	124	$13,387.04	$3,450.38	$1,933.55	$18,770.98
Applied Biology (Pre-Medicine Track) BS	127	$13,840.53	$3,040.72	$1,832.20	$18,713.44
Applied Biology BS	127	$13,620.31	$3,093.38	$1,875.95	$18,589.64
Marketing (Retailing Track) BS	124	$13,303.29	$3,207.94	$1,886.78	$18,398.02
Management BS	123	$13,810.27	$2,590.11	$1,916.75	$18,317.13
Applied Mathematics (Operations Research Track) BS	120	$13,031.45	$2,958.44	$2,281.86	$18,271.76
Marketing (Sales Track) BS	124	$13,282.84	$3,099.09	$1,882.15	$18,264.09
Professional Tennis Management BS	124	$12,920.39	$3,392.24	$1,914.35	$18,226.98
Heavy Equipment Technology AAS	67	$13,442.49	$3,348.40	$1,433.69	$18,224.58
Medical Technology (Career Mobility) BS (Yrs 3 & 4)	72	$13,774.27	$2,930.13	$1,490.46	$18,194.85
Wage Earning Home Economics Education BS (Yrs 3 &	99	$10,912.89	$4,723.00	$2,353.51	$17,989.40
Small Business Management BS	123	$13,356.63	$2,660.98	$1,904.75	$17,922.36
Restaurant and Food Industry Management AAS	69	$14,841.95	$1,931.85	$1,121.97	$17,895.77
Allied Health Education BS (Yrs 3 & 4)	100	$10,674.60	$4,724.19	$2,391.07	$17,789.86
Technical Education BS (Yrs 3 & 4)	99	$10,674.60	$4,724.19	$2,354.46	$17,753.25
Applied Biology (Pre-Veterinary Medicine Track) BS	123	$13,051.05	$2,854.48	$1,786.36	$17,691.88
CAD Drafting and Tool Design AAS	67	$11,671.97	$4,466.22	$1,394.49	$17,532.69
HVACR Technology AAS	67	$11,911.47	$4,050.15	$1,373.67	$17,335.29
Business Administration BS	123	$12,784.42	$2,588.42	$1,928.49	$17,301.33
Manufacturing Engineering Technology BS (Yrs 3 & 4)	79	$10,191.36	$5,332.09	$1,720.53	$17,243.98
Social Work BSW	128	$12,730.18	$2,575.29	$1,867.71	$17,173.17
Automotive Service Technology (Ford ASSET opt) AAS	67	$11,707.22	$3,603.65	$1,475.22	$16,786.09
Automotive Service Technology (Chrysler Apprentice opt	68	$11,643.80	$3,615.19	$1,489.13	$16,748.12
Automotive Service Tech (General Motors ASEP opt) AA	68	$11,643.80	$3,615.19	$1,489.13	$16,748.12
Dental Hygiene AAS	77	$9,224.37	$5,445.53	$1,869.98	$16,539.89
Hotel Management BS (Yrs 3 & 4)	63	$13,598.62	$1,746.34	$973.78	$16,318.74
Opticianry AAS	65	$11,489.89	$2,967.75	$1,563.99	$16,021.62
Construction Management (from Arch Tech) BS (Yrs 3 &	83	$9,756.70	$4,354.63	$1,643.70	$15,755.03
Industrial Electronics Technology AAS	67	$11,740.94	$2,599.88	$1,390.14	$15,730.96
Manufacturing Tooling Technology AAS	68	$9,882.70	$4,098.49	$1,465.28	$15,446.47
Training in Business and Industry BS (Yrs 3 & 4)	99	$9,918.71	$3,432.06	$1,966.44	$15,317.21
Plastics Engineering Technology BS (Yrs 3 & 4)	65	$9,292.76	$4,545.84	$1,366.27	$15,204.87
Rubber Engineering Technology BS (Yrs 3 & 4)	67	$9,785.60	$3,956.09	$1,392.18	$15,133.87

* Instructor Cost - ***Salary & Fringe***
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment***
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment***

Table II

Degree Program Costing
Total Program Cost Ranked High to Low
2000-01

Program Name	Program Credits Required	Total Instructor Cost*	Total Dept Cost**	Total Dean's Cost***	Total Program Cost
Nursing BSN (Yrs 3 & 4)	60	$8,752.14	$3,936.36	$1,404.42	**$14,092.91**
Architectural Technology AAS	66	$9,088.24	$3,564.74	$1,403.87	**$14,056.84**
Welding Engineering Technology BS (Yrs 3 & 4)	73	$8,150.91	$4,158.37	$1,457.89	**$13,767.17**
CJ/Law Enforcement option BS (Yrs 3 & 4)	70	$9,086.57	$2,639.14	$1,930.87	**$13,656.58**
HVACR Engineering Technology BS (Yrs 3 & 4)	64	$8,849.36	$3,347.64	$1,307.91	**$13,504.91**
Printing Management BS (Yrs 3 & 4)	67	$9,428.81	$2,817.58	$1,242.65	**$13,489.03**
Welding Technology AAS	67	$7,911.95	$4,083.55	$1,429.01	**$13,424.51**
Facilities Management BS (Yrs 3 & 4)	68	$9,172.69	$2,918.25	$1,322.88	**$13,413.82**
Automotive Body AAS	63	$8,896.84	$2,948.29	$1,375.54	**$13,220.68**
Radiography AAS	78	$6,059.23	$4,913.83	$2,224.45	**$13,197.51**
Plastics Technology AAS	68	$8,661.67	$3,177.62	$1,317.24	**$13,156.53**
Civil Engineering Technology AAS	64	$8,329.19	$3,457.41	$1,311.38	**$13,097.98**
Product Design Engineering Technology BS (Yrs 3 & 4)	68	$8,109.40	$3,587.05	$1,401.20	**$13,097.65**
Building Construction Technology AAS	64	$7,876.19	$3,841.21	$1,308.34	**$13,025.75**
Quality Engineering Technology BS (Yrs 3 & 4)	68	$8,235.44	$3,423.46	$1,365.43	**$13,024.32**
New Media Printing and Publishing BS (Yrs 3 & 4)	64	$9,175.34	$2,502.25	$1,161.04	**$12,838.62**
Rubber Technology AAS	64	$8,617.90	$2,989.32	$1,196.66	**$12,803.88**
Elect/Electron Engr Tech (Communications) BS (Yrs 3 &	68	$8,482.78	$2,855.78	$1,350.50	**$12,689.06**
Elect/Electron Engr Tech (Indust Auto) BS (Yrs 3 & 4)	68	$8,482.78	$2,855.78	$1,350.50	**$12,689.06**
Medical Record Technology AAS	63	$8,177.88	$2,718.56	$1,744.70	**$12,641.15**
Heavy Equipment Serv Eng Tech/Mfg opt BS (Yrs 3 & 4)	66	$7,992.56	$3,284.17	$1,307.28	**$12,584.01**
Nuclear Medicine Technology AAS	66	$7,692.91	$3,152.62	$1,600.60	**$12,446.13**
Elect/Electron Engr Tech (Tech Integration) BS (Yrs 3 &	68	$8,333.35	$2,677.33	$1,351.51	**$12,362.19**
Heavy Equipment Serv Eng Tech/Maint opt BS (Yrs 3 &	66	$8,384.41	$2,603.90	$1,280.75	**$12,269.07**
Automotive and Heavy Equipment Mgt BS (Yrs 3 & 4)	67	$8,179.10	$2,660.11	$1,305.37	**$12,144.59**
Surveying Technology AAS	60	$7,874.65	$2,998.96	$1,162.59	**$12,036.21**
Pre-Optometry AS	88	$8,694.81	$1,947.50	$1,226.43	**$11,868.74**
CJ/Corrections option BS (Yrs 3 & 4)	66	$7,699.56	$2,248.18	$1,646.38	**$11,594.13**
Mechanical Engineering Technology AAS	66	$7,617.77	$2,591.52	$1,281.70	**$11,490.99**
Visual Communication BS (Yrs 3 & 4)	64	$8,045.83	$2,098.03	$1,004.04	**$11,147.90**
Ornamental Horticulture Technology AAS	60	$8,669.08	$1,638.72	$838.12	**$11,145.92**
Early Childhood Education AAS	63	$7,764.86	$1,199.72	$1,523.03	**$10,487.61**
Industrial Chemistry Technology AAS	63	$7,900.94	$1,392.92	$880.01	**$10,173.87**
Pre-Engineering AS	73	$7,677.56	$1,333.34	$1,082.87	**$10,093.77**
Computer Info Systems (WEB Development Track) AAS	60	$7,601.45	$1,543.06	$902.95	**$10,047.46**
Info Systems Mgmt/Quality Improvement Emphasis MS	31	$8,444.37	$1,112.45	$489.06	**$10,045.88**

* Instructor Cost - ***Salary & Fringe***
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment***
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment***

Source: Office of Institutional Research, g:\...\progcost\0001\tpcrank.rsl

Table II

Degree Program Costing
Total Program Cost Ranked High to Low
2000-01

Program Name	Program Credits Required	Total Instructor Cost*	Total Dept Cost**	Total Dean's Cost***	Total Program Cost
Criminal Justice Administration MS	30	$7,842.89	$1,055.56	$770.17	$9,668.62
Visual Communication AAS	66	$6,607.37	$1,943.28	$958.21	$9,508.86
Computer Info Systems (Programming Track) AAS	60	$7,058.10	$1,543.06	$902.95	$9,504.11
Legal Assistant AAS	64	$7,098.30	$1,357.14	$1,045.30	$9,500.74
Master of Educ-Curriculum & Instruc/Secondary Cert opt	36	$5,621.44	$2,521.58	$1,125.48	$9,268.50
Pre-Teaching (Elementary or Secondary) AA	63	$6,303.30	$1,771.26	$1,164.28	$9,238.84
CJ/Generalist option BS (Yrs 3 & 4)	64	$5,517.34	$2,147.65	$1,560.88	$9,225.87
Computer Info Systems (PC/Networking Support Track)	60	$6,685.54	$1,572.23	$932.51	$9,190.28
Collegiate Skills Program AA	60	$5,756.32	$1,148.05	$2,260.87	$9,165.24
Pre-Criminal Justice AA	64	$6,282.28	$1,652.76	$1,206.39	$9,141.44
Real Estate AAS	63	$6,602.29	$1,431.14	$1,003.00	$9,036.43
Pre-Law AA	60	$6,766.96	$1,242.16	$1,002.31	$9,011.42
Accountancy AAS	60	$6,656.29	$1,200.92	$932.51	$8,789.72
General Business AAS	63	$6,337.81	$1,284.64	$917.86	$8,540.30
Career Exploration AA	60	$5,504.90	$1,231.33	$1,799.29	$8,535.52
Pre-Technical & Professional Communications AA	60	$5,790.63	$1,578.67	$1,121.38	$8,490.68
Career and Tech Educ/Instructor Option MS	33	$5,304.42	$2,184.57	$998.76	$8,487.75
Directed Studies AA	60	$5,597.47	$1,346.92	$1,358.61	$8,303.00
Info Systems Mgmt/Information Systems Emphasis MS	31	$6,562.86	$1,141.62	$518.62	$8,223.10
Pre-Science AS	60	$5,670.10	$1,446.69	$973.75	$8,090.55
Customer Energy Specialist Certificate	48	$5,705.78	$1,475.49	$851.27	$8,032.54
Career and Tech Educ/Training & Dev Option MS	31	$4,981.04	$2,095.23	$949.40	$8,025.68
Career and Tech Educ/Educational Tech Option MS	33	$5,350.90	$1,814.13	$814.64	$7,979.67
Pre-Social Work AA	60	$5,311.11	$1,531.25	$1,065.26	$7,907.62
Career and Tech Educ/Administrative Option MS	33	$4,801.76	$2,083.07	$972.41	$7,857.24
Pre-Mortuary Science AS	60	$5,484.95	$1,392.01	$937.17	$7,814.13
Pre-Public Administration AA	60	$5,174.12	$1,376.17	$1,194.62	$7,744.91
Pre-Pharmacy AS	61	$5,559.82	$1,250.32	$852.63	$7,662.78
Master of Educ-Curriculum & Instruc/Subject Area opt M	32	$4,761.91	$1,911.52	$914.80	$7,588.23
Career and Tech Educ/Postsecondary Admin Option MS	32	$4,341.20	$2,089.15	$960.91	$7,391.25
Applied Speech Communication AA	60	$5,157.59	$1,210.22	$907.86	$7,275.68
Liberal Arts AA	60	$5,240.72	$1,151.39	$875.88	$7,267.98
Heavy Equipment Technology Kamatsu Equip Repair Ce	18	$2,561.48	$804.03	$444.18	$3,809.69
Public Relations Certificate	13	$3,033.35	$417.19	$192.69	$3,643.23
Advertising Certificate	14	$2,794.11	$529.20	$207.52	$3,530.83
Mainframe Computer Certificate	13	$2,701.29	$483.45	$222.26	$3,406.99

* Instructor Cost - ***Salary & Fringe***
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment***
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment***

Table II

Degree Program Costing
Total Program Cost Ranked High to Low
2000-01

Program Name	Program Credits Required	Total Instructor Cost*	Total Dept Cost**	Total Dean's Cost***	**Total Program Cost**
Insurance Certificate	12	$2,713.21	$377.50	$237.00	**$3,327.70**
Hotel Management Certificate	12	$2,557.49	$494.81	$237.00	**$3,289.30**
Facilities Management Certificate	12	$1,958.88	$919.82	$293.08	**$3,171.78**
Construction Administration Certificate	12	$1,494.12	$1,047.76	$292.07	**$2,833.94**
AS/400 Programming Certificate	12	$2,154.66	$419.33	$177.87	**$2,751.86**
Quality Technology Certificate	12	$1,467.92	$892.93	$294.09	**$2,654.95**
Advanced Construction Management Certificate	12	$1,491.76	$791.89	$294.09	**$2,577.74**
International Business Certificate	12	$2,113.14	$218.97	$177.87	**$2,509.98**
Midrange Computer Certificate	12	$1,828.78	$448.50	$207.43	**$2,484.72**
Direct Marketing Certificate	12	$1,795.32	$453.60	$177.87	**$2,426.79**
Advanced Studies in Investment Analysis Certificate	12	$1,919.49	$218.97	$177.87	**$2,316.34**
Performance Machining Certificate	12	$1,287.69	$691.52	$293.42	**$2,272.63**
Marketing Certificate	12	$1,637.91	$453.60	$177.87	**$2,269.38**
Marketing Research Certificate	12	$1,698.89	$379.39	$177.87	**$2,256.16**
Manufacturing Operations Management Certificate	12	$1,464.92	$535.35	$206.42	**$2,206.68**
Performance Motorsports Certificate	10	$1,373.11	$582.75	$244.40	**$2,200.26**
Restaurant and Food Industry Management Certificate	12	$1,493.88	$474.21	$207.43	**$2,175.52**
Retailing Certificate	12	$1,489.02	$453.60	$177.87	**$2,120.49**
Marketing Sales Certificate	12	$1,479.62	$384.36	$175.13	**$2,039.11**
Advanced Studies in Global Logistics Certificate	12	$1,432.59	$394.94	$177.87	**$2,005.40**
Computer Literacy Certificate	12	$1,378.03	$419.33	$177.87	**$1,975.24**
Real Estate Certificate	9	$1,443.83	$322.75	$192.53	**$1,959.11**
Forensics Sciences/Clinical Crime Investigation Certifica	12	$1,449.87	$337.35	$166.92	**$1,954.13**
Small Business Management Certificate	12	$1,411.34	$262.08	$177.87	**$1,851.29**
Athletic Coaching Certificate	10	$768.64	$448.46	$279.70	**$1,496.80**
Geographic Information Systems Certificate	6	$663.31	$523.88	$146.03	**$1,333.22**

* Instructor Cost - ***Salary & Fringe***
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment***
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipmen***

Source: Office of Institutional Research, g:\...\progcost\0001\tpcrank.rsl

Table III

Degree Program Costing
Total Cost per SCH Ranked High to Low
2000-01

Program Name	Program Credits Required	Instructor Cost per SCH	Dept Cost per SCH	Dean's Cost per SCH	Total Cost per SCH
Optometry OD (Professional Yrs 1,2,3 & 4)	163	$369.65	$51.42	$124.58	$545.65
Medical Laboratory Technology AAS	69	$309.65	$60.65	$26.79	$397.08
Environmental Hlth & Safety Mgmt (Haz Material Mgmt op	124	$327.63	$37.48	$23.76	$388.86
Environmental Hlth & Safety Mgmt (Indust Safety option)	124	$317.75	$37.47	$23.84	$379.06
Environmental Hlth & Safety Mgmt (Indust Hygiene option	124	$305.29	$35.81	$22.79	$363.89
Pharmacy BS (Professional Yrs 1,2 & 3)	94	$246.66	$47.06	$43.20	$336.92
Printing & Digital Graphic Imaging Technology AAS	63	$234.96	$76.17	$21.72	$332.85
Environmental Health & Safety Mgmt (Env Health option)	131	$262.05	$38.38	$23.98	$324.40
Info Systems Mgmt/Quality Improvement Emphasis MS	31	$272.40	$35.89	$15.78	$324.06
Criminal Justice Administration MS	30	$261.43	$35.19	$25.67	$322.29
Automotive Service Technology AAS	68	$232.59	$53.16	$21.90	$307.66
Biotechnology BS	130	$257.47	$24.44	$13.93	$295.85
Nursing AAS	72	$187.07	$75.59	$24.83	$287.49
Doctor of Pharmacy Pharm.D. (Professional Yrs 1,2,3 & 4	149	$207.55	$40.16	$36.15	$283.86
Public Relations Certificate	13	$233.33	$32.09	$14.82	$280.25
Insurance Certificate	12	$226.10	$31.46	$19.75	$277.31
Hotel Management Certificate	12	$213.12	$41.23	$19.75	$274.11
Heavy Equipment Technology AAS	67	$200.63	$49.98	$21.40	$272.01
Info Systems Mgmt/Information Systems Emphasis MS	31	$211.71	$36.83	$16.73	$265.26
Facilities Management Certificate	12	$163.24	$76.65	$24.42	$264.31
Mainframe Computer Certificate	13	$207.79	$37.19	$17.10	$262.08
Respiratory Care AAS	79	$173.33	$60.61	$27.95	$261.90
CAD Drafting and Tool Design AAS	67	$174.21	$66.66	$20.81	$261.68
Restaurant and Food Industry Management AAS	69	$215.10	$28.00	$16.26	$259.36
Hotel Management BS (Yrs 3 & 4)	63	$215.85	$27.72	$15.46	$259.03
Career and Tech Educ/Training & Dev Option MS	31	$160.68	$67.59	$30.63	$258.89
HVACR Technology AAS	67	$177.78	$60.45	$20.50	$258.74
Master of Educ-Curriculum & Instruc/Secondary Cert opt	36	$156.15	$70.04	$31.26	$257.46
Career and Tech Educ/Instructor Option MS	33	$160.74	$66.20	$30.27	$257.20
Medical Technology (Career Mobility) BS (Yrs 3 & 4)	72	$191.31	$40.70	$20.70	$252.71
Television Production BS	128	$130.45	$100.35	$21.88	$252.68
Advertising Certificate	14	$199.58	$37.80	$14.82	$252.20
Automotive Service Technology (Ford ASSET opt) AAS	67	$174.73	$53.79	$22.02	$250.54
Opticianry AAS	65	$176.77	$45.66	$24.06	$246.49
Automotive Service Technology (Chrysler Apprentice opt)	68	$171.23	$53.16	$21.90	$246.30
Automotive Service Tech (General Motors ASEP opt) AA	68	$171.23	$53.16	$21.90	$246.30
Career and Tech Educ/Educational Tech Option MS	33	$162.15	$54.97	$24.69	$241.81

* Instructor Cost - ***Salary & Fringe***
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment***
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipmen***

Table III

Degree Program Costing
Total Cost per SCH Ranked High to Low
2000-01

Program Name	Program Credits Required	Instructor Cost per SCH	Dept Cost per SCH	Dean's Cost per SCH	**Total Cost per SCH**
Career and Tech Educ/Administrative Option MS	33	$145.51	$63.12	$29.47	**$238.10**
Master of Educ-Curriculum & Instruc/Subject Area opt MS	32	$148.81	$59.73	$28.59	**$237.13**
Construction Administration Certificate	12	$124.51	$87.31	$24.34	**$236.16**
Nursing BSN (Yrs 3 & 4)	60	$145.87	$65.60	$23.41	**$234.88**
Industrial Electronics Technology AAS	67	$175.24	$38.80	$20.75	**$234.79**
Plastics Engineering Technology BS (Yrs 3 & 4)	65	$142.97	$69.94	$21.02	**$233.92**
Career and Tech Educ/Postsecondary Admin Option MS	32	$135.66	$65.29	$30.03	**$230.98**
AS/400 Programming Certificate	12	$179.55	$34.94	$14.82	**$229.32**
Manufacturing Tooling Technology AAS	68	$145.33	$60.27	$21.55	**$227.15**
Rubber Engineering Technology BS (Yrs 3 & 4)	67	$146.05	$59.05	$20.78	**$225.88**
Geographic Information Systems Certificate	6	$110.55	$87.31	$24.34	**$222.20**
Quality Technology Certificate	12	$122.33	$74.41	$24.51	**$221.25**
Performance Motorsports Certificate	10	$137.31	$58.27	$24.44	**$220.03**
Manufacturing Engineering Technology BS (Yrs 3 & 4)	79	$129.00	$67.49	$21.78	**$218.28**
Real Estate Certificate	9	$160.43	$35.86	$21.39	**$217.68**
Advanced Construction Management Certificate	12	$124.31	$65.99	$24.51	**$214.81**
Dental Hygiene AAS	77	$119.80	$70.72	$24.29	**$214.80**
Architectural Technology AAS	66	$137.70	$54.01	$21.27	**$212.98**
Heavy Equipment Technology Kamatsu Equip Repair Cer	18	$142.30	$44.67	$24.68	**$211.65**
HVACR Engineering Technology BS (Yrs 3 & 4)	64	$138.27	$52.31	$20.44	**$211.01**
Automotive Body AAS	63	$141.22	$46.80	$21.83	**$209.85**
International Business Certificate	12	$176.09	$18.25	$14.82	**$209.17**
Surveying Engineering BS	137	$140.32	$46.93	$20.20	**$207.45**
Midrange Computer Certificate	12	$152.40	$37.38	$17.29	**$207.06**
Tech & Professional Comm (Publication Mgmt Track) BS	121	$156.90	$32.39	$16.95	**$206.24**
Civil Engineering Technology AAS	64	$130.14	$54.02	$20.49	**$204.66**
Computer Networks & Systems (Embedded Systems Trac	136	$148.89	$36.11	$19.48	**$204.48**
Building Construction Technology AAS	64	$123.07	$60.02	$20.44	**$203.53**
Direct Marketing Certificate	12	$149.61	$37.80	$14.82	**$202.23**
Computer Networks & Systems (Indust Automation Track)	136	$145.76	$36.11	$19.48	**$201.35**
Printing Management BS (Yrs 3 & 4)	67	$140.73	$42.05	$18.55	**$201.33**
Medical Record Administration BS	124	$136.07	$39.46	$25.38	**$200.91**
Medical Record Technology AAS	63	$129.81	$43.15	$27.69	**$200.65**
Surveying Technology AAS	60	$131.24	$49.98	$19.38	**$200.60**
New Media Printing and Publishing BS (Yrs 3 & 4)	64	$143.36	$39.10	$18.14	**$200.60**
Welding Technology AAS	67	$118.09	$60.95	$21.33	**$200.37**
Rubber Technology AAS	64	$134.65	$46.71	$18.70	**$200.06**

* Instructor Cost - ***Salary & Fringe***
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment***
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment***

Source: Office of Institutional Research, g:\...\progcost\0001\tcpschrank.rsl

Table III

Degree Program Costing
Total Cost per SCH Ranked High to Low
2000-01

Program Name	Program Credits Required	Instructor Cost per SCH	Dept Cost per SCH	Dean's Cost per SCH	**Total Cost per SCH**
International Business BS	127	$162.19	$20.83	$15.73	**$198.74**
Computer Networks & Systems (Info Systems Track) BS	137	$144.68	$34.96	$18.88	**$198.52**
Computer Networks & Systems (Communications Track)	136	$142.76	$35.54	$19.49	**$197.79**
Facilities Management BS (Yrs 3 & 4)	68	$134.89	$42.92	$19.45	**$197.26**
CJ/Law Enforcement option BS (Yrs 3 & 4)	70	$129.81	$37.70	$27.58	**$195.09**
Plastics Technology AAS	68	$127.38	$46.73	$19.37	**$193.48**
Advanced Studies in Investment Analysis Certificate	12	$159.96	$18.25	$14.82	**$193.03**
Health Care Systems Administration BS	124	$130.88	$37.81	$24.08	**$192.77**
Product Design Engineering Technology BS (Yrs 3 & 4)	68	$119.26	$52.75	$20.61	**$192.61**
Quality Engineering Technology BS (Yrs 3 & 4)	68	$121.11	$50.34	$20.08	**$191.53**
Heavy Equipment Serv Eng Tech/Mfg opt BS (Yrs 3 & 4)	66	$121.10	$49.76	$19.81	**$190.67**
Construction Management (from Arch Tech) BS (Yrs 3 &	83	$117.55	$52.47	$19.80	**$189.82**
Performance Machining Certificate	12	$107.31	$57.63	$24.45	**$189.39**
Tech & Professional Comm (Automotive Writing Track) B	121	$142.06	$29.79	$17.41	**$189.26**
Marketing Certificate	12	$136.49	$37.80	$14.82	**$189.12**
Welding Engineering Technology BS (Yrs 3 & 4)	73	$111.66	$56.96	$19.97	**$188.59**
Nuclear Medicine Technology AAS	66	$116.56	$47.77	$24.25	**$188.58**
Marketing Research Certificate	12	$141.57	$31.62	$14.82	**$188.01**
Construction Management (Highway/Bridge Track) BS	131	$118.62	$49.72	$19.66	**$188.00**
Construction Management (Commercial/Indust Track) BS	131	$115.16	$52.65	$19.64	**$187.45**
Elect/Electron Engr Tech (Indust Auto) BS (Yrs 3 & 4)	68	$124.75	$42.00	$19.86	**$186.60**
Elect/Electron Engr Tech (Communications) BS (Yrs 3 &	68	$124.75	$42.00	$19.86	**$186.60**
Heavy Equipment Serv Eng Tech/Maint opt BS (Yrs 3 & 4	66	$127.04	$39.45	$19.41	**$185.89**
Ornamental Horticulture Technology AAS	60	$144.48	$27.31	$13.97	**$185.77**
Manufacturing Operations Management Certificate	12	$122.08	$44.61	$17.20	**$183.89**
Accountancy/Computer Information Systems BS	139	$144.76	$22.79	$14.84	**$182.39**
Nuclear Medicine Technology BS	125	$123.15	$38.09	$21.08	**$182.32**
Elect/Electron Engr Tech (Tech Integration) BS (Yrs 3 & 4	68	$122.55	$39.37	$19.88	**$181.80**
Wage Earning Home Economics Education BS (Yrs 3 & 4	99	$110.23	$47.71	$23.77	**$181.71**
Business Education/Marketing/Distributive Edu BS	156	$118.83	$41.80	$20.71	**$181.35**
Restaurant and Food Industry Management Certificate	12	$124.49	$39.52	$17.29	**$181.29**
Automotive and Heavy Equipment Mgt BS (Yrs 3 & 4)	67	$122.08	$39.70	$19.48	**$181.26**
Resort Mgmt/Lodging Management Concentration BS	127	$137.44	$27.52	$15.70	**$180.66**
Technical Education BS (Yrs 3 & 4)	99	$107.82	$47.72	$23.78	**$179.33**
Accountancy/Finance BS	137	$146.45	$17.76	$15.04	**$179.26**
Allied Health Education BS (Yrs 3 & 4)	100	$106.75	$47.24	$23.91	**$177.90**
Accountancy (Cost/Managerial Track) BS	124	$137.77	$22.63	$17.00	**$177.40**

* Instructor Cost - ***Salary & Fringe***
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment***
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment***

Table III

Degree Program Costing
Total Cost per SCH Ranked High to Low
2000-01

Program Name	Program Credits Required	Instructor Cost per SCH	Dept Cost per SCH	Dean's Cost per SCH	Total Cost per SCH
Music Industry Management BS	124	$134.64	$27.58	$14.90	$177.12
Retailing Certificate	12	$124.08	$37.80	$14.82	$176.71
CJ/Corrections option BS (Yrs 3 & 4)	66	$116.66	$34.06	$24.95	$175.67
Tech & Professional Comm (Multimedia Writing Track) BS	121	$133.19	$25.65	$16.25	$175.08
Accountancy (Public Accounting Track) BS	124	$138.99	$19.63	$16.35	$174.96
Tech & Professional Comm (Computer Info Writing Track)	121	$133.22	$25.21	$16.00	$174.44
Visual Communication BS (Yrs 3 & 4)	64	$125.72	$32.78	$15.69	$174.18
Mechanical Engineering Technology AAS	66	$115.42	$39.27	$19.42	$174.11
Business Education/General Business BS	159	$116.88	$36.64	$20.29	$173.82
Accountancy (Professionally Directed Track) BS	124	$135.55	$20.14	$16.44	$172.14
Marketing Sales Certificate	12	$123.30	$32.03	$14.59	$169.93
Recreation Leadership & Mgt/Corp Fitness-Well Track BS	128	$112.34	$34.78	$22.40	$169.52
Radiography AAS	78	$77.68	$63.00	$28.52	$169.20
Integrated Resource Management BS	125	$122.63	$28.33	$17.80	$168.76
Resort Mgmt/Facilities Operations Mgmt Concentration B	128	$119.92	$32.01	$16.74	$168.68
Recreation Leadership & Mgt/Outdoor-Adv Edu Track BS	128	$111.56	$34.24	$22.41	$168.21
Computer Information Systems BS	124	$127.57	$25.91	$14.59	$168.07
Tech & Professional Comm (Technical Journalism Track)	121	$128.51	$22.92	$16.14	$167.56
Computer Info Systems (WEB Development Track) AAS	60	$126.69	$25.72	$15.05	$167.46
Customer Energy Specialist Certificate	48	$118.87	$30.74	$17.73	$167.34
Advanced Studies in Global Logistics Certificate	12	$119.38	$32.91	$14.82	$167.12
Computer Information Systems/Marketing BS	148	$123.29	$28.00	$15.21	$166.50
Psychology BS	124	$119.00	$28.58	$18.04	$165.62
Tech & Professional Comm (Sci & Medical Writing Track)	121	$123.66	$25.16	$16.74	$165.56
Recreation Leadership & Mgt/Leisure Service Track BS	128	$109.83	$33.76	$21.81	$165.41
Computer Information Systems/Management BS	159	$125.03	$24.76	$15.42	$165.21
Computer Literacy Certificate	12	$114.84	$34.94	$14.82	$164.60
Recreation Leadership & Mgt/Sports Management Track	128	$109.07	$33.14	$21.58	$163.79
Applied Mathematics (Statistics Track) BS	120	$121.96	$23.07	$18.48	$163.52
Applied Mathematics (Actuarial Science Track) BS	120	$122.22	$22.97	$18.17	$163.36
Forensics Sciences/Clinical Crime Investigation Certificat	12	$120.82	$28.11	$13.91	$162.84
Early Childhood Education AAS	63	$123.25	$15.23	$24.18	$162.65
Technical and Professional Communication BS	121	$125.16	$21.46	$15.60	$162.22
Insurance BS	124	$119.63	$25.13	$17.23	$161.99
Industrial Chemistry Technology AAS	63	$125.41	$22.11	$13.97	$161.49
Resort Mgmt/Facilities Planning Mgmt Concentration BS	125	$113.78	$29.66	$16.57	$160.01
Applied Biology (Environmental Biology Track) BS	127	$118.78	$25.54	$14.84	$159.16

* Instructor Cost - ***Salary & Fringe***
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment***
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipmen***

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Table III

Degree Program Costing
Total Cost per SCH Ranked High to Low
2000-01

Program Name	Program Credits Required	Instructor Cost per SCH	Dept Cost per SCH	Dean's Cost per SCH	Total Cost per SCH
Insurance/Real Estate BS	124	$119.52	$22.79	$16.36	$158.66
Computer Info Systems (Programming Track) AAS	60	$117.63	$25.72	$15.05	$158.40
Human Resource Management BS	122	$123.29	$19.63	$15.23	$158.15
Applied Mathematics BS	120	$113.93	$24.47	$18.77	$157.17
Applied Mathematics (Computer Science Track) BS	120	$113.08	$25.08	$18.95	$157.11
Biology Education BS	122	$99.01	$38.42	$19.22	$156.65
Elementary Education BS	162	$110.22	$27.82	$18.57	$156.61
Public Administration BS	124	$112.17	$24.84	$19.07	$156.08
Mathematics Education BS	144	$104.54	$32.21	$19.23	$155.98
Public Relations BS	124	$115.81	$24.51	$15.17	$155.49
Resort Mgmt/Marketing Concentration BS	126	$111.40	$27.60	$15.94	$154.94
Training in Business and Industry BS (Yrs 3 & 4)	99	$100.19	$34.67	$19.86	$154.72
Finance BS	125	$120.00	$19.21	$15.38	$154.59
Small Business Management Certificate	12	$117.61	$21.84	$14.82	$154.27
Computer Info Systems (PC/Networking Support Track) A	60	$111.43	$26.20	$15.54	$153.17
Resort Mgmt/Rec & Leadership Mgmt Concentration BS	125	$107.75	$28.00	$17.32	$153.07
Collegiate Skills Program AA	60	$95.94	$19.13	$37.68	$152.75
Applied Speech Communication BS	126	$112.50	$22.88	$17.21	$152.60
Applied Mathematics (Operations Research Track) BS	120	$108.60	$24.64	$19.02	$152.25
Advertising BS	125	$110.37	$26.53	$15.25	$152.15
Marketing BS	124	$109.49	$26.13	$15.92	$151.55
Professional Golf Management BS	124	$107.96	$27.82	$15.59	$151.38
Pre-Law AA	60	$112.78	$20.70	$16.71	$150.18
Athletic Coaching Certificate	10	$76.86	$44.85	$27.97	$149.68
Applied Biology (Pre-Dentistry Track) BS	127	$110.84	$24.09	$14.54	$149.47
Management BS	123	$112.28	$21.06	$15.58	$148.92
Legal Assistant AAS	64	$110.91	$21.20	$16.33	$148.44
Marketing (Retailing Track) BS	124	$107.28	$25.87	$15.22	$148.37
Applied Biology (Pre-Physical Therapy Track) BS	127	$109.73	$23.93	$14.51	$148.17
Chemistry Education BS	152	$96.04	$33.09	$18.31	$147.45
Applied Biology (Pre-Medicine Track) BS	127	$108.98	$23.94	$14.43	$147.35
Marketing (Sales Track) BS	124	$107.12	$24.99	$15.18	$147.29
Professional Tennis Management BS	124	$104.20	$27.36	$15.44	$146.99
Pre-Teaching (Elementary or Secondary) AA	63	$100.05	$28.11	$18.48	$146.64
Accountancy AAS	60	$110.94	$20.02	$15.54	$146.50
Applied Biology BS	127	$107.25	$24.36	$14.77	$146.38
Small Business Management BS	123	$108.59	$21.63	$15.49	$145.71

* Instructor Cost - ***Salary & Fringe***
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment***
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment***

Table III

Degree Program Costing
Total Cost per SCH Ranked High to Low
2000-01

Program Name	Program Credits Required	Instructor Cost per SCH	Dept Cost per SCH	Dean's Cost per SCH	**Total Cost per SCH**
CJ/Generalist option BS (Yrs 3 & 4)	64	$86.21	$33.55	$24.39	**$144.15**
Visual Communication AAS	66	$100.11	$29.44	$14.52	**$144.07**
Applied Biology (Pre-Veterinary Medicine Track) BS	123	$106.11	$23.21	$14.52	**$143.84**
Real Estate AAS	63	$104.80	$22.71	$15.92	**$143.43**
Pre-Criminal Justice AA	64	$98.16	$25.82	$18.85	**$142.83**
Career Exploration AA	60	$91.75	$20.51	$29.99	**$142.25**
Pre-Technical & Professional Communications AA	60	$96.51	$26.30	$18.69	**$141.50**
Business Administration BS	123	$103.94	$21.04	$15.68	**$140.66**
English Education BS	144	$90.42	$30.25	$18.45	**$139.11**
Directed Studies AA	60	$93.29	$22.44	$22.64	**$138.37**
Pre-Engineering AS	73	$105.17	$18.26	$14.83	**$138.27**
General Business AAS	63	$100.60	$20.39	$14.57	**$135.56**
Pre-Optometry AS	88	$98.80	$22.13	$13.94	**$134.87**
Pre-Science AS	60	$94.50	$24.10	$16.23	**$134.83**
Social Work BSW	128	$99.45	$20.12	$14.59	**$134.16**
Pre-Social Work AA	60	$88.52	$25.51	$17.75	**$131.78**
Pre-Mortuary Science AS	60	$91.42	$23.19	$15.62	**$130.23**
Pre-Public Administration AA	60	$86.24	$22.92	$19.91	**$129.07**
Pre-Pharmacy AS	61	$91.14	$20.50	$13.98	**$125.62**
Applied Speech Communication AA	60	$85.96	$20.17	$15.13	**$121.26**
Liberal Arts AA	60	$87.35	$19.19	$14.60	**$121.13**

* Instructor Cost - ***Salary & Fringe***
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment***
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipmen***

Source: Office of Institutional Research, g:\...\progcost\0001\tcpschrank.rsl

Table IV

Degree Program Costing
Instructor Cost Per SCH Ranked High to Low
2000-01

Program Name	Program Credits Required	Total Instructor Cost*	**Instructor Cost Per SCH**
Optometry OD (Professional Yrs 1,2,3 & 4)	163	$60,252.41	**$369.65**
Environmental Hlth & Safety Mgmt (Haz Material Mgmt opt) BS	124	$40,625.77	**$327.63**
Environmental Hlth & Safety Mgmt (Indust Safety option) BS	124	$39,400.79	**$317.75**
Medical Laboratory Technology AAS	69	$21,365.66	**$309.65**
Environmental Hlth & Safety Mgmt (Indust Hygiene option) BS	124	$37,856.48	**$305.29**
Info Systems Mgmt/Quality Improvement Emphasis MS	31	$8,444.37	**$272.40**
Environmental Health & Safety Mgmt (Env Health option) BS	131	$34,328.24	**$262.05**
Criminal Justice Administration MS	30	$7,842.89	**$261.43**
Biotechnology BS	130	$33,471.23	**$257.47**
Pharmacy BS (Professional Yrs 1,2 & 3)	94	$23,062.25	**$246.66**
Printing & Digital Graphic Imaging Technology AAS	63	$14,802.29	**$234.96**
Public Relations Certificate	13	$3,033.35	**$233.33**
Automotive Service Technology AAS	68	$15,816.44	**$232.59**
Insurance Certificate	12	$2,713.21	**$226.10**
Hotel Management BS (Yrs 3 & 4)	63	$13,598.62	**$215.85**
Restaurant and Food Industry Management AAS	69	$14,841.95	**$215.10**
Hotel Management Certificate	12	$2,557.49	**$213.12**
Info Systems Mgmt/Information Systems Emphasis MS	31	$6,562.86	**$211.71**
Mainframe Computer Certificate	13	$2,701.29	**$207.79**
Doctor of Pharmacy Pharm.D. (Professional Yrs 1,2,3 & 4)	149	$30,820.63	**$207.55**
Heavy Equipment Technology AAS	67	$13,442.49	**$200.63**
Advertising Certificate	14	$2,794.11	**$199.58**
Medical Technology (Career Mobility) BS (Yrs 3 & 4)	72	$13,774.27	**$191.31**
Nursing AAS	72	$13,469.31	**$187.07**
AS/400 Programming Certificate	12	$2,154.66	**$179.55**
HVACR Technology AAS	67	$11,911.47	**$177.78**
Opticianry AAS	65	$11,489.89	**$176.77**
International Business Certificate	12	$2,113.14	**$176.09**
Industrial Electronics Technology AAS	67	$11,740.94	**$175.24**
Automotive Service Technology (Ford ASSET opt) AAS	67	$11,707.22	**$174.73**
CAD Drafting and Tool Design AAS	67	$11,671.97	**$174.21**
Respiratory Care AAS	79	$13,693.05	**$173.33**
Automotive Service Technology (Chrysler Apprentice opt) AAS	68	$11,643.80	**$171.23**

* Instructor Cost - ***Salary & Fringe***

Source: Office of Institutional Research, g:\...\progcost\0001\icrank.rsl

Table IV

Degree Program Costing
Instructor Cost Per SCH Ranked High to Low
2000-01

Program Name	Program Credits Required	Total Instructor Cost*	Instructor Cost Per SCH
Automotive Service Tech (General Motors ASEP opt) AAS	68	$11,643.80	$171.23
Facilities Management Certificate	12	$1,958.88	$163.24
International Business BS	127	$20,597.94	$162.19
Career and Tech Educ/Educational Tech Option MS	33	$5,350.90	$162.15
Career and Tech Educ/Instructor Option MS	33	$5,304.42	$160.74
Career and Tech Educ/Training & Dev Option MS	31	$4,981.04	$160.68
Real Estate Certificate	9	$1,443.83	$160.43
Advanced Studies in Investment Analysis Certificate	12	$1,919.49	$159.96
Tech & Professional Comm (Publication Mgmt Track) BS	121	$18,984.91	$156.90
Master of Educ-Curriculum & Instruc/Secondary Cert opt MS	36	$5,621.44	$156.15
Midrange Computer Certificate	12	$1,828.78	$152.40
Direct Marketing Certificate	12	$1,795.32	$149.61
Computer Networks & Systems (Embedded Systems Track) BS	136	$20,249.47	$148.89
Master of Educ-Curriculum & Instruc/Subject Area opt MS	32	$4,761.91	$148.81
Accountancy/Finance BS	137	$20,064.21	$146.45
Rubber Engineering Technology BS (Yrs 3 & 4)	67	$9,785.60	$146.05
Nursing BSN (Yrs 3 & 4)	60	$8,752.14	$145.87
Computer Networks & Systems (Indust Automation Track) BS	136	$19,823.86	$145.76
Career and Tech Educ/Administrative Option MS	33	$4,801.76	$145.51
Manufacturing Tooling Technology AAS	68	$9,882.70	$145.33
Accountancy/Computer Information Systems BS	139	$20,122.15	$144.76
Computer Networks & Systems (Info Systems Track) BS	137	$19,821.00	$144.68
Ornamental Horticulture Technology AAS	60	$8,669.08	$144.48
New Media Printing and Publishing BS (Yrs 3 & 4)	64	$9,175.34	$143.36
Plastics Engineering Technology BS (Yrs 3 & 4)	65	$9,292.76	$142.97
Computer Networks & Systems (Communications Track) BS	136	$19,416.03	$142.76
Heavy Equipment Technology Kamatsu Equip Repair Certificate	18	$2,561.48	$142.30
Tech & Professional Comm (Automotive Writing Track) BS	121	$17,188.98	$142.06
Marketing Research Certificate	12	$1,698.89	$141.57
Automotive Body AAS	63	$8,896.84	$141.22
Printing Management BS (Yrs 3 & 4)	67	$9,428.81	$140.73
Surveying Engineering BS	137	$19,224.49	$140.32
Accountancy (Public Accounting Track) BS	124	$17,234.74	$138.99
HVACR Engineering Technology BS (Yrs 3 & 4)	64	$8,849.36	$138.27

* Instructor Cost - ***Salary & Fringe***

Source: Office of Institutional Research, g:\...\progcost\0001\icrank.rsl

Table IV

Degree Program Costing
Instructor Cost Per SCH Ranked High to Low
2000-01

Program Name	Program Credits Required	Total Instructor Cost*	Instructor Cost Per SCH
Accountancy (Cost/Managerial Track) BS	124	$17,083.36	$137.77
Architectural Technology AAS	66	$9,088.24	$137.70
Resort Mgmt/Lodging Management Concentration BS	127	$17,455.00	$137.44
Performance Motorsports Certificate	10	$1,373.11	$137.31
Marketing Certificate	12	$1,637.91	$136.49
Medical Record Administration BS	124	$16,873.08	$136.07
Career and Tech Educ/Postsecondary Admin Option MS	32	$4,341.20	$135.66
Accountancy (Professionally Directed Track) BS	124	$16,808.47	$135.55
Facilities Management BS (Yrs 3 & 4)	68	$9,172.69	$134.89
Rubber Technology AAS	64	$8,617.90	$134.65
Music Industry Management BS	124	$16,694.76	$134.64
Tech & Professional Comm (Computer Info Writing Track) BS	121	$16,120.07	$133.22
Tech & Professional Comm (Multimedia Writing Track) BS	121	$16,115.55	$133.19
Surveying Technology AAS	60	$7,874.65	$131.24
Health Care Systems Administration BS	124	$16,228.77	$130.88
Television Production BS	128	$16,697.23	$130.45
Civil Engineering Technology AAS	64	$8,329.19	$130.14
CJ/Law Enforcement option BS (Yrs 3 & 4)	70	$9,086.57	$129.81
Medical Record Technology AAS	63	$8,177.88	$129.81
Manufacturing Engineering Technology BS (Yrs 3 & 4)	79	$10,191.36	$129.00
Tech & Professional Comm (Technical Journalism Track) BS	121	$15,549.69	$128.51
Computer Information Systems BS	124	$15,819.19	$127.57
Plastics Technology AAS	68	$8,661.67	$127.38
Heavy Equipment Serv Eng Tech/Maint opt BS (Yrs 3 & 4)	66	$8,384.41	$127.04
Computer Info Systems (WEB Development Track) AAS	60	$7,601.45	$126.69
Visual Communication BS (Yrs 3 & 4)	64	$8,045.83	$125.72
Industrial Chemistry Technology AAS	63	$7,900.94	$125.41
Technical and Professional Communication BS	121	$15,144.04	$125.16
Computer Information Systems/Management BS	159	$19,879.18	$125.03
Elect/Electron Engr Tech (Communications) BS (Yrs 3 & 4)	68	$8,482.78	$124.75
Elect/Electron Engr Tech (Indust Auto) BS (Yrs 3 & 4)	68	$8,482.78	$124.75
Construction Administration Certificate	12	$1,494.12	$124.51
Restaurant and Food Industry Management Certificate	12	$1,493.88	$124.49
Advanced Construction Management Certificate	12	$1,491.76	$124.31

* Instructor Cost - ***Salary & Fringe***

Source: Office of Institutional Research, g:\...\progcost\0001\icrank.rsl

Table IV

Degree Program Costing
Instructor Cost Per SCH Ranked High to Low
2000-01

Program Name	Program Credits Required	Total Instructor Cost*	Instructor Cost Per SCH
Retailing Certificate	12	$1,489.02	$124.08
Tech & Professional Comm (Sci & Medical Writing Track) BS	121	$14,962.92	$123.66
Marketing Sales Certificate	12	$1,479.62	$123.30
Human Resource Management BS	122	$15,041.82	$123.29
Computer Information Systems/Marketing BS	148	$18,246.54	$123.29
Early Childhood Education AAS	63	$7,764.86	$123.25
Nuclear Medicine Technology BS	125	$15,393.30	$123.15
Building Construction Technology AAS	64	$7,876.19	$123.07
Integrated Resource Management BS	125	$15,329.26	$122.63
Elect/Electron Engr Tech (Tech Integration) BS (Yrs 3 & 4)	68	$8,333.35	$122.55
Quality Technology Certificate	12	$1,467.92	$122.33
Applied Mathematics (Actuarial Science Track) BS	120	$14,665.86	$122.22
Manufacturing Operations Management Certificate	12	$1,464.92	$122.08
Automotive and Heavy Equipment Mgt BS (Yrs 3 & 4)	67	$8,179.10	$122.08
Applied Mathematics (Statistics Track) BS	120	$14,635.57	$121.96
Quality Engineering Technology BS (Yrs 3 & 4)	68	$8,235.44	$121.11
Heavy Equipment Serv Eng Tech/Mfg opt BS (Yrs 3 & 4)	66	$7,992.56	$121.10
Forensics Sciences/Clinical Crime Investigation Certificate	12	$1,449.87	$120.82
Finance BS	125	$15,000.55	$120.00
Resort Mgmt/Facilities Operations Mgmt Concentration BS	128	$15,349.70	$119.92
Dental Hygiene AAS	77	$9,224.37	$119.80
Insurance BS	124	$14,833.78	$119.63
Insurance/Real Estate BS	124	$14,820.25	$119.52
Advanced Studies in Global Logistics Certificate	12	$1,432.59	$119.38
Product Design Engineering Technology BS (Yrs 3 & 4)	68	$8,109.40	$119.26
Psychology BS	124	$14,755.96	$119.00
Customer Energy Specialist Certificate	48	$5,705.78	$118.87
Business Education/Marketing/Distributive Edu BS	156	$18,537.74	$118.83
Applied Biology (Environmental Biology Track) BS	127	$15,084.76	$118.78
Construction Management (Highway/Bridge Track) BS	131	$15,538.58	$118.62
Welding Technology AAS	67	$7,911.95	$118.09
Computer Info Systems (Programming Track) AAS	60	$7,058.10	$117.63
Small Business Management Certificate	12	$1,411.34	$117.61
Construction Management (from Arch Tech) BS (Yrs 3 & 4)	83	$9,756.70	$117.55

* Instructor Cost - ***Salary & Fringe***

Source: Office of Institutional Research, g:\...\progcost\0001\icrank.rsl

Table IV

Degree Program Costing
Instructor Cost Per SCH Ranked High to Low
2000-01

Program Name	Program Credits Required	Total Instructor Cost*	Instructor Cost Per SCH
Business Education/General Business BS	159	$18,584.46	$116.88
CJ/Corrections option BS (Yrs 3 & 4)	66	$7,699.56	$116.66
Nuclear Medicine Technology AAS	66	$7,692.91	$116.56
Public Relations BS	124	$14,360.38	$115.81
Mechanical Engineering Technology AAS	66	$7,617.77	$115.42
Construction Management (Commercial/Indust Track) BS	131	$15,085.58	$115.16
Computer Literacy Certificate	12	$1,378.03	$114.84
Applied Mathematics BS	120	$13,671.07	$113.93
Resort Mgmt/Facilities Planning Mgmt Concentration BS	125	$14,222.12	$113.78
Applied Mathematics (Computer Science Track) BS	120	$13,569.50	$113.08
Pre-Law AA	60	$6,766.96	$112.78
Applied Speech Communication BS	126	$14,174.94	$112.50
Recreation Leadership & Mgt/Corp Fitness-Well Track BS	128	$14,380.13	$112.34
Management BS	123	$13,810.27	$112.28
Public Administration BS	124	$13,909.05	$112.17
Welding Engineering Technology BS (Yrs 3 & 4)	73	$8,150.91	$111.66
Recreation Leadership & Mgt/Outdoor-Adv Edu Track BS	128	$14,279.74	$111.56
Computer Info Systems (PC/Networking Support Track) AAS	60	$6,685.54	$111.43
Resort Mgmt/Marketing Concentration BS	126	$14,035.87	$111.40
Accountancy AAS	60	$6,656.29	$110.94
Legal Assistant AAS	64	$7,098.30	$110.91
Applied Biology (Pre-Dentistry Track) BS	127	$14,076.66	$110.84
Geographic Information Systems Certificate	6	$663.31	$110.55
Advertising BS	125	$13,796.25	$110.37
Wage Earning Home Economics Education BS (Yrs 3 & 4)	99	$10,912.89	$110.23
Elementary Education BS	162	$17,855.89	$110.22
Recreation Leadership & Mgt/Leisure Service Track BS	128	$14,058.83	$109.83
Applied Biology (Pre-Physical Therapy Track) BS	127	$13,935.52	$109.73
Marketing BS	124	$13,577.27	$109.49
Recreation Leadership & Mgt/Sports Management Track BS	128	$13,960.65	$109.07
Applied Biology (Pre-Medicine Track) BS	127	$13,840.53	$108.98
Applied Mathematics (Operations Research Track) BS	120	$13,031.45	$108.60
Small Business Management BS	123	$13,356.63	$108.59
Professional Golf Management BS	124	$13,387.04	$107.96

* Instructor Cost - ***Salary & Fringe***

Source: Office of Institutional Research, g:\...\progcost\0001\icrank.rsl

Table IV

Degree Program Costing
Instructor Cost Per SCH Ranked High to Low
2000-01

Program Name	Program Credits Required	Total Instructor Cost*	Instructor Cost Per SCH
Technical Education BS (Yrs 3 & 4)	99	$10,674.60	$107.82
Resort Mgmt/Rec & Leadership Mgmt Concentration BS	125	$13,469.06	$107.75
Performance Machining Certificate	12	$1,287.69	$107.31
Marketing (Retailing Track) BS	124	$13,303.29	$107.28
Applied Biology BS	127	$13,620.31	$107.25
Marketing (Sales Track) BS	124	$13,282.84	$107.12
Allied Health Education BS (Yrs 3 & 4)	100	$10,674.60	$106.75
Applied Biology (Pre-Veterinary Medicine Track) BS	123	$13,051.05	$106.11
Pre-Engineering AS	73	$7,677.56	$105.17
Real Estate AAS	63	$6,602.29	$104.80
Mathematics Education BS	144	$15,053.22	$104.54
Professional Tennis Management BS	124	$12,920.39	$104.20
Business Administration BS	123	$12,784.42	$103.94
General Business AAS	63	$6,337.81	$100.60
Training in Business and Industry BS (Yrs 3 & 4)	99	$9,918.71	$100.19
Visual Communication AAS	66	$6,607.37	$100.11
Pre-Teaching (Elementary or Secondary) AA	63	$6,303.30	$100.05
Social Work BSW	128	$12,730.18	$99.45
Biology Education BS	122	$12,079.52	$99.01
Pre-Optometry AS	88	$8,694.81	$98.80
Pre-Criminal Justice AA	64	$6,282.28	$98.16
Pre-Technical & Professional Communications AA	60	$5,790.63	$96.51
Chemistry Education BS	152	$14,598.63	$96.04
Collegiate Skills Program AA	60	$5,756.32	$95.94
Pre-Science AS	60	$5,670.10	$94.50
Directed Studies AA	60	$5,597.47	$93.29
Career Exploration AA	60	$5,504.90	$91.75
Pre-Mortuary Science AS	60	$5,484.95	$91.42
Pre-Pharmacy AS	61	$5,559.82	$91.14
English Education BS	144	$13,019.97	$90.42
Pre-Social Work AA	60	$5,311.11	$88.52
Liberal Arts AA	60	$5,240.72	$87.35
Pre-Public Administration AA	60	$5,174.12	$86.24
CJ/Generalist option BS (Yrs 3 & 4)	64	$5,517.34	$86.21

* Instructor Cost - ***Salary & Fringe***

Source: Office of Institutional Research, g:\...\progcost\0001\icrank.rsl

Ferris State University
Degree Program Costing 2000 - 2001 (Summer, Fall, and Winter)

College : Arts and Sciences
Department : Biological Sciences

Program Name: Applied Biology BS

Program Credits Required (Total credits to graduate) 127

*Instructor Cost per Student Credit Hour(SCH) (Average for program)	$107.25
**Department Cost per Student Credit Hour	$24.36
***Dean's Cost per Student Credit Hour	$14.77
Total Cost per Student Credit Hour (Average for program)	**$146.38**
Total Program Instructor Cost (Assumes a student will complete program in one year)	$13,620.31
Total Program Department Cost	$3,093.38
Total Program Dean's Cost	$1,875.95
Total Program Cost (Assumes a student will complete program in one year)	**$18,589.64**

Course ID	Level	Instructor Cost	Dept Cost	Dean's Cost	SCH's Produced	Instructor Cost/SCH	Dept Cost/SCH	Dean's Cost/SCH	Credits Required	Program Instructor Cost	Program Dept Cost	Program Dean's Cost
ABIOELE	E	$11,982,148	$3,239,589	$2,275,444	123118	$97	$26	$18	9	$876	$237	$166
ASCIELE	E	$6,790,766	$1,551,895	$1,182,874	76325	$89	$20	$15	17	$1,513	$346	$263
BIOL108	L	$84,815	$21,409	$9,222	663	$128	$32	$14	3	$384	$97	$42
BIOL121	L	$93,950	$34,486	$14,856	1068	$88	$32	$14	4	$352	$129	$56
BIOL122	L	$74,612	$24,153	$10,405	748	$100	$32	$14	4	$399	$129	$56
BIOL205	L	$92,750	$28,254	$12,171	875	$106	$32	$14	5	$530	$161	$70
BIOL300	U	$47,129	$15,306	$6,593	474	$99	$32	$14	3	$298	$97	$42
BIOL340	U	$12,600	$2,034	$876	63	$200	$32	$14	3	$600	$97	$42
BIOL347	U	$14,428	$1,647	$709	51	$283	$32	$14	3	$849	$97	$42
BIOL375	U	$31,675	$6,587	$2,838	204	$155	$32	$14	3	$466	$97	$42
BIOL460	U	$15,541	$2,131	$918	66	$235	$32	$14	2	$471	$65	$28
CHEM324	U	$10,290	$1,005	$584	42	$245	$24	$14	3	$735	$72	$42
COMM121	L	$215,073	$47,383	$44,776	3219	$67	$15	$14	3	$200	$44	$42
CULTELE	E	$1,709,820	$289,517	$261,225	18573	$92	$16	$14	12	$1,105	$187	$169
ENGL150	L	$573,937	$101,166	$100,025	7191	$80	$14	$14	3	$239	$42	$42
ENGL250	L	$443,106	$62,337	$61,634	4431	$100	$14	$14	3	$300	$42	$42
ENGL311	U	$132,570	$14,730	$14,564	1047	$127	$14	$14	3	$380	$42	$42
HLTH125	L	$40,983	$17,469	$12,130	388	$106	$45	$31	2	$211	$90	$63
ISYS105	L	$324,920	$121,187	$51,405	3468	$94	$35	$15	3	$281	$105	$44
MATH120	L	$51,303	$4,625	$7,678	552	$93	$8	$14	3	$279	$25	$42
SCIUELE	E	$2,340,587	$685,713	$339,872	24434	$96	$28	$14	24	$2,299	$674	$334
SOCAELE	E	$1,465,079	$375,755	$289,735	20589	$71	$18	$14	12	$854	$219	$169

* Instructor Cost - ***Salary & Fringe*** - the actual cost to teach a course
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment*** - departmental average applied to all course prefixes within a department
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment*** - college average applied to all course prefixes within a college

Source: Office of Institutional Research, g:\...\progcost\0001\progcost.rsl

Ferris State University
Degree Program Costing 2000 - 2001 (Summer, Fall, and Winter)

College : Arts and Sciences
Department : Biological Sciences

Program Name: Applied Biology (Environmental Biology Track) BS

Program Credits Required (Total credits to graduate) 127

*Instructor Cost per Student Credit Hour(SCH) (Average for program)	$118.78
**Department Cost per Student Credit Hour	$25.54
***Dean's Cost per Student Credit Hour	$14.84
Total Cost per Student Credit Hour (Average for program)	**$159.16**
Total Program Instructor Cost (Assumes a student will complete program in one year)	$15,084.76
Total Program Department Cost	$3,243.31
Total Program Dean's Cost	$1,885.21
Total Program Cost (Assumes a student will complete program in one year)	**$20,213.29**

Course ID	Level	Instructor Cost	Dept Cost	Dean's Cost	SCH's Produced	Instructor Cost/SCH	Dept Cost/SCH	Dean's Cost/SCH	Credits Required	Program Instructor Cost	Program Dept Cost	Program Dean's Cost
ASCIELE	E	$6,790,766	$1,551,895	$1,182,874	76325	$89	$20	$15	2	$178	$41	$31
BIOL119	L	$3,294	$1,808	$779	56	$59	$32	$14	4	$235	$129	$56
BIOL121	L	$93,950	$34,486	$14,856	1068	$88	$32	$14	4	$352	$129	$56
BIOL122	L	$74,612	$24,153	$10,405	748	$100	$32	$14	4	$399	$129	$56
BIOL218	L	$10,493	$1,453	$626	45	$233	$32	$14	3	$700	$97	$42
BIOL340	U	$12,600	$2,034	$876	63	$200	$32	$14	3	$600	$97	$42
BIOL341	U	$6,317	$1,550	$668	48	$132	$32	$14	3	$395	$97	$42
BIOL342	U	$12,714	$1,550	$668	48	$265	$32	$14	3	$795	$97	$42
BIOL344	N	$10,739,143	$3,370,936	$1,862,252	75466	$142	$45	$25	3	$427	$134	$74
BIOL347	U	$14,428	$1,647	$709	51	$283	$32	$14	3	$849	$97	$42
BIOL351	U	$2,882	$1,356	$584	42	$69	$32	$14	3	$206	$97	$42
BIOL353	U	$4,258	$2,067	$890	64	$67	$32	$14	4	$266	$129	$56
BIOL375	U	$31,675	$6,587	$2,838	204	$155	$32	$14	3	$466	$97	$42
BIOL442	U	$16,192	$3,003	$1,294	93	$174	$32	$14	3	$522	$97	$42
BIOL460	U	$15,541	$2,131	$918	66	$235	$32	$14	2	$471	$65	$28
BIOL496	U	$0	$581	$250	18	$0	$32	$14	1	$0	$32	$14
CHEM121	L	$140,857	$50,740	$29,489	2120	$66	$24	$14	5	$332	$120	$70
CHEM122	L	$69,525	$23,335	$13,562	975	$71	$24	$14	5	$357	$120	$70
CHEM214	L	$23,380	$2,872	$1,669	120	$195	$24	$14	4	$779	$96	$56
CHEM324	U	$10,290	$1,005	$584	42	$245	$24	$14	3	$735	$72	$42
COMM121	L	$215,073	$47,383	$44,776	3219	$67	$15	$14	3	$200	$44	$42
CULTELE	E	$1,709,820	$289,517	$261,225	18573	$92	$16	$14	12	$1,105	$187	$169
ECON221	L	$189,087	$33,510	$38,020	2565	$74	$13	$15	3	$221	$39	$44
ENGL150	L	$573,937	$101,166	$100,025	7191	$80	$14	$14	3	$239	$42	$42
ENGL250	L	$443,106	$62,337	$61,634	4431	$100	$14	$14	3	$300	$42	$42
ENGL311	U	$132,570	$14,730	$14,564	1047	$127	$14	$14	3	$380	$42	$42
GEOG421	N	$10,739,143	$3,370,936	$1,862,252	75466	$142	$45	$25	3	$427	$134	$74
GEOL121	L	$23,750	$6,989	$4,062	292	$81	$24	$14	4	$325	$96	$56
GEOL321	N	$10,739,143	$3,370,936	$1,862,252	75466	$142	$45	$25	4	$569	$179	$99
ISYS105	L	$324,920	$121,187	$51,405	3468	$94	$35	$15	3	$281	$105	$44
MATH126	L	$130,948	$10,993	$18,250	1312	$100	$8	$14	4	$399	$34	$56
MATH251	L	$35,667	$2,262	$3,756	270	$132	$8	$14	3	$396	$25	$42
PHYS211	L	$114,821	$35,135	$20,420	1468	$78	$24	$14	4	$313	$96	$56
PHYS212	L	$66,589	$14,169	$8,235	592	$112	$24	$14	4	$450	$96	$56
PSYC150	L	$268,284	$77,185	$55,417	3984	$67	$19	$14	3	$202	$58	$42
SOCAELE	E	$1,465,079	$375,755	$289,735	20589	$71	$18	$14	3	$213	$55	$42

* Instructor Cost - ***Salary & Fringe*** - the actual cost to teach a course
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment*** - departmental average applied to all course prefixes within a department
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment*** - college average applied to all course prefixes within a college

Ferris State University
Degree Program Costing 2000 - 2001 (Summer, Fall, and Winter)

College : Arts and Sciences
Department : Biological Sciences

Program Name: Applied Biology (Pre-Dentistry Track) BS

Program Credits Required (Total credits to graduate) 127

*Instructor Cost per Student Credit Hour(SCH) (Average for program)	$110.84
**Department Cost per Student Credit Hour	$24.09
***Dean's Cost per Student Credit Hour	$14.54
Total Cost per Student Credit Hour (Average for program)	**$149.47**
Total Program Instructor Cost (Assumes a student will complete program in one year)	$14,076.66
Total Program Department Cost	$3,059.93
Total Program Dean's Cost	$1,846.02
Total Program Cost (Assumes a student will complete program in one year)	**$18,982.60**

Course ID	Level	Instructor Cost	Dept Cost	Dean's Cost	SCH's Produced	Instructor Cost/SCH	Dept Cost/SCH	Dean's Cost/SCH	Credits Required	Program Instructor Cost	Program Dept Cost	Program Dean's Cost
ASCIELE	E	$6,790,766	$1,551,895	$1,182,874	76325	$89	$20	$15	2	$178	$41	$31
BIOL121	L	$93,950	$34,486	$14,856	1068	$88	$32	$14	4	$352	$129	$56
BIOL122	L	$74,612	$24,153	$10,405	748	$100	$32	$14	4	$399	$129	$56
BIOL231	L	$29,669	$8,525	$3,672	264	$112	$32	$14	4	$450	$129	$56
BIOL232	L	$33,908	$7,750	$3,338	240	$141	$32	$14	4	$565	$129	$56
BIOL300	U	$47,129	$15,306	$6,593	474	$99	$32	$14	3	$298	$97	$42
BIOL347	U	$14,428	$1,647	$709	51	$283	$32	$14	3	$849	$97	$42
BIOL370	U	$11,312	$1,937	$835	60	$189	$32	$14	4	$754	$129	$56
BIOL375	U	$31,675	$6,587	$2,838	204	$155	$32	$14	3	$466	$97	$42
BIOL386	U	$41,514	$7,427	$3,199	230	$180	$32	$14	5	$902	$161	$70
BIOL460	U	$15,541	$2,131	$918	66	$235	$32	$14	2	$471	$65	$28
BIOLELE	N	$10,739,143	$3,370,936	$1,862,252	75466	$142	$45	$25	3	$427	$134	$74
CHEM121	L	$140,857	$50,740	$29,489	2120	$66	$24	$14	5	$332	$120	$70
CHEM122	L	$69,525	$23,335	$13,562	975	$71	$24	$14	5	$357	$120	$70
CHEM221	L	$60,596	$17,831	$10,363	745	$81	$24	$14	5	$407	$120	$70
CHEM222	L	$63,192	$16,036	$9,320	670	$94	$24	$14	5	$472	$120	$70
CHEM324	U	$10,290	$1,005	$584	42	$245	$24	$14	3	$735	$72	$42
CHEM364	U	$17,726	$5,553	$3,227	232	$76	$24	$14	4	$306	$96	$56
COMM121	L	$215,073	$47,383	$44,776	3219	$67	$15	$14	3	$200	$44	$42
CULTELE	E	$1,709,820	$289,517	$261,225	18573	$92	$16	$14	12	$1,105	$187	$169
ENGL150	L	$573,937	$101,166	$100,025	7191	$80	$14	$14	3	$239	$42	$42
ENGL250	L	$443,106	$62,337	$61,634	4431	$100	$14	$14	3	$300	$42	$42
ENGL311	U	$132,570	$14,730	$14,564	1047	$127	$14	$14	3	$380	$42	$42
HLTH125	L	$40,983	$17,469	$12,130	388	$106	$45	$31	2	$211	$90	$63
ISYS105	L	$324,920	$121,187	$51,405	3468	$94	$35	$15	3	$281	$105	$44
MATH120	L	$51,303	$4,625	$7,678	552	$93	$8	$14	3	$279	$25	$42
MATH126	L	$130,948	$10,993	$18,250	1312	$100	$8	$14	4	$399	$34	$56
MGMT310	U	$41,609	$6,569	$5,336	360	$116	$18	$15	3	$347	$55	$44
PHYS211	L	$114,821	$35,135	$20,420	1468	$78	$24	$14	4	$313	$96	$56
PHYS212	L	$66,589	$14,169	$8,235	592	$112	$24	$14	4	$450	$96	$56
SOCAELE	E	$1,465,079	$375,755	$289,735	20589	$71	$18	$14	12	$854	$219	$169

* Instructor Cost - ***Salary & Fringe*** - the actual cost to teach a course
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment*** - departmental average applied to all course prefixes within a department
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment*** - college average applied to all course prefixes within a college

Source: Office of Institutional Research, g:\...\progcost\0001\progcost.rsl

Ferris State University
Degree Program Costing 2000 - 2001 (Summer, Fall, and Winter)

College : Arts and Sciences
Department : Biological Sciences

Program Name: Applied Biology (Pre-Medicine Track) BS

Program Credits Required (Total credits to graduate) 127

*Instructor Cost per Student Credit Hour(SCH) (Average for program)	$108.98
**Department Cost per Student Credit Hour	$23.94
***Dean's Cost per Student Credit Hour	$14.43
Total Cost per Student Credit Hour (Average for program)	**$147.35**
Total Program Instructor Cost (Assumes a student will complete program in one year)	$13,840.53
Total Program Department Cost	$3,040.72
Total Program Dean's Cost	$1,832.20
Total Program Cost (Assumes a student will complete program in one year)	**$18,713.44**

Course ID	Level	Instructor Cost	Dept Cost	Dean's Cost	SCH's Produced	Instructor Cost/SCH	Dept Cost/SCH	Dean's Cost/SCH	Credits Required	Program Instructor Cost	Program Dept Cost	Program Dean's Cost
ABIOELE	E	$11,982,148	$3,239,589	$2,275,444	123118	$97	$26	$18	3	$292	$79	$55
ASCIELE	E	$6,790,766	$1,551,895	$1,182,874	76325	$89	$20	$15	5	$445	$102	$77
BIOL121	L	$93,950	$34,486	$14,856	1068	$88	$32	$14	4	$352	$129	$56
BIOL122	L	$74,612	$24,153	$10,405	748	$100	$32	$14	4	$399	$129	$56
BIOL231	L	$29,669	$8,525	$3,672	264	$112	$32	$14	4	$450	$129	$56
BIOL232	L	$33,908	$7,750	$3,338	240	$141	$32	$14	4	$565	$129	$56
BIOL300	U	$47,129	$15,306	$6,593	474	$99	$32	$14	3	$298	$97	$42
BIOL347	U	$14,428	$1,647	$709	51	$283	$32	$14	3	$849	$97	$42
BIOL370	U	$11,312	$1,937	$835	60	$189	$32	$14	4	$754	$129	$56
BIOL375	U	$31,675	$6,587	$2,838	204	$155	$32	$14	3	$466	$97	$42
BIOL386	U	$41,514	$7,427	$3,199	230	$180	$32	$14	5	$902	$161	$70
BIOL460	U	$15,541	$2,131	$918	66	$235	$32	$14	2	$471	$65	$28
CHEM121	L	$140,857	$50,740	$29,489	2120	$66	$24	$14	5	$332	$120	$70
CHEM122	L	$69,525	$23,335	$13,562	975	$71	$24	$14	5	$357	$120	$70
CHEM221	L	$60,596	$17,831	$10,363	745	$81	$24	$14	5	$407	$120	$70
CHEM222	L	$63,192	$16,036	$9,320	670	$94	$24	$14	5	$472	$120	$70
CHEM324	U	$10,290	$1,005	$584	42	$245	$24	$14	3	$735	$72	$42
CHEM364	U	$17,726	$5,553	$3,227	232	$76	$24	$14	4	$306	$96	$56
COMM121	L	$215,073	$47,383	$44,776	3219	$67	$15	$14	3	$200	$44	$42
CULTELE	E	$1,709,820	$289,517	$261,225	18573	$92	$16	$14	12	$1,105	$187	$169
ENGL150	L	$573,937	$101,166	$100,025	7191	$80	$14	$14	3	$239	$42	$42
ENGL250	L	$443,106	$62,337	$61,634	4431	$100	$14	$14	3	$300	$42	$42
ENGL311	U	$132,570	$14,730	$14,564	1047	$127	$14	$14	3	$380	$42	$42
HLTH125	L	$40,983	$17,469	$12,130	388	$106	$45	$31	2	$211	$90	$63
ISYS105	L	$324,920	$121,187	$51,405	3468	$94	$35	$15	3	$281	$105	$44
MATH130	L	$38,744	$4,190	$6,955	500	$77	$8	$14	4	$310	$34	$56
MGMT310	U	$41,609	$6,569	$5,336	360	$116	$18	$15	3	$347	$55	$44
PHYS211	L	$114,821	$35,135	$20,420	1468	$78	$24	$14	4	$313	$96	$56
PHYS212	L	$66,589	$14,169	$8,235	592	$112	$24	$14	4	$450	$96	$56
SOCAELE	E	$1,465,079	$375,755	$289,735	20589	$71	$18	$14	12	$854	$219	$169

* Instructor Cost - ***Salary & Fringe*** - the actual cost to teach a course
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment*** - departmental average applied to all course prefixes within a department
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment*** - college average applied to all course prefixes within a college

Source: Office of Institutional Research, g:\...\progcost\0001\progcost.rsl

Ferris State University
Degree Program Costing 2000 - 2001 (Summer, Fall, and Winter)

College : Arts and Sciences
Department : Biological Sciences

Program Name: Applied Biology (Pre-Physical Therapy Track) BS

Program Credits Required (Total credits to graduate) 127

*Instructor Cost per Student Credit Hour(SCH) (Average for program)	$109.73
**Department Cost per Student Credit Hour	$23.93
***Dean's Cost per Student Credit Hour	$14.51
Total Cost per Student Credit Hour (Average for program)	**$148.17**
Total Program Instructor Cost (Assumes a student will complete program in one year)	$13,935.52
Total Program Department Cost	$3,039.01
Total Program Dean's Cost	$1,842.84
Total Program Cost (Assumes a student will complete program in one year)	**$18,817.37**

Course ID	Level	Instructor Cost	Dept Cost	Dean's Cost	SCH's Produced	Instructor Cost/SCH	Dept Cost/SCH	Dean's Cost/SCH	Credits Required	Program Instructor Cost	Program Dept Cost	Program Dean's Cost
BIOL121	L	$93,950	$34,486	$14,856	1068	$88	$32	$14	4	$352	$129	$56
BIOL122	L	$74,612	$24,153	$10,405	748	$100	$32	$14	4	$399	$129	$56
BIOL205	L	$92,750	$28,254	$12,171	875	$106	$32	$14	5	$530	$161	$70
BIOL231	L	$29,669	$8,525	$3,672	264	$112	$32	$14	4	$450	$129	$56
BIOL232	L	$33,908	$7,750	$3,338	240	$141	$32	$14	4	$565	$129	$56
BIOL300	U	$47,129	$15,306	$6,593	474	$99	$32	$14	3	$298	$97	$42
BIOL347	U	$14,428	$1,647	$709	51	$283	$32	$14	3	$849	$97	$42
BIOL375	U	$31,675	$6,587	$2,838	204	$155	$32	$14	3	$466	$97	$42
BIOL460	U	$15,541	$2,131	$918	66	$235	$32	$14	2	$471	$65	$28
CHEM121	L	$140,857	$50,740	$29,489	2120	$66	$24	$14	5	$332	$120	$70
CHEM122	L	$69,525	$23,335	$13,562	975	$71	$24	$14	5	$357	$120	$70
CHEM214	L	$23,380	$2,872	$1,669	120	$195	$24	$14	4	$779	$96	$56
CHEM324	U	$10,290	$1,005	$584	42	$245	$24	$14	3	$735	$72	$42
COMM121	L	$215,073	$47,383	$44,776	3219	$67	$15	$14	3	$200	$44	$42
CULTELE	E	$1,709,820	$289,517	$261,225	18573	$92	$16	$14	12	$1,105	$187	$169
ENGL150	L	$573,937	$101,166	$100,025	7191	$80	$14	$14	3	$239	$42	$42
ENGL250	L	$443,106	$62,337	$61,634	4431	$100	$14	$14	3	$300	$42	$42
ENGL311	U	$132,570	$14,730	$14,564	1047	$127	$14	$14	3	$380	$42	$42
HLTH125	L	$40,983	$17,469	$12,130	388	$106	$45	$31	2	$211	$90	$63
ISYS105	L	$324,920	$121,187	$51,405	3468	$94	$35	$15	3	$281	$105	$44
MATH126	L	$130,948	$10,993	$18,250	1312	$100	$8	$14	4	$399	$34	$56
PHYS211	L	$114,821	$35,135	$20,420	1468	$78	$24	$14	4	$313	$96	$56
PHYS212	L	$66,589	$14,169	$8,235	592	$112	$24	$14	4	$450	$96	$56
PSYC150	L	$268,284	$77,185	$55,417	3984	$67	$19	$14	3	$202	$58	$42
PSYC226	L	$19,487	$3,022	$2,170	156	$125	$19	$14	3	$375	$58	$42
PSYC410	U	$47,098	$4,998	$3,589	258	$183	$19	$14	3	$548	$58	$42
SCIUELE	E	$2,340,587	$685,713	$339,872	24434	$96	$28	$14	7	$671	$196	$97
SOCAELE	E	$1,465,079	$375,755	$289,735	20589	$71	$18	$14	12	$854	$219	$169
SOCY121	L	$170,519	$55,273	$39,685	2853	$60	$19	$14	3	$179	$58	$42
SOCY355	N	$10,739,143	$3,370,936	$1,862,252	75466	$142	$45	$25	3	$427	$134	$74
STQM260	L	$116,011	$20,733	$23,523	1587	$73	$13	$15	3	$219	$39	$44

* Instructor Cost - ***Salary & Fringe*** - the actual cost to teach a course
** Depatment Cost - ***Departmental Level Non Instructor Compensation, Supplies and Equipment*** - departmental average applied to all course prefixes within a department
*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment*** - college average applied to all course prefixes within a college

Source: Office of Institutional Research, g:\...\progcost\0001\progcost.rsi

Ferris State University
Degree Program Costing 2000 - 2001 (Summer, Fall, and Winter)

College : Arts and Sciences
Department : Biological Sciences

Program Name: Applied Biology (Pre-Veterinary Medicine Track) BS

Program Credits Required (Total credits to graduate) 123

*Instructor Cost per Student Credit Hour(SCH) (Average for program)	$106.11
**Department Cost per Student Credit Hour	$23.21
***Dean's Cost per Student Credit Hour	$14.52
Total Cost per Student Credit Hour (Average for program)	**$143.84**
Total Program Instructor Cost (Assumes a student will complete program in one year)	$13,051.05
Total Program Department Cost	$2,854.48
Total Program Dean's Cost	$1,786.36
Total Program Cost (Assumes a student will complete program in one year)	**$17,691.88**

Course ID	Level	Instructor Cost	Dept Cost	Dean's Cost	SCH's Produced	Instructor Cost/SCH	Dept Cost/SCH	Dean's Cost/SCH	Credits Required	Program Instructor Cost	Program Dept Cost	Program Dean's Cost
BIOL121	L	$93,950	$34,486	$14,856	1068	$88	$32	$14	4	$352	$129	$56
BIOL122	L	$74,612	$24,153	$10,405	748	$100	$32	$14	4	$399	$129	$56
BIOL231	L	$29,669	$8,525	$3,672	264	$112	$32	$14	4	$450	$129	$56
BIOL232	L	$33,908	$7,750	$3,338	240	$141	$32	$14	4	$565	$129	$56
BIOL347	U	$14,428	$1,647	$709	51	$283	$32	$14	3	$849	$97	$42
BIOL370	U	$11,312	$1,937	$835	60	$189	$32	$14	4	$754	$129	$56
BIOL375	U	$31,675	$6,587	$2,838	204	$155	$32	$14	3	$466	$97	$42
BIOL386	U	$41,514	$7,427	$3,199	230	$180	$32	$14	5	$902	$161	$70
BIOL460	U	$15,541	$2,131	$918	66	$235	$32	$14	2	$471	$65	$28
CHEM121	L	$140,857	$50,740	$29,489	2120	$66	$24	$14	5	$332	$120	$70
CHEM122	L	$69,525	$23,335	$13,562	975	$71	$24	$14	5	$357	$120	$70
CHEM221	L	$60,596	$17,831	$10,363	745	$81	$24	$14	5	$407	$120	$70
CHEM222	L	$63,192	$16,036	$9,320	670	$94	$24	$14	5	$472	$120	$70
CHEM364	U	$17,726	$5,553	$3,227	232	$76	$24	$14	4	$306	$96	$56
COMM121	L	$215,073	$47,383	$44,776	3219	$67	$15	$14	3	$200	$44	$42
CULTELE	E	$1,709,820	$289,517	$261,225	18573	$92	$16	$14	12	$1,105	$187	$169
ENGL150	L	$573,937	$101,166	$100,025	7191	$80	$14	$14	3	$239	$42	$42
ENGL250	L	$443,106	$62,337	$61,634	4431	$100	$14	$14	3	$300	$42	$42
ENGL311	U	$132,570	$14,730	$14,564	1047	$127	$14	$14	3	$380	$42	$42
FREEELE	E	$24,198,385	$7,382,074	$5,176,043	212177	$114	$35	$24	3	$342	$104	$73
HLTH125	L	$40,983	$17,469	$12,130	388	$106	$45	$31	2	$211	$90	$63
ISYS105	L	$324,920	$121,187	$51,405	3468	$94	$35	$15	3	$281	$105	$44
MATH115	L	$244,523	$25,691	$42,647	3066	$80	$8	$14	3	$239	$25	$42
MATH126	L	$130,948	$10,993	$18,250	1312	$100	$8	$14	4	$399	$34	$56
MATH130	L	$38,744	$4,190	$6,955	500	$77	$8	$14	4	$310	$34	$56
MGMT310	U	$41,609	$6,569	$5,336	360	$116	$18	$15	3	$347	$55	$44
PHYS211	L	$114,821	$35,135	$20,420	1468	$78	$24	$14	4	$313	$96	$56
PHYS212	L	$66,589	$14,169	$8,235	592	$112	$24	$14	4	$450	$96	$56
SOCAELE	E	$1,465,079	$375,755	$289,735	20589	$71	$18	$14	12	$854	$219	$169

* Instructor Cost - ***Salary & Fringe*** - the actual cost to teach a course
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*** Dean's Cost - ***Dean's Level Non Instructor Compensation, Supplies and Equipment***- college average applied to all course prefixes within a college

Source: Office of Institutional Research, g:\...\progcost\0001\progcost.rsl

Program Review Panel Evaluation Form

(PRP: complete this form and include with your report)

SUMMARY

Program: Applied Biology

Instructions: Circle the number which most closely describes t he program you are evaluating.

1. Student Perception of Instruction **Average Score** 4.5

5 4 3 2 1

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** 4.25

5 4 3 2 1

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** 4.0

5 4 3 2 1

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** 4.0

5 4 3 2 1

Graduates easily find employment in field.

Graduates are sometimes forced to find positions out of their field.

5 4 3 2 1

5. Use of Information on Labor Market **Average Score** 4.0

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.

Program Review Panel Evaluation Form (page 2)

6. Use of Profession/Industry Standards **Average Score** N/A

5 4 3 2 1

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** 4.25

5 4 3 2 1

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** 4.25

5 4 3 2 1

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** 5.0

5 4 3 2 1

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** 4.25

5 4 3 2 1

Instructional staffing for this program is sufficient to permit optimum program effectiveness.

Staffing is inadequate to meet the needs of this program effectively.

Program Review Panel Evaluation Form (page 3)

11. Facilities Average Score 4.0

5 4 3 2 1

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 3.75

5 4 3 2 1

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 3.75

5 4 3 2 1

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 4.0

5 4 3 2 1

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 3.75

5 4 3 2 1

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.

SUMMARY - MAJOR CONCLUSIONS

1. The FSU Applied Biology Program is a stable, inexpensive and valuable program. It is consistent with the FSU 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 including several Fulbright grants 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 2000-2001 data supplied by the Office of Institutional Research and Testing and the programs exit interview most Applied Biology graduates responding to the survey (20 out of 36 graduates) find placement (95% placement rate) 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 $29,930 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 continually examine the Applied Biology Curriculum. Consideration must be given to incorporating another course that emphasizes the development of oral presentation skills. It appears that the requirement of 36 semester credits in the biology major should be retained (prior to program review in 1997 it was 30 semester credits) as well as the total semester hour requirement of 127 credits (prior to program review in 1997 it was 120 semester credits). The biology faculty with its impressive academic diversity can and should be allowed to offer a broad range of biology electives, applicable to the biology major, 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. The present curriculum, based upon the success of graduates in obtaining admission to competitive graduate and professional programs, appears to support the program's primary goal.

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 an updated department home page on the world wide web. Ferris itself in these days of increasing competition for students must make marketing of its programs an institutional goal.

6. Enrollment in the FSU Applied Biology Program is stable over the last several years at approximately 150 total students which suggests that demand by students is good. The program has averaged 28 graduates over the last 5 years with about 47% graduating with academic honors. To maintain these impressive enrollment statistics the Applied Biology Program should continually explore new career tracks which can attract good students and provide good career routes. A genetic counseling track is one possibility.

7. The FSU Applied Biology BS Program is very inexpensive ranking tenth lowest in total program cost (total program cost = $18,589.64) out of 81 FSU programs requiring 120 or more total credits or in the bottom 12% with respect to cost. This is based upon 2000-01 data supplied by the Office of Institutional Research. Considering the laboratory nature of biology courses and the expense of equipment and supplies in biology programs this is an amazing accomplishment. There is a slight variance in the costs of the individual tracks with the environmental biology track being the most expensive and the pre-veterinary track the least expensive. 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 new 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 stay the present course. The program has a long history of stable if not slightly increasing enrollment, is very inexpensive and has a good record of placing its graduates into competitive graduate and professional programs as well as into the job market. New tracks should continually be explored and started such as the new forensic biology track and when appropriate existing tracks should be expanded or eliminated such as sports medicine.

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. Recently the FSU Strategic Marketing Committee has been reinstated under new leadership and this may be a place to begin.

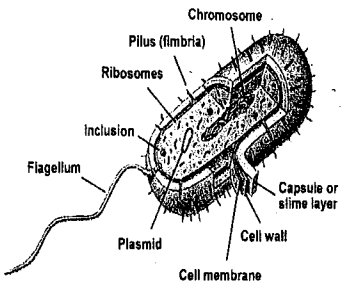
3. It would be very desirable from the programs perspective to have more than one academic based scholarship available (Helen Ferris Vartan Scholarship). With a ten year history of 38% of its graduates receiving academic distinction (47% over the last 5 years) or higher the Applied Biology program attracts many high quality students. Scholarships would allow the program to continue to do so in a competitive market. The program should explore ways to fund additional scholarships.

4. Some consideration must be given to increasing the oral communication requirements in the program. Since last program review COMM 121 is now required but seniors and recent graduates are still suggesting that more oral communication courses in the program would be desirable. One possible solution is to reduce the cultural enrichment requirement from 12 semester hours to 9 semester hours and add a second oral communication course. This would address this concern without increasing the total hours in the program and would still satisfy general education requirements.

5. 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 strengths of the Applied Biology Program.

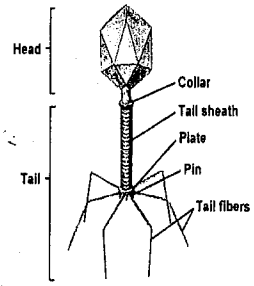
6. It is recommended that the Biology Faculty be both encouraged and well supported in their professional development activities such as professional travel, consulting and research. Applied Biology Seniors see, as a strength of the program, a Biology Faculty with expertise in their professional areas. 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. The Biology Faculty must also be supported in being allowed to offer low enrollment elective courses applicable to the biology major.

7. It is evident from survey items and comments that many Biology Department faculty members believe several of the concerns with regards to facilities and equipment which were expressed in the last Applied Biology Program Review have not been satisfactorily addressed. Prominent among these is the lack of storage space (exacerbated by increased enrollment in several lab-intensive courses) and the perceived failure to establish a systematic adequately funded program for the replacement of aging equipment/furnishings and acquisition of new equipment. (As regards this last, the Department of Biological Sciences Planning Priorities for Fiscal Years 2002-2004 lists equipment replacement on a rotational basis that constantly replaces or updates current scientific equipment as a priority in its base budget support requests.) The faculty is generally pleased with the renovations in Science 126 and Science 120 but encourage serious consideration of additional lecture space (lecture sections in some courses fill the current space to design capacity).



MEDICAL MICROBIOLOGY

BIOLOGY 108 **WINTER, 2003**
3 CR. (2+3) **No Pre-Requisites**



COURSE SYLLABUS

DATE	TOPIC	TEXT REFERENCE
Mon. 1/13	Introduction and History	CHAP 1
Wed. 1/15	Prokaryotes and Eukaryotes	CHAP 4
Mon. 1/20	M.L.K. DAY - NO CLASSES	
Wed. 1/22	Bacterial Structures and Functions	CHAP 4
Mon. 1/27	Bacterial Structures and Functions	CHAP 4
Wed. 1/29	Bacterial Growth and Sporulation	CHAP 8, p 100-101
Mon. 2/3	Bacterial Taxonomy-Fungi Structure	CHAPS 10, 11, 12
Wed. 2/5	Viral Structure & Replication	CHAP 13
Mon. 2/10	FIRST EXAM	
Wed. 2/12	Microbial Metabolism	CHAP 5
Mon. 2/17	Microbial Metabolism	CHAP 5
Wed. 2/19	Microbial Genetics	CHAPS 6 & 7
Mon. 2/24	Microbial Genetics	CHAP 6
Wed. 2/26	Antibacterial Agents	CHAP 21
Mon. 3/3	Antiviral Agents	CHAP 21
Wed. 3/5	Sterilization and Disinfection	CHAP 9
Mon. 3/17	Host Parasite Interactions	
Wed. 3/19	SECOND EXAM	CHAPS 14 & 15
Mon. 3/24	The Immune Response	CHAPS 16 & 17
Wed. 3/26	Allergy and Hypersensitivity	CHAP 18
	FRI. MARCH 28th , FINAL "W" DAY	
Mon. 3/31	Digestive System Infections	CHAP 23
Wed. 4/2	Digestive System Infections	CHAP 23
Mon. 4/7	Respiratory System Infections	CHAP 22
Wed. 4/9	Respiratory System Infections	CHAP 22
Mon. 4/14	THIRD EXAM	
Wed. 4/16	Infections of the Body's Surfaces	CHAP 26
Mon. 4/21	Infections of the Body's Surfaces	CHAP 26
Wed. 4/23	Epidemiology & Nosocomial Infections	CHAP 20
Mon. 4/28	STD's – BACTERIAL	CHAP 24
Wed. 4/30	STD's - VIRAL	CHAP 24 p 735-740
Thurs. 5/8	→ FINAL EXAM - COMPREHENSIVE ←	10-11:40 AM

TEXT: ***INTRODUCTION TO MICROBIOLOGY***, Second Edition by Ingraham and Ingraham. **NOTE THE HELPFUL GLOSSARY** G1-G13 at the back of the book. **ALSO NOTE THE EXCELLENT SUMMARIES** at the end of each chapter

EXAMS: Exams may include multiple choice, matching, short answer questions, problems and case studies. **Purchase 6 Scantron™ answer sheets. 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 NEEDED, 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, T, W & R 12 noon to 1:00 p.m. and by appointment. **Please feel welcome to ask for help outside class. E-mail: hoeksemw@ferris.edu**

ATTENDANCE POLICY: You are **expected** 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 a.m. on TUES. and THRS.

3. Study your notes on a regular basis, using the study guide, 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 (591-3543) provides FREE tutorial services open to all FSU students.

BIOL 121 GENERAL BIOLOGY
MWF 11:00 – 11:50 am
Dr. Adewusi Fall 2002

Instructor: Dr. Olukemi Adewusi ASC 2114 Phone: 591-5628 (o); 591-5638 (lab)
Email: adewusio@ferris.edu

Office Hrs: Tue: 1:30 - 3:00, Wed: 1:30 - 3:00, Fri: 10:00 - 10:50

Course Objectives: To introduce students to:

- the scientific methods/problem reasoning processes.
  - collect, record and analyze data
  - differentiate between scientific and non-scientific reasoning processes
  - understand how biologic knowledge is gained
- the basic principles of biology.
  - understanding how these principles were developed.
  - understanding how these principles interact with and influence one another.
  - Discuss how these principles can be applied to everyday lives.
- Biology in the News
  - Reading and understanding a current biological topic in a news paper/television.
  - Understanding the impact of recent biological discoveries on society.

How the Course is Taught

- Traditional lecture (3 hours/week)
- Hands-on Practicum: Traditional laboratory activities and field trips.
- Instructional Technology: Internet, email and videotapes.
- Interactive Assemblies: Small group to discuss News topics.

WebCt : Lecture outlines, review questions and grades will be available electronically via webct. To access using a browser, go to: http://webct.ferris.edu:9000. Type in your global id for both the username and password. Your global id is provided by the telecommunication depertment.

Textbook: BIOLOGY by Raven and Johnson (6th edition).
GENERAL BIOLOGY LABORATORY MANUAL by Adewusi, Mitchell and Stewart (2nd edition).

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

Examinations:

1. There will be five (5) scheduled exams, each worth 100 pts=500 pts. And lab quizzes totaling 200 pts. Exam questions will be true/false, multiple choice and/or fill in the blanks. Exams will be taken from the content of the lectures, class handout materials, textbook and lab materials.

2. Pop quizzes will be given during the semester. Each pop quiz will cover materials from the previous lecture. There are no make-up pop quizzes. Pop quiz points are bonus points.

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 or valid documentation (such as a letter from a physician, evidence of funeral etc) has been submitted to the instructor. The documentation 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.

Grades: A final grade based on the total 700 possible points will be determined according to the following scale:

	Maximum Possible Points
Lecture exams	500
Laboratory and/or honors project	200
Pop quizzes (bonus)	0-20
	700

A = 650-700	B = 575-599	C = 495-519	D = 415-434
A- = 625-649	B- = 550-574	C- = 470-494	D- = 396-414
B+ = 600-624	C+ = 520-549	D+ = 435-469	F = Below 396

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

Disruptive Behaviors: Behaviors that are disruptive to learning will not be tolerated (see attached handout for further clarification).

Electronic Devices: Electronic devices (cellular phones, laptops, walkmans, etc.) must be turned off in the lecture hall.

Attendance Policy: Prompt attendance to all lectures is required and expected. If you miss a lecture, you are responsible for the lecture contents and any assignments given during the lecture. Attendance will be taken **only** at the beginning of the class periods. If you are tardy, be sure to contact the record keeper **immediately** after the class period to be certain that your attendance is recorded. **There is a two point penalty for each missed lecture and a one point penalty for tardiness.** If you have a valid reason for an absence, see Dr. Adewusi with your documentation as soon as you return.

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.

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

5. ANSWER ALL OF THE REVIEW QUESTIONS AND HOMEWORKS.

6. 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.

7. 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 make an appointment if you cannot come in during regularly scheduled office hours.

8. STUDY WITH A CLASSMATE OR A GROUP OF CLASSMATES.

9. Attend Student Learning Assistance, SLA sessions with Anna Rizzo.

10. 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 121 GENERAL BIOLOGY Lecture Schedule Dr. Adewusi Fall 2002

Unit	DATE	CHAPTERS	TOPIC
	Aug 26		Introduction
Ecology	Aug 28	1	The Science of Biology
	Aug 30	24	Population Ecology
	Sep 2		**Labor Day-No Class**
	Sep 4, 6	25	Community Ecology
	Sep 9, 11	28	Dynamics of Ecosystems
	Sep 13	29	The Biosphere
	Sep 16		**EXAM 1**
Genetics	Sep 18	11	How cells Divide
	Sep 20, 23	12	Sexual Reproduction and Meiosis
	Sep 25, 27	13	Mendelian Genetics
	Sep 30, Oct 2	13	Human Genetics
	Oct 4		Biology in the News
	Oct 7		**EXAM 2**
Evolution	Oct 9	20	Genes Within Populations
	Oct 11	21	Evidence for Evolution
	Oct 14	22	Origin of Species
	Oct 16	23	How Humans Evolved
Viruses and Simple Organisms	Oct 18, 21	32	Classification
	Oct 23	**EXAM 3**	
	Oct 25, 28	34	Bacteria
	Oct 30	35	Protists
	Oct 31		**Last Day for approved "W" grade**
	Nov 1	35	Protists
	Nov 4	36	Fungi
	Nov 6, 8	33	Viruses
	Nov 11		**EXAM 4**
Plants	Nov 13, 15	37	Evolutionary History of Plants
	Nov 18, 20	38	The Plant Body
	Nov 22	39	Plant Transport and Nutrition
	Nov 25	40	Plant Development
	Nov 27		Biology in the News
	Nov 28		**Thanksgiving Holiday**
	Dec 2, 4	41	Plant Growth and Regulation
	Dec 6	42	Plant Reproduction
	Dec 12	**Exam 5**	**12: 00 – 1:40 pm**

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

BIOL 121 GENERAL BIOLOGY Lab Schedule · Dr. Adewusi Fall 2002

INSTRUCTORS: Ms. Cindy FitzWilliams-Heck

Ms. Anna Rizzo
ASC 2115, 591-5022

GRADING: Lab quizzes will be given as scheduled below. Lab make-up policies will be provided by the lab instructor.

ATTENDANCE POLICY: Prompt attendance to all laboratory sessions is required and expected. More than two unexcused lab absences is grounds for a failing grade in the course. Additional attendance policies and penalties will be provided by the instructor.

LABORATORY MANUAL: GENERAL BIOLOGY LABORATORY MANUAL by Adewusi, Mitchell and Stewart (2nd edition).

STUDY THE LAB EXERCISE BEFORE YOU COME TO EACH LAB.

WEEK OF	EXPERIMENT	QUIZ NUMBER
Aug 26	Introduction	
Sep 2	**Labor Day -No Lab**	
Sep 9	Predation Population Growth I	1
Sep 16	Population Growth II Mendelian Genetics I	2
Sep 23	Mendelian Genetics II	3
Sep 30	Mendelian Genetics III ABO and Rh Blood Types	4
Oct 7	Adaptive Mutants in Yeast	5
Oct 15	The microscope Biochemical Evidence of Evolution	6
Oct 21	Bacteria, Protista	7
Oct 28	Protista, Fungi	8
Nov 4	Survey of Plants	9
Nov 11	Plant Anatomy	10
Nov 18	Plant Physiology I	11
Nov 25	**No Lab**	
Dec 2	Plant Physiology II	12

SYLLABUS ATTACHMENT

COLLEGE OF ARTS AND SCIENCES – FERRIS STATE UNIVERSITY

Fall 2002

IMPORTANT DATES

Classes Begin.....8/26/02
Last day for Drop/Add.....8/28/02
Labor Day (no classes).....9/02/02
Last day to Withdraw from Univ with "W".....10/31/02
Last day to Drop class with "W".....10/31/02
Thanksgiving Holiday (no classes).....11/28-29/02
Last day of fall semester classes.....12/06/02
FINAL EXAMS.....12/09-13/02
Fall semester commencement.....12/14/02

LIBRARY HOURS

Regular hours for the (FLITE) library are as follows:

Monday-Thursday	8:00 a.m.-12:00 a.m.
Friday	8:00 a.m. - 9:00 p.m.
Saturday	9:00 a.m. - 6:00 p.m.
Sunday	1:00 p.m.-12:00 a.m.

(For verification of hours, call 591-3733)

COMPUTER LAB HOURS (FLITE)

Computer lab hours in the (FLITE) library are as follows:

Monday-Thursday	8:00 a.m.-12:00 a.m.
Friday	8:00 a.m. - 9:00 p.m.
Saturday	9:00 a.m. - 6:00 p.m.
Sunday	1:00 p.m.-12:00 a.m.

(For verification of hours, call 591-3733)

CLASS ATTENDANCE IS IMPORTANT!

There is significant research to show that students with daily attendance earn significantly higher grades than students who miss even a few class periods. Many instructors have mandatory attendance policies by which your grade will be affected by absences. Some instructors also have policies about class tardiness, to encourage students to be present for the full class period. Check your course syllabus or talk to your instructor about his/her policies.

HOW TO CONTACT A FACULTY MEMBER

If you have questions or need help, talk to your instructor. Faculty office locations, phone numbers, and office hours can be obtained from the class syllabus, or the department office. Faculty directory notebooks are also located in the student lounges and in the dean's office (ASC 3052).

DROPPING CLASSES OR WITHDRAWING

If you need to drop a class, you must do so OFFICIALLY, through your dean's office, in order to avoid receiving an "F" grade in the course. If you need to totally withdraw from school, you must do so OFFICIALLY at Admissions and Records in CSS 201. The last day to withdraw or drop a class may be different for different classes. See dates listed under "Important Dates". In case of extenuating circumstances after these dates (e.g., a serious illness requiring you to withdraw from school), contact Admissions and Records at 591-2792.

INCOMPLETES

The intent and appropriate use of the "I" grade is NOT to avoid student probation, dismissal, or unacceptable grades, nor should it be considered as an extended alternative to withdraw from a class (W). The "I" is only considered for extenuating circumstances that have led to a student's missing a portion of the course. Extenuating circumstances are generally defined as those situations over which the student has little or no control--e.g., illness, birth, jury duty, death of a parent, serious injury. Instructors may require suitable documentation.

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

WHERE TO GO FOR HELP

Successful students are often those who seek help ea before little problems become big ones. Ferris Sta University offers a variety of services, FREE OF CHARGE, to help you. Details are on the next page.

BIOL 122 General Biology II 2003

Lecture: SCI 126 MWF 8 – 9am, Lab in SCI 212

Instructor: Dr. Karen Strasser
Office hours: MW 9 to 11am or by appointment. Office: 2120 ASC
Contact info: Phone: 591-2543 email: Karen_Strasser@ferris.edu

Required Materials:

Lecture Text: Biology, 6th edition by Raven and Johnson
Laboratory Materials: General Biology Laboratory Manual, notebook, calculator
Required test materials: Packet of SCANTRON cards (form 882-E), 2 #2 pencils, student ID

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

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

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

Exams: Examinations will be given during the normal lecture period on the dates are listed on the class schedule. Exams will include material covered in lecture and assigned readings in the textbook. Failure to take an exam at the scheduled time (see class schedule) will result in a grade of 0 for the exam. If you have a valid excuse, inform me ahead of time (except for hospitalization etc.), and provide written documentation within 2 weeks of the missed exam (proof of funeral, hospitalization, etc) the points missed will be added to the cumulative final exam. For example, if you missed exam 2 (with a valid excuse), the comprehensive final would be worth 300 points instead of 200 points.
***Bring a scantron sheet (Form 882-E), 2 #2 pencils, and your student ID to each exam.

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

Grading Scale:

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

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

To do well in this course:

Attend all lectures and labs, and BE ON TIME
Exhibit professional behavior
Take good notes, and organize them
Read the assigned sections of the text book both before and after class
Study your notes EVERY WEEK, not just before the exam
Ask questions when there is something you don't understand
Do the weekly study questions posted on web CT(every week!)

Lecture Schedule: (subject to change)

Week		New Topic	Readings (chp)
1)	Jan 13, 15, 17	Introduction Chemistry review, Biological molecules	 2, 3
2)	Jan 20, 22, 24	Martin Luther King Day, no classes Jan 20 Cells (Jan. 22-24)	 5
3)	Jan. 27, 29, 31	Biological Membranes	6
4)	Feb. 3, 5, 7	Energy and Metabolism **Exam 1 Friday Feb. 7**	8
5)	Feb. 10, 12, 14	Cellular respiration Photosynthesis	9 10
6)	Feb. 17, 19, 21	DNA structure genes, gene expression	14 15-16
7)	Feb. 24, 26, 28	Cellular mechanisms of development gene technology	17 18
8)	Mar. 3, 5, 7	**Exam #2 Wed March 5** Noncoelomate animals	 44
9)	Mar. 10, 12, 14	**SPRING BREAK**	
10)	Mar. 17, 19, 21	Mollusks and Annelids Arthropods	45 46
11)	Mar. 24, 26, 28	Echinoderms Vertebrates Last day to drop with a "W" March 28	47 48
12)	Mar. 31, Apr. 2, 4	Animal organization Digestion	49 51
13)	Apr. 7, 9, 11	Circulation **Exam #3 Wednesday April 9**	52
14)	Apr. 14, 16, 18	Respiration No class Friday April 18	53
15)	Apr. 21, 23, 25	Nervous system Endocrine system	54 56
16)	Apr. 28, 30, May 2	Immune system (time permitting) Homeostasis (time permitting)	57 58
17)	May 7	2 Part Final: (Part 1 Exam #4, Part 2 Cumulative Final Exam) **Wednesday May 7, 8 am**	

Lab information

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

Lab participation: 65points

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

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

***Missing more than 2 labs will result in a failing grade in the course

Lab Quizes: 100 points:

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

Lab Schedule: (subject to change)

Week of	Topic	Page in Lab manual (Second half)	
1) Jan. 13-17	Macromolecules	1	
2) Jan. 20-24	No lab this week: Martin Luther King Day		
3) Jan. 27-31	Osmosis	15	Quiz 1 (macromolecules)
4) Feb. 3-7	Enzymes I	21	Quiz 2 (Osmosis)
5) Feb. 10-14	Enzymes II	31	Quiz 3 (Enzymes)
6) Feb. 17-21	Energy	35	Quiz 4 (Enzymes 2)
7) Feb. 24-28	DNA isolation and bacterial transformation I	42	Quiz 5 (energy)
8) Mar. 3-7	DNA isolation and bacterial transformation II	44	Quiz 6 (DNA I and II)
9) Mar. 10-14	No lab this week: Spring Break		
10) Mar. 17-21	Invertebrate lab 1	51	
11) Mar. 24-28	invertebrate lab 2	64	Quiz 7 (Invert 1 material)
12) Mar 31- Apr 4	Vertbrate Anatomy I	75	Quiz 8 (invert 2 material)
13) Apr. 7-11	Vertebrate Anatomy II	85	Quiz 9 (Vert anatomy 1)
14) Apr 14-18	No lab this week: Easter Break		
15) Apr 21-25	Kinesis in Pill bugs	88	Quiz 10 (Vert anatomy 2)
16) Apr. 28 – May 2	Environmental factors and macroinvertebrates	92	Quiz 11 (Kinesis in pill bugs)

BIOL 205
HUMAN ANATOMY AND PHYSIOLOGY

SYLLABUS WINTER SEMESTER 2003

Human Anatomy & Physiology is fascinating and exciting because it is about one of the most interesting things in the world -- OUR BODIES.
Biol-205 should be one of the most interesting, enjoyable, and valuable classes you will ever take.

A. COURSE INSTRUCTOR:

Robert Friar, PhD
Phone: Office: 591-2542
Home: 796-9470
email: friar@ferris.edu

Telephone help hours:
MTWTFSS 9:00 - 10:00 PM

Office: ASC-2017
Office Hours:

M-W-F	1:00 - 2:30	- or in lab
-T---	10:00 - 10:50	
-T---	7:00 - 7:30	
--W--	1:00 - 3:30	
---R-	3:00 - 4:00	

(Other hours by appointment)

SLA-SI Instructor: Laura Forbes Office: ASC-1015C laura_forbes@ferris.edu

B. TEXT and SUPPORTIVE MATERIALS:

1. *Hole's Human Anatomy & Physiology*, 8th Ed; (1999); Authors: Shier, Butler, Lewis; or
   Hole's Human Anatomy & Physiology, 7th Ed; (1996); Authors: Shier, Butler, Lewis. (Cost less; just as good!)
   Hole's Human Anatomy & Physiology, 9th Ed; (2001); (New; Cost more; No advantage; Avoid.)
   (Be sure you have assignments for your edition.)

   READ YOUR TEXT DAILY. Assignments are listed on Pages 7, 8, and 9 of this syllabus.
   Bring your text to LAB. You do NOT need to bring it to lecture.

2. BIOL 205 Lecture Outlines, Study Guides, and Lab Manual, by Friar -- $ = 16.00; Purchase at Rankin Bookstore.

C. COURSE CONTENT:

This course will provide you with the opportunity to study the HUMAN BODY. This course will begin with the CELL and progress through TISSUES, ORGANS and organ SYSTEMS. The organ systems to be studied are SKELETAL, MUSCULAR, INTEGUMENTARY, NERVOUS, ENDOCRINE, CIRCULATORY, RESPIRATORY, DIGESTIVE, RENAL, and REPRODUCTIVE.

D. COURSE FORMAT: 4 hours lecture each week; 3 hours lab each week; (5 credit hours)

E. CLASS SCHEDULE:

1. LECTURE:

	DAY	TIME	ROOM	INSTRUCTOR
LECTURE:	M*WRF	12:00 - 12:50 p	SCI-126	R. Friar
Review:	-T---	11:00 - 11:50 a	SCI-126	R. Friar * **
Review:	-T---	12:00 - 12:50 p	SCI-126	R. Friar * **

* Tuesday reviews are optional, but strongly recommended. Purpose is to provide assistance with lecture materials.

** The following Tuesdays at 11:00-11:50 or 12:00-12:50 are REQUIRED: Jan. 14, Jan. 21, Jan. 28, Feb. 4.
Jan 14 for "How To Study & Pledge." Other three Tuesdays replace Apr. 23, 24, 25. I will be at a professional meeting.

2. LAB SECTIONS

CODE	DAY	TIME	ROOM	INSTRUCTOR
211	Mon.	3:00 - 5:50 p	Sci 222	R. Friar
212	Mon.	6:00 - 8:50 p	Sci 222	R. Friar
213	Tue.	4:00 - 6:50 p	Sci 222	R. Friar
214	Wed.	8:00 - 10:50 a	Sci 222	R. Friar
215	Tue.	1:00 - 2:50 p	Sci 222	J. Scott, DVM
216	Thur	8:00 - 10:50 a	Sci 222	R. Palmer, PhD

3. SLA-SI: Highly recommended for all students. Required if your grade falls below C.

SLA-SI	Mon.	4:30 - 6:00 p	Sci 232	L. Forbes (1° Lect)
SLA-SI	Wed.	4:00 - 5:00 p	Sci 232	L. Forbes (1° Lect)
SLA-SI	Wed.	5:00 - 6:00 p	Sci 232	L. Forbes (1° Lect)
SLA-SI	Thur.	4:00 - 5:00 p	Sci 232	L. Forbes (1° Lab)
SLA-SI	Thur.	6:00 - 7:00 p	Sci 232	L. Forbes (1° Lab)

4. Lab Review & Tutoring: Friday 1:00 - 3:00 in Sci-222. Other hours to be arranged as requested.

F. PURPOSE OF BIOL-205:

1. To study the ANATOMY (structure) and PHYSIOLOGY (function) of the human body and to develop the prerequisite knowledge, skills and values needed for designated courses and curricula, e.g. applied biology, bio-technology, dental hygiene, medical records, medical lab technology, medical technology, nuclear medicine, nursing, respiratory therapy, science education, and others.
2. To learn the descriptive and technical terminology used in anatomy and physiology and health care professions.
3. To be able to identify the major structures (molecules, organelles, cells, tissues, organs, and organ systems) which make up the human body and to understand the functions of these structures.
4. To develop an appreciation for how structure determines function and the importance of homeostasis.
5. To comprehend the philosophy and methodology of science.
6. To develop the ability to read and comprehend scientific information - especially in one's chosen professional field and in the popular press.
7. To develop the ability to critically evaluate new information, as well as to question established "facts," when formulating an opinion or attitude.
8. To develop the ability to THINK and reason logically in technical and nontechnical areas and to maintain an open mind and to be flexible on all issues.
9. To develop the ability to apply scientific knowledge to one's profession and to one's personal life.
10. To develop the ability to analyze scientific, medical, social and political issues and to think clearly and sensibly in determining good, unbiased, workable solutions.
11. To develop the willingness and ability to take a stand on important issues confronting one's profession, community, nation, and society.
12. To develop a sense of the importance of community involvement and helping our fellow humans and to foster and support community service.
13. To develop an awareness of the many things that each of us can do to improve and maintain good health and to be able to differentiate between health fads and myths and good health practices.
14. To answer questions related to the human body, its functions, and care.

G. ADDITIONAL HELP -- SLA-SI, Tutoring, Lecture & Lab Reviews, Personal Help, Email, Telephone.

1. Structured Learning Assistance-Supplemental Instruction (SLA-SI): We are offering SLA-SI workshops in conjunction with this course. The SLA-SI workshops are designed to assist students in successfully completing this course. SLA-SI workshops will provide extra hours of instruction, review, discussion, practice, development of study skills, and related activities designed to make learning anatomy and physiology easier and to enhance retention. The SLA-SI workshops provide a superb opportunity for studying, learning, and remembering the many things we will investigate in Biol -- 205.

   I encourage all students to take advantage of this excellent opportunity.
   (If your grade falls below a C, you are required to attend at least two hours per week.)

   For more information talk to Laura Forbes after class.

2. TELEPHONE HELP. Each evening between 9:00 and 10:00 you may call me at my home (796-9470) for help. I'm setting this time aside seven nights each week to be available to assist students, so don't hesitate to call. Don't wait until the night before an exam. If I am on the phone when you call, try calling back in 5 to 10 minutes. If I am out when you call, leave your name, number, and latest time for me to return your call.
3. E-MAIL HELP, questions, discussions, personal problems you want to discuss. Available 24 hours per day. *(You may email questions to me at friar@ferris.edu)* I shall strive to respond within 24 hours.
4. LAB TUTORING will be available if needed. Ask if you want additional lab reviews.
5. LECTURE TUTORING may not be needed with SLA-SI and Tuesday reviews, but will be available if requested.
6. OFFICE HOURS and personalized help are available daily. If you cannot made one of my established office hours, request an appointment. If you have personal problems you wish to discuss, come see me.

6. SUGGESTIONS on HOW to STUDY will be given on the First Tuesday at 11:00 -11:50 a.m. and 12:00 - 12:50 in Sci-126. Be sure you develop an effective system for studying anatomy and physiology early in the course. See me if you need help with study skills. I encourage EVERYONE to JOIN or ORGANIZE a STUDY GROUP by the end of the first week or middle of the second week.

7. There are very few reasons why anyone should do poorly in this course. If you put forth the effort to learn and master the material, you can and WILL be successful.

===> THE "I WILL" IS MORE IMPORTANT THEN THE "I.Q." <===

No matter how much others do to help you, it is of no value to you if YOU do not use the help and if YOU do not use effective study skills. Remember, YOU are the ONLY one who can transfer INFORMATION into your BRAIN and retain it for future use. If you do well, the credit is yours. If you do poorly, the blame is on your shoulders.

H. CLASS ATTENDANCE POLICY: Simply stated, I expect you to be in class EVERY DAY. You are paying a substantial amount in both time and money for your education. Be sure to get what you are paying for. You can't get it if you miss classes or if you don't study and master the course materials. Furthermore, Michigan tax payers are paying 55% of your college education bill. They have a right to expect you will do your best. You have an obligation to do your best! I will expect you to do your best!

1. LECTURE: Because there is a close correlation between class attendance and class performance (grades on quizzes and exams), attendance will be taken each day. You will lose 5 pts for each absence; 2.5 pts if tardy.

a. Recognizing that emergencies may occasionally occur, you will be allowed three absences during the semester without penalty to your grade. Each additional absence beyond the first three will result in 5 points being deducted from your lecture grade. To encourage perfect attendance, each person who is present and on time for all classes will receive 15 bonus pts at the *end of the semester*. Persons with one absence will receive 10 bonus pts. Persons with two absences will receive 5 bonus pts. Persons with three absences will receive 0 bonus pts. Remember, absences beyond three will cost you 5 points each. If tardy or if leave early you lose 2.5 points.

b. "NO FAULT" ATTENDANCE POLICY: Despite all of the excuses, there are very few reasons that justify an absence. Because it is difficult to establish the validity of excuses, I use a "No Fault" attendance policy. Therefore, the reason for an absence, whether personal problems, illness, funeral, religious holiday, field trip or other collegiate activity, job interview, bad weather, too lazy to come to class, indifference, etc., does not matter.

c. If illness or other emergency forces you to miss a lecture, call me, email me, or come see me. If unable to call, have someone call for you. This is important so I can assist you with getting the material missed. Please share with me any problems that you have so I am aware that the problem exists and so I can offer assistance in resolving the problem.

d. TARDINESS: All lectures and labs will begin on time and end on time. You are expected to be in your seat at least 30 seconds BEFORE class begins. If you have a handicap or other problems which will cause you to be tardy, discuss the situation with me during the first week of class.

e. SEAT ASSIGNMENT: To facilitate taking attendance in lecture, each person will have an assigned seat. Your assigned seat will be the seat you select when you come to the second class. Be sure to get a seat that you want for the rest of the semester. If you have trouble seeing or hearing, sit in the front near the center.

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

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

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

c. MISSING MORE THAT ONE LAB will result in an "I" for the course and you must take the missed labs next semester. (Remember an "I" becomes an "F" if not removed by the end of the following semester.)

I. TESTS and QUIZZES:

1. LECTURE EXAMS: There will be four lecture exams plus the final exam. Each lecture exam will cover the previous three weeks of lecture related material and be worth 100 points. The COMPREHENSIVE FINAL lecture exam will be 200 points. The questions on the final exam will be approximately 50% from the last 3 weeks of the course and 50% from the first 12 weeks.

2. Source of Questions: Questions will be taken primarily from lectures (Study Guides) and reading assignments with a few questions from biological, medical, health related, political, social and ethical issues in the news which have been mentioned in class. You should keep current in the above news items by reading at least one news magazine/week or newspaper/day or both. I will expect you to use your anatomical and physiological knowledge to think reasonably, rationally, and logically about items in the news. *All of us must learn to think for ourself. Don't let anyone think for you. Those who want to think for us (tell us how and what to think and what to do or not do) usually want to control us and manipulate our thoughts and actions.*

3. Types of questions: Each exam will include true/false, multiple choice, matching, fill-in-blanks, definitions, essay questions, and diagrams. In addition to testing your knowledge (recognition) of the material covered, I will ask you to propose or discuss realistic solutions to biological, medical, health-related, political, and social problems and ethical issues, and to make value judgments. You will be required to use logic to justify your answer(s). (NOTE: LECTURE test questions will NOT come from lab and VICE VERSA.)

4. THE EXAM DATES are listed below and in the Lecture Schedule & Reading Assignment.

I.	Thursday	Jan	30	IV.	Thursday	Apr	10
II.	Thursday	Feb	20	V.	FINAL EXAM,	You may chose between:	
III.	Thursday	Mar	20		Mon. May. 5 @ 12:00 - 1:40 pm		
					Wed. May. 7 @ 2:00 - 3:40 pm		

** *(Anyone who misses one of the lecture exams must notify me in person or by phone* AS SOON AS POSSIBLE *and must arrange with me to take a make-up exam. If you are unable to call, have someone contact me. The NO FAULT policy also applies to missing an exam!)*

Since persons who take exams late have additional time to prepare for the exam, to be fair to the rest of the class I will deduct 5% from the score for each day the exam is delayed. (You will also lose 5 pts for being absent.)

5. UNANNOUNCED QUIZZES There may be 5 or 10-point pop quizzes given in lecture. Some of these quizzes will be given during the first three minutes of lecture and cover material discussed in the previous lecture or over the reading assignment. Others will be given at the end of the lecture and cover material discussed in that day's lecture. Because one reason for the pop quiz is to encourage students to be prepared, to participate in discussions and to comprehend the material, a missed lecture quiz MAY NOT be made up.

6. LAB QUIZZES: Each week there will be a 20 to 30-point quiz at the beginning of lab. This will usually be a combination of a pre-lab quiz over that day's lab and especially over the material covered in previous lab. If you miss a lab quiz, see me at once and GET INTO ANOTHER LAB that week! A missed quiz becomes a zero. If you miss more than one lab, a grade of "I" will be given and you must take that lab the next semester. *(Note: some labs will end with a 5 to 10-point quiz.)*

Lab scores will make up 25% of your class grade. Lab can have a major affect on your final class grade. Every student could make an "A" in lab if he/she ALWAYS came to lab FULLY PREPARED. Each lab exercise tells what you need to know. Study thoroughly before lab and make good scores!

J. GRADING SYSTEM: Your grade will be based on your:

((lecture exams + quizzes + attendance + pledge) x (75%)) + (lab scores x 25%) = ___%

It is my belief that too much emphasis is placed on grades and not enough emphasis is placed on learning, retaining and applying the information, skills, and values taught. If you master the material, you don't need to worry about grades. If you don't master the material, worry won't help you!

Because grades strongly motivate some and because grades should reflect your progress in a course, I will post grades each week on the bulletin board outside SCI 222. Check it weekly to be sure no scores are missing and that each score is correctly recorded. Report any suspected errors to me at once.

GRADING SCALE

Grade %	Grade %	Grade %	Grade %	Grade %
	B+ = 87	C+ = 77	D+ = 67	F = 59.9999999
A = 93	B = 83	C = 73	D = 63	
A- = 90	B- = 80	C- = 70	D- = 60	

This is a set scale and will NOT be changed. I will not curve the class. I do not give extra points to persons who are "close" to the next letter grade. In this course you will be provided with extra opportunities to learn the material and therefore to excel in both lecture and lab. If you want an "A", be sure you have the points required. THE CHOICE IS YOURS. Remember, LIFE IS ABOUT CHOICES! We choose to study until we master the material OR we choose to not devote the time needed to master the material. Some people find numerous excuses to avoid mastering a given course. *"He who is good at making excuses is rarely good for anything else."*

K. SUGGESTIONS on HOW to STUDY: will be given the First Tuesday at 11:00 and 12:00. Be sure you develop an effective system for studying anatomy and physiology early in the course.

STUDY GROUPS: One important factor is to be in an effective study group. I strongly urge everyone to be in a good study group by the end of the first week. A good study group is one which meets at a set time one to four times per week and in which everyone contributes. It is the responsibility of all members of the group to see that the group functions well. If that group does not function well for you, politely tell the other members of the group your concerns and if they are not met, find or form a new group. No one should stay in a study group that does not meet regularly, is ineffective or is incompatible. *(Be sure you are not the reason for the group being ineffective or incompatible.)* If discussions irrelevant to studying A & P occur, politely suggest the topic be discussed after the study session. *(Be sure to write down the names and phone numbers of all persons in your group.)*

My function as the teacher and Laura's function as the SLA-SI instructor is to develop an environment conducive to efficient learning and to guide your learning experiences. We shall strive to do this for you. We greatly enjoy working with people who are dedicated to excellence, who are organized, read text before class, always arrive on time, come prepared, pay attention, think, ask good questions, apply new knowledge to themselves, study diligently, work hard, and who are pleasant, congenial, helpful and cooperative with classmates. *(Remember, if you are not this type of person, you can become whatever you wish to be and I will be happy to work with persons who want help in changing traits they consider undesirable.)*

No one appreciates people who waste time or persons who don't try, don't care, arrive late, miss class, leave class early, procrastinate, are lazy, make excuses, blames others for their failures, abuse their health, lack respect for others, sleep in class, talk in class, and/or who make no effort to change their behaviors that interfere with learning and self-development.

IF I do a good job teaching this course and if you do a good job in studying and learning about the human body, this should be one of the most interesting, enjoyable, and valuable classes you will ever take. While there are many specific parts and functions to learn about the human body and many concepts, ideas, skills, and values to ascertain and while studying this course will require considerable time and effort, this is a course that everyone can do well in if they put forth a serious effort and really try. GOOD LUCK! Remember, I am here to help you.

> *"Anyone who is not mentally retarded* (and none of us are) *can achieve any reasonable dream and master any subject, if he/she is willing to devote the necessary time and energy to reaching his/her goals."*

1. YOU CAN HAVE ANY DREAM IF YOU ARE WILLING TO WORK 1000'S OF HOURS TO ACHIEVE IT!

2. THE SECRET OF LEARNING AND MAKING GOOD GRADES IS, "MASTERING EACH DAYS WORK AS IT COMES." NEVER GET BEHIND.

3. A MAJOR FACTOR IN SUCCESS IS TIME ON TASK!

4. DON'T WAIT UNTIL THE NIGHT BEFORE AN EXAM TO STUDY.

5. JOIN OR ORGANIZE A SMALL STUDY GROUP.

6. TAKE ADVANTAGE OF SLA-SI, REVIEWS, TUTORING, AND EXTRA HELP.

7. REMEMBER, EXCUSES SATISFY ONLY THE PERSON WHO MAKES THEM!

8. A HANDICAP IS NOT A HANDICAP UNTIL IT BECOMES AN EXCUSE.

9. IF YOU SCORE HIGH IN ALL OF YOUR COURSES, YOUR PROBABILITY FOR SUCCESS IN LIFE WILL BE FAR HIGHER THAN FOR SOMEONE WHO JUST GETS BY.

10. OUR HISTORY IS WRITTEN IN OUR GENES AND IN OUR ACTIONS. WE CAN DO LITTLE ABOUT OUR GENES, BUT WE CAN DO VIRTUALLY EVERYTHING ABOUT OUR ACTIONS.

11. SHOWING UP ON TIME AND BEING PREPARED IS 90% OF LIFE. (Woody Allen)

12. NEVER BLAME OTHERS. TAKE RESPONSIBILITY FOR EVERY ASPECT OF YOUR LIFE. (Plato)

COMMON COURTESIES:

The behavior of a few students would suggest that they never learned, or have forgotten, the basic rules of respecting the rights of others.

Persons Of Quality Do NOT Interfere With The Right Of Others.

Talking during lecture and other disruptive behaviors which interfere with the rights of others or their ability to learn, is unacceptable. Cell phones, pagers, tape or disk players MUST BE TURNED OFF in class.

FOOD and BEVERAGES (water is okay) should NOT be consumed in lecture or lab.

Small children do NOT belong in lecture or lab.

If anything occurs during lecture or lab that interferes with your ability to concentrate or to learn, let me know.

BEST WISHES FOR A GREAT SEMESTER AND A WONDERFUL YEAR!

BIO 205 LECTURE SCHEDULE & READING ASSIGNMENTS in 8th Ed of Shier, Butler, Lewis

For your SAFETY and to PROTECT others, please do NOT consume FOOD or BEVERAGE in LECTURE or LAB.

Read assignment before class.
Always read Chapter Objectives, Key Terms and Understanding Words at the beginning of chapters. After studying chapter, read the Chapter Summary, Critical Thinking Questions, and answer questions in Review Exercises at end. ?? denote ?? to answer.

Lect	DATE	DAY	LECTURE TOPIC	READING ASSIGNMENT ?? = questions
			- - - - - - - - - - Week 1 -	
			SLA/SI: M 4:30 - 6:00; W 4:00 - 5:00; W 5:00 - 6:00; R 4:00 - 5:00; R 6:00 - 7:00; Lab Tutoring F 1:00 - 3:00.	"Preface -" pp xxiii-xxv
1	Jan	13 M	Syllabus; (1LO) Introduction to A & P	Chp 1, 1-35; Answer ?? A,1-20; B,1-6 on p. 27
*-	Jan	14 T	Required: You may come at either 11:00-11:50 or 12:00-12:50. Attendance will be taken. (1LO-stud) Factors Affecting Learning and Memory; Factors Affecting Success in College and in Life: How to Study A & P; Applying knowledge to personal life; PLEDGE.	
2	Jan	15 W	Complete Introduction to A & P	Know Anatomical Terms pp. 18-22; Very Important!
			Review of Chemistry. (Be sure you know-	Chp 2, 36-58; Answer ?? 1-35 on p. 58; Ask if need help.
3	Jan	16 R	(2LO) Cell Structures & Functions	Chp 3, 59-77; Answer ?? 1-12 on p. 99
4	Jan	17 F	Cell Structures & Functions	Chp 3, 77-100; Answer ?? 13-35 on p. 100
			- - - - - - - - - - Week 2 -	
			SLA/SI: (No Monday SLA); W 4:00 - 5:00; W 5:00 - 6:00; R 4:00 - 5:00; R 6:00 - 7:00; Lab Tutoring F 1:00 - 3:00.	
-	Jan	20 M	NO LECTURE: MLK Day (I encourage all to attend various special programs commemorating Dr. King.) Special Note For Students In The Two Monday Lab Codes. Labs will meet at regular times. You may choose to come on Monday or sign to come on T, W, or R.	
*5	Jan	21 T	Complete Cell; Protein Synthesis	Chp 4, Scan 101-116; Study 117-134; ?? 1-8; 27-37 on p. 134
			Required: You may come at either 11:00-11:50 or 12:00-12:50. Attendance will be taken.	
6	Jan	22 W	(3LO) Tissues; Histology; Epithelium;	Chp 5, 135-144; ?? 1-11 on p. 159
7	Jan	23 R	Connective, Mus., & Nerv. Tis.;	Chp 5, 144-159; ?? 12-27 on p. 159
			Skin; Integumentary System	Chp 6, 160-183; ?? 1-29 on p. 183
8	Jan	24 F	(3LO) Bones; Joints	Chp 7, 184-200; ?? 1-21 on p. 240
			Read: Chp 8 (Joints), pp. 256-267; Skim 268-280 ?? 1-15 on p. 286 (Know 3 types of joints; 6 synovial joints; 17 joint movements.)	
			- - - - - - - - - - Week 3 -	
			SLA/SI: M 4:30 - 6:00; W 4:00 - 5:00; W 5:00 - 6:00; R 4:00 - 5:00; R 6:00 - 7:00; Lab Tutoring F 1:00 - 3:00.	
9	Jan	27 M	(4LO) Nervous Sys; Membrane Potential	Chp 10, 343-356; ?? 1-10 on p. 372
10	Jan	28 T	Depolarization/Repolarization/AP	Chp 10, 356-360; ?? 11-15 on p. 373
*			Required: You may come at either 11:00-11:50 or 12:00-12:50. Attendance will be taken.	
11	Jan	29 W	Conduction, Velocity, Synapses	Chp 10, 360-364; ?? 16-19 on p. 373
12	Jan	30 R	EXAM 1 Bring two # 2 Pencils, Eraser, and blue or black Ballpoint -- NOT red. Wait outside door. Pick up Scrantron on back table as you enter. I will hand exam to you as I assign you a seat. (Leaving the room during an exam disturbs others and is inappropriate. PLEASE, just prior to the exam, get drink, go to rest room, etc., bring tissues and anything else you might need.)	
13	Jan	31 F	Synapses; NT; coding; processing	Chp 10, 365-373; ?? 20-27 on p. 373

- - - - - - - - - - - - Week 4 -

SLA/SI: M 4:30 - 6:00; W 4:00 - 5:00; W 5:00 - 6:00; R 4:00 - 5:00; R 6:00 - 7:00; Lab Tutoring F 1:00 - 3:00.

14	Feb	3	M	Processing; REVIEW for Exam 1.	Chp 10, 365-373; ?? 20-27 on p. 373
15	Feb	4	T	(5LO1) Neurons; Glial Cells; Regener.	Review Chp 10, 344-354;
*				Required: You may come at either 11:00-11:50 or 12:00-12:50. Attendance will be taken.	
**				---> *This is the last "catch-up" or "get-ahead" lecture.*	
16	Feb	5	W	(5LO2) PNS; 12-CN; SpCd; Cerebellum	Chp 11, 374-386, 403-418; ?? 1-8; 29; p. 429
17	Feb	6	R	(6LO) CNS; Reflex; Brain Stem	Chp 11, 398-418; ?? 22-38 on p. 429-430
18	Feb	7	F	Cerebrum, Sensory, Thought, Motor	Chp 11, 387-398; ?? 9-21 on p. 429

- - - - - - - - - - - - Week 5 -

SLA/SI: M 4:30 - 6:00; W 4:00 - 5:00; W 5:00 - 6:00; R 4:00 - 5:00; R 6:00 - 7:00; Lab Tutoring F 1:00 - 3:00.

19	Feb	10	M	Cerebrum: Speech, RF, R-OH, Memory	
-	Feb	11	T	Optional review at 11:00-11:50 and 12:00-12:50	
20	Feb	12	W	Cerebrum: Memory, Language, CNS development	
21	Feb	13	R	(7LO) Senses, Touch, Smell, Taste	Chp 12, 431-445; ?? 1-21 on p. 478
22	Feb	14	F	Balance; Hearing	Chp 12, 446-457; ?? 22-32 on p. 478

- - - - - - - - - - - - Week 6 -

SLA/SI: M 4:30 - 6:00; W 4:00 - 5:00; W 5:00 - 6:00; R 4:00 - 5:00; R 6:00 - 7:00; Lab Tutoring F 1:00 - 3:00.

23	Feb	17	M	Complete Hearing; Vision	Chp 12, 457-478; ?? 33-48 on p. 478
-	Feb	18	T	Optional review at 11:00-11:50 and 12:00-12:50	
24	Feb	19	W	Complete Vision	
25	Feb	20	R	EXAM 2 Bring two # 2 Pencils, eraser, and blue or black Ballpoint. <u>Wait outside door</u> Prior to the exam, get drink, go to rest room, bring tissues and anything else you need.)	
26	Feb	21	F	(8LO) Autonomic Nervous System (ANS)	Chp 11, 418-429; ?? 39-49 on p. 430

- - - - - - - - - - - - Week 7 -

SLA/SI: M 4:30 - 6:00; W 4:00 - 5:00; W 5:00 - 6:00; R 4:00 - 5:00; R 6:00 - 7:00; Lab Tutoring F 1:00 - 3:00.

27	Feb	24	M	Finish ANS; Start (9LO) Muscles	
-	Feb	25	T	Optional review at 11:00-11:50 and 12:00-12:50	
28	Feb	26	W	Muscles, Anatomy and Histology	Chp 9, 281-287; ?? 1-8 on p. 335
29	Feb	27	R	Muscle Physiology; Contraction	Chp 9, 287-300; ?? 9-30 on p. 335
30	Feb	28	F	Muscle Physiology; Energy, Metabolism	Review: Chp 4, 101-116; ?? 9-26 on p. 134

- - - - - - - - - - - - Week 8 -

SLA/SI: M 4:30 - 6:00; W 4:00 - 5:00; W 5:00 - 6:00; R 4:00 - 5:00; R 6:00 - 7:00; Lab Tutoring F 1:00 - 3:00.

31	Mar	3	M	Muscle Physiology; Threshold, Twitch, Tetanus	
-	Mar	4	T	Optional review at 11:00-11:50 and 12:00-12:50	
32	Mar	5	W	(10LO) Endocrine System; Hormones	Chp 13, 479-488; ?? 1-11 on p. 518
33	Mar	6	R	Hypothalamus, RH & IH; Pituitary	Chp 13, 488-495; ?? 12-23 on p. 518
34	Mar	7	F	Pituitary, Growth Hormone, hGH	

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Mar 8-16 **SPRING BREAK.** Relax; Have fun; Eat right; Exercise; *Stay sober;* Read a good book. Avoid sunburns. If you travel, drive safely, learn about the area you visit, write letters or cards to family and friends, volunteer to help others.

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- - - - - - - - - - Week 9 -

SLA/SI: M 4:30 - 6:00; W 4:00 - 5:00; W 5:00 - 6:00; R 4:00 - 5:00; R 6:00 - 7:00; Lab Tutoring F 1:00 - 3:00.

35	Mar	17	M	Thyroxine; Parathormone	Chp 13, 495-501; ?? 24-29 on p. 518
-	Mar	18	T	Optional review at 11:00-11:50 and 12:00-12:50	
36	Mar	19	W	Pancreas, Insulin, Glucagon; DM	Chp 13, 507-518; ?? 36-43 on p. 519
37	Mar	20	R	**EXAM 3** Bring two # 2 Pencils, eraser, and blue or black Ballpoint. Wait outside door Prior to the exam, get drink, go to rest room, bring tissues and anything else you need.)	
38	Mar	21	F	Adrenal Cortex, G and M	Chp 13, 501-506; ?? 30-35 on p. 518-9

- - - - - - - - - - Week 10 -

SLA/SI: M 4:30 - 6:00; W 4:00 - 5:00; W 5:00 - 6:00; R 4:00 - 5:00; R 6:00 - 7:00; Lab Tutoring F 1:00 - 3:00.

39	Mar	24	M	(11LO) CVS, Arteries, Veins, Blood, Bld. Clot	Chp 14, 520-551; ?? 1-42 p.551-2
-	Mar	25	T	Optional review at 11:00-11:50 and 12:00-12:50	
				Anatomy of Heart	Chp 15, 553-565; ?? 1-7 on p. 618
40	Mar	26	W	Anatomy of Blood Vessels	Chp 15, 573-582; ?? 17-26 on p. 619
41	Mar	27	R	Actions of Heart, Cycle, Sounds,	Chp 15, 565-595; ?? 8-16 on p. 618 Read 612-618; (Scan 595-615 for lab)
42	Mar	28	F	(12LO) Cardiac Output, Body Fluids	Chp 15, 582-594; ?? 27-31 on p. 619

Last Day to drop or withdraw with a "W"

- - - - - - - - - - Week 11 -

SLA/SI: M 4:30 - 6:00; W 4:00 - 5:00; W 5:00 - 6:00; R 4:00 - 5:00; R 6:00 - 7:00; Lab Tutoring F 1:00 - 3:00.

43	Mar	31	M	Blood Flow; Blood Pressure	
-	Apr	1	T	Optional review at 11:00-11:50 and 12:00-12:50	
44	Apr	2	W	Lymphatic System; Immunity	Chp 16, 620-654; ?? 1-46 on p. 654
45	Apr	3	R	(13LO) Digestive System, Anatomy	Chp 17, 655-676; ?? 1-25 on p. 702
46	Apr	4	F	Physiology of Digestion	Chp 17, 676-702; ?? 26-44 on p. 702

- - - - - - - - - - Week 12 -

SLA/SI: M 4:30 - 6:00; W 4:00 - 5:00; W 5:00 - 6:00; R 4:00 - 5:00; R 6:00 - 7:00; Lab Tutoring F 1:00 - 3:00.

47	Apr	7	M	Nutrition and Metabolism	Chp 18, 705-737; ?? 1-41 on p. 736-7
-	Apr	8	T	Optional review at 11:00-11:50 and 12:00-12:50	
48	Apr	9	W	(14LO) Anatomy of Respiratory System	Chp 19, 738-751; ?? 1-13 on p. 776
49	Apr	10	R	**EXAM 4** Bring two # 2 Pencils, eraser, and blue or black Ballpoint. Wait outside door Prior to the exam, get drink, go to rest room, bring tissues and anything else you need.)	
50	Apr	11	F	Ventilation & Mechanics of Breathing	Chp 19, 751-764; ?? 14-31 on p. 776-7

- - - - - - - - - - Week 13 -

SLA/SI: M 4:30 - 6:00; W 4:00 - 5:00; W 5:00 - 6:00; (No Thursday or Friday SLA-SI or Lab Tutoring.

51	Apr	14	M	Transport of O_2 & CO_2	Chp 19, 775-786; ?? 21-37 on p. 794
-	Apr	15	T	Optional review at 11:00-11:50 and 12:00-12:50	
52	Apr	16	W	Control of Respiratory	
-	Apr	17	R	NO CLASS TODAY -- EASTER BREAK	Special Note for Thursday Lab.

We will hold lab on Thursday for those who prefer to come on Thursday, or
You may sign up to come to lab on Monday, Tuesday, or Wednesday.

Take your books with you; study; relax. Give family and friends a hug! Enjoy the long weekend.

- - - - - - - - - - - - Week 14 -

				SLA/SI: M 4:30 - 6:00; W 4:00 - 5:00; W 5:00 - 6:00; R 4:00 - 5:00; R 6:00 - 7:00; Lab Tutoring F 1:00 - 3:00.	
53	Apr	21	M	(15LO) Urinary System Anatomy	Chp 20, 778-794; ?? 1-16 on p. 811
-	Apr	22	T	No Review today at 11:00 nor at 12:00.	
--	*Apr*	*23*	*W*	NO Lecture today. I'll be at Professional meeting. Replaced by Jan 21. Study for Final	
--	*Apr*	*24*	*R*	NO Lecture today. I'll be at Professional meeting. Replaced by Jan 28. Study for Final	
--	*Apr*	*25*	*F*	NO Lecture today. I'll be at Professional meeting. Replaced by Feb 4. Study for Final	

- - - - - - - - - - - - Week 15 -

				SLA/SI: M 4:30 - 6:00; W 4:00 - 5:00; W 5:00 - 6:00; R 4:00 - 5:00; R 6:00 - 7:00.	
54	Apr	28	W	Physiology of the Nephron Counter current Mechanism	Chp 20, 794-811; ?? 17-43 on p. 811
-	Apr	29	T	Optional review at 11:00-11:50 and 12:00-12:50	
55	Apr	30	W	Acid - Base balance.	Chp 21, 813-833; ?? 1-27 on p. 833-4
56	May	1	R	(16LO) Male Reproductive System	Chp 22, 835-850; ?? 1-26 on p. 889
57	May	2	F	Female Anatomy and Physiology	Chp 22, 850-864; ?? 27-50 on p. 889
				Pregnancy and Parturition	Chp 22, 864-877; ?? 51-59 on p. 890
				STD and Birth Control	Chp 22, 877-890; ?? 60-62 on p. 890
					Optional: Chp 23 & 24

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- - - - - - - FINAL EXAM WEEK - - - Final Given at Two Times; Select One - - - -

You may take Final Exam on either Monday, 5-5-02 @ 12:00 noon or Wednesday, 5-7-02 @ 2:00
You MUST SIGN up on May 1 if want to take the exam on Wednesday, May 7.

May 5 M **12:00 noon: FINAL EXAM** 200 pts. Monday, May 5, at 12:00 - 1:40 a.m. in Sci-126
100 pts from weeks 13-15; *plus* 100 pts from weeks 1-12.
Bring two # 2 Pencils, eraser, and blue or black Ballpoint. Wait outside door
Prior to the exam, get drink, go to rest room, bring tissues and anything else you need.)

May 7 W **2:00 p.m. OPTIONAL Time for FINAL EXAM** 200 pts.
Wednesday, May 7, at 2:00 - 3:40 pm. in Sci-126. MUST sign to take exam on Wednesday.

BIOL-205 LABORATORY SCHEDULE WINTER 2002

Be sure to study lab assignments before coming to lab. Labs will begin with a pre-lab quiz over that days lab and a post-lab quiz over the material from the previous week's lab.

ANATOMY LABS: Label and study all anatomy diagrams before coming to lab.

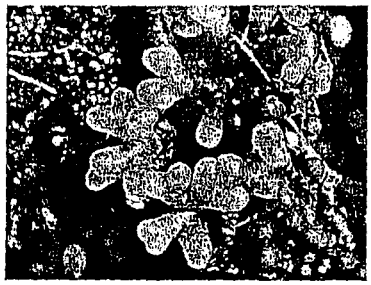
PHYSIOLOGY LABS: Read entire lab and review the Review Questions (on yellow pages) before coming to lab.

Week/Date		Lab #	LECTURE TOPIC	INSTRUCTIONS and READING ASSIGNMENT (Review pages below in 8th Ed Hole's A & P, by Shier, et al.)
1	1-13s	Lab 3	Skeletal System Anatomy	See *Text:* pages 201-234. (Label diagrams in Lab 3.) (Next Monday is MLK Birthday. Monday labs must sign for day and time for next week's lab.)
2	1-20	Lab 4	Cell Physiology	Read lab 4; Review *Text:* pages 78-81 (Diffusion) Monday is MLK Day. It is proper for all persons who wish to reverently commemorate this Day to do so. It is also essential that we not lose a week of lab. Students enrolled in codes 211 & 212 may come to lab on Monday, or sign for another slot. Everyone in 211 & 212 must SIGN for a t
3	1-27	Lab 1 Lab 2	Microscopy - Histology - Epithelium	Read pages 1-3 of Lab 1 Read pages 1-5 of Lab 2, Review *Text:* pages 137-141
4	2-03	Lab 2	Histology - Connective, Muscle, Nerve tissue:	Read p. 6-9 of Lab 2; Review *Text:* 144-155
5	2-10c	Lab 5	Neural Anatomy Bones of Skull	Review *Text:* 388-390; 397-399; 402; 409; 415; 420; 446; 459-466; 969; 995 Review *Text:* 203-214; 241-255 (Label diagrams in Lab 5.)
6	2-17o	Lab 7	Membrane Action Potential	Review *Text* pages 357-360; Read Lab # 7.
7	2-24	Lab 6	Nervous System Function	Review *Text* pages 420;432-450; 459-465; Read Lab # 6.
8	3-03p	Lab 8	Contraction of Skel. Muscles	Review *Text* pages 287-297; Read Lab # 8.
	3-10		SPRING BREAK	(Plan activities that improve your physical and mental health. Do something nice for others; do some volunteer work.) (Label and study the diagrams in Labs 10 & 11.)
9	3-17c	Lab 9 Lab 10	Muscle Anatomy CVS Anatomy: Blood Cells	*Text:* 300-330; 973-980; (Label diagrams in Lab 9) *Text:* (Review WBC on pages 523 and 530 before coming to lab.)
10	3-24c	Lab 10 Lab 11 Lab 11	CVS Anatomy Respiration Anatomy Digestion Anatomy	*Text:* 556-566; 595-611; 970-971; 980-982; (Label diagrams in Lab 10) *Text:* 740-741; 744-752; 758; 761; 964-965; 970; 980; (Label Lab 11) *Text:* 665-671; 676-680; 693; 946-968; 983-984; (Label diagrams in Lab 11)
11	3-31p	Lab 14	Cardiac Muscle Physiology: Turtle Heart:	Review *Text* 571-575 (Read Lab # 14.)
12	4-07p	Lab 12	Circulatory System: Human ECG, Bld Pressure:	Review *Text* 566-575; 586-587; (Read Lab # 12.) Easter Vacation begins next week on Thursday, 4-17. Students in Thursday lab may take Lab on 4-17 or sign to attend another lab.
13	4-14c	Lab 13 Lab 13	Urinary Anatomy Reproductive Anatomy	*Text:* 780-786; 803-804; 807; (Label diagrams in Lab 13) *Text:* 837; 839; 841; 845; 851; 854; 857; 859; (Label diagrams in Lab 13) (Students in lab 216 may come Thursday 8:00-11:00 or to another lab -- if you signed to do so.)
14	4-21c		Take Quiz over Lab 13; REVIEW for Lab Practical; Sign for 1.25-hour time-slot to take Lab Exam next week.)	
15	4-28c		LAB PRACTICAL EXAM OVER ALL LABS	Come on the day and at the time for which you signed.

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

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

Lactarius hyphae on Pine roots



Anzia colpodes black foam lichen

MICROBIAL ECOLOGY
BIOLOGY 218
COURSE SYLLABUS
WINTER SEMESTER 2003

Instructor: Dr. Scott Herron
Office: 2012 Arts and Science Commons (ASC)
Telephone: 591-2087
Email: herrons@ferris.edu

Office Hours:
Monday 11:00 am-12:00 pm
Tuesday 9:15 am-10:00 am, 2:15 3:00 pm
Thursday 9:15 am-10:00 am, 2:15-3:00 pm
All other office hours by appointment

Required Materials:
Lecture book- Microbial Ecology, by Atlas and Bartha, 1998, 4th ed., Benjamin/Cummings Publishing Company.
Laboratory- Microbiological Applications, by Benson, 2002, 8th ed., McGrawHill Publishers.
Two packets of **Scantron** computer grading sheets (See Bookstore for scantrons).

Class Schedule

Lecture:	Section 211	T, TH	12-12:50PM
	Lecture Room: SCI 215		
Lab:	Section 211	T, TH	1:00-2:15PM
	Lab Room: SCI 215		

Course Objectives:
To improve your understanding of the basic principles and applications of Microbial Ecology, see how these principles are related to each other, and realize how they affect our daily lives. My goal is to instill an enthusiasm in you to observe and learn more about the living organisms around you, while reflecting on the knowledge of life throughout your life.

Grading Policies:
There will be four (4) scheduled exams. Exam questions will be true/false, multiple choice, and/or fill in the blanks. Exams will be taken from the lectures, class handouts, textbook readings, and lab materials. An optional final exam will also be given. This final exam will be comprehensive and will be able to replace a lower score from the previous four exams.

Students are required and expected to take the exams and quizzes at scheduled times. Failure to take exams and quizzes at the scheduled time will result in a grade of zero.

Surprise quizzes may be given during the semester, especially if I feel that the students are not keeping up with the assigned readings. Each surprise quiz will cover materials from the previous lectures. Surprise quiz points are bonus points.

Grades: Grades will be determined by comparing the students' total number of points to the number of points possible in the course. I expect that there will be **approximately** 400 points possible in lecture, 180 points in laboratory, and 100 points from the final exam (optional points to replace a low or missed exam).

Synopses: Synopses are graded assignments where you will be required to illustrate your writing and analyzing abilities in regards to scientific literature. You will type an original 1 page summary of a primary research article in Microbial Ecology. The due dates, number of synopses, and point totals applied to the lab grade will be determined in class.

Letter grades will be assigned according to the following scale:

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

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

Attendance Policy: Prompt attendance to all classes is required and expected. If you miss lecture, you are responsible for the lecture contents and any assignments given out during the lecture. Attendance will be taken **only** at the beginning of the class periods. **There is a two point penalty for each missed lecture and a one point penalty for tardiness.** If you have a valid reason for an absence, see Dr. Herron with your documentation as soon as you return. **Attendance in all lab sessions is required as there will be no make up lab period.** *Failure to attend more than two lab periods is grounds for failure as stated in Biology Departmental policies.*

Study Suggestions: Come to class regularly and be on time. Do not talk in class when the instructor is addressing the class. Organize your notes clearly, remembering that overhead materials are an outline. Read your textbook and fill in missing information. Ask questions regularly, during lecture, lab, or office hours. Study with classmates. Use student development services for tutoring if needed, but see me 1st.

BIOLOGY 218 (MICROBIAL ECOLOGY)
TENTATIVE LECTURE SCHEDULE

Date	Subject	Reading
1/14	Introduction to Microbial Ecology	Chapter 1
1/16-1/21	Microbial Evolution and Biodiversity	Chapter 2
1/23	Interactions among Microbial Populations	Chapter 3
1/28	Interactions among Microbial Populations	Chapter 3
1/30	Interactions betw Microbes & Plants	Chapter 4
2/4	Interactions betw Microbes & Plants	Chapter 4
2/6	Interactions betw Microbes & Animals	Chapter 5
2/11	Interactions betw Microbes & Animals	Chapter 5
2/13	**Exam # 1**	
2/18	Development of Microbial Communities	Chapter 6
2/20	Physiological Ecology: Abiotic Factors	Chapter 8
2/25	Microbes in the Air & Water	Chapter 9
2/27	Microbes in the Soil	Chapter 9
3/4	**Exam # 2**	
3/6	Biogeochemical Cycling: Carbon & O_2 **<Spring Break 3/8-3/16>**	Chapter 10
3/18	Biogeochemical Cycling: Nitrogen, etc.	Chapter 11
3/20	Biodeterioration of Solid Wastes	Chapter 12
3/25	Biodeterioration of Liquid Wastes	Chapter 12
3/27	Persistence and Biomagnification of Xenobiotic Molecules	Chapter 13
4/1	Microbes & Inorganic Pollutants	Chapter 13
4/3	Biodegradation: Testing and Monitoring	Chapter 14
4/8	Microbial Recovery of Metals	Chapter 15
4/10	**Exam # 3**	
4/15	Microbes and Petroleum **<Easter Break 4/17-4/20>**	Chapter 15
4/22	Microbes and Fuel; Microbial Biomass	Chapter 15
4/24	Environmental Modification and the Control of Pests	Chapter 16
4/29	Predatory & Pathogenic Control of Pests	Chapter 16
5/1	Genetic Engineering and Pest Control	Chapter 16
Week of 5/5-5/9	**Exam # 4 plus Final Exam**	

Laboratory attendance is mandatory! More than two unexcused absences from lab will result in failure of the course. It is expected that you read the Lab Manual and any reading assignments prior to the beginning of lab period. You must also hand in any pre-lab assignments prior to the lab period.

LABORATORY SCHEDULE

Week	Week of	Subjects	Exercise in Lab Book
1	Jan. 13	Brightfield Microscopy	1
2	Jan. 20	Protozoa, Algae, and Cyanobacteria Microscopic Invertebrates	6 7
3	Jan. 27	Bacteria Fungi (Yeasts and Molds)	9 10
4	Feb. 3	Aseptic Technique Negative Staining Gram Staining	8 11 15
5	Feb. 10	Pure Culture Techniques Bacterial Population Counts	21 23
6	Feb. 17	Slide Cultures: Autotrophs Slide Cultures: Molds	24 26
7	Feb. 24	Slime Mold Culture Isolation of Phototrophic Bacteria	25 27
8	March 3	Nitrogen-fixing Bacteria Ammonification in Soil	59 60
9	March 10	**No labs this week**	
10	March 17	Bacterial Commensalism Bacterial Synergism Microbial Antagonism	31 32 33
11	March 24	Temperature: Effects on Growth Temperature: Lethal Effects	34 35
12	April 1	pH and Microbial Growth Osmotic Pressure and Bacterial Growth	36 37
13	April 7	Oligodynamic Action Ultraviolet Light: Lethal Effects	38 39
14	April 14	Microbial Spoilage of Canned Food Microbial Spoilage of Refrigerated Meat	70 71
15	April 21	Microbiology of Alcohol Fermentation Microbiology of Yogurt Production	72 73
16	April 28	Field Trip	

Lab Grades: Each of 15 labs will be worth 10 points, for a total of 150 points. Lab quizzes (10 points each) in the beginning of lab and synopses will account for additional points(15-60 pts).

M.Ryan, Ph.D **BIOL 286: GENERAL MICROBIOLOGY** **WINTER 2003**

DATE	TOPIC:	CHAPTER ASSIGNMENT:
MON 13 JAN.	Introduction and history	1,3,4,14,26
WED. 15 JAN.	Procaryotic and Eucaryotic Cells	4,9
MON. 20 JAN.	MLK DAY NO CLASS!	
WED. 22 JAN.	Bacterial Structure and Function	4
MON. 27 JAN.	Bacterial Structure and Function	4
WED. 29 JAN.	Bacterial Structure and Function	4
MON 3 FEB.	Bacterial Growth and Sporulation	6
WED. 5 JAN	Bacterial Classification	9
MON. 10 FEB	Fungal Structure, Classification, Growth	11
WED. 12 FEB.	Viral Structure and Replication	10
MON. 17 FEB.	Viral Structure and Replication	10
WED. 19 FEB	EXAM I	
MON. 24 FEB.	Microbial Metabolism	2,5,25
WED. 26 FEB.	Microbial Metabolism	2,5
MON. 3 MAR	Microbial Metabolism	2,5
WED. 5 MAR.	Microbial Genetics	7,8
MON. 10 MAR.	SPRING BREAK!!	
WED. 12 MAR.	SPRING BREAK!!	
MON. 17 MAR.	Microbial Genetics	7,8
WED. 19 MAR	EXAM II	
MON. 24 MAR	Antimicrobial Agents	12
WED. 26 MAR.	Antimicrobial Agents (Last day for W grade 28March)	12
MON. 31 MAR.	Sterilization and Disinfection	13
WED. 2 APR	Host/Parasite Relationships	14,15
MON. 7 APR.	EXAM III	
WED. 9 APR	Microbial Pathogenicity	19-22
MON. 14 APR.	Microbial Pathogenicity	20-22
WED. 16 APR.	Innate Immunity	16
MON. 21 APR	Humoral Immunity	17
WED. 23 APR.	Cellular Immunity	17
MON. 28 APR.	Hypersensitivity	18
WED. 30 APR.	Hypersensitivity	18
TUES. 6 MAY	COMPREHENSIVE FINAL EXAM	(10:00AM-11:40AM)

TEXT: MICROBIOLOGY, Principles and Applications. 5th Edition. 2002.
By Jacquelyn G. Black. Prentice-Hall, Inc. Englewood Cliffs, NJ

PREREQUISITES: a prior college level biology course and a year of college level chemistry.

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 exams 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 may 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 an 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.

MIDTERM GRADES will be issues and based on an available lecture grades and an approximate lab grade.

OFFICE HOURS: Mon./Wed. 9:30-10AM and 12:30-1PM as well as by appointment! You may contact me at @ext.5892 or ryanm@ferris.edu or CAS Commons 2115.

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, and genetics.
5) To learn the mechanisms of microbial pathogenicity and microbial control through sterilization, disinfection, antimicrobials and the human immune response.

BIOLOGY 231 HUMAN ANATOMY AND PHYSIOLOGY FALL 2002

Dr. Robert Palmer Office: Commons 2113 Phone: 591-2552 Email: Robert_Palmer @ferris.edu
Office Hours: M 1-3; T, W, and Th 9-10; or drop in/call my office anytime! (or rpalmer@ferris.edu)

Prerequisites: Biology 121 and 122, and Chemistry 121 and 122.

		Lecture Topic - SCI 120	Laboratory Exercise (number) - SCI 228
Aug	26M	Introduction/Homeostasis	1. Microscope and Histology (1)
	28W	Cell Structure and Function	
	30F	Cell control	
Sept	2	Labor Day recess	2. Histology (con't)
	4	Tissue Structure and Function	
	6	" " "	
	9	" " "	3. Integument (2)
	11	Integument	
	13	Membrane Transportation	
	16	" "	4. Cell Membrane Permeability (3)
	18	" "	
	20	Exam 1 (Homeo - Memb Tran)	
	23	Membrane Potential	5. Lab Exam 1
	25	" "	
	27	Neuron Structure	
	30	" "	6. Oscilloscope and Effects of Caffeine
Oct	2	Synaptic transmission	on the ECG (4 and 5)
	4	" "	
	7	Exam 2 (Memb Potent - Syn. Transp)	7. Compound Action Potential (6)
	9	Central Nervous System organization	
	11	" " " "	
	14	" " " "	8. Neural anatomy (7)
	16	Peripheral Nervous system	
	18	" " "	
	21	Sensory Receptors/organs	9. Sensory Physiology (8)
	23	" " "	
	25	Autonomic Nervous system	
	28	Exam 3 (CNS - Sensory Recep)	10. Lab Exam 2
	30	ANS con't.	
Nov	2	" "	
	4	Muscle anatomy	11. Skeleton (9)
	6	" "	
	8	Skeletal muscle physiology	
	11	" " "	12. Muscle anatomy (13))
	13	" " "	
	15	Smooth muscle	
	18	Exam 4 (ANS - Smooth muscle)	13. Muscle physiology (10 and 11)
	20	Endocrine system	
	22		
	25	Pituitary gland	Open laboratory
	27	" "	
	29	Thanksgiving Day Recess	
	2	Other endocrine glands	14. Lab Exam 3
	4	" " "	
	6	" " "	
Dec	12 Th	Exam 5 10:00 - 11:40 a.m. Sci 120	

Note: Dates for lecture exams are approximate and may be changed. Exact dates will be announced in lecture. The date for Exam 5 on December 12th is fixed (i.e., you can't take it early except for University excused activities).

Texts: Saladin Anatomy and Physiology 2nd Ed McGraw Hill
(Other texts may be acceptable, see me.)
Palmer. Bio 231 Lab Manual (Only at FSU Bookstore)

Supplies: You should obtain disposable gloves for animal dissection or cadaver use. You should also bring a notebook to laboratory along with your Lab Manual to take notes, record data, write reports, etc. Most other materials needed in the course will be provided for you in lecture and lab. You do not need to provide a lab coat for laboratory but I would recommend that you don't wear your best clothing to lab.

Grades: The total number of points you have earned in class will determine your final grade in the class. Students with the highest number of points will receive A's, the next highest group will get B's, and so on. In lecture there will be five 100-point exams covering lecture material for a total of 500 points that can be obtained from lecture exams. The total points that can be obtained from laboratory activities will be around 10 to 20 points per exercise, depending on the amount of material in each lab. The total points for laboratory will amount to around 150. Other assignments and quizzes may be assigned to the whole class in lecture or lab, but no other source of points (i.e. extra credit) is available for individual students to improve their grade. Therefore, the total possible points that can be earned in the course is going to be approximately 650.

After each major lecture and lab exam, a letter grade scale will be posted for the exam and also for the total points accumulated so far in the course so that you will know your approximate grade throughout the course. Plus and minus grades are given on the final grade for the course for those right adjacent to the cutoff between letter grades.

Exams: Lecture exams will be based only 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 lecture exams will be placed on reserve in the library. Lab quizzes will be based only on material covered in laboratory and will be mostly short answer using calculations, identifications, diagrams, etc. Makeup exams for missed exams and quizzes will usually be all essay.

Attendance: Attendance in lecture is usually optional and if you do not feel like coming to class, listening to lecture and taking notes, do not come. However, most of the questions on the lecture exams will be taken from the lecture notes so obtaining a good set of notes is imperative. Copying someone else's notes is not usually as good as taking your own notes. AND, there is a high correlation between students who do not attend regularly and poor grades. There may be occasions when attendance is required but these times will be announced ahead of time. The only other times attendance at lecture is required is during the exams. If you know ahead of time that you need to be excused from an exam, please make arrangements with me as soon as possible. If you miss an exam because of personal illness, emergency, or other cause, you will have to have acceptable verification in order to make up the exam or quiz. Please try to contact me before missing the class or as soon as possible after an absence has occurred.

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

Other information. Included in this syllabus is the syllabus attachment for the College of Arts and Sciences. It has a great deal of helpful information. Please review and retain this sheet for future reference.

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

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 technical 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 characteristics of blood vessels?" or "How does blood flow through the body?".

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 processes and theories. In other words, I want you to practice synthesizing material. For instance, how do nervous and endocrine systems compare in their control of urine formation?

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. Use correct grammar, punctuation, sentence structure, etc.

****

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 that 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, processes that cannot be seen with the eye, must be deduced from experimental data, and 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. TAKE 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 other students won't distract you.
   Use abbreviations and short cuts (i.e. don't write in complete sentences) and expand them later.
   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 explanations and 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 areas 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 memorized.

Test yourself by covering your notes and writing it down in abbreviated form, by using flashcards, by repeating it to a classmate, by recording it on a tape player and play it back while looking at your notes, etc. If you didn't get it right, study 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 period. 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 an exam 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 at least) study together. Stick to business!!!

5. TAKE THE EXAM CAREFULLY.

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

On multiple choice, read the question and try to answer it before you look at the answers. If the answer you came up with is not there, re-read the question.

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 know the answer but misread the question or did you just not know the information thoroughly enough? Try to adjust your exam taking or study techniques to eliminate the problem.

SYLLABUS ATTACHMENT

COLLEGE OF ARTS AND SCIENCES – FERRIS STATE UNIVERSITY

Fall 2002

IMPORTANT DATES

Classes Begin.....8/26/02
Last day for Drop/Add.....8/28/02
Labor Day (no classes).....9/02/02
Last day to Withdraw from Univ with "W".....10/31/02
Last day to Drop class with "W" 10/31/02
Thanksgiving Holiday (no classes).....11/28-29/02
Last day of fall semester classes. 12/06/02
FINAL EXAMS.....12/09-13/02
Fall semester commencement.....12/14/02

LIBRARY HOURS

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Monday-Thursday	8:00 a.m.-12:00 a.m.
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If you have questions or need help, talk to your instructor. Faculty office locations, phone numbers, and office hours can be obtained from the class syllabus, or the department office. Faculty directory notebooks are also located in the student lounges and in the dean's office (ASC 3052).

DROPPING CLASSES OR WITHDRAWING

If you need to drop a class, you must do so **OFFICIALLY**, through your dean's office, in order to avoid receiving an "F" grade in the course. If you need to totally withdraw from school, you must do so **OFFICIALLY** at Admissions and Records in CSS 201. The last day to withdraw or drop a class may be different for different classes. See dates listed under "Important Dates". In case of extenuating circumstances after these dates (e.g., a serious illness requiring you to withdraw from school), contact Admissions and Records at 591-2792.

INCOMPLETES

The intent and appropriate use of the "I" grade is NOT to avoid student probation, dismissal, or unacceptable grades, nor should it be considered as an extended alternative to withdraw from a class (W). The "I" is only considered for extenuating circumstances that have led to a student's missing a portion of the course. Extenuating circumstances are generally defined as those situations over which the student has little or no control--e.g., illness, birth, jury duty, death of a parent, serious injury. Instructors may require suitable documentation.

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

WHERE TO GO FOR HELP

Successful students are often those who seek help early, before little problems become big ones. Ferris State University offers a variety of services, **FREE OF CHARGE**, to help you. Details are on the next page.

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Academic Support Center

Arts & Sciences Commons 1017 591-3543

The Writing Center, Tutorial Services, and Academic Skills Center join together to offer FSU students an array of academic support services, e.g.

- tutoring for many Ferris courses
- individual help with writing skills and writing assignments for English or other courses.
- help in developing better reading and study strategies
- workshops to help you meet the challenges of college life
- workshops to help you write more effectively and easily

SCHOLAR Program

Arts & Sciences Commons 1025 591-5976

SCHOLAR is an academic support program that aids in the student's successful progression by offering a Peer Mentor Program, a Student Retention Program, and an Academic Student Advisory Committee.

Disabilities Services

Arts &Sciences Commons 1021 591-5039

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Personal Counseling, Sexual Assault, Substance Abuse

Birkam Health Center – 2nd Floor..... 591-5968

Personal counseling is available confidentially and free of charge. Counselors are available to assist with personal and stress-related problems, family and relationship issues, substance abuse, sexual assault, depression, or other similar problems. Call or stop by to obtain an appointment.

College of Arts & Sciences Department Offices

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

ACADEMIC MISCONDUCT

Academic misconduct refers to dishonesty or misrepresentation with respect to assignments, tests, quizzes, written work, oral presentations, class projects, internship experience, or computer usage; violation of computer licenses, programs, or data bases; or unauthorized acquisition or distribution of tests or other academic material belonging to someone else. It includes such behaviors as cheating, presenting another person's ideas or work as your own, taking someone else's exam for them, violating computer software licenses or program/data ownership, etc. If you are uncertain about whether a particular behavior might represent academic misconduct, be sure to ask your professor for clarification.

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

DISRUPTIVE BEHAVIOR

The College of Arts and Sciences strives to maintain a positive learning environment and educational opportunity for all students. Consequently, patterns of behaviors which obstruct or disrupt the teaching/learning environment will be addressed. The instructor is in charge of his or her course (e.g., assignments, due dates, attendance policy) and classroom (e.g., behaviors allowed, tardiness). Harassment, in any form, will not be tolerated. Some instructors have special requirements for their classes (e.g., lab safety procedures). If so, they will review those with you.

Penalties for disruptive behavior can include involuntary withdrawal from the course and/or disciplinary action to and including probation or dismissal from the University.

BIOLOGY 232 HUMAN ANATOMY AND PHYSIOLOGY 2 WINTER 2003

Dr. Robert Palmer Office: A&S Commons 2113 Phone: 591-2552
Email: Robert_Palmer@ferris.edu

Office Hours: M 1-3; T 9-11; W 9-10; or you may drop in or call my office anytime!
Email is really quick for short questions.

PREREQUISITE: PASSING GRADE IN BIOL 231

		Lecture: SCI 126 Topic (text chapter)	Laboratory: Science 228 Exercise (number)
Jan	13M	Introduction/Homeostasis	1. Digestive anatomy (1)
	15W	Digestive system anatomy	
	17F	" " "	
	20	Martin Luther King Day	2. Smooth Muscle Physiology (2)
	22	Digestive system physiology	
	24	" " "	
	27	" " "	3. Respiratory anatomy (3)
	29	Metabolism	
	31	"	
Feb	3	"	4. Lab Exam 1
	5	Respiratory system anatomy	
	7	Exam 1	
	10	External respiration	5. Respiratory Physiology (4)
	12	Gas transportation	
	14	" "	
	17	" "	6. Metabolism (5)
	19	Control of respiration	
	21	Cardiac anatomy	
	24	Cardiac physiology	7. Cardiovascular anatomy (6)
	26	" "	
	28	" "	
Mar	3	Cardiac control	8. Lab Exam 2
	5	Blood vessel anatomy	
	7	Exam 2	
	10-14	SPRING RECESS	
	17	Blood vessel anatomy (con't)	9. Electrocardiogram (7)
	19	Circulatory physiology	
	21	" "	
	24	Cardiovascular control	10. Cardiac muscle physiology (8)
	26	Blood	
	28	"	
	31	Immunology	11. Blood pressure regulation (9 & 10)
Apr	2	"	
	4	Exam 3	
	7	Renal anatomy	12. Lab Exam 3
	9	" "	
	11	Renal physiology	
	14	Control of urine production	13. Easter recess
	16		
	18	Easter Recess	
	21	Male reproductive anatomy	14. Renal/Reproductive anatomy (11)
	23	Exam 4	
	25	Male reproductive physiology	
	28	Female reproductive anatomy and physiology	15. Lab Exam 4
	30	" " "	
May	2	" " "	

May 8 Thursday, 10:00 - 11:40 a.m. Exam 5

Note: Exact dates for lecture exams will be announced in lecture. The date for Exam 5 on May 8th is fixed (i.e., you can't take it early except for University excused activities).

Texts:

Saladin Anatomy and Physiology 2nd Edition McGraw Hill (or similar book)
Palmer. BIOLOGY 232 Laboratory Manual. Winter 2002 (at FSU Bookstore)

Equipment: disposable surgical gloves

Grades: Your final grades in the class will be determined by the total number of points that you have earned in the class from the total possible points. Students with the highest points will receive A grades, the next highest group B grades, and so on. Exams in lecture will be given after having covered two or three major lecture topics. The general distribution of lecture exams during the semester are indicated in the lecture topic sequence. Each exam will be approximately one hundred points so the total points that can be obtained from lecture material will be approximately 500. Each laboratory exercise is worth approximately 10- 20 points. The total points that can be obtained from laboratory activities will be approximately 120 - 150. Other assignments and quizzes may be assigned to the whole class in lecture or lab, but no other source of points (extra credit) is available for individual students to improve their grade. Therefore the total number of points that can be earned in the class will be around 650.

After each lecture exam and lab exam, a letter grade scale will be posted based on the total points accumulated so far in the course so that you will know your approximate grade throughout the course. Plus and minus grades are given on the final grade at the end of the semester for those scores right adjacent to the letter grade cutoff.

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 exams will be based on material presented in lab and the questions will be multiple choice, short answer, calculations, identifications, diagrams, etc. Make up exams for excused absences from lecture exams and lab exams will usually be all short answer and essay.

Attendance: Attendance in lecture is optional 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 would be when exams or quizzes are given or if required attendance at a lecture is announced ahead of time in lecture. Some quizzes may be given in lecture but they will be announced at least one lecture before the quiz date. 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 may be asked to provide verification in order to make up a missed exam or quiz. Please contact me as soon as possible after missing an exam or quiz.

Attendance and participation in laboratory is mandatory for all students and an unexcused absence from lab, or lack of participation in lab, will result in a reduction of your course grade by twenty points plus any missed quiz or assignments. 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. Arriving at lab after I have begun conducting the laboratory will be considered a tardy and excessive tardiness will be counted as unexcused absences with a ten point deduction for the first tardy, and doubling with each successive tardy.

Other information Included in this syllabus is the syllabus attachment for the College of Arts and Sciences. It has a great deal of helpful information. Please review and retain this sheet for future reference.

At-risk 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 do better and 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 their 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 and ask me to explain difficult or confusing subjects.
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. See the College of Arts and Sciences syllabus attachment.

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!

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.

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. (i.e. 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 <u>same day</u>, 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.
   <u>Test yourself</u> 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 <u>**YOU**</u> need to understand and to memorize the material. Don't do the same as 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.

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SYLLABUS ATTACHMENT

COLLEGE OF ARTS AND SCIENCES -- FERRIS STATE UNIVERSITY

Winter 2003

IMPORTANT DATES

First day of classes.....1/13/03
Last day for schedule adjustment (drop/add).....1/15/03
Martin Luther King Day (no classes).....1/20/03
Spring recess (no classes)..... 3/8 - 3/16/03
Summer/fall early registration begins.....3/24/03
Last day to DROP or withdraw with "W" 3/28/03
Easter recess (no classes)..... 4/17 - 4/20/03
Last day of winter semester classes.....5/2/03
FINAL EXAMS ..... 5/5 - 5/9/03
Summer/fall early registration closes.....5/7/03
Winter semester commencement.....5/10/03

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(over)

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Pathophysiology
Biology 300
Winter 2002

Instructor:	Dr. Douglas Fonner	Office email:	fonnerd@ferris.edu
Office:	ASC 2011 Biology Dept.	Office Hours	M 10:00 – 12:00 am
Office Phone:	231 591-2554		W 10:00 – 12:00 am
Home Phone:	231 796-3077		Th 3:00 – 4:30 pm
Fax:	231 591-2540		

Goals and Objectives

The goal Pathophysiology is to increase your understanding of the interactions of cells and organ systems as they pertain to the disease state. Course objectives are:

1. To relate the fundamental principles and theories of physiology to diseases.
2. To improve rational thinking though application of course materials in problem solving.
3. To promote critical thinking by examining the observations that led to several of 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.

Grading System

		Component	
93% A	73% C	Exams (4)	60 %
90% A-	70% C-	Final	25 %
87% B+	67% D+	Case Studies	15 %
83% B	63% D	**Total**	**100 %**
80% B-	60% D-		
77% C+			

Exams: The 4 exams will include lecture, reading and case study materials. They will consist of multiple choice, matching, and short answer questions. The final is comprehensive.

Case Studies and Application Questions: Case studies and application questions apply pathophysiology concepts to clinical cases and problems. They will be completed in small groups during the class period.

Text: *Understanding Pathophysiology*, Huether, and McCance, second edition.

Course Materials on the Web

Your can access course materials on the Pathophysiology homepage on the Ferris server. Follow the path below to log into Pathophysiology. Your **username** is your last name and your **password** is your 9 digit student number, with hyphens (e.g., 000-00-0000). After you log on you can change your password. Be sure to select Pathophysiology when you log on.

http://www.ferris.edu → Faculty & Staff → Faculty Instructional Pages → Fonner, Doug → Pathophysiology

Schedule

Date		Topic
January	15	Cell function
	17	Cell injury
	22	Altered osmoregulation and excitability
	24	Inflammation
	29	General adaptation syndrome
	31	Cancer
February	5	Fluid compartments and edema
	7	**Exam 1**
	12	Water, sodium and potassium balance
	14	Acid-base balance
	19	Endocrine concepts, hypothalamus and pituitary
	21	Thyroid disorders
	26	Adrenal disorders
	28	Insulin and glucagon
March	5	Diabetes
	7	**Exam 2**
	12	**Spring Break**
	14	**Spring Break**
	19	Cardiac output
	21	Circulation, blood pressure and hypertension
	26	Atherosclerosis and coronary artery disease
	28	**Easter Break**
April	2	Heart failure
	4	Shock
	9	Respiratory disorders
	11	**Exam 3**
	16	Renal failure
	18	Esophagus and stomach disorders
	23	Small and large intestine disorders
	25	Liver, gall bladder and pancreas dysfunction
	30	**Exam 4**
May	2	Review
		Exam Week

Readings
Reference: *Understanding Pathophysiology*, Huether and McCance, second edition.

The topics are organized into general subject areas. Relevant chapters are listed after the subject followed by page numbers for specific topics.

General Concepts Chapters 1, 3, 6, 8, 9, 10

Cell Function	Pages 2-10, 12-20
Cell Injury	Pages 65-70, 83-97
Inflammation and Tissue Repair	Pages 152-154, 162-176
General Adaptation Syndrome	Pages 222-230
Altered Cell Growth and Cancer	Pages 235-250, 270-277

ECF Chapter 4

Compartments and Edema	Pages 104-107
Water and Sodium Balance	Pages 107-112
Potassium Balance	Pages 113-116
Acid-base Balance	Pages 116-122

Endocrine Chapters 17, 18

Basic concepts	Pages 446-452, 9-10, 471
Hypothalamus, pituitary	Pages 453-457, 472-477
Thyroid, parathyroid	Pages 457-460, 477-483
Pancreas and Diabetes mellitus	Pages 460-462, 483-493
Adrenals	Pages 462-466, 493-498

CVS Chapters 22, 23

Cardiac Output	Pages 590-608
Circulation	Pages 609-622
BP and Hypertension	Pages 618-621, 633-638
Atherosclerosis	Pages 629-633
Coronary artery disease	Pages 643-654
Heart failure	Pages 671-677
Shock	Pages 676-688

Pulmonary system Chapters 25, 26, 27

Ventilation	Pages 719-730
Gas Transport and Exchange	Pages 731-737
Pulmonary Disorders	Pages 745-759

Renal system Chapters 28, 29

Structure and Function	Pages 790-803
Renal Failure	Pages 808-824

Digestive system Chapters 33, 34

Esophagus	Pages 918-920, 945-948
Stomach	Pages 921-924, 950-956
Malabsorption	Pages 924-926, 956-957
Large intestine	Pages 928-929, 957-960
Liver and Gall bladder	Pages 930-935, 962-972
Pancreas	Pages 935-938, 972-973

ADVANCED MEDICAL MICROBIOLOGY AND IMMUNOLOGY

WINTER 2001 — BIOL 308 (3 CREDITS)

PRE-REQUISITE: BIOL 108 OR EQUIVALENT

LECTURE SCHEDULE AND COURSE INFORMATION

DATE	TOPIC	TEXT ASSIGNMENT
Mon. 1/8	The Nature of Infectious Agents	SCHAECHTER BOOK Chaps. 1, 2, 3
Wed. 1/10	The Nature of Infectious Agents	Chaps. 4, 8, 9, 10 and 31
Fri. 1/12	Antimicrobial Agents	Chap. 5, 30, and 43
Mon. 1/15	✣ MLK DAY - NO CLASS ✣	
Wed. 1/17	Epidemiology	Chap. 56
Fri. 1/19	QUIZ 1	
Mon. 1/22	Respiratory Tract Infections	Chaps. 12, 13, 23, 29, 44 and 59
Wed. 1/24	Respiratory Tract Infections	Chaps. 12, 13, 23, 29, 44 and 59
Fri. 1/26	GI Tract Infections	Chaps. 16, 17, 37, and 73
Mon. 1/29	Wound Infections	Chaps. 11, 15, 20 and 35
Wed. 1/31	CNS Infections	Chaps. 14, 20, 35 and 58
Fri. 2/2	QUIZ 2	
Mon. 2/5	Lyme Disease	Chap. 25.
Wed. 2/7	STD's - Bacterial	Chaps. 14, 24, 27, and 66
Fri. 2/9	STD's - Viral	Chaps. 38, 40, 41, 42 and 66
Mon. 2/12	Paramyxoviruses	Chap. 34
Wed. 2/14	Orthomyxoviruses	Chap. 36
Fri. 2/16	QUIZ 3	
Mon. 2/19	Orthomyxoviruses	Chap. 36
Wed. 2/21	Viral Hepatitis	Chap. 42 - Case Studies & Graphs
Fri. 2/23	Viral Hepatitis	Chap. 42 - Case Studies & Graphs
Mon. 2/26	Innate Immunity/Phagocytosis	BENJAMINI BOOK Chaps. 1-3
Wed. 2/28	The Immune System	Chaps. 1-3, 7- 9 & GLOSSARY p. 455
Fri. 3/2	QUIZ 4	
Mon. 3/5 - Fri. 3/9	✣ SPRING RECESS - NO CLASS ✣	
Mon. 3/12	The Immune System	Chaps. 1-3, 7- 9 & GLOSSARY p. 455
Wed. 3/14	Clonal Selection	Pages 5-7
Fri. 3/16	Humoral Immunity/Acute Inflammation	Chaps. 7, 8, 9, and 10
Mon. 3/19	Humoral Immunity/Acute Inflammation	Chaps. 7, 8, 9 and 10
Wed. 3/21	Cellular Immunity/Chronic Inflammation	Chaps. 7, 8, 9 and 10
Fri. 3/23 → LAST "W" DAY	QUIZ 5	
Mon. 3/26	Cellular Immunity/Chronic Inflammation	Chaps. 7, 8, 9 and 10
Wed. 3/28	Cytokines	Chap. 12
Fri. 3/30	Immunoglobulins	Chap. 4
Mon. 4/2	The Genetics of Antibody Diversity	Chap. 6
Wed. 4/4	Immunological Reactions	Chap. 5
Fri. 4/6	QUIZ 6	
Mon. 4/9	Complement	Chap. 13
Wed. 4/11	Allergy and Hypersensitivity	Chaps. 14, 15 and 16
Fri. 4/13	✣ EASTER RECESS - NO CLASS ✣	
Mon. 4/16	Allergy and Hypersensitivity	Chaps. 14, 15 and 16
Wed. 4/18	Immunological Disorders	Chaps. 17 and 18
Fri. 4/20	Immunological Disorders	Chaps. 17 and 18
Mon. 4/23	Immune Therapies	Chap. 21
Wed. 4/25	AIDS	Pages 345-353
Fri. 4/27	QUIZ 7	
Mon. 4/30	➢ COMPREHENSIVE FINAL EXAM ➣	12-1:40 pm

TEXTS: MECHANISMS OF MICROBIAL DISEASE, third edition 1998, by Schaechter et al for the first half of the course. The case studies are especially important.

IMMUNOLOGY: A SHORT COURSE, fourth edition, 2000, by Benjamini et al for the second half of the course. The chapter end summaries and questions (with answers) are especially important.

SUMMARY OF NOTIFIABLE DISEASES, 1997, Centers for Disease Control and Prevention (Do **not** purchase. I will supply the necessary materials from this publication)

INSTRUCTOR: W. Hoeksema, Office ASC 2013, Telephone: (231) 591-2555. Please leave a message, at any time, on my answering machine. Office Hours: 11:00 AM - 11:50 AM on M and W ; 1:00 - 3:00 PM on T and R. You can E-mail me at **hoeksemw@ferris.edu**

GRADING: Expect a quiz **every two weeks.** Your ONE LOWEST quiz grade will be dropped if you maintain a perfect attendance. If you miss a quiz 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 5/1. 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 poor 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.

WWW: The following 4 web sites are very helpful with respect to the course content of BIOL 308.

1. **http://www.medscape.com/ (NOTE: you will have to register, it's free)**
This site features excellent current information on infectious diseases and immunology

2. **http://www.mayohealth.org/mayo/9912/htm/immune.htm**
This site provides a basic introduction to the immune system and presents, in a well-written manner, the cells, tissues and organs important for immune cell development and activation.

3. http://www.biology.arizona.edu/immunology/immunology.html
This site provides a basic introduction to the immune system. At the end of each tutorial there is an online test with immediate access to correct answers and brief explanations. Material is clearly written, easy to navigate and is updated relatively frequently.

4. **http://www-micro.msb.le.ac.uk/**
This site has excellent on line courses in microbiology, virology and immunology from Leicester University

BIOL 340 Evolution
Fall 2002

Instructor: Dr. Mary R. Murnik Office: ASC 2117
Telephone: 231-591-2546 e-mail: murnikm@ferris.edu
Office Hours: M W 11-11:50am, T R 8:30-9:20am

Course Objectives:

BIOL 340 involves the study of the process of evolution, including the origin of species and fossil evidence in the geological record, and molecular evidence of evolutionary relationships. The purpose of this course is to increase your understanding of the evidence for organic evolution, the theories that have been offered to explain how evolution has occurred, and the fundamental principles in the study of evolution. You will learn to apply these principles in analyzing the relationships between biological organisms. You will consider the evidence of evolutionary relationships, including molecular homologies that have been recently discovered by genome projects, the evolution of metabolic pathways, symbiotic relationships and the evolution of eukaryotes. You will gain a broader understanding of how biologists think, and you will develop your skills in expressing yourself orally and in writing. This course meets General Education requirements as a Writing Intensive, Scientific Understanding 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 expected. Absences will result in lowering your grade because graded writing assignments, "five minute papers", and take-home assignments are submitted on most class days. You will be given time near the end of class period to write a short statement or essay concerning concepts which we have considered that day. You may relate the current material to topics that you considered in previous courses, you may question the ideas being discussed, or you may critically review a videotape segment that was presented. Ideas and questions that are submitted will be reviewed at the beginning of the next class. Take-home assignments must be turned in at the beginning of the next class session.

Your participation in class discussions is very important. We all have different backgrounds and interests that can contribute to this course. At times we will work in groups when considering evolutionary topics.

Texts:

Evolution, 3rd edition, Monroe Stickberger, Jones and Bartlett, 2000
Evolution Lecture Guide, Mary R. Murnik, Great Lakes Books, 2001
The Miniature Guide to Critical Thinking, Richard Paul & Linda Elder, Foundation for Critical Thinking, 2001

Additional Course materials and information will be distributed in class. Internet references are given in the text, and you are encouraged to seek other references both in print and on the internet.

Grades:

Grades in this course will be based on the three assigned papers, the daily "five minute papers" and assignments, and two objective examinations.

	Maximum Points
Papers (Sci. Rev. 100 pts, 2 Pop. Sci. @50 pts)	200
"Five Minute Papers"	200
Lecture assignments	200
Midterm & Final, 100 pt. Ea.	200

The grading scale is:

A	93-100%	B-	80-82%%	D+	67-69%
A-	90-92%	C+	77-79%	D	63-66%
B+	87-89%	C	73-76%	D-	60-62%
B	83-86%	C-	70-72%	F	below 60%

Penalties:

Papers are due by 9:00 am on the assigned day. Grades on papers will be lowered 5 points for each half-day late. For example, a paper which is turned in after 9:00 am but before 3:00 pm would be lowered 5 points. If the paper were turned in after 3 pm but before 9 am the next day, the penalty is 10 pts.

Reference 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.

Cheating:

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

Papers:

You will write three edited, typewritten papers. One paper will be in the format of a *science review article* (described below, worth 100 points), and two papers will be *popular science articles* (worth 50 points) with headlines, attention-getting introductory paragraphs and informal references within the articles. Writing your papers should increase your understanding of evolutionary topics.

Paper Topics:

Topics may be assigned for each paper. Let the instructor know if you have a particular interest. *If topics are not assigned, your chosen topic should be approved by the instructor at least two weeks before the paper is due.* 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, strategies for writing for different audiences, writing styles, etc. The instructor may have reference materials about the topic of your paper which you might find useful.

Drafts:

You are encouraged to submit drafts of your papers (no later than two *class* days before the paper is due.) 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 FLITE. References should be articles in scientific journals or magazines. In some cases a science book may be chosen (usually not a text.) Internet research is encouraged, but you must be careful to only use material which has been reviewed by other scientists (articles in scientific journals and magazines are reviewed.) Material can be placed on the internet which is misleading, false or incomplete, out of context, etc. For that reason, you need to use judgement in using internet sites. If you wish to include an unreviewed article (from the internet or general press), you should have reviewed articles that present information relevant to that topic.

You should attach copies of your reference materials to your paper. No credit will be given for a paper lacking reference citations and/or copies of references.

Paper Formats:

1. *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 and contain:

a. A **headline**, with your name underneath
b. A body consisting of approximately 1500 words, with an introductory paragraph which summarizes the content in an interesting way, with more specific information in the following paragraphs. If you have access to software that will format your article in **newspaper-like columns**, use it.
c. General **acknowledgement of references** should be done informally within the text of the paper (eg. "According to Cavalli Sforza, an internationally recognized population geneticist from Stanford,...")
d. A list of your references should be attached (with copies).

2. *Scientific review paper*

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

a. a **title page**, with title, course, name and date
b. a body of at least four pages (approximately 2000 words) with three parts: introduction, main section and summary
c. a reference list
   a. List by number, with the first article being cited as # 1
      eg.
      1. Cavalli-Sforza, L. L., Paolo Menozzi and Alberto Piazza, 1994. *The History and Geography of Human Genes*

   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, chiimpanzee, gorilla and orangutan have revealed a general homology of chromosomal bands in the four species and suggested a common ancestor for the chimpanzee, gorilla and man. (1)

Lecture Schedule

Reading & writing assignments will be assigned daily
(assignments below refer to chapters or pages in text)

8/26	Introduction to BIOL 340
8/28	1. **The Emergence of Evolutionary Thought** Great Chain of Being, Growing awareness of change: Lyell and earth change, Cuvier's catastrophism, Kelvin and the age of the earth, Lamarck. Questions from biogeography, comparative anatomy, fossils, geologic time, Darwin and the Theory of Natural Selection. (Chapters 1 and 2)
8/30	2. **Science and Critical Thinking** All theories are "flat earth models", scientific criteria, all theories have problems and puzzles. How do we think? Are there different levels? What constitutes "good thinking" or critical thinking? (Chapter 3)
9/4	3. **Considering some arguments which have been presented against the theory of evolution** Old earth evidence, the fossil record, the second law of thermodynamics, the Creation vs Evolution continuum. (Chapter 4)
9/6,9	4. **Origin of the solar system** Evidence for the Big Bang, nature of the universe, origin of the earth. (Chapter 5)
9/11,13	5. **Plate Tectonics, continental drift and fossilization** Plate tectonics, continental drift and its impact on evolution. Geological dating, sedimentary environments, trace fossils. (Chapter 6)
9/13	**Paper I due** (popular science article)
9/16-25	6. **Origin of Life and the Precambrian Fossil Record** Conditions on early Earth, the oldest known fossils, chemical indicators, banded iron formations. synthesis of biological molecules, self-replicating molecules, evolution of metabolic pathways, evolution of photosynthesis, fossilization, oxygen toxicity. What *is* life? (Chapters 7,8)
9/27-, 10/2	7. **Emergence of Eukaryotes** Symbiosis, endosymbiosis, organelles, evolution of sexual reproduction, eukaryotic themes (Chapter 9)
10/4	8. **The Organization of Life** The "kingdoms" (Chapters 11,12)

10/7-11	9. **Genetics and Evolution** Variation, sources of variation, genetic equilibrium, gene flow and drift, natural selection: stabilizing, disruptive or directional, group selection, kin selection, altruism, K *vs* r strategists, mimicry, neutral alleles (Chapters 21,22, 385-386)
10/14,16	10. **Speciation** Reproductive isolating mechanisms, origin of species, extinction and adaptive radiation (590-601, 430, 456-9, 38-9, 282)
10/18	**Mid-Term Examination**
10/21	11. **Evolutionary Patterns** Molecular phylogenies, homologous vs analogous structures, evolutionary trends, , punctuated equilibrium vs phyletic gradualism; sudden changes and convergence (Chapter 12, 351-5, 41-2)
10/23,25	12. **Evolution of animals** Protists, metazoans, Ediacaran fauna, evolution of skeletons, the Cambrian Event, Burgess Shale animals, genomic homologies. (Chapters 14, 16)
10/28	**Paper 2 due** (Science review article)
10/28	13. **Evolution of early vertebrates** The evolution of the Chordata, amphioxus, osteostrachans, evolution of jaws, cartilaginous fishes, placoderms, bony fishes, lobefins and lungfish, coelacanths, homeoboxes and organization (Chapter 17)
10/30	14. **Leaving the Water** First land animals, amphibians and reptiles, hox genes and duplications (409-424)
11/1	15. **Origin of Land Plants** The first land plants, the primeval landscape (Chapter 13)
11/4-15	16. **The Dinosaurian World** Late Triassic: The Beginning of the Age of Dinosaurs Jurassic: Dinosaurs Dominate Cretaceous: Transition, then hard times 425-431
11/18	**Paper 3 due** (popular science article 2)

11/18	17. **Evolution of Flight and Warm-Blooded Dinosaurs** Preadaptation for flight, flying insects, early gliding vertebrates, pterosaurs, bird origin controversy (431-437)
11/20	18. **Extinction** Is there an extinction cycle? Do species get old? What about asteroids? (432-433)
11/22	19. **Evolution of Mammals and Primates** Cynodonts, mammalian reproduction, Prosimians, anthropoids, emergence of hominoids (Chapters 19, 20)
11/25- 12/6	20. **Evolution of Hominids** Australopiths, the genus *Homo: habilis, erectus,sapiens*; *Why* did we leave the trees: the Savanna vs the Aquatic Ape theories; *When* did we emerge from Africa?: the Multiple Origin/ Multiregional/"Candelabra" Theory vs the "Out of Africa theory. (Chapter 20)
12/9	**(Monday) Final Examination 8:00 am, SCI 120**

Note: Changes may be made in the lecture schedule depending on student progress and interest. It is your responsibility to attend class and be informed about assignments, deadlines and schedules.

SYLLABUS ATTACHMENT

COLLEGE OF ARTS AND SCIENCES – FERRIS STATE UNIVERSITY

Fall 2002

IMPORTANT DATES

Classes Begin 8/26/02
Last day for Drop/Add 8/28/02
Labor Day (no classes) 9/02/02
Last day to Withdraw from Univ with "W" 10/31/02
Last day to Drop class with "W" 10/31/02
Thanksgiving Holiday (no classes) 11/28-29/02
Last day of fall semester classes. 12/06/02
FINAL EXAMS 12/09-13/02
Fall semester commencement 12/14/02

LIBRARY HOURS

Regular hours for the (FLITE) library are as follows:

Monday-Thursday	8:00 a.m.-12:00 a.m.
Friday	8:00 a.m. - 9:00 p.m.
Saturday	9:00 a.m. - 6:00 p.m.
Sunday	1:00 p.m.-12:00 a.m.

(For verification of hours, call 591-3733)

COMPUTER LAB HOURS (FLITE)

Computer lab hours in the (FLITE) library are as follows:

Monday-Thursday	8:00 a.m.-12:00 a.m.
Friday	8:00 a.m. - 9:00 p.m.
Saturday	9:00 a.m. - 6:00 p.m.
Sunday	1:00 p.m.-12:00 a.m.

(For verification of hours, call 591-3733)

CLASS ATTENDANCE IS IMPORTANT!

There is significant research to show that students with daily attendance earn significantly higher grades than students who miss even a few class periods. Many instructors have mandatory attendance policies by which your grade will be affected by absences. Some instructors also have policies about class tardiness, to encourage students to be present for the full class period. Check your course syllabus or talk to your instructor about his/her policies.

HOW TO CONTACT A FACULTY MEMBER

If you have questions or need help, talk to your instructor. Faculty office locations, phone numbers, and office hours can be obtained from the class syllabus, or the department office. Faculty directory notebooks are also located in the student lounges and in the dean's office (ASC 3052).

DROPPING CLASSES OR WITHDRAWING

If you need to drop a class, you must do so OFFICIALLY, through your dean's office, in order to avoid receiving an "F" grade in the course. If you need to totally withdraw from school, you must do so OFFICIALLY at Admissions and Records in CSS 201. The last day to withdraw or drop a class may be different for different classes. See dates listed under "Important Dates". In case of extenuating circumstances after these dates (e.g., a serious illness requiring you to withdraw from school), contact Admissions and Records at 591-2792.

INCOMPLETES

The intent and appropriate use of the "I" grade is NOT to avoid student probation, dismissal, or unacceptable grades, nor should it be considered as an extended alternative to withdraw from a class (W). The "I" is only considered for extenuating circumstances that have led to a student's missing a portion of the course. Extenuating circumstances are generally defined as those situations over which the student has little or no control--e.g., illness, birth, jury duty, death of a parent, serious injury. Instructors may require suitable documentation.

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

WHERE TO GO FOR HELP

Successful students are often those who seek help early, before little problems become big ones. Ferris State University offers a variety of services, FREE OF CHARGE, to help you. Details are on the next page.

WHERE TO GO FOR HELP

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

Academic Support Center

Arts & Sciences Commons 1017 591-3543

The Writing Center, Tutorial Services, and Academic Skills Center join together to offer FSU students an array of academic support services, e.g.

- tutoring for many Ferris courses
- individual help with writing skills and writing assignments for English or other courses.
- help in developing better reading and study strategies
- workshops to help you meet the challenges of college life
- workshops to help you write more effectively and easily

SCHOLAR Program

Arts & Sciences Commons 1025 591-5976

SCHOLAR is an academic support program that aids in the student's successful progression by offering a Peer Mentor Program, a Student Retention Program, and an Academic Student Advisory Committee.

Disabilities Services

Arts &Sciences Commons 1021 591-5039

FSU provides special services and assistance for students with physical handicaps or learning disabilities. In order to take advantage of these services, stop by or call for an appointment with FSU's Special Needs Counselor, Eunice Merwin.

Personal Counseling, Sexual Assault, Substance Abuse

Birkam Health Center – 2nd Floor..... 591-5968

Personal counseling is available confidentially and free of charge. Counselors are available to assist with personal and stress-related problems, family and relationship issues, substance abuse, sexual assault, depression, or other similar problems. Call or stop by to obtain an appointment.

College of Arts & Sciences Department Offices		
Biology	ASC-2004	591-2550
Humanities	JOH-119	591-3675
Lang. & Lit.	ASC-3080	591-3988
Mathematics	ASC-2021	591-2565
Physical Science	ASC-3021	591-2580
Social Scienc	ASC-2108	591-2735
Dean's Office	ASC-3052	591-3660

ACADEMIC MISCONDUCT

Academic misconduct refers to dishonesty or misrepresentation with respect to assignments, tests, quizzes, written work, oral presentations, class projects, internship experience, or computer usage; violation of computer licenses, programs, or data bases; or unauthorized acquisition or distribution of tests or other academic material belonging to someone else. It includes such behaviors as cheating, presenting another person's ideas or work as your own, taking someone else's exa for them, violating computer software licenses or program/data ownership, etc. If you are uncertain about whether a particular behavior might represent academic misconduct, be sure to ask your professor for clarification.

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

DISRUPTIVE BEHAVIOR

The College of Arts and Sciences strives to maintain a positive learning environment and educational opportunity for all students. Consequently, patterns of behaviors which obstruct or disrupt the teaching/learning environment will be addressed. The instructor is in charge of his or her course (e.g., assignments, due dates, attendance policy) and classroom (e.g., behaviors allowed, tardiness). Harassment, in any form, will not be tolerated. Some instructors have special requirements for their classes (e.g., lab safety procedures). If so, they will review those with you.

Penalties for disruptive behavior can include involuntary withdrawal from the course and/or disciplinary actio to and including probation or dismissal from the University.

Natural History of Invertebrates - Biology 341 NTA

Fall Semester 2001 - Traverse City, Michigan

Instructor: **Dr. Erwin 'Duke' Elsner**
Extension Agriculture Agent, Michigan State University
office: 520 W. Front Street, Suite A, Traverse City, MI
phone: (231) 922-4822 fax: (231) 922-4633
e mail: elsner@msue.msu.edu

Lecture/Lab: **Tuesdays, 5:30 - 10:30 p.m.** (1-2 hours lecture + open lab time most nights)
August 28 through December 11, 2001 (deviations to be discussed)
Room 116, Science Building, Northwestern Michigan College

Field Trips: **To be arranged**

Text: Invertebrate Zoology by Ruppert & Barnes

Supplemental Course Information & Materials:

http://www.ferris.edu/htmls/academics/course.offerings/physbo/biology/watson/b341.htm
(Dr. Watson's course home page for BIOL 341 at Big Rapids)

BIOGRAPHICAL NOTES:
I have collected insects since my early grade-school years. My B.S., M.S. and Ph.D. are in Entomology. My professional roles as an agricultural agent include integrated pest management of arthropods and diseases on tree and small fruits, turf grasses and ornamental plants, forests and gardens, and household insect pest management. My avocational interests are the collection, photography and life history studies of lepidoptera (butterflies, skippers and moths). My collection efforts in Michigan have resulted in over 80 new county records for butterfly species and one state record for moths. Be prepared to hear more about insects than you can stand!

Course Requirements **Grading scale**

	Points per	Total possible	grade	points needed	grade	points needed
3 lecture tests	@ 100	= 300	A	462	C	362
1 Collection	@ 150	= 150	A-	447	C-	347
1 lab practical	@ 50	= 50	B+	432	D+	332
			B	412	D	312
1 optional final	@ 100	= 100	B-	397	D-	297
total possible		= 500 points	C+	382	F	296 & below

Date	Lecture Topics & Test Schedule	Book Chapters
Aug. 28	Introduction to Course and Collection Requirements	
Sept. 1	Field Trip	
Sept. 4	Protozoans	1 & 2
Sept. 11	Porifera & Cnidaria	3 & 4
Sept. 18	Platyhelminthes & Aschelminthes	5, 6 & 7
Sept. 22	Field Trip	
Sept. 25	No Class	
Oct. 2	**Test 1** & Mollusca	11
Oct. 9	Annelida & Introduction to Arthropods	12
Oct. 16	Chelicerata, Crustaceans & Myriapods	13, 14 & 15
Oct. 23	Myriapods & Introduction to Insects	15 & 16
Oct. 30	**Test 2** & Select Orders of insects	16
Nov. 6	Insects	16
Nov. 13	Insects/LAB PRACTICAL EXAM	16
Nov. 20	Insects & Ecinodermata	16 & 18
Nov. 27	Ecinodermata & Review **Collections Due**	18
Dec. 4	**Test 3** and final lecture	
Dec. 11	Cumulative Final (Optional)	

Invertebrate Collection

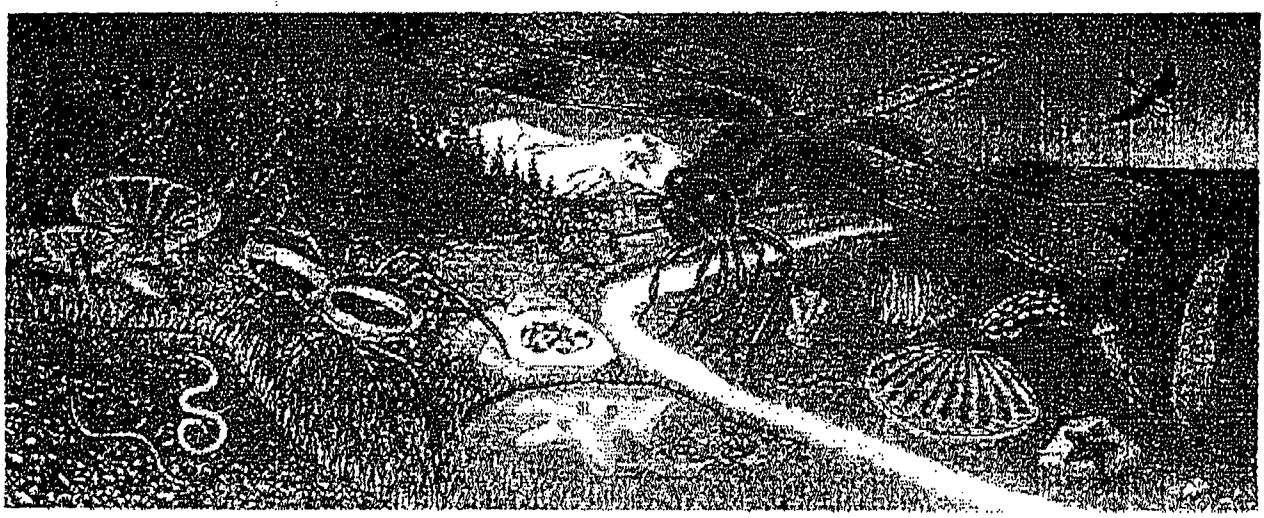
Each student is required to complete an invertebrate collection for this class. The **minimum** collection needed for full credit is **50 families or orders** which depends upon the taxa. Specimens must be **macroscopic**. Extra credit, up to 26 points, is possible for each additional correctly identified specimens over the minimum required. Misidentified specimens carry a minus 1 point penalty, however.

Since there are over 1,000,000 possible species in nature, the possibilities are endless. Special collecting techniques will be discussed in lab and used on field trips.

There are a few threatened or endangered invertebrates in Michigan. I will provide a list of these and we will avoid their habitats on field trips.

NOTE: since identification is the hardest part of the collection requirement, it is strongly suggested that you begin collecting immediately and worry about identification later after course lectures and readings improve your identification abilities. It is also very important to acquire your specimens as soon as possible in case an early fall results in many potential specimens going into their dormant states, which are often much harder to find and harder to identify.

The relative size of the organisms below indicate their number of species. Note that the invertebrates comprise the majority of all living organisms



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BIOL 342
NATURAL HISTORY OF VERTEBRATES

SUMMER 2001

PURPOSE

During the six-week period, the student will be introduced to the life history and ecological significance of selected 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 class work to actual teaching situations in a middle school or high school classroom. In essence, BIOL 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 mammology (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 Central United States by Tomelleri and Eberli or Freshwater Fishes by Page/Burr , Amphibians and Reptiles of the Great

Lakes Region by **Hardy, Birds of North America** by the National Geographic Society and
Mammals of the Great Lakes Region by Kurta

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 Tyning
Amphibians of North America by Smith and Barlowe
Peterson's field guide to the Birds by Peterson
Birds of North America by Robbins, Brunn, 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
3. 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.
4. Grades. To determine his/her grade for BIOL 342, the student should total all the points accumulated for lecture exams and identification quizzes. This should 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

. Office hours are 12-1 Mon. and Wed., and 2:15-3 Mon. and Wed.. 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 If you have an urgent problem, call to make sure I'm here. If necessary, I will make evening appointments. My home phone is ?. I'm moving so I'll let you know as soon as I know My office is in ASC 2015. My office phone number is 591-5633. My e-mail is bruce_l_beetley@ferris .edu

HINTS

My intention is to make BIOL 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.

NATURAL HISTORY OF VERTEBRATES
BIOL 342 LAB SCHEDULE

SUMMER 2001

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 lab room, SCI 208, will often be open for study purposes. If it is locked 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.

Regularly Scheduled Field Trips

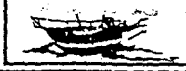
Wed. May 16	Orientation Lab
Mon. May 21	Birds
Wed. May 23	Birds
Mon. May 28	Memorial Day. No class.
Wed. May 30	Birds
Mon. June 4	Fish. Be prepared for the water
Wed. June 6	Fish. Be prepared for the water.
Mon. June 11	Amphibians and Reptiles
Wed. June 13	Amphibians and Reptiles
Mon. June 18	Mammals
Wed. June 20	Mammals and Preparation Lab.
Mon. June 25	Laboratory and lecture final.

Note: This schedule is tentative. The instructor may change the labs due to inclimate weather or other factors.

SYLLABUS ATTACHMENT

COLLEGE OF ARTS AND SCIENCES -- FERRIS STATE UNIVERSITY

Summer 2001



IMPORTANT DATES

Classes Begin	5/15/01
Nine Week Session starts	5/15/01
Last day for Drop/Add	5/16/01
Memorial Day (no classes)	5/28/01
Last Day to drop class "W" grade Session "A"	6/11/01
Last Day to drop class "W" 1st 9-week session	6/22/01
Session "A" ends	6/26/01
Session "B" starts	6/27/01
Independence Day (No Classes)	7/04/01
Last Day to drop class "W" grade	7/09/01
Last Day to drop class "W" grade Session "B"	7/24/01
Regular classes end	8/08/01

LIBRARY HOURS

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HOW TO CONTACT A FACULTY MEMBER

If you have questions or need help, talk to your instructor. Faculty office locations, phone numbers, and office hours can be obtained from the class syllabus, or the department office. Faculty directory notebooks are also located in the student lounges and in the dean's office (ASC 3052).

DROPPING CLASSES OR WITHDRAWING

If you need to drop a class or withdraw from school, you must do so **OFFICIALLY**, through your dean's office, in order to avoid receiving an "F" grade in the course. The last day to withdraw or drop a class may be different for different classes. See dates listed under "Important Dates" above. In case of extenuating circumstances after these dates (e.g., a serious illness requiring you to withdraw from school), contact your dean's office. (For Arts and Sciences students, call 591-3660).

INCOMPLETES

The intent and appropriate use of the "I" grade is NOT to avoid student probation, dismissal, or unacceptable grades, nor should it be considered as an extended alternative to withdraw from a class (W). The "I" is only considered for extenuating circumstances that have led to a student's missing a portion of the course. Extenuating circumstances are generally defined as those situations over which the student has little or no control--e.g., illness, birth, jury duty, death of a parent, serious injury. Instructors may require suitable documentation.

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

WHERE TO GO FOR HELP

Successful students are often those who seek help early, before little problems become big ones. Ferris State University offers a variety of services, FREE OF CHARGE, to help you. Details are on the next page.

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WHERE TO GO FOR HELP

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

Academic Support Center

Arts &Sciences Commons 1017 591-3543

The Writing Center, Tutorial Services, and Academic Skills Center join together to offer FSU students an array of academic support services, e.g.

- tutoring for many Ferris courses
- individual help with writing skills and writing assignments for English or other courses.
- help in developing better reading and study strategies
- workshops to help you meet the challenges of college life
- workshops to help you write more effectively and easily

SCHOLAR Program

Arts &Sciences Commons 1025 591-5976

SCHOLAR is an academic support program that aids in the student's successful progression by offering a Peer Mentor Program, a Student Retention Program, and an Academic Student Advisory Committee.

Disabilities Services

Arts &Sciences Commons 1021 591-5039

FSU provides special services and assistance for students with physical handicaps or learning disabilities. In order to take advantage of these services, stop by or call for an appointment with FSU's Special Needs Counselor, Eunice Merwin.

Personal Counseling, Sexual Assault, Substance Abuse

Birkam Health Center – 2nd Floor 591-5968

Personal counseling is available confidentially and free of charge. Counselors are available to assist with personal and stress-related problems, family and relationship issues, substance abuse, sexual assault, depression, or other similar problems. Call or stop by to obtain an appointment.

College of Arts & Sciences Department Offices		
Biology	ASC-2004	591-2550
Humanities	JOH- 119	591-3675
Lang & Lit	ASC-3080	591-2520
Mathematics	ASC-2021	591-2565
Physical Science	ASC-3021	591-2580
Social Sciences	ASC-2108	591-2735
Dean's Office	ASC-3052	591-3660

ACADEMIC MISCONDUCT

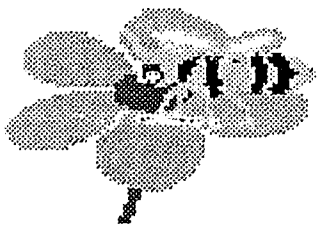
Academic misconduct refers to dishonesty or misrepresentation with respect to assignments, tests, quizzes, written work, oral presentations, class projects, internship experience, or computer usage; violation of computer licenses, programs, or data bases; or unauthorized acquisition or distribution of tests or other academic material belonging to someone else. It includes such behaviors as cheating, presenting another person's ideas or work as your own, taking someone else's exam for them, violating computer software licenses or program/data ownership, etc. If you are uncertain abo whether a particular behavior might represent academic misconduct, be sure to ask your professor for clarification.

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

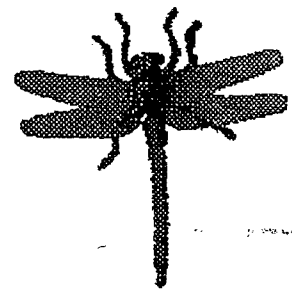
DISRUPTIVE BEHAVIOR

The College of Arts and Sciences strives to maintain a positive learning environment and educational opportunity for all students. Consequently, patterns of behaviors which obstruct or disrupt the teaching/learning environment will be addressed. The instructor is in charge of his or her course (e.g., assignments, due dates, attendance policy) and classroom (e.g., behaviors allowed, tardiness). Harassment, in any form, will not be tolerated. Some instructors have special requirements for their classes (e.g., lab safety procedures). If so, they will review those with you.

Penalties for disruptive behavior can include involuntary withdrawal from the course and/or disciplinary action up to and including probation or dismissal from the University.



Entomology Biol 344



Dr. Phillip L. Watson
Office 2007 ASC ; Phone 592-2558; email ***watsonp@ferris.edu***
Homepage on FSU main homepage-http://www.ferris.edu/htmls/academics/course.offerings/physbo/biology/watson/Watson's Homepage.htm
or from the FSU home page, choice faculty under academics, then my name, then our course

Lecture Text Entomology by Elzinga , **Lab Manual** by Watson

Lecture 5 to 5:50 -**Room** Science 231-- **Days** Tuesday and Thursday

Lab time 3 to 5:50 ----**Room** Science 231---- **day** Tuesday

Course points

4 exams	@400 each	= 400*
2 lab quizzes	@ 50 each	= 100*
Collection	@100	= 100 *
final	@(100)	= (100)*
total		= 600

Course grading

A = 555	C = 435
A- = 537	C- = 411
B+ = 525	D+= 405
B = 495	D = 375
B- = 477	D- = 357
C+ = 441	F = 356

☆ *Labs will generally follow the order in the lab book, but will be weather dependent*

☆

FINE PRINT * no makeup exams or laboratory quizes without documented excuse. Excessive tardiness or absences (more than 2) will reduce your overall grade. Final is optional if you are passing the course with a C. You may also take the final to replace a low score.

Questions??? come to my office or see me just before or after class or email me. Please DO not ask me to call you. This results in telephone tag, if you do need to *call please leave a clear message* and I will attend to the problem

NOTE: Grades will be posted every week outside of the Lab by *the last 5 digits of your student number*

PERSONAL RECORD of scores

test 1 =	lab quiz 1 =
test 2 =	lab quiz 2 =
test 3 =	Collection =
test 4 =	
cumulative =	
total of best 4 exams =	total points earned =

Lecture topics

Schedule

Date	*lecture topic*	*chap***
Aug 31	Introduction	1
Sept.2	External anatomy	2
Sept.7	External / Internal anatomy	2-3
Sept.9	Internal anatomy	3
Sept.14	Metamorphosis	4
Sept.16	*Test 1*	
Sept.21	Ecology	5
Sept.23	Behavior	6
Sept.28	Population dynamics	7
Sept. 29	Parasitism	8
Oct. 5	Predation	9
Oct. 7	*Test 2*	
Oct.12	Insect pests of humans & other animals	10
Oct. 14	House hold pests	12
Oct.19	Insect pest management	11
Oct.21	Proturans -> Ephmeroptera	pages 359-364
Oct. 26	Odonata to Dermaptera	pages 365- 377
Oct. 28	Plecoptera to Thysanoptera	pages 378 - 382
Nov. 2	Hemiptera to Neuroptera	pages 382-399
Nov. 4	*Test 3*	
Nov.9	Coleoptera	Pages 400-414
Nov.11	Coleoptera	Pages 400-414
Nov. 16	Hymenoptera	Pages 414 - 422
Nov. 18	Hymenoptera	Pages 414 - 422
Nov. 23	Mecoptera -Tricoptera	Pages 423-426
Nov. 25	Lepidoptera	Pages 425 - 435
Nov. 30	Lepidoptera	Pages 425 - 435
Dec.2	Siphonaptera & Diptera	Pages 436-450
Dec.7	Siphonaptera & Diptera	Pages 436-450
Dec 9	*Test 4*	
Dec 13-17	cumulative optional final, date to be announced	

** chapters for the lecture book should be read before lecture. Text book is the starting point for the lectures. Book and lecture material in class will be used for the tests

BIO 347 Environmental Conservation

Fall 2002

Lecture T R 12-12:50 in STR 136 Lab: R 2-4:50 in SCI 208 (**please note room change**)

Instructor: Dr. Karen Strasser
Office hours: 1pm to 3pm M, 8:00am to 9am T R, or by appointment
Office: 2120 ASC Phone: 591-2453 email: Karen_Strasser@ferris.edu

Required Materials:

Lecture Text: A primer of Conservation Biology 2nd edition, Primack
Calculator
Storage disks (a zip disk would be best)
3 ringed binder (for handouts)
Packet of SCANTRON cards

Course objectives:
To introduce you to the major factors that are contributing to the current extinction crisis and encourage you to think critically about these issues. To demonstrate how disciplines such as taxonomy, ecology, genetics, population biology, economics and sociology interact to shape the future of healthy ecosystems.

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

Attendance: Attendance in lecture is expected. Please BE ON TIME!!!! Attendance in lab is MANDATORY. 2 missed laboratories will result in a failing grade in the class. Surprise quizzes may be given without notice for bonus points. You can not get these points unless you are there to take the quiz!

Exams: Examinations will be given during the normal lecture period on the dates are listed on the class schedule. There are **NO MAKEUP EXAMS**. Failure to take an exam at the scheduled time (see class schedule) will result in a grade of 0 for the exam. If you have a valid excuse, inform me ahead of time, and provide documentation within 2 weeks of the missed exam (proof of funeral, hospitalization, etc), you may replace the missed exam with the grade on the final (which is comprehensive). Thus instead of being worth 100 points, the final would be worth 200 points. Exams will cover material covered in lecture and lab.

Grading: Final grades will based on points earned in lecture and laboratory. Lecture grade (500 points) will be based on the average of 4 exams (100 points each) and a CUMULATIVE final (100 points). Quizzes may be given lecture if deemed necessary. Lab grades (100 points) will be based on the score earned on a lab exam (100 points) and participation 50 points.

Grading Scale:

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

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

To do well in this course:

Attend all lectures and labs, and BE ON TIME
Exhibit professional behavior (you may be asked to leave if you don't)
Take good notes, and organize them
Read the assigned sections of the text book both before and after class
Study your notes EVERY WEEK, not just before the exam
Ask questions when there is something you don't understand

Lecture Schedule: (subject to change)

Week		New Topic	Readings chp(pages)
1)	Aug 27,29	Intro Conservation Biology	1(1-10)
2)	Sept 3,5	Biological diversity, Location	1 (10-33)
3)	Sept 10,12	Ecological economics	1 (33-61)
4)	Sept 17,19	Extinction - patterns **Exam 1 Thursday Sept 19**	2 (63-74)
5)	Sept 24,26	Causes of extinction habitat destruction - degradation	2 (75-86, 91-101)
6)	Oct 1,3	Causes of extinction fragmentation, overexploitation	2 (86-91,101-106)
7)	Oct 8,10	Causes of extinction exotics / disease	2(106-113)
8)	Oct 15,17	Vulnerability **Exam #2 Thursday Oct 17**	2(114-118)
9)	Oct 22,24	small populations	3(122-134)
10)	Oct 29,31	Applied population biology Establishing new populations	3 (135-146) 3 (147-155)
11)	Nov 5,7	Ex situ strategies	3(156-167)
12)	Nov 12,14	**Exam #3 Thursday Nov. 14**	
13)	Nov. 19,21	Protected areas	4(184-198)
14)	Nov 26	Managing protected areas Restoration	4 (210-238)
15)	Dec 3,5	Legal considerations International agreements	3 (168-180) 4 (259 -)
16)	Dec 10	Exam #4 and Cumulative Final Exam **Tuesday Dec 10 at 12pm**	

Lab Schedule: (subject to change)

	Week of	Topic
1)	Aug 29	Introduction Set up plant Experiment
2)	Sept 5	Set up Island Biogeography exps
3)	Sept 12	Biodiversity study
4)	Sept 19	American Black bear discussion
5)	Sept 26	Collect samples for Biogeography study Finish plant experiment
6)	Oct 3	Process samples for Island Biogeography exp
7)	Oct 10	Process samples for Island Biogeography exp
8)	Oct 17	Film and Literature discussion
9)	Oct 24	Toxicology experiment
10)	Oct 31	Human population exercise / Cemetery trip
11)	Nov 7	Public Opinion exercise
12)	Nov 14	Film / literature discussion
13)	Nov. 21	**Lab exam**
14)	Nov 28	Thanksgiving, No Lab
15)	Dec 5	Lecture review for final

SYLLABUS ATTACHMENT

COLLEGE OF ARTS AND SCIENCES – FERRIS STATE UNIVERSITY

Fall 2002

IMPORTANT DATES

Classes Begin.....8/26/02
Last day for Drop/Add.....8/28/02
Labor Day (no classes).....9/02/02
Last day to Withdraw from Univ with "W".....10/31/02
Last day to Drop class with "W" 10/31/02
Thanksgiving Holiday (no classes).....11/28-29/02
Last day of fall semester classes. 12/06/02
FINAL EXAMS.....12/09-13/02
Fall semester commencement.....12/14/02

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DROPPING CLASSES OR WITHDRAWING

If you need to drop a class, you must do so **OFFICIALLY**, through your dean's office, in order to avoid receiving an "F" grade in the course. If you need to totally withdraw from school, you must do so **OFFICIALLY** at Admissions and Records in CSS 201. The last day to withdraw or drop a class may be different for different classes. See dates listed under "Important Dates". In case of extenuating circumstances after these dates (e.g., a serious illness requiring you to withdraw from school), contact Admissions and Records at 5[illegible] 2792.

INCOMPLETES

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Arts & Sciences Commons 1017 591-3543

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Arts & Sciences Commons 1025 591-5976

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Disabilities Services

Arts &Sciences Commons 1021 591-5039

FSU provides special services and assistance for students with physical handicaps or learning disabilities. In order to take advantage of these services, stop by or call for an appointment with FSU's Special Needs Counselor, Eunice Merwin.

Personal Counseling, Sexual Assault, Substance Abuse

Birkam Health Center – 2nd Floor..... 591-5968

Personal counseling is available confidentially and free of charge. Counselors are available to assist with personal and stress-related problems, family and relationship issues, substance abuse, sexual assault, depression, or other similar problems. Call or stop by to obtain an appointment.

College of Arts & Sciences Department Offices

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

ACADEMIC MISCONDUCT

Academic misconduct refers to dishonesty or misrepresentation with respect to assignments, tests, quizzes, written work, oral presentations, class projects, internship experience, or computer usage; violation of computer licenses, programs, or data bases; or unauthorized acquisition or distribution of tests or other academic material belonging to someone else. It includes such behaviors as cheating, presenting another person's ideas or work as your own, taking someone else's exam for them, violating computer software licenses or program/data ownership, etc. If you are uncertain about whether a particular behavior might represent academic misconduct, be sure to ask your professor for clarification.

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DISRUPTIVE BEHAVIOR

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BIOL 349: MEDICAL PARASITOLOGY Winter 2002

Instructor: Dr. Olukemi Adewusi
ASC 2114
Phone: 591-5628 office: 591-5638 lab
Email: adewusio@ferris.edu

Office Hours: Mon: 2:00 - 3:00, Wed: 9:30 – 11:00, 2:00 – 3:00, Thur: 2:00 - 3:00

Prerequisite: One year of college biology

Course Objectives

This course is designed to teach students

1. the basic concepts of parasitology
2. the major types of medically important parasites (protozoans, helminthes and arthropods).
3. basics of identification of common parasites of humans.

Textbook: Medical Parasitology by Markell, Voge and John, 8th ed. W.B. Saunders Co.

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.

Examinations

There will be four (4) lecture exams each worth 100 points; seven lab quizzes each worth 20 points and one lab exam worth 60 points. Film quizzes and class participation is worth 100 points. Exam dates will be announced later. Examination questions will be taken from the contents of the lecture notes, which are bases on your text. Some lab information may also be included on your test. Make-up exams will be given only after a valid excuse has been provided; these exams may be more difficult.

Grading:

A final grade based on the 800 points possible will be assigned as follows:

A = 756-800	B = 668-699	C = 588-619	D = 480-539
A- =724 - 755	B- = 643-667	C- = 560-567	F = <480
B+ = 700-723	C+ = 620-642	D+ = 540-559	

BIOL 349: MEDICAL PARASITOLOGY Dr. Adewusi Winter 2002

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

VI. Survey of Parasitic Arthropods

A. True Parasites
Mites
Lice
Flies
Fleas

B. Arthropods and Disease Transmission

C. Harmful Effects of Arthropods

Biol. 349: Medical Parasitology Laboratory Schedule Winter 2002

Each student will be assigned a slide box containing permanently preserved specimens. Once slide boxes are assigned, please check to ensure that all slides are present, note cracks, chips etc on the attached form. Fill out the requested information, sign and return the form to me. Keep a record of the box number for future reference since this will be your slide box for the entire semester. Students will be responsible for slides missing from the boxes at the end of the semester. Occasional accidentally slide breakage is budgeted for but please be careful in handling slides so as to minimize breakages since each slide averages about $5.00. BE SURE TO OPEN SLIDE BOXES SO THAT THE LID IS FACING UPRIGHT.

One common way of misplacing slides is to accidentally leave them on the stage of your microscope at the end of the class period, so please check microscope stages before you leave at the end of each laboratory period. Your lab manual provides a step-by-step instruction on what to look for on each slide and the accompanying CD-ROM provides an opportunity to study the parasites away from the lab.

During some laboratories, demonstrations may be set up to supplement the slide collections. Most demonstrations will be set up for ONE laboratory period only and may be included on your test so it is important that you examine them carefully during the laboratory period.

Attendance: Attendance in lab is mandatory.

Exams: Lab quizzes will include identification of specimens, morphology, pathology, the life cycles, sites of infection, intermediate and definitive hosts. These informations can be found in the lab manual, handouts, assigned text and lecture notes. 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. There will be no make-up lab quizzes.

Text: The laboratory manual for this course, review questions and grades will be available lectronically via webct. To access using a browser, go to: http://webct.ferris.edu:9000. Type in your global id and password (provided by the university). A pictoral atlas of most of the pictures is available on a CD ROM (optional, $5.00).

Laboratory Schedule Winter 2002

Date	Topic
Jan. 15	Introduction and The Microscope
Jan. 24, 29	*Enterobius vermicularis* *Trichuris trichiura* *Necator americanus and A. caninun* *Trichinella spiralis* *Wuchereria bancrofti*
Jan. 31	**Quiz 1 (nematodes)**
Feb. 5, 7, 12	*Hymenolepis nana* *Hymenolepis diminuta* *Dipylidium caninum* *Taenia solium* *Taenia saginata* *Diphyllobothrium latum* *Echinococcus granulosus*
Feb. 14	**Quiz #2 (cestodes)**
Feb. 19, 21 25	*Schistosoma japonicum, S. mansoni, S. haematobium* *Fasciola hepatica* *Clonorchis sinensis* *Paragonimus westermani*
Feb. 28	**Quiz #3 (trematodes)**
March 5, 7, 19	*Entamoeba histolytica* *Entamoeba coli* *Balantidium coli* *Giardia lamblia* *Chilomastix mesnili* *Trichomonas vaginalis*
March 11-15	**Spring Break**
March 19	Fecal Examination
March 21, 26 April 2	Trypanosomes Leishmania Plasmodium
March 28	**Easter break**
April 4	**Quiz #4 (protozoans)**

April 9, 11,16 *Sarcoptes scabiei*
Pediculus humanus
Phthirus pubis
Ctenocephalides felis
Xenopsylla cheopis
Cimex lectularis
Aphid
Argas
Dermacentor

April 18 **Quiz #6 (arthropods)**

April 23, 25, 30 *Triatoma sanguisuga*
Simulium
Chrysops
Glossina
Ixodid
Aedes
Anopheles
Culex

May 2 **Quiz #7 (arthropods)**

May Parasite Identification

May 2 Laboratory Final Examination (Cummulative)

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

BIOL 351
Field Botany
Summer 2001

Course: Biol 351 Field Botany 3 credits

Instructor: Prof. John Vanderploeg

Office: A &S Commons Rm 2119 Phone 591-2547

Office Hours: 8:30-8:50 MTW

Lecture: 10:30-12:30 MW in Science 235

Lab: 1:30 - 5pm MW in Science 235

Course Objectives: To make the students in this course aware of and familiar with the woody and herbaceous vascular plants that are common in this 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 thinking and reading and the ability to search out this knowledge.

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

Grading Policy: (subject to change)

	Points Possible
Identification Exams (dates to be determined)	225
Characteristics	150
Herbarium Collection	100
Attendance/Participation	100
	575 points

The identification exams will require field and/or lab identification of trees, shrubs, weeds and wildflowers. The characteristics exam will cover lectures that cover basic plant anatomy and the specific characteristics of various plant families. The herbarium collection requirements are describes 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-
		<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 ability to do well in this course. Since tardiness is disruptive, please be on time. Since most labs involve field trips, late arrival to lab might prevent you from locating us.

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

Since the number of weeks that we meet are limited, it is our goal to go outside for most labs. Be sure that you dress appropriate for the weather. Be sure to wear comfortable shoes since we will be walking some significant distances.

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 in close proximity to 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

lecture and lab Instructor: Dr. Roger Mitchell

course objective: Obtain a working knowledge of plant function. Particular emphasis will be placed on the plant's use of water and on photosynthesis.

Office hours: ASC (Commons) 2118: Monday 9:00 - 11:00 AM and Tuesday 3:00 – 5:00 PM. Make an appointment, or drop by to see if I am available at some other time. Knock if the door is closed! You may call my office at any time: 591-5879.

Materials you are required to have:

texts: Plant Physiology, Taiz and Zeiger, 2nd ed., and Plant Structure and Function, Starr and Taggart, 9th ed. (8th should also be acceptable).

#2 pencils for the lecture exams

3H pencils, color pencils, and eraser for lab drawings

your student ID for each exam

additional materials for lab, including gloves.

Exams and the total percentage. 25% lab grade, 75% for lecture exams, including the final exam. Part of the final will be based on the lectures after the third exam, and the remainder will be comprehensive. The first lecture exam will be worth 25 points, the second and third 50, and the final 75. Exams can only be made up with a legitimate excuse, with a 5% deduction per day. Students who schedule makeup exams in advance will normally take the same test as the rest of the class, or something similar. Makeup exams that are not taken before the tests are turned back will be penalized 20%. Late make-ups may either be essay tests or use the student's grade on the corresponding part of the final. I reserve the right to make additional assignments as a condition of giving makeup exams. There is no "extra credit." All of these components will be added to get a final total percentage, which will not be adjusted in any way.

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

Dropping with the "W" grade must be done on or before **November 1**.

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

Attendance policy: Attendance will be taken in both lab and lecture. If you miss a lab, you may get a "0" for that day's score. Labs cannot be made up for any reason. Missing more than two labs for any reason will result in failing the class. Excessive tardiness may count as an absence. Attendance will sometimes be taken in lecture, although it will not count directly for grading. Assigned seating will be used to aid in attendance taking in both lab and lecture.

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

Disruption of class. I will take whatever action is necessary to maintain a lecture atmosphere conducive to learning. I reserve the right to force involuntary withdrawal or make additional assignments in response to tardiness or disruptive behavior.

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

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

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

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

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

TENTATIVE LECTURE SCHEDULE:

date	subject	Taiz	Starr
Aug. 27	plant cells	1	
29			
31	plant anatomy		29
Sep. 5			
7			
10			
12	basics of metabolism	2	
14	**exam 1**		
17			
19			
21	water in plant cells	3	30
24			
26			
28	water balance	4	
Oct. 1			
3			
5	mineral nutrition	5	
8			
10	xylem transport	6	
12	**exam 2**		
15			
17			
19			
22	phloem transport	10	
24			
26	photosynthesis: light reactions	7	
29			
31			
Nov. 2			
5			
7	photosynthesis: carbon fixation	8	
9	**exam 3**		
12			
14			
16	photosynthesis in the plant and environment	9	
19			
21			
26	respiration	11	
28			
30			
Dec. 3	plant hormones		32
5	**if time allows:**		
7	plant development		

TENTATIVE LAB SCHEDULE:

week	week of	subject
1	August 27	mineral nutrition
2	September 3	**NO LAB**
3	10	cell wall substances
4	17	anatomy review
5	24	enzymes 1
6	October 1	enzymes 2
7	8	transpiration
8	15	water relations
9	22	soil lab
10	29	chromatography
11	November 5	detecting photosynthesis
12	12	chloroplast isolation
13	19	photosynthesis III
14	26	starch
15	December 3	respiration: CO_2 release

SYLLABUS ATTACHMENT

COLLEGE OF ARTS AND SCIENCES – FERRIS STATE UNIVERSITY

Fall 2001

IMPORTANT DATES

Classes Begin.....8/27/01
Last day for Drop/Add.....8/29/01
Labor Day (no classes).....9/03/01
Last day to Withdraw from Univ with "W".....11/01/01
Last day to Drop class with "W" 11/01/01
Thanksgiving Holiday (no classes).....11/22-23/01
Last day of fall semester classes. 12/07/01
FINAL EXAMS.....12/10-14/01
Fall semester commencement.....12/15/01

LIBRARY HOURS

Regular hours for the (FLITE) library are as follows:

Monday-Thursday ..... 8:00 a.m.-12:00 a.m.
Friday ..... 8:00 a.m. - 9:00 p.m.
Saturday ..... 9:00 a.m. - 6:00 p.m.
Sunday..... 1:00 p.m.-12:00 a.m.
(For verification of hours, call 591-3733)

COMPUTER LAB HOURS (FLITE)

Computer lab hours in the (FLITE) library are as follows:

Monday-Thursday ..... 8:00 a.m.-12:00 a.m.
Friday ..... 8:00 a.m. - 9:00 p.m.
Saturday ..... 9:00 a.m. - 6:00 p.m.
Sunday..... 1:00 p.m.-12:00 a.m.
(For verification of hours, call 591-3733)

CLASS ATTENDANCE IS IMPORTANT!

There is significant research to show that students with daily attendance earn significantly higher grades than students who miss even a few class periods. Many instructors have mandatory attendance policies by which your grade will be affected by absences. Some instructors also have policies about class tardiness, to encourage students to be present for the full class period. Check your course syllabus or talk to your instructor about his/her policies.

HOW TO CONTACT A FACULTY MEMBER

If you have questions or need help, talk to your instructor. Faculty office locations, phone numbers, and office hours can be obtained from the class syllabus, or the department office. Faculty directory notebooks are also located in the student lounges and in the dean's office (ASC department office. Faculty directory notebooks are also located in the student lounges and in the dean's office (ASC 3052).

DROPPING CLASSES OR WITHDRAWING

If you need to drop a class or withdraw from school, you must do so **OFFICIALLY**, through your dean's office, in order to avoid receiving an "F" grade in the course. The last day to withdraw or drop a class may be different for different classes. See dates listed under "Important Dates" above. In case of extenuating circumstances after these dates (e.g., a serious illness requiring you to withdraw from school), contact your dean's office. (For Arts and Sciences students, call 591-3660).

INCOMPLETES

The intent and appropriate use of the "I" grade is NOT to avoid student probation, dismissal, or unacceptable grades, nor should it be considered as an extended alternative to withdraw from a class (W). The "I" is only considered for extenuating circumstances that have led to a student's missing a portion of the course. Extenuating circumstances are generally defined as those situations over which the student has little or no control--e.g., illness, birth, jury duty, death of a parent, serious injury. Instructors may require suitable documentation.

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

WHERE TO GO FOR HELP

Successful students are often those who seek help early, before little problems become big ones. Ferris State University offers a variety of services, **FREE OF CHARGE**, to help you. Details are on the next page.

(over)

WHERE TO GO FOR HELP

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

Academic Support Center

Arts &Sciences Commons 1017 591-3543

The Writing Center, Tutorial Services, and Academic Skills Center join together to offer FSU students an array of academic support services, e.g.

- tutoring for many Ferris courses
- individual help with writing skills and writing assignments for English or other courses.
- help in developing better reading and study strategies
- workshops to help you meet the challenges of college life
- workshops to help you write more effectively and easily

SCHOLAR Program

Arts &Sciences Commons 1025 591-5976

SCHOLAR is an academic support program that aids in the student's successful progression by offering a Peer Mentor Program, a Student Retention Program, and an Academic Student Advisory Committee.

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Arts &Sciences Commons 1021 591-5039

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COURSE SYLLABUS
DEVELOPMENTAL BIOLOGY
BIOL 370
WINTER SEMESTER 2003

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: **231-591-5639**
e-mail: **bussj@ferris.edu**

Office hours:

Monday	11:00 am - 11:50 am; 1:00 pm - 1:50 pm
Wednesday	11:00 am - 11:50 am; 1:00 pm - 1:50 pm

MAJOR OBJECTIVES OF THE COURSE:

1. The student will demonstrate knowledge concerning experimental design.
2. The student will demonstrate an understanding of the basic concepts associated with gamete production and fertilization.
3. The student will demonstrate an understanding of the basic concepts regarding the control of developmental events.
4. The student will demonstrate knowledge of anatomical terminology and of vertebrate anatomical structure.
5. The student will demonstrate knowledge concerning the relationships between developmental events and the definitive adult structure.
6. The student will identify web sites on the internet relating to topics in developmental biology.

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?" As we explore the basic concepts of embryonic development we will investigate not only the morphological changes that 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 that take place during development. Students will be required to demonstrate their ability to identify structures on serial sections. On occasion, living materials will be used to observe the progression of morphological changes during development.

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. A strong emphasis in the exams will be placed on knowledge of the terminology used in this course. 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, 8th ed., Prentice Hall, 2001.

EXAMINATIONS:

Five lecture 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. A written **final examination** will be given during finals week. Each **lecture exam** score will be **converted to a percentage** and will account for **100 points**. The **lecture exams** will account for a total of **500** points.

Laboratory practical examinations will consist primarily of identification of embryonic structures and demonstration of knowledge of their function and their relationship to adult structures. Each laboratory exam score will be **converted to percentage** and will account for **100 points**. The **laboratory exams** will account for a total of **300** points.

Points will be awarded for participation in lecture and some laboratory exercises and for other activities such as outside written assignments. 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 a 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 - 77.99 = C
90 - 91.99 = A-	70 - 71.99 = C-
88 - 89.99 = B+	68 - 69.99 = D+
82 - 87.99 = B	62 - 67.99 = D
78 - 81.99 = B-	60 - 61.99 = D-
78 - 79.99 = 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 may 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.

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.

It is expected that each student will come to the **laboratory session** prepared to maximize his/her learning experience. The student is expected to have read the laboratory materials and studied the appropriate illustrations in the laboratory text prior to the start of the laboratory session.

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

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

BIOL 373: CELL BIOLOGY
Dr. Adewusi Fall 2002

Instructor: Dr. Olukemi Adewusi
ASC 2114
Phone: 591-5628 office; 591-5638 lab
Email: adewusio@ferris.edu

Office Hours: Tue: 1:30 - 3:00, Wed: 1:30 - 3:00, Fri: 10:00 - 10:50

Pre-requisites: One year of college biology and CHM 124 or equivalent.

Course Objectives: The Student will learn

- selected principles and theories of cell biology.
- the structure-function relationship of components of prokaryotic and eukaryotic cells.
- the basic techniques used in cell and molecular research.

Textbook: Essential Cell Biology: An Introduction to the Molecular Biology of the Cell by Alberts et al.

Examinations: There will be four (4) cumulative exams each worth 100 points and 4 quizzes each worth 50 points. Examination questions will be taken from the content of the textbook, the lectures and class handout material and will cover three areas: memory, comprehension and application of the subject matter. You must take exams at the scheduled time otherwise, a grade of zero will be awarded for missed exams. A make-up exam will be given to students with valid excuse (such as physician note, funeral pamphlet etc) 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.

Grading:

A final grade based on the 600 points possible will be assigned as follows:

A = 540-600	B = 480-509	C = 420-449	D = 360-389
B+ = 510-539	C+ = 450-479	D+ = 390-419	F = <360

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

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

BIOL 373: CELL BIOLOGY
Dr. Adewusi Fall 2002

Chapter	Topic
1	Introduction to Cells
2	Chemical Components of Cells
5	Protein Structure and Function
	EXAM I
3	Energy, Catalysis, and Biosynthesis
4	How Cells Obtain Energy from Food
13	Energy Generation in Mitochondria and Chloroplast
	EXAM II
11	Membrane Structure
12	Membrane Transport
14	Intracellular compartments and transport
	EXAM III
6	DNA
7	From DNA to Protein
8	Chromosomes and Gene Regulation
9	Genetic Variation
10	DNA Technology
	FINAL EXAM

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

BIOL 375 Principles of Genetics
Winter 2003

Instructor: Dr. Mary R. Murnik *Office*: ASC 2117 *Phone*: 231-591-2546

e-mail: murnikm@ferris.edu

Office Hours: MTWF 8:20-8:50am, ~~M 2-3~~pm, T 1-2 pm
I am usually in my office when I am not in class and would be happy to see you. Appointments can be made for additional times.

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 concepts and principles. 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

Text: *Genetic Analysis*, Anthony Griffiths, *et al*, seventh ed., Freeman, 2000

Lecture Guide: *Genetics: A Lecture Guide for BIOL 375*, Mary R. Murnik, 2002
(Available only at Great Lakes Book and Supply)

Attendance and Participation: Attendance and participation at all lectures is expected. If you miss a lecture, it is your responsibility to obtain information that was presented. You are expected to read relevant text material before class and to do related problems in the lecture guide. Lectures will not repeat all text and problem material. Problem sets will be assigned which must be turned in *at the beginning* of the next lecture session. No late assignments will be accepted. If you must miss a lecture, it is your responsibility to submit that lecture's assignment *in advance* and obtain the assignment for the next lecture. (Arrangements can be made for alternate assignments in the case of documented emergencies.) You may need to refer to the text and the lecture guide problems in order to analyze assigned problems

Grades: There will be daily assignments, four scheduled tests and a final examination. The daily assignments are worth 5 pts.each. The tests and final exam are worth 100 points each. The final exam will replace the lowest test score (if it is higher.) The final is optional *only* for those who have earned at least 70% on the four scheduled tests. If you do not take the required final exam, your average will be reduced by 10 percent. (For example, an average of 75% would be reduced to 65%.)

Grading scale:

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, late assignments: 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, university-sanctioned travel.) *Daily assignments are only accepted at the beginning of the class.*

Cheating: The FSU policy on cheating is described in the Student Handbook. Cheating on a test usually results in automatic failure in the course. If a grade of zero is given as a penalty, this grade may not be dropped from the calculation of the grade average.

Help: I will be happy to help you during regular office hours or during any other available time. You are also encouraged to attend the scheduled *tutoring sessions*, which your tutor **Derek Quinn** will hold in the ASC Tutoring Center on Tuesdays and Thursdays from 11-11:50 am..

BIOL 375 Lecture Schedule

Date	*Topic*	*Chapter/Pages in Text*
Jan. 13	Introduction to Mendelian Genetics	1, 27-37
Jan. 15	Probability	37-38
Jan. 17	The Chi-Square Test and Independent Assortment	124-126
Jan. 22	Modification of Mendelian Ratios	4
Jan. 24,27	Sex Linkage and Pedigree Analysis	38-40,47-51
Jan. 29,31	Polygenic Inheritance and Quantitative Traits	743-758
Feb. 3	Mitosis and Meiosis (on Test 2)	3
Feb. 6	**Test 1**	
Feb. 7,10	Chromosomal Changes: Aneuploidy ,Polyploidy	677-684
Feb. 12,14	Chromosomal Rearrangements	18
Feb. 17,19	Linkage	17
Feb. 21	Population Genetics: genetic equilibrium	24
Feb. 22, 26	Population Genetics and Evolution	26
Feb. 28	**Test 2**	
Mar 3,5	DNA, Genes and Proteins	1, 8, 9 to 282
Mar. 7,10	Transcription and Translation	10
Mar. 17, 19	Transcription and its control in Prokaryotes	11 to 350
Mar 21, 24,26	Gene Structure and Expression in Eukaryotes	308-10,350-361
Mar 28,31	Mutations	15, 16
April 2	**Test 3**	
April 4,7	Genetics of Bacteria and Viruses	7
April 9	Transposable Elements	14
April 11,14	Genetic Engineering	12, 13
April 16,18	Extranuclear Inheritance	21
April 21 23	Genes and Cancer	22
April 30	**Test 4**	
May 5 (Monday)	*8:00-9:40 am* *Final Exam*	*SCI 120 (regular classroom)*

MICROBIOLOGY AND IMMUNOLOGY

Biol 386
5 CR. (4+3)

Winter, 2003

PREREQUISITES: BIOL 232 AND PREVIOUS OR CONCURRENT BIOCHEMISTRY

COURSE SYLLABUS

DATE	TOPIC	REFERENCE
1. Mon. 1/13	Introduction and History	Brock ch. 1
2. Tues. 1/14	Prokaryotic and Eukaryotic Cells	B. pages 57-60,99-100
3. Wed. 1/15	Bacterial Structure and Function	B. ch. 3
4. Thrs. 1/16	Bacterial Structure and Function	B. ch. 3
5. Mon. 1/20	**M.L.K. DAY--NO CLASSES**	
6. Tues. 1/21	Bacterial Structure and Function	B. ch. 3
7. Wed. 1/22	Bacterial Growth and Sporulation	B. ch. 5 & p.91-95,743
8. Thrs. 1/23	Bacterial Taxonomy	B. ch. 12, 13 & 14
9. Mon. 1/27	Viral Structure and Replication	B. ch. 8
10. Tues. 1/28	Viral Structure and Replication	B. ch. 8
11. Wed. 1/29	Fungal Structure and Taxonomy	B. ch. 17
12. Thrs. 1/30	**EXAM I**	
13. Mon. 2/3	Microbial Metabolism	B. ch. 4, 11 & 15
14. Tues. 2/4	Microbial Metabolism	B. ch. 4, 11 & 15
15. Wed. 2/5	Microbial Metabolism	B. ch. 4, 11 & 15
16. Thrs. 2/6	Microbial Genetics	B. ch. 6, 7, 9 & 10
17. Mon. 2/10	Microbial Genetics	B. ch. 6,7, 9 & 10
18. Tues. 2/11	Microbial Genetics	B. ch. 6,7, 9 & 10
19. Wed. 2/12	Microbial Control	B. ch. 18
20. Thrs. 2/13	Microbial Control	B. ch. 18
21. Mon. 2/17	Sterilization and Disinfection	B. ch. 18
22. Tues. 2/18	Host Parasite Interactions	Schaechter. ch.1,2,& 3
23. Wed. 2/19	Mech. of Bacterial Pathogenicity	S. ch. 8, 9, & 10
24. Thrs. 2/20	Mech. of Bacterial Pathogenicity	S. ch. 8, 9, & 10
25. Mon. 2/24	Mech. of Viral Pathogenicity	S. ch. 31
26. Tues. 2/25	Mech. of Viral Pathogenicity	S. ch. 31
27. Wed. 2/26	**EXAM II**	
28. Thrs. 2/27	Respiratory Tract Infections	S. ch.13,19,21,23 & 59
29. Mon. 3/3	Respiratory Tract Infections	S. ch.13,19,21,23 & 59

30. Tues. 3/4	Respiratory Tract Infections	S. ch.13,19,21,23 & 59
31. Wed. 3/5	Skin & Mucous Membrane Infections	S. ch. 48 & 61
32. Thrs. 3/6	Oral Cavity Infections	S. ch. 57
33. 3/10 – 3/14	**SPRING RECESS NO CLASSES**	
34. Mon. 3/17	G.I. Tract Infections	S.ch.16,17,22,32,37,73
35. Tues. 3/18	G.I. Tract Infections	S.ch.16,17,22,32,37,73
36. Wed. 3/19	Wound Infections	S. ch 11, 15 20 & 35
37. Thrs. 3/20	Wound Infections	S. ch 11, 15 20 & 35
38. Mon. 3/24	Viral Hepatitis	S. ch. 42
39. Tues. 3/25	STD's - Bacterial	S. ch. 14,24, 27 & 66
40. Wed. 3/26	STD's - Viral	S. ch. 40, 41 & 66
41. Thrs. 3/27	AIDS	S. ch. 38 & 68

LAST DAY FOR A "W" GRADE IS FRIDAY MARCH 28th

42. Mon. 3/31	Childhood Infections	S. ch. 34 & 69
43. Tues. 4/1	Nosocomial Infections	S. ch. 72
44. Wed. 4/2	**EXAM III**	
45. Thurs. 4/3	Immune System, Innate Immunity	Kuby ch. 1 & 3
46. Mon. 4/7	Phagocytosis, Humoral Immunity	K. ch. 4-6,8-13
47. Tues. 4/8	Humoral Immunity, Acute Inflammation	K. ch. 4-6,8-13,15
48. Wed. 4/9	Humoral Immunity, Acute Inflammation	K. ch. 4-6,8-13,15
49. Thrs. 4/10	Complement	K. ch. 14
50. Mon. 4/14	Cellular Immunity/Chronic Inflamm.	K. ch. 15-16
51. Tues. 4/15	Cellular Immunity/Chronic Inflamm.	K. ch. 15-16
52. Wed. 4/16	Cellular Immunity/Chronic Inflamm.	K. ch. 15-16
53. Thrs. 4/17 - Fri. 4/18	**NO CLASSES - EASTER RECESS**	
54. Mon. 4/21	Hypersensitivity	K. ch. 17,20,21
55. Tues. 4/22	**EXAM IV**	
56. Wed. 4/23	Hypersensitivity	K. ch. 17,20,21
57. Thrs. 4/24	Hypersensitivity	K. ch. 17,20,21
58. Mon. 4/28	Hypersensitivity	K. ch. 17,20,21
59. Tues. 4/29	Immunological Diseases	K. ch. 18-22
60. Wed. 4/30	Autoimmunity	K. ch. 20
61. Thrs. 5/1	Transplantation Immunity	K. ch. 23
62. TUES. 5/6	FINAL EXAMINATION - COMPREHENSIVE	

TEXTS: 1) Brock: BIOLOGY OF MICROORGANISMS, 9TH edition, 2000, by Madigan, et.al.
NOTE: Working Glossary at beginning of each chapter and G-1 to G-14 at end of book

2) MECHANISMS OF MICROBIAL DISEASE, 3RD edition, 1998, by Schaechter, et.al.
NOTE: Excellent case studies in most chapters

3) Kuby: IMMUNOLOGY, 4TH EDITION, 2000, by Goldsby et.al. (Glossary p. 609-624)

EXAMS: There will be 4 regularly scheduled exams plus a **comprehensive final**. Each of these exams is 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**. ALL EXAM DATES **are tentative and may be changed** to accommodate the **majority** of the class.

SCALE: 100-93 = A, 92-90 = A-, 89-87 = B+, 86-83 = B, 82-80 = B-, 79-77 = C+, 76-73 = C, 72-70 = C-, 69-67 = D+, 66-63 = D, 62-60 = D-, 59- = F

ATTENDANCE: You are EXPECTED to attend every lecture and to explain any absence. 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 9:30 - 10:00 AM on M & W and 12:30 - 1:30 PM on T and R or by appointment. E-mail: **ryanm@ferris.edu**

W. Hoeksema, Ph.D., ASC-2013, extension #2555. Office hours are 12 noon - 12:50 PM on M, T, W & R or by appointment. E-mail: **hoeksemw@ferris.edu**

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 control of microbial growth.

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.

BIOL 442

Ecology

Dr. Phillip L. Watson
Office 2007 ASC ; Phone 592-2558; email watsonp@ferris.edu
homepage-http://www.ferris.edu/htmls/academics/course.offerings/physbo/biology/watson/Watson's Homepage.htm

Lecture Text Ecology & Field Biology by Smith & Smith **Lab Manual** by Watson

Lecture 2 to 2:50 -**Room** Science 126-- **Days** Monday and Wednesday

Lab time 3-5:50----**Room** Science 227---Wednesday

Course points

			Course grading	
4 exams	@100 each	= 400*	A = 92.5%	C = 72.5%
10 labs	@ 20	= 200*	A- = 89.5%	C- = 69.5%
research project	@100	= 100 *	B+ = 87.5%	D+= 67.5%
final	@(100)	= (100)**	B = 82.5%	D = 62.5%
total		= 700	B- = 79.5%	D- = 59.5%
			C+ = 77.5%	F = 59.4%

☆ *Labs will generally follow the order in the lab book, but will be weather dependent (always bring a calculator to lab)*

☆ ***Independent research project:***

Each student is required to complete an ecological research project. Refer to your lab book for information. The projects will be judged on the scientific approach and methodology, not whether you prove or disprove your hypothesis. Data must be analyzed statistically

FINE PRINT * no makeup exams without documented excuse, labs cannot be made up but there is ONE and only one make up lab. Late laboratory reports will be assessed a 10% reduction for every week they are late. Excessive tardiness may result in not being allowed to take a test or start a laboratory exercise! Excessive unexcused absences (more than 3) will reduce your overall grade by 5%. **Final is optional if you are passing the course with a C. You may also take the final to replace a missing or low score. **Questions???** come to my office hours posted on the web or see me just before or after class or email me. Please DO not ask me to call you. This results in telephone tag, if you do call please leave a clear message and I will attend to the problem

NOTE: Grades will be posted every week outside of the Lab and on the web page by ***the last 5 digits of your student number***

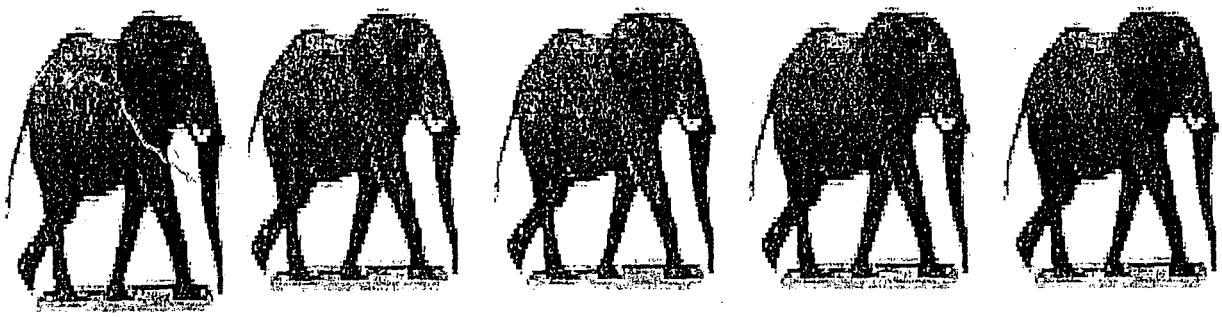
PERSONAL RECORD of scores

test 1 =	lab 1 =	lab 6 =	Research paper points =
test 2 =	lab 2 =	lab 7 =	Total points of Best of 4 exams =
test 3 =	lab 3 =	lab 8 =	Total lab points =
test 4 =	lab 4 =	lab 9 =	**Total points in class =**
cumulative =	lab 5 =	lab 10 =	
total of best 4 exams =			

Lecture topics

Date	lecture topic	chap**
January 13	Introduction to experimentation	1
January 15	Evolution ,ecology, distribution	2,26
January 20	MLK Day ---No classes	
January 22	Speciation	3, 19
January 27	Limiting factors	4,5
January 29	Limiting factors	6,7,8,9
February 3	Limiting factors	6,7,8,9
February 5	Soil	10
February 10	***TEST 1***	
February 12	Population dynamics	11
February 17	Life history patterns	12
February 19	Population growth	13
February 24	Population growth	13
February 26	Intraspecific competition	14
March 3	Interspecific competition	15
March 5	***Test 2***	
March 10-12	**Spring break**	
March 17	Predation ,Herbivory & coevolution	16,17
March 19	Predation ,Herbivory & coevolution	16,17
March 24	Human interaction with Natural Populations	18
March 26	Human interaction with Natural Populations Nutrient	10,11,12
March 31	Succession & community changes	20,21,23
April 2	Succession & community changes	20,21,23
April 7	***Test 3***	,
April 9	Ecosystem diversity (grasslands)	27,28,29
April 14	Ecosystem diversity (grasslands)	27,28,29
April 16	Ecosystem diversity (forests)	30,31
April 21	Ecosystem diversity (fresh water)	32,33,34
April 23	Ecosystem diversity (fresh water)	32,33,34
April 28	Ecosystem diversity (Oceans)	35,36,37
April 30	***Test 4 & reports due***	
May 8	**Cumulative optional final**	

** chapters for the lecture book should be read before lecture. Text book is the starting point for the lectures. Book and lecture material in class will be used for the tests. Lecture notes are on the web.



BIOLOGY 460 - CURRENT TOPICS IN BIOLOGY
WINTER SEMESTER- 2003

The **class will meet on all dates listed in bold print and underlined** on the following schedule unless notified in advance by the coordinator. **Attendance at other dates may be required and will be announce by the instructor ahead of time.** (Don't make firm plans for the other dates, a meeting may be called for a seminar or other purposes.) During some class sessions, topics from the text will be discussed. During other class sessions, Biology faculty, students from other classes, or visiting scientists will be presenting the results of their research.

Jan 15	Introduction to Research Papers and Abstracts (Chapter 1)
Jan 22	FLITE Library and Library Searches. Internet research methods and sources. Meet in Library 112 (not in Sci 120)
Jan 29	Writing a Review Paper (Chapter 5) **Deadline** - Approval form from mentor agreeing to accept
Feb 5	Continue research.
Feb 12	**Deadline** - Title/Topic/Purpose of monograph – turn in to instructor by 4:00 p.m.
Feb 19	Continue reserarch
Feb 26	Oral presentation: summary of one primary article. Begin writing monograph
Mar 5	**Deadline** - Detailed Outline of Monograph Oral presentations continued
Mar 12	Spring recess
Mar 19	**Deadline** - First Draft of Monograph – turn in to instructor by 4:00 p.m. Wed
Mar 26	Oral and poster presentation developmnent
Apr 2	**Deadline** - Draft of poster – turn in to instructor by 4:00 p.m. Wed.
Apr 9	**Deadline** - Second Draft of Monograph – turn in to instructor by 4:00 p.m. Wed
Apr 16	Continue writing, oral and poster presentation development
Apr 23	Oral presentations **Deadline** - Turn in posters to instructor
Apr 28	**Deadline**- Turn in Final monograph to instructor by 4:00 p.m. Monday. (May be turned in earlier)
Apr 30	Oral presentations continued
May 7	Final meeting schedule: Wednesday 6:00 - 7:40 p.m.

BIOLOGY 460 - CURRENT TOPICS IN BIOLOGY
WINTER SEMESTER- 2003

The **class will meet on all dates listed in bold print and underlined** on the following schedule unless notified in advance by the coordinator. **Attendance at other dates may be required and will be announce by the instructor ahead of time.** (Don't make firm plans for the other dates, a meeting may be called for a seminar or other purposes.) During some class sessions, topics from the text will be discussed. During other class sessions, Biology faculty, students from other classes, or visiting scientists will be presenting the results of their research.

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Apr 28	**Deadline**- Turn in Final monograph to instructor by 4:00 p.m. Monday. (May be turned in earlier)
Apr 30	Oral presentations continued
May 7	Final meeting schedule: Wednesday 6:00 - 7:40 p.m.

CURRENT TOPICS IN BIOLOGY
BIOLOLGY 460
COURSE SYLLABUS
WINTER SEMESTER - 2003

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 Prerequisites: ENGL 311 or 321. Entry by permit.

INSTRUCTOR:	Dr. Robert Palmer
Office:	2113 Arts and Sciences Commons
Telephone:	Office: 591-2552 E-mail: Robert_Palmer@ferris.edu
Office hours:	M 1-3, T 9 – 11, and W 9 - 10; or drop in/call any time

TEXTBOOK:

McMillan, Victoria E. 2001. Writing Papers in the Biological Sciences. 3rd Ed. Boston. Bedford/St. Martin's

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 and analyzed relevant information to the topic.
3. presented the information and analysis in his/her own words, in the form of a monograph, an oral presentation, and in a poster presentation.

COURSE EXPECTATIONS:

Students will select a topic of interest to them and find a mentor willing to assist them in researching the topic and preparing a monograph. **The monograph must represent more than a general summary of the subject.** It must contain some element of analytical and 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. Although disagreement is not mandatory in the writing of your paper, it does add interest to your monograph. A monograph that is simply a discussion of the symptoms of Parkinson's disease is not satisfactory. 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 analyzes the pros and cons of the treatments.

The student should select a topic that is understandable to them. If they have never had a course in genetics, a topic on a genetic condition would be very difficult for them to adequately analyze and write clearly about.

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:
The total number of points earned in the course will determine student grades in the course. A percentage will be calculated from the total points possible. The possible sources of points are:

1. Class Assignments (5, 10, or 25 pts each) Mentor, topic statement, outline, oral summary, 1st draft, 2nd draft, final monograph, poster draft	120 points
2. Oral Presentation	50 points
3. Poster presentation	50 points
4. Monograph (score to be awarded by mentor)	200 points
5. Other assignments, quizzes, exams	variable

GRADING SCALE: (percentage of points earned)

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
80 - 81.9 = B-	60 - 61.9 = D-
78 - 79.9 = C+	Below 60 = F

A grade of incomplete will only be given for the normal reasons that the grade is issued, not simply for the failure to complete the monograph or other assignments.

Attendance:

Attendance at scheduled meetings is mandatory. Any absence without a University excuse (as defined below) or other serious reason 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. Excessive tardiness and leaving class early without permission will count as individual absences.

DEADLINES:

Failure to meet a deadline will result in a deduction of 25 points from the final point total for each day starting at the end of class or 4:00 p.m. on the day the assignment was due (excluding Saturdays, Sundays, and FSU recognized holidays.) Assignments may be turned in early; you do not have to wait until a class session to submit assignments. A deadline failure can be either not turning in an assignment on time or turning in an incomplete assignment.

DEFINITIONS, GUIDELINES, and ASSIGNMENTS:

Mentor

Mentors are faculty whose expertise is relevant to the study being done by the student. **The course instructor must approve the mentor.** A list of Biology faculty who may be asked to be a mentor will be provided. If you want to ask some other FSU faculty member to be a mentor but you are not sure the person will be approved, please contact the instructor before talking to the person. The student must contact an appropriate person to be their mentor and the person must agree to advise them on the selected project. Mentors are under no obligation to accept a particular student or topic suggested by the student.

The student should meet with the mentor on a regular basis so the mentor can guide the student in their choice of topic, literature search, analysis, draft preparation, poster presentation, and final monograph. The mentor will assign a grade for the finished monograph. A mentor approval form must be signed and submitted to the course instructor by the deadline indicated in the course schedule indicating that the mentor is willing to work with the student.

Assignment: Submit mentor agreement form. (5pts)

Title, topic and purpose selection

This assignment has three parts: a proposed **title, a brief description** of your topic and the **purpose** of the monograph. This must be submitted by the deadline listed on the schedule. The purpose is what you want to accomplish in the paper. For instance, the purpose of a paper on Parkinson's disease should not be to just describe the treatments for the disease, but to also discuss the pros and con's of the treatments and decide which is best in which situations. In other words, indicate what type of analysis you will make in the monograph. This should be typed. A mentor approval form must be signed and submitted with the title/topic/purpose paper.

Assignment: Submit Title/Topic/Purpose form. (10 pts)

Example:

Title: Use of Stem Cells to treat Phenylketonuria

Description: Phenylketonuria is a gentic disease characterized by the lack of an enzyme production which metabolizes phenylalanine. High levels of phenylalanine result in mental retardation and other harmful effects. Stem cells with the ability to produce the correct enzyme could cure the disease if they could be implanted and function in a person.

Purpose: This monograph will describe the basic cause of the disease and how the use of implanted stem cells could correct the disease. An analyzsis will be made of the potential benefits and problems associated with stem cell use. The reader will be able to make a more informed decision on the value of stem cell use in this disease.

Oral summary of one primary article

Each student will select one **primary** article they will use in their monograph and present a summary to the class. The oral summary should have these parts: title, general introduction, what they found (data), and what they said it meant (discussion). An overhead projector may be used for the title and any graphs/charts from the paper. The department will provide write-on acetates and pens but if you want photocopy acetates, you will have to purchase them. At the end of class, turn in a copy of the article that you summarized to the instructor. It will be returned to you.

Assignment: Deliver oral summary. (10 pts)

Outline

You will submit a **detailed** outline of the monograph to the course instructor by the deadline listed on the schedule. This outline draft is the skeleton of your monograph. The outline draft should have a title, a statement of the purpose of the monograph and the outline should show the expected general flow of the monograph. **The outline should be detailed enough to include most of the points that are going to be made in the paper.** An approval form signed by your mentor must accompany this outline draft. The mentor will help you with the content of the outline and the class instructor will evaluate the outline for sufficient detail.

Assignment: Submit outline. (10 pts)

Monograph (10-15 pages of body)

First draft

A monograph is an objective review of a particular subject. Although it is based on a literature review, it is not simply a compilation of information on that subject, but rather an **analysis** of a particular topic. For example, in an analysis on elephant density in Zimbabwe, you might find that it has direct correlation with *Aacacia 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.

You will submit a first draft of your monograph to the course instructor by the deadline listed on the schedule. This draft should be an expansion of the outline draft already prepared. **This draft must contain the major parts of the monograph including a Literature Cited section and references within the paper.** The title page and abstract are not required in this draft and tables/figures may be done in a draft form. Refer to the MONOGRAPH PARAMETERS section in the syllabus for details on the format. The course instructor will evaluate the draft for completeness and format and then pass the monograph on to your mentor. Include the articles that you are using for the paper so the mentor can determine how you are using and interpreting the resources.

Assignment: Submit first draft. (25 pts)

Second draft

By the deadline listed on the schedule, submit a second draft of your monograph to the course instructor who will then pass it on to your mentor. This should be a refinement of the first draft previously prepared and should incorporate the corrections and suggestions offered by your mentor. Again, include the resources used in the paper.

Assignment: Submit second draft. (25 pts)

Third draft

If your mentor requires it, you will submit a third draft of your monograph **directly to the mentor** by the deadline established by the mentor. This should be a refinement of the second draft and should incorporate the corrections and suggestions offered by your mentor.

Final Monograph

You will submit your final, complete monograph and photocopies of all references to your instructor by the deadline listed on the schedule. The instructor will pass the monograph on to your mentor for final grading. This paper should be a refinement of the last draft with all spelling and grammatical errors eliminated and ideas clearly expressed. **The monograph and references will not be returned to the student. You must also submit to the instructor a final copy of your monograph on computer diskette (preferably in Word for Windows) by the deadline listed on the schedule.** Refer to REASONS FOR REJECTING THE MONOGRAPH in the syllabus.

Assignment: Submit final monograph, reference articles, and diskette with monograph. (25 pts.)

Poster Presentation

Each student will prepare a poster for presentation to the class, the Biology Faculty, and other interested parties. A poster is a visual summary of the information you are trying to convey with your monograph. The poster must be presented in such a way that an observer who views the poster will gain an overview of the topic you have researched, determine what your position is on the topic being shown, and understand the scientific basis for this conclusion. It must include tables, charts or diagrams prepared by the student presenting scientific data based on the results published in the scientific literature. Photocopies of published material are not acceptable. On the assigned date, a detailed draft of the poster must be submitted to the course instructor.

Assignment: Submit draft of poster (10 pts.)
Assignment: Poster presentation (50 pts.)

Oral Presentation

Each student will give a 12-15 minute oral presentation to the class, Biology faculty, and other interested parties who may attend. This will be an oral summary of the information you are trying to convey with your monograph. A computer projection system for a power point presentation is available as well as an overhead projector. The presentation order will be basically a random assignment by the instructor with some modification to accommodate mentors with two or more mentee's.

Assignment: Oral presentation (50 pts.)

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 easily 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 of the course is for you to demonstrate that you can look up, understand, and communicate biological information. It is much easier to do this if the topic you choose is reasonably easy to understand and to find information on the topic.

The subject you choose should meet the following guidelines:

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. In the same way, limiting the subject too much may result in inadequate references and the inability to write a complete paper. Your mentor will be able to assist you in limiting your subject matter.

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. Be careful of very recent discoveries as there may not be adequate research done yet on the subject and therefore very limited literature may be available.

SUGGESTIONS CONCERNING THE WRITING OF THE DRAFTS AND FINAL MONOGRAPH.

1. **First draft**

   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 too much 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"

   AVOID PLAGIARISM.

2. **Subsequent drafts**

   a. 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.

b. Delete clutter.
   Whenever possible use simple words and sentences.
   Delete unnecessary words.
   Replace large words and phrases with simple words.

c. Precision and Clarity.
   Use the correct word (know the definition of every word you use)
   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)
   Avoid stacked modifiers (e.g., more nourishing food) and dangling modifiers (e.g., After killing the rat, the diet was tested.)
   Avoid clichés (e.g., advanced technology and marked contrast)
   Write positively
   Avoid abbreviations and foreign words
   Express similar ideas in similar ways (parallelism)
   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.

d. Cohesion
   Organize sentences in a logical order
   Make smooth transitions
   Try not to hedge
   Know when to stop writing; e.g. don't keep repeating the same thought from the same data.
   Punctuate your writing correctly
   Have someone else read what you have written

❖ Your mentor will be of tremendous help in the improvement of grammar and sentence structure in your subsequent drafts. You may also choose to use the **FSU Writing Center** on the first floor of the Arts and Science Commons. Your mentor, however, will make the final determination concerning the quality of the writing. The writing assistant may indicate that your paper is well written but your mentor may find that it does not meet his/her standards.

MONOGRAPH PARAMETERS:

Length

The monograph must be 10 to 16 pages in length. The title page, abstract, literature cited, tables and figures do not count towards the total page requirement.

Typing

Typing must be double-spaced using standard typeface (10 or 12) on one side of 8 1/2 by 11 inch paper. Use one inch margins at the top, bottom, and right side of all pages and 1.25 inch margins on the left side. Indent each paragraph five spaces. Use Arabic numerals (1, 2, 3 etc) to number the pages starting the count with the first page of text (but do not put an actual number on the first page) and put the numbers in the upper right hand corner.

Title page

The information on the title page should be centered in the middle of the page and include your name, the course title, the semester and year, and your mentors' name (not your instructor's name).

Abstract

The abstract is a one paragraph, concise statement on the purpose of the monograph, the basic results of the literature research, and the conclusion drawn. Put it on a separate sheet immediately following the title page.

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, not photocopied from research sources. They should be numbered consecutively, titled and referenced appropriately. Large figures should be on separate pages from the typed text.

Literature citation

Monographs must be based on at least 8 primary (original research) articles with a total of at least 10 primary and secondary articles. You may (and sometimes should) cite specialized references (e.g. texts, scientific dictionaries) and general publications (e.g., newspaper articles), but these citations will not be counted as a part of the 10 source requirement. Literature should be cited in the monograph and listed in the literature cited (or reference) section of the monograph following the style found in Chapter 6 of McMillan (2001). A commonly and easily used system is the number system (p114), the variation using parentheses (p115) rather than superscripts. The sources are then listed in the literature cited section in the order they are used, not alphabetically. I highly recommend using this method.

Any article which is cited must be photocopied and submitted with the monograph. Organize the articles in the same order as listed in the Literature Cited section of the monograph. On the photocopied article, **highlight or underline** the information that was cited in the monograph and indicate the **page number** in the **monograph** of where the **citation** was used. The copies of the articles submitted with the monograph will not be returned to the student.

REASONS FOR REJECTING THE MONOGRAPH

1. Failure to follow the documentation guidelines, including photocopies of references with cited sections clearly marked and indexed
2. Failure to use "primary" sources of information as the basis of your report.
3. Failure to follow the manuscript preparation guidelines.
4. Plagiarism - see pages 16-17 of McMillan (3rd Ed.)

OTHER HINTS AND SUGGESTIONS

1. Decide on a topic and mentor **quickly**. If you cannot decide or find a mentor, see the course instructor soon so that he/she may assist you in your decision. If your mentor thinks that the topic can be done, begin your literature search. Meet on a weekly basis with your mentor to discuss your topic and the articles on that topic.

2. The use of the internet has greatly enhanced the process of looking for and obtaining resources for your monograph. However, you may also want to seriously think about visiting

other university libraries that have extensive collections of scientific literature: i.e. CMU, WMU, MSU, UM, WSU, etc. This can be faster than the interlibrary loan process.

3. Collect some references on that topic and begin to read them. Once you have a general understanding for that topic, begin to pull from each of the papers the important points. Collate these points into an outline draft.

4. Begin work on your first draft after you have received the comments from your mentor on the outline draft.

Listed below are faculty of the Biology Department and their general areas of interest and/or training. If you have a topic that you are thinking of researching, try to find a faculty member with background in that area. If you don't have a topic idea but know a professor interested an area that you would like to work with, go talk to them and perhaps they could suggest a topic that you might like. It would be best if you talk to the professor in person, not on the phone or by Email. Faculty from other departments may be used but must be approved by the instructor. Please check with me about other potential mentors before talking to the faculty member.

Faculty	Office	Areas of interests
K. Adewusi	2113	Parasitology, Biotechnology
B. Beetley	2015	Wildlife Biology, Ornithology, Ecology
C. Boogaard	2116	Molecular Biology, Biotechnology
J. Buss	2009	Developmental Biology, Genetics
D. Fonner	2011	Physiology, Pathology, Endocrinology
R. Friar	2017	Physiology, Pathology, Reproduction
L. Goggolin	2016	Anatomy
S. Herron	2012	Botany, Wildlilfe, Ecology
W. Hoeksema	2013	Microbiology, Immunology, Virology
R. Mitchell	2118	Botany, Molecular Biology, Systematics
M. Murnik	2117	Genetics, Evolution
R. Palmer	2113	Physiology, Pathology, Reproduction
M. Ryan	2115	Microbiology, Immunology
K. Stasser	2120	Marine Aquatic Biology, Conservation, Ecology
J. Vanderploeg	2119	Horticulture
P. Watson	2007	Entomology, Ecology

BIOLOGY 460
CURRENT TOPICS IN BIOLOGY

MENTOR ACCEPTANCE OF STUDENT

Student name _____

I accept student this student as my mentee. _____

Signature of mentor _____

Date _____

General topic area for research:

Comments:

MENTOR APPROVAL FORM
BIOLOGY 460
CURRENT TOPICS IN BIOLOGY

TITLE, TOPIC, AND PURPOSE

Student name _____

Signature of mentor _____

Date _____

On a separate sheet, type out your title, topic, and purpose for your monograph. Refer to the discussion of **Title, topic and purpose selection** in the syllabus. Follow the example in the syllabus.

Comments:

MENTOR APPROVAL FORM
BIOLOGY 460
CURRENT TOPICS IN BIOLOGY

MONOGRAPH OUTLINE

Student name _____

Signature of mentor _____

Date _____

On a separate sheets of paper, submit a detailed outline of your monograph. Organize this in an outline form using standard notation: i.e. headings of I., A., 1., a., etc. Start with the title of the monograph, next put in the purpose for your monograph, and follow that with the outline. Refer to the **Outline** discussion in your syllabus.

Comments: