SUNY BROCKPORT
Faculty Senate
State University of New York
College at Brockport
350 New Campus Drive
Brockport, NY 14420-2925
(585) 395-2586 (Fax) 395-2246

TO: Dr. Paul Yu, College President

FROM: The Faculty Senate Meeting on: May 3, 2004

RE: 1. Formal Resolution (Act of Determination)
2. Recommendation (Urging the Fitness of)
3. Other, For Your Information (Notice, Request, Report, etc.)

SUBJ: MS in Environmental Science & Biology

Signed: (Dr. Kenneth O'Brien, 2002-2004 Faculty Senate President)
Date: 5/13/04

*complete document with appendices is 105 pages and can be accessed at www.brockport.edu/facultysenate/resolutions

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TO: The Faculty Senate

FROM: Dr. Paul Yu, College President

RE: 1. Decision and Action Taken on Formal Resolution (circle)
   a. Accepted. Effective Date: 7-6-04
   b. Deferred for discussion with the Faculty Senate on ___/____/____
   c. Unacceptable for the reasons contained in the attached explanation

II, III. Response to Recommendation or Other/FYI
   a. Received and acknowledged
   b. Comment:

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DISTRIBUTED TO: Presidents Staff
Dean's Council

O: Originator, Academic Advisement, Registrar

Distribution Date: 7-6-04

Signed: (Dr. Paul Yu, President, SUNY College at Brockport)

Dr. John B. Ladd, Interim President

Date: 7-6-04

1 of 105
Faculty Senate, 3/3/04
2003-2004-43.res.doc
To: Kenneth O’Brien, President, Faculty Senate  
From: Joseph Makarewicz  
Chair, Department of Environmental Science and Biology  

Re: Submission of two new programs:  

On behalf of the Department of Environmental Science and Biology, I have attached two proposals for consideration by the Faculty Senate:  

1. Master of Science in Environmental Science; and  
2. Combined BS/MS in Environmental Science and Biology.  

During the summer of 2002 the former Department of Biological Sciences at SUNY Brockport was divided into two new departments: Biological Sciences, and Environmental Science and Biology. This division created departments with areas of expertise in cellular and molecular biology (Biological Sciences) and environmental science and ecology (Environmental Science and Biology). The Biological Sciences Department was given administrative authority for the both the undergraduate major and the existing M.S. program in Biological Science. Provost Flanagan in his 24 June 2002 memo encouraged the Department of Environmental Sciences and Biology “…to develop a graduate program in environmental biology, environmental science, ecology, or a related field”. In the Spring Term of 2003, a “trial” balloon was approved by Provost Flanagan, Dean Maggiotto, and the Academic Priorities Committee. In addition, this proposal has been reviewed by the faculty of the Department of Environmental Science and Biology, the Environmental Science Board, Dean Stuart Appelle and Dean Susan Stites-Doe.
FACULTY SENATE OFFICE
RESOLUTION PROPOSAL COVER PAGE

DEADLINE FOR SUBMISSIONS: February 23 - Proposals received later may not be reviewed until next semester.
Submit all proposals to the Faculty Senate President electronically or on a disk with a hard copy.
Please provide cover page information requested.
facprez@brockport.edu, fsenate@brockport.edu
Faculty Senate Office, 426 Allen Building

1. PROPOSAL TITLE:
Please be somewhat descriptive, for example, Graduate Probation/Dismissal Proposal rather than Graduate Proposal.
Master of Science in Environmental Science and Biology

2. BRIEF DESCRIPTION OF PROPOSAL:
This is a proposal for a MS degree in Environmental Science.

3. SUBMISSION & REVISION DATES:
PLEASE DATE ALL UPDATED DOCUMENTS and resubmit to the Senate Office electronically prior to Senate review and vote at fsenate@brockport.edu.

<table>
<thead>
<tr>
<th>First Submission</th>
<th>Updated on</th>
<th>Updated on</th>
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<tr>
<td>27 February 2004</td>
<td>March 19, 2004</td>
<td>April 27, 2004</td>
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4. SUBMITTED BY: (contact person)

<table>
<thead>
<tr>
<th>Name</th>
<th>Department</th>
<th>Phone</th>
<th>Email</th>
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<tbody>
<tr>
<td>Joseph Makarewicz</td>
<td>Environmental Science and Biology</td>
<td>395-5747</td>
<td><a href="mailto:jmakarew@brockport.edu">jmakarew@brockport.edu</a></td>
</tr>
</tbody>
</table>

5. COMMITTEES TO COPY: (Senate office use only)

<table>
<thead>
<tr>
<th>Committee</th>
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<tr>
<td>__ Budget</td>
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<td>__ College Environment</td>
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<td>__ Enrollment Policies</td>
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<td>__ General Education</td>
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<tr>
<td>X Graduate Curriculum</td>
<td>Committee Chair</td>
<td>3/3/04</td>
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<tr>
<td>__ Personnel Policies</td>
<td>Executive Committee Senate Floor College President</td>
<td>4/26/04</td>
</tr>
<tr>
<td>__ Student Policies</td>
<td></td>
<td></td>
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<tr>
<td>__ Undergraduate Curriculum</td>
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<td></td>
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</tbody>
</table>
The Vision

The goal of the proposed Master of Science program in Environmental Science and Biology is to develop in its students an advanced understanding of ecosystem structure and function, and how environmental stressors affect them. Graduates of SUNY Brockport’s Master of Science program in Environmental Science and Biology will be trained in a variety of modern scientific methods in environmental chemistry and toxicology, ecological genetics, statistical and computational analysis, and field biology. The interdisciplinary nature of our program will facilitate interaction among students and faculty with different areas of expertise, both within SUNY Brockport and across a broad range of academic, governmental and non-governmental organization institutions. Our program will encourage students to design and conduct innovative graduate research projects, and to develop strong written and oral communication skills through presentations at professional meetings and submission of manuscripts to peer-reviewed journals. Courses included in this curriculum will ensure high levels of oral and written communication skills and technical expertise, will help students acquire up-to-date knowledge on environmental issues and politics and develop the strong scientific and analytical skills essential for solving tomorrow’s vexing environmental problems. Graduates of the Masters Program in Environmental Science and Biology will be “well rounded specialists” in Environmental Science.

The proposed Masters program in Environmental Science and Biology will provide a solid background in the natural sciences. Graduate students will take a minimum of 30 credit hours by faculty advisement. Courses could be taken in at least two of the college’s Schools – Letters and Sciences, and Professions. For example, Environmental Law is offered in the School of Professions. However, we expect that most course offerings would be from the School of Letters and Sciences. Nevertheless, the program contains courses that integrate the expertise of faculty in several departments, such as Biological Sciences, Chemistry and Earth Sciences. Thus, the course sequence selected by the student, in collaboration with the Thesis Advisory Committee, may include courses from other disciplines and draw on environmental experts from the larger community. This unique approach reflects the interdisciplinary nature of the program.

Graduate students are also important for our ability to attract research funds and develop the quality of the undergraduate program in Environmental Science and Biology. Graduate students are an integral part of the vigorous research programs directed by faculty in the Department of Environmental Science and Biology. Since 1995, our graduate students in the MS program in Biological Sciences with interests in ecology and environmental science have produced 32 theses based on original research (Appendix A). Since 1995 research by Drs. Haynes, Norment and Makarewicz has generated approximately $4.8 million in external funding, much of which has gone to support graduate student research.

During the same period, externally-funded research by faculty with expertise in environmental science and biology has resulted in at least 30 peer-reviewed publications, including 15 with graduate student coauthors. Ongoing research by Department of Environmental Science and Biology faculty in areas such as toxic chemical levels in Great Lakes biota; water quality problems in the Finger Lakes and Lake Ontario; phytoplankton and zooplankton dynamics in the Great Lakes; fisheries ecology in Lake Ontario and Finger Lakes; stressed stream analyses of watersheds; impacts of zebra mussels, spiny and
Evidence of Need

It is difficult to talk in general terms about “Environmental” employment. Whereas industries like biotechnology, auto manufacturing, and software design have a clear set of specific employers with relatively similar job titles and descriptions, the environmental job market is dispersed over thousands of public, private and nonprofit employers. Some of these employers are identifiable as “environmental,” while other employers include environmental functions within an apparently unrelated business. Thus an important aspect of environmental employment is the fact that jobs are widely dispersed across thousands of small units, rather than being largely centralized in relatively few, well-known places.

The Environmental Trends Report: 2002 of the Environmental Careers Organization (ECO) identified the following important, emerging multidisciplinary eco-careers:

1. Pollution prevention/Waste reduction specialist
2. Conservation biologist/ecosystems manager
3. Environmental information technology/GIS
4. Environmental manager
5. Global climate researcher
6. Renewable energy and energy management
7. “Smart Growth” urban planner
8. Policy integration specialist
9. Community organizer
10. Fundraiser
11. Environmental economist
12. Environmental health specialist

In 2000, 64,000 jobs were identified as available under the category of Environmental Scientist by the ECO (Environmental Career Trends: 2002). By 2010, ECO projects a 14,000 increase in the number of Environmental Scientists - a 22.3% increase in jobs (Table 1). Other occupations, such as Conservation Scientist, Forest Conservation Scientist, Geoscientist, Hydrologist and Environmental Technician, for which students with an MS in Environmental Science would qualify, show an increase of another 18,000 positions by 2010. Thus, a minimum increase of 32,000 jobs related to Environmental Science are projected by 2010.

Projected national jobs trends indicate that a national and local need exists for trained scientists with a M.S. in Environmental Science and Biology. The Occupational Outlook Handbook, published by the U. S. Department of Labor, forecasts that employment of environmental scientists is “expected to grow faster than the average for all occupations through 2010,” due to the “continuing need for companies and organizations to comply with environmental laws and regulations.” The projected increase in jobs for environmental scientists through 2010 is expected to be between 21 to 35 percent. The Occupational Outlook Handbook also predicts a growth of jobs as conservation scientists, another occupation that many graduates of a M.S. program in Environmental Science and Biology would be qualified for, of
between 3 to 9 percent. Kevin Doyle, Director of Career Education for the Environmental Careers Organization, also predicts that the need for Environmental Scientists will increase by over 20% in the coming decade, with the need for conservation scientists increasing by over 8% (Table 1). At the regional level, continuing concern about environmental issues in the Great Lakes Basin, protection of air and water quality, conservation of wetlands, and the environmental needs of companies such as Xerox and Kodak should ensure a steady demand for environmental scientist professionals with graduate degrees. For example, a 1998 survey by the Environmental Careers Organization of 40 employers in the private sector and government agencies asked, “When hiring non-seasonal, entry level environmental professionals, what level of education/training do you prefer?” Forty percent responded that the undergraduate degree was preferred, followed closely (29%) by the Master’s degree.

Locally, the consistently high number of graduate students supervised by Drs. Haynes, Norment and Makarewicz in their former department, the Department of Biological Sciences, provides an indication of current and future demand for a M.S. program in Environmental Science and Biology at SUNY Brockport (Appendix A). Perhaps of greater importance in illustrating the existence of a local and national job market in environmental science is the placement record of our M.S. students (Appendix A). Some have gone on to Ph.D. programs at major research universities, but the majority has entered the job market. Our former M.S. students are working for the U.S. Environmental Protection Agency, New York Sea Grant, U.S. Fish and Wildlife Service, New York State Department of Environmental Conservation, Monroe County Health Department, Orleans County Soil and Water, Monroe County Pure Waters, Ecology and Environment, Inc., Battelle Laboratories, Mote Marine Laboratories and Paul Smith’s College, to name but a few.

### Faculty Experience

The proposed graduate program will be delivered by innovative faculty, all of whom hold a Ph.D. and who have extensive research experience, professional achievements, and a record of collaboration with other researchers in academia, industry and government (Appendix C). Environmental Science faculty are members of the Department of Environmental Science and Biology and have directed over 57 M.S. degrees in their former department, Biological Sciences (Appendix A). This faculty has attracted external funds (> $4.8 million) from NOAA, EPA, Sea Grant, Army Corps of Engineers, Biological Research Institute, U.S. Fish and Wildlife Service and the New York State Department of

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1. The Environmental Careers Organization (ECO) has been serving the needs of environmental employers, students and aspiring professionals for 25 years. ECO, 179 South Street, Fifth Floor, Boston MA 02210

### Table 1. Projected employment by occupation in fields related to Environmental Science. Data from The Environmental Careers Organization^1^.

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Employment (in 1000s)</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2000</td>
<td>2010</td>
</tr>
<tr>
<td>Environmental Scientists</td>
<td>64</td>
<td>78</td>
</tr>
<tr>
<td>Conservation Biologists</td>
<td>16</td>
<td>18</td>
</tr>
<tr>
<td>Forest Conservationist</td>
<td>20</td>
<td>22</td>
</tr>
<tr>
<td>Geoscientists</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>Hydrologist</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Env. Protection Techs</td>
<td>27</td>
<td>34</td>
</tr>
<tr>
<td>TOTAL ENVIRONMENTAL</td>
<td>160</td>
<td>192</td>
</tr>
<tr>
<td>Economists</td>
<td>22</td>
<td>26</td>
</tr>
<tr>
<td>Chemists</td>
<td>84</td>
<td>100</td>
</tr>
</tbody>
</table>
Environmental Conservation, and they have published in peer-reviewed journals such as Science, Bioscience, Ecological Monographs, Journal of Great Lakes Research, Environmental Science and Technology, Auk, Condor and Canadian Journal of Zoology. The vigorous, externally-funded research programs of the faculty has meant that funding of graduate stipends and research supplies often has been augmented by external funding sources.

We envision the graduate program as reflecting the interdisciplinary approach of the undergraduate major in Environmental Science and Biology. Thus, graduate faculty with supervisory privileges will also include “Associate Faculty” (Appendix C) from departments other than Environmental Science and Biology who teach courses in the undergraduate B.S. program in Environmental Science or who, by petition to the Chairperson of the Department of Environmental Science and Biology, request to be “Associate Faculty”. Currently “Associate Faculty” reside in the Departments of Earth Sciences, Psychology and Chemistry (e.g., See Appendix C). Associate Faculty in the Departments of Chemistry, Earth Sciences and Psychology with expertise in areas such as geographic information systems, wetland systems, animal behavior, green chemistry, surficial geomorphology, and environmental chemistry will be able to supervise graduate students.

With the combined expertise of faculty from the Department of Environmental Science and Biology and Associate Faculty from other departments, the graduate teaching and research program in Environmental Science and Biology at SUNY Brockport would become even stronger with opportunities for students to pursue advanced study in a much wider range of subjects.

1. The Environmental Careers Organization (ECO) has been serving the needs of environmental employers, students and aspiring professionals for 25 years. ECO, 179 South Street, Fifth Floor, Boston MA 02210

**Library Resources:** Journals available to graduate students through Drake Memorial Library are listed in Appendix D.

**Resources:** No new fiscal or faculty resources are required for this proposal.

**Computer Facilities:** Lennon Hall houses a satellite “PC Center” with 24 Gateway PCs and a SUN equipped center (10 machines) for computer modeling.

**Laboratory and Field Facilities:**
There is a wide range of well-equipped laboratories and field research equipment available for environmental research at SUNY Brockport. The Lennon Hall facility, where the Department of Environmental Science and Biology and Department of Earth Sciences are housed, was recently renovated with funds from the National Science Foundation and the New York State Construction Fund. The $13 million renovation provides state-of-the-art facilities, with new equipment ranging from radio-telemetry gear for tracking birds and fish, a Geographic Information Systems lab, a new $38,000 fish-electroshocking vessel; a 25-foot lake-going vessel for Lake Ontario equipped with
GPS, marine radio, fathometer, SeaBird CTD, gas powered winch; three Bran-Luebbe chemical autoanalysers, Perkin Elmer atomic absorption (flame and graphite) spectrophotometer, HP G1800C Quadrupole GC/MS, Agilent 6890N Network Gas Chromatograph System, and assorted spectrophotometers, fluorometers and microscopes. Additional facilities under departmental direction include an aquaculture facility, aquaculture ponds, diluter room for toxicity testing, a greenhouse, a NELAC (National Environmental Laboratory Accreditation Consortium) certified analytical laboratory, herbarium, and a large walk-in environmental chamber. Nearby field sites used on a regular basis for teaching and research include Iroquois National Wildlife Refuge and Braddock Bay Bird Observatory.

The Master of Science Program

General: Graduate students pursuing the M.S. degree would be required to complete a minimum of 30 semester hours. Thirteen hours of core courses that include a defended thesis based upon original research would be required. Students would also have to pass an oral comprehensive exam administered by their “Thesis Advisory Committee”. Graduate students pursuing an M.S. in Environmental Science and Biology would be supervised by faculty members in the Department of Environmental Science and Biology, and by qualified “Associate Faculty” from the Departments of Earth Science, Psychology and Chemistry, which currently collaborate with the Department of Environmental Science and Biology on the B.S. program in Environmental Science.

Admission: Admission into the MS program in Environmental Science is competitive and is based on previous academic performance, letters of recommendation and work experience. Applicants must have a 3.0 GPA and a BS or BA in an appropriate field (e.g., Biology, Environmental Science, Earth Science, Chemistry). If the applicant has an overall cumulative undergraduate GPA of less than 3.0 from the college or university granting the degree, or the applicant’s undergraduate transcript shows a pattern of courses with grades below “B”, the student may be considered for admission only if the GRE General Test is taken.

Major Advisor and Thesis Advisory Committee: Upon admission to the program in Environmental Science and Biology, the candidate will be assigned a Major Advisor by the Department of Environmental Science and Biology. This decision will consider the student’s area of specialization and the willingness of faculty member to accept the responsibility of serving as the Major Advisor. The Major Advisor will monitor the student’s academic progress and be responsible for direction of the Thesis Proposal, Oral Comprehensive Exam and the Thesis Defense.

The candidate, with the advice of the Major Advisor, will select two other members who, together with the Major Advisor, will constitute the candidate’s Thesis Advisory Committee. One member may be a scientist not from the Brockport campus. The Thesis Advisory Committee will:

1. With the candidate develop a Plan of Graduate Study (see below).
2. Act in an advisory capacity concerning thesis research.
3. Administer and evaluate the candidate’s Oral Comprehensive Exam.
4. Evaluate the candidate’s written thesis (ENV 704) and administer the Thesis Defense.
5. Terminate the student’s participation in the graduate program if the student does not make reasonable progress towards completion of the M.S. degree, or does not maintain a 3.0 GPA. Reasonable progress is defined by the following:
   a. The maintenance of a GPA of 3.0 in courses listed in the Plan of Graduate Study; and
   b. The development of a Thesis Proposal and Plan of Graduate Study in a timely manner.

Graduate Dismissal Policy: Students with a GPA below 3.0 will have one semester to bring the GPA to 3.0. Failure to bring the GPA to 3.0 will result in the student’s dismissal from the program. Students with a GPA below 3.0 may not enroll in Thesis (ENV 704).

Time Limit: Students have five years from the date of matriculation to complete the MS.

Independent Study: Independent study allows students to explore unique areas of interest not addressed by currently offered courses, or to explore in greater depth a topic covered in an existing course. A student is limited to three credits of Independent Study credit.

Thesis Proposal: A thesis proposal must be written by the candidate prior to the end of the second semester and be approved by the Thesis Advisory Committee prior to the start of the candidate’s thesis research.

Full-Time Students: Students enrolled in ENV 704 are considered to be full-time students even though they may have less than 12 credit hours of courses.

Transfer Credit: Up to six credits of graduate course work with a grade of “B” or better may be transferred from other institutions with the approval of the student’s Thesis Advisory Committee.

Plan of Graduate Study/The Curriculum
Thirty credits or more are required for the M.S. in Environmental Science and Biology. Of these 30 credits, 17 credits or more are to be at the 600/700 level. The remainder may be at the 700, 600 or 500 level as determined by the Thesis Advisory Committee in consultation with the candidate prior to the end of the first semester of matriculation. Thirteen credits of core courses are required as follows: Graduate Research Seminar (ENV 705), Thesis (ENV 705), Experimental Design (ENV 614). The Plan of Graduate Study may include supervised independent study which will not exceed three credits. The Plan of Graduate Study will reflect the student’s expressed desire to concentrate in some area of Environmental Science and Biology. That is, courses selected will reflect the expertise required for their thesis, enabling them to help solve important environmental problems while providing a fully integrated, interdisciplinary approach to environmental science and biology. This educational outcome should provide our graduates with the background demanded in the marketplace. To accomplish this, the program will use strengths of the School of Letters and Sciences to provide a strong scientific education at the graduate level. Furthermore, several courses and internships include extensive problem-solving exercises provided by members of the environmental community (government, non-government organizations, and industry). Members of the environmental community have indicated a willingness to participate as mentors to students in these problem-solving exercises (e.g., Brockport’s paid intern program with NYSDEC).

The courses making up the Plan of Study are to be listed on the Plan of Study Form and approved by all members of the Thesis Advisory Committee and the Department Chair. Courses may be from any department on campus, as long as they contribute to a coherent program of study (See Appendix B for
a list of potential courses). Any changes in the Plan of Graduate Study must be approved by the Thesis Advisory Committee.

Level of Expectation of Students

The M.S. in Environmental Science and Biology is a rigorous, demanding thesis-based experience. The comprehensive exam, thesis defense and schedule of courses are designed to challenge students to think critically, independently and creatively, while providing the intellectual depth and breadth necessary to support the research formally developed in the thesis proposal.

The oral comprehensive exam is a 2 to 3-hour formal question and answer period required of every student. Exam questions from each faculty member are unannounced and may cover any aspect of environmental science and biology deemed important by the Thesis Advisory Committee.

The written thesis is reviewed by the Thesis Advisory Committee and revised by the candidate until deemed acceptable for the Thesis Defense by the Committee. The written thesis (ENV 704 – six credits) will be formally defended before the Thesis Advisory Committee. The defense, which takes place over a 2 to 3-hour period, concentrates on aspects of the thesis. That is, the student must be able to satisfactorily answer questions dealing with experimental design, methodology, hypotheses, conclusions, etc. developed in the thesis.

The Graduate Research Seminar (ENV 705), required of all students, is designed as four, one-credit seminars offered in successive semesters (total of four credits). Each seminar will critically review selected literature (one or two papers per week) on a topic determined by the faculty member. Over a two-year period, four different faculty will teach the course, providing students with breadth and depth on a series of topics.

Experimental Design (ENV 614 – 3 credits) is required of all students. We believe all students need to have a strong background in design of experiments to be successful. Parametric and non-parametric statistics as well as regression and ANOVA are covered. See Appendix E for the syllabus.

Syllabi of other 600 and 500-level elective courses are provided in Appendix E. 500-level courses are offered to graduate students and to selected undergraduate students who have taken prerequisite courses. In 500-level courses, graduate students face a significantly higher level of expectation than undergraduates. This is accomplished by one or more techniques including enhanced reading lists, extra term papers or projects, presentations before the class, and often a more rigorous exam. For example, in Limnology (ENV 519) a total of 22 journal articles are read both by undergraduate and graduate students. In addition, graduate students must read five extra chapters (218 pages), write an additional paper on some aspect of their thesis research and answer extra exam questions. Representative syllabi of nineteen of the Department’s 500 and 600-level courses are presented in Appendix E.

Requirements for Graduation with the MS in Environmental Science

1. Completion of the Plan of Graduate Study, as determined by the Thesis Advisory Committee in consultation with the candidate by the end of the first semester.
2. Successful completion of an oral comprehensive exam administered by the Advisory Committee by the beginning of the third semester of matriculation. The results of this exam may be used by the advisory committee to adjust the candidate’s Plan of Graduate Study. In case of failure of this exam, ONE oral reexamination may be granted by the committee prior to the start of the fourth semester.
3. Required Core Courses (13 credits)
   a) Graduate Research Seminar (ENV 705 – 4 credits, one one-credit course per semester).
   b) Thesis (ENV 704 – 6 credits, two credits in the second, third and fourth semesters)
   c) Experimental Design (ENV 614 – 3 credits)
4. A minimum of 17 semester hours at the 600/700 level.
5. A minimum of 30 semester hours of credit with a cumulative GPA of 3.0 or higher
   in the courses listed in the Plan of Graduate Study:
7. Submission of five copies of the defended thesis to the department secretary.

Table 2. A typical two-year course schedule for an MS student in Environmental Science and Biology.
*=required.

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Cr</th>
<th>Second Semester</th>
<th>Cr</th>
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<tr>
<td>*Experimental Design (ENV 614)</td>
<td>3</td>
<td>*Thesis Research (ENV 704)</td>
<td>2</td>
</tr>
<tr>
<td>*Graduate Research Seminar (ENV 705)</td>
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<td>*Graduate Research Seminar (ENV 705)</td>
<td>1</td>
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<tr>
<td>700/600/500 Level Electives</td>
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<td>700/600 Level Elective</td>
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<td><strong>Subtotal</strong></td>
<td>10</td>
<td><strong>Subtotal</strong></td>
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<tr>
<td>Third Semester</td>
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<td>Fourth Semester</td>
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<td>*Thesis Research (ENV 704)</td>
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<td>*Thesis Research (ENV 704)</td>
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<td>*Graduate Research Seminar (ENV 705)</td>
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<td>4</td>
<td>700/600/500 Level Electives</td>
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<td><strong>Subtotal</strong></td>
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<td><strong>Subtotal</strong></td>
<td>6</td>
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<td><strong>Total Credits required for graduation - 30</strong></td>
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</table>
### Appendix A. Current (or last known) job placement, thesis title and advisor of MS students advised by Norment, Haynes and Makarewicz in their former department.

<table>
<thead>
<tr>
<th>Name</th>
<th>Year</th>
<th>Title of Thesis</th>
<th>Major Advisor</th>
<th>Position</th>
</tr>
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<tbody>
<tr>
<td>Amering, Alan</td>
<td>1978</td>
<td>An organic energy budget for the New York State Barge Canal</td>
<td>Makarewicz</td>
<td>Kodak, Rochester,NY</td>
</tr>
<tr>
<td>Insalaco, Samuel</td>
<td>1979</td>
<td>Routine determination of mirex and photomirex in fish tissue in the presence of polychlorinated hydrocarbons</td>
<td>Makarewicz</td>
<td>V.P. for European Affairs, OH Materials, Findlay, Oio</td>
</tr>
<tr>
<td>McCormack, Charles</td>
<td>1980</td>
<td>Stamina and feeding responses of rainbow trout fitted with dummy biotelemetry devices.</td>
<td>Haynes</td>
<td>Unknown</td>
</tr>
<tr>
<td>Calaban, Michael</td>
<td>1981</td>
<td>The effect of temperature and density on the amplitude of vertical migration of <em>Daphnia magna</em>.</td>
<td>Makarewicz</td>
<td>Water Quality Specialist, NY Dept Environmental Conservation</td>
</tr>
<tr>
<td>McKellar, Dorothy</td>
<td>1982</td>
<td>Growth response of <em>Anacystis nidulans</em> to sodium, phosphate and potassium.</td>
<td>Makreiwicz</td>
<td>Technical Assistant, Stone and Webster, Boston, MA</td>
</tr>
<tr>
<td>Devault, David</td>
<td>1982</td>
<td>Effects of wind stress, wind speed and direction on phytoplankton in the nearshore region of Lake Michigan</td>
<td>Makarewicz</td>
<td>Toxics Chemical Coordinator, Great Lakes Program, EPA Chicago, IL</td>
</tr>
<tr>
<td>Mellas, Ernest</td>
<td>1982</td>
<td>Effect of dummy telemetry transmitter attachments on swimming performance and behavior of rainbow trout and white perch.</td>
<td>Haynes</td>
<td>Professor of Biology, Monroe Community College, Rochester, NY</td>
</tr>
<tr>
<td>Leupold, Maureen</td>
<td>1983</td>
<td>Blue-green algal mats from acidified lakes: Mat structure and pH response of algal isolates.</td>
<td>Makarewicz</td>
<td>Assistant Professor, Genesee Community College</td>
</tr>
<tr>
<td>Nettles, David</td>
<td>1983</td>
<td>Ecology of Lake Ontario brown trout. Assistant Professor, Paul Smith’s College.</td>
<td>Haynes</td>
<td>NYSDEC, Atlantic salmon recovery coordinator for Lake Champlain, Raybrook, NY</td>
</tr>
<tr>
<td>Kent, Brian</td>
<td>1984</td>
<td>Mirex and its metabolites: Trends in levels of Lake Ontario coho and chinook salmon.</td>
<td>Makarewicz</td>
<td>Director, Quality Assurance Program, General Electric, Syracuse, NY</td>
</tr>
<tr>
<td>Poulin, Kathleen</td>
<td>1985</td>
<td>A review and evaluation of regulatory, design and environmental impact considerations for Great Lakes recreation development.</td>
<td>Haynes</td>
<td>Environmental regulations specialist, Architectural and Engineering firms, Providence RI.</td>
</tr>
<tr>
<td>Firstencel, Heidi</td>
<td>1987</td>
<td>The Black Tern: Breeding ecology in upstate New York and results of pesticide residue analyses</td>
<td>Makarewicz</td>
<td>Research Associate, Cornell Ornithology Lab, Ithaca, NY</td>
</tr>
<tr>
<td>Lewis, Theodore</td>
<td>1987</td>
<td>Exchange of mirex between Lake Ontario and its tributaries.</td>
<td>Makarewicz</td>
<td>Research Associate, Research Foundation of SUNY</td>
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<tr>
<td>Name</td>
<td>Year</td>
<td>Title</td>
<td>Advisor</td>
<td>Institution</td>
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<tr>
<td>Shea, Mary</td>
<td>1987</td>
<td>Mysis relicta: Production, vertical migration and life history of the Lake Ontario population.</td>
<td>Makarewicz</td>
<td>Water Treatment Plant Operator, Batavia, NY</td>
</tr>
<tr>
<td>Koapaha, Joutje</td>
<td>1989</td>
<td>Leptodora kindtii: Seasonal population abundance and food web interactions in Lake Ontario.</td>
<td>Makarewicz</td>
<td>Unknown, Returned to Indonesia</td>
</tr>
<tr>
<td>Fry, Barry</td>
<td>1989</td>
<td>Alpha and Pmax as functional indicators of aquatic ecosystems</td>
<td>Makarewicz</td>
<td>Director of Sales Columbia Analytical, Rochester, NY</td>
</tr>
<tr>
<td>Teal, Gregory</td>
<td>1989</td>
<td>Nutrient loadings into Conesus Lake</td>
<td>Makarewicz</td>
<td>Lab Director, Columbia Analytical, Rochester, NY</td>
</tr>
<tr>
<td>Puckett, Norma</td>
<td>1989</td>
<td>Trophic interactions and alewife predation in Conesus Lake</td>
<td>Makarewicz</td>
<td>Lab Director (retired), Van Lare STP</td>
</tr>
<tr>
<td>Letson, Michael</td>
<td>1991</td>
<td>An experimental test of the crayfish as a control mechanism for submerged aquatic macrophytes.</td>
<td>Makarewicz</td>
<td>CH2 Hill Consultants, Florida</td>
</tr>
<tr>
<td>Murray, Michael</td>
<td>1991</td>
<td>Residues of mirex and photomirex in eggs and fillets of Lake Ontario coho and chinook salmon.</td>
<td>Makarewicz</td>
<td>Analytical Lab, Buffalo, NY</td>
</tr>
<tr>
<td>Desormeaux, Eileen</td>
<td>1992</td>
<td>Trophic interactions: The relative importance of Dreisena filtration and Daphnia grazing on phytoplankton abundance and water clarity.</td>
<td>Makarewicz</td>
<td>School teacher, Chili High School</td>
</tr>
<tr>
<td>Aultman, Dana</td>
<td>1992</td>
<td>Spring thermal fronts and salmonine distributions in Lake Ontario.</td>
<td>Haynes</td>
<td>Statistician, Eastman Kodak Company</td>
</tr>
<tr>
<td>Brown, Gary</td>
<td>1993</td>
<td>Investigation of generalized watershed loading functions predictions on Sodus East Creek watershed</td>
<td>Makarewicz</td>
<td>Co-Director, Monroe Co. Environmental Health Dept</td>
</tr>
<tr>
<td>Crego, Gregory</td>
<td>1994</td>
<td>Effects of alewife predation on zooplankton community structure in Honeoye and Conesus Lakes</td>
<td>Makarewicz</td>
<td>Ph.D program, Mississippi</td>
</tr>
<tr>
<td>Stewart, Timothy</td>
<td>1993</td>
<td>Benthic macroinvertebrate community changes following zebra mussel colonization of southwestern Lake Ontario</td>
<td>Haynes</td>
<td>Assistant Professor, Dept. Natural Resources, Iowa State University</td>
</tr>
<tr>
<td>Miller, Steven</td>
<td>1994</td>
<td>An analysis of factors potentially limiting the abundance of the zebra mussel in Salmon Creek, Monroe County, New York.</td>
<td>Haynes</td>
<td>Regulatory analyst/fishery technician, NYSDEC, Avon, NY.</td>
</tr>
<tr>
<td>Name</td>
<td>Year</td>
<td>Title</td>
<td>Institution</td>
<td>Organization</td>
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<tr>
<td>Verna, Tony</td>
<td>1995</td>
<td>The paleolimnology of Irondequoit Bay: Trophic history inferred from</td>
<td>Makarewicz</td>
<td>General Motors, Rochester, NY</td>
</tr>
<tr>
<td></td>
<td></td>
<td>sedimentary diatom assemblages</td>
<td></td>
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<tr>
<td>Cloen, Carol</td>
<td>1996</td>
<td>Ultraviolet-B penetration in the water column and its effect on the</td>
<td>Makarewicz</td>
<td>Natural Resource Adm., WA Dept of Natural Resources</td>
</tr>
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<td>American toad, <em>Bufo americanus</em></td>
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<tr>
<td>Nale, Helen</td>
<td>1996</td>
<td>Benthic macroinvertebrates of Sandy Creek: Characterization and use in</td>
<td>Makarewicz</td>
<td>High school teacher, Penfield, NY</td>
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<tr>
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<td>water quality analysis</td>
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<tr>
<td>Cady, Bruce</td>
<td>1996</td>
<td>The effects of zooplankton grazing and nutrients on the phytoplankton</td>
<td>Makarewicz</td>
<td>Kodak (Retired)</td>
</tr>
<tr>
<td></td>
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<td>of Conesus Lake, NY</td>
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<td></td>
<td>Wildlife Refuge.</td>
<td></td>
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<tr>
<td>Tangorra, Philip</td>
<td>1996</td>
<td>Sediment chemistry of Irondequoit, NY</td>
<td>Makarewicz</td>
<td>Lab Analyst, Hudson Valley Health Department</td>
</tr>
<tr>
<td>Roberts, Chris</td>
<td>1996</td>
<td>Effects of Forest Fragmentation on the Reproductive Biology of Scarlet</td>
<td>Norment</td>
<td>Ecologist, Nature Conservancy Rochester, NY</td>
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<tr>
<td></td>
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<td>Tanagers (<em>Piranga olivacea</em>)</td>
<td></td>
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<tr>
<td>Lampman, Gregory</td>
<td>1997</td>
<td>Trophic interactions in Lake Ontario: The zooplankton-phytoplankton</td>
<td>Makarewicz</td>
<td>Associate Project Manager, NYSERDA</td>
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<tr>
<td></td>
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<tr>
<td>Jones, Gregory</td>
<td>1997</td>
<td>Stopover Ecology of neotropical migrants on the south shore of Lake</td>
<td>Norment</td>
<td>Ph.D. program, Univ. Florida</td>
</tr>
<tr>
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<td></td>
<td>Ontario during spring migration</td>
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<tr>
<td>Lowie, Christopher</td>
<td>1998</td>
<td>Habitat requirements stream spawning walleye.</td>
<td>Haynes</td>
<td>Andromous fish passage coordinator U.S. Fish and</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td>Wildlife Service, Washington, DC</td>
</tr>
<tr>
<td>Terninko, John</td>
<td>1998</td>
<td>Watershed management plan for Wayne County</td>
<td>Makarewicz</td>
<td>Associate Director, Center for Environmental</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Information, Rochester, NY</td>
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<tr>
<td>Cook, George</td>
<td>1998</td>
<td>Chironomids as indicators of water quality in Irondequoit Creek.</td>
<td>Haynes</td>
<td>Aquatic ecology consultant, Rochester, NY</td>
</tr>
<tr>
<td>Weaver, Ken</td>
<td>1987</td>
<td>Alpha and betadiversity in zooplankton communities.</td>
<td>Makarewicz</td>
<td>Everglades Park, Florida</td>
</tr>
<tr>
<td>Arnold, Mary</td>
<td>2001</td>
<td>Paleolimnological analysis of Sodus Bay</td>
<td>Makarewicz</td>
<td>Private Consultant, Diatom Analysis</td>
</tr>
<tr>
<td>Robinson, Judy</td>
<td>2000</td>
<td>Follow-up vegetational and avifaunal surveys on wetlands restored through</td>
<td>Norment</td>
<td>Environmental Specialist, Dept. of Env. Quality,</td>
</tr>
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<td></td>
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<td>the U.S. Fish and Wildlife Service</td>
<td></td>
<td>Virginia</td>
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<tr>
<td>Bland, Stephen</td>
<td>2002</td>
<td>Causes of moss distribution in Alleghany primary order streams</td>
<td>Makarewicz</td>
<td>Analyst, VanLage STP, Rochester, NY</td>
</tr>
<tr>
<td>Burke, Brian</td>
<td>2000</td>
<td>Habitat suitability comparisons for</td>
<td>Haynes</td>
<td>Unknown</td>
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<tr>
<td>Author(s)</td>
<td>Year</td>
<td>Title</td>
<td>Institution/Position</td>
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<td>Ward, Roger</td>
<td>2001</td>
<td>Factors affecting the benthic nepheloid layer</td>
<td>Makarewicz, Regulatory Affairs Officer, NYSDEC</td>
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<tr>
<td>Smith, Sue</td>
<td>2001</td>
<td>Nocturnal energy levels and stopover behavior of spring neotropical migrants along the southern Lake Ontario shoreline</td>
<td>Norment, Ph.D. program, U. Rhode Island</td>
<td></td>
</tr>
<tr>
<td>Bailey-Billhardt, Nichelle</td>
<td>2001</td>
<td>Ecological indicators of water quality in Irondequoit Creek.</td>
<td>Haynes, Director, Orleans C. Soil and Water Conservation District, Albion, NY</td>
<td></td>
</tr>
<tr>
<td>Damaske, Bestsy</td>
<td>2001</td>
<td>Long-term changes mirex levels in Lake Ontario salmon</td>
<td>Makarewicz, GC analyst, Battelle labs, Columbus, OH</td>
<td></td>
</tr>
<tr>
<td>Parnell, Nicholas</td>
<td>2002</td>
<td>Developing an Index of Biotic Integrity based on fish assemblages in small lakes in central and western New York.</td>
<td>Haynes, Senior Fisheries Scientist, Mote Marine Laboratory, Sarasota, FL</td>
<td></td>
</tr>
<tr>
<td>Laxson, Corey</td>
<td>2002</td>
<td>Cercopagis pengoi distribution in Lake Ontario</td>
<td>Makarewicz, Assistant Professor, Paul Smiths College, NY</td>
<td></td>
</tr>
<tr>
<td>Rhyne, Randall</td>
<td>2002</td>
<td>Sampling and statistical considerations for steam invertebrate indices</td>
<td>Haynes, High School teacher, Fayetteville, NC</td>
<td></td>
</tr>
<tr>
<td>Hughes, Thomas</td>
<td>2002</td>
<td>Lake sturgeon ecology in the Niagara River</td>
<td>Haynes, Biologist, NYSDEC, Stony Brook, NY</td>
<td></td>
</tr>
<tr>
<td>D’Auito, Peter</td>
<td>2003</td>
<td>Factors controlling metaphyton in Conesus Lake</td>
<td>Makarewicz, Everglades Project, USGS, Florida</td>
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</table>
Appendix B. List of potential electives available to candidates for the Master of Science degree in Environmental Science and Biology. *Required. 1Syllabi in Appendix E.

<table>
<thead>
<tr>
<th>B. Courses</th>
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<tr>
<td>700 LEVEL Courses</td>
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<tr>
<td>*ENV 704</td>
<td>Thesis (6)</td>
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<td>*ENV 705</td>
<td>Graduate Research Seminar (1)</td>
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<td>LST 722</td>
<td>Great Lakes Issues (3)</td>
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<tr>
<td>600 LEVEL Courses</td>
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<td>*ENV 614</td>
<td>Experimental Design (3)</td>
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<td>ENV 621</td>
<td>Water Chemistry (4)</td>
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<td>ENV 692</td>
<td>Graduate Internship (3)</td>
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<td>ENV 699</td>
<td>Independent Study (3)</td>
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<td>ESC 636</td>
<td>Water Resources Topics (3)</td>
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<td>NAS 663</td>
<td>Field Natural History (3)</td>
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<td>PAD 679</td>
<td>Grant Writing and Management (1)</td>
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<td>PAD 680</td>
<td>Public Policy (3)</td>
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<td>500 LEVEL Courses</td>
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<td>ENV 513</td>
<td>Topics in Plant Biology (3)</td>
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<td>Limnology (3)</td>
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<td>Limnology Lab (2)</td>
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<td>*ENV 522</td>
<td>Population Biology (3)</td>
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<td>Pollution Biology (3)</td>
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<td>ENV 527</td>
<td>Animal Behavior (4)</td>
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<td>Ornithology (4)</td>
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<td>Conservation Biology (3)</td>
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<td>Herpetology (4)</td>
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<td>ENV 557</td>
<td>Field Biology (3)</td>
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<td>Mammalogy (4)</td>
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<td>ENV 583</td>
<td>Aquatic Invertebrates (4)</td>
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<td>ENV 584</td>
<td>Fish Ecology (3)</td>
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<tr>
<td>*ENV 589</td>
<td>Environmental Impact Analysis (3)</td>
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<td>*ENV 590</td>
<td>Fishery Techniques (2)</td>
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<td>*ENV 595</td>
<td>Plant Ecology (4)</td>
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<td>Landform Analysis Lab (3)</td>
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<td>Air Pollution Meteorology (3)</td>
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<td>ESC 555</td>
<td>Intro to Soil Science (4)</td>
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<td>Geo Information Sciences (3)</td>
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<td>Recombinant DNA (3)</td>
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<td>Biochemistry II (4)</td>
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<td>BIO 515</td>
<td>Molecular Biology (3)</td>
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</tbody>
</table>
Appendix C. Vitae of Environmental Science and Biology Faculty and representative “Associate Faculty”.

JOSEPH C. MAKAREWICZ

CURRENT POSITION: Distinguished Professor and Chairman, Department of Environmental Science and Biology, State University of New York at Brockport, Brockport, New York 14420 (716-395-5747), e-mail: Jmakarew@brockport.edu

EDUCATION:
1969 B.S. (Marine Biology, minor in Chemistry) University of Massachusetts - Dartmouth
1974 Ph.D. (Limnology, Water Resources) Cornell University

PROFESSIONAL EXPERIENCE:
1968 Research Assistant, Univ. of Georgia Marine Institute, Sapelo Island, Georgia.
Salt marsh hydrology.
1969-1971 Graduate Teaching Assistant, Cornell University, Ithaca, NY
1971-1972 Instructor in Environmental Sciences, Bristol Community College, Fall River, Massachusetts.
1971-1972 Instructor in Biology, Southeastern Massachusetts Univ., North Dartmouth, Massachusetts
1975-1976 Research Fellow, Edmund Niles Huyck Preserve, Rensselaerville, New York
1974-1978 Assistant Professor of Biology, SUNY at Brockport, NY
1974-present Designed, equipped and maintained a fully equipped (A.A., G.C., Autoanalyser, phase scopes, etc.) certified (ELAP, NELAC) water quality laboratory: 1975-present. Directed 31 graduate students and over 50 undergraduate research projects; employ and supervise 2-3 technicians per year.
1978-1984 Associate Professor of Biology, SUNY at Brockport, NY
1984-1998 Professor of Biology, SUNY at Brockport, NY
1989-1990 Senior Fulbright Research Fellow, Max Planck Institute fur Limnologie, Germany
1992-present Research Fellow: CILER (Cooperative Institute for Limnology and Ecosystems Research)
1991-1997 Chairman, Dept. of Biological Sciences, SUNY at Brockport
1998-2000 Coordinator - Environmental Science major
1998-present Distinguished Professor of Biological Sciences, SUNY Brockport, Brockport, NY
2000-2002 Director – Environmental Science Program
2000-present Chairman – Department of Environmental Science and Biology

ADMINISTRATIVE:
Coordinator, Director and now Chair of the Department of Environmental Science and Biology (1998-present). SUNY College at Brockport.
Implemented and developed the curriculum and major and minor in Environmental Science and Biology.
Set-up a new department from “ground zero” into a functioning department with four faculty and 3 staff.
Set-up web site, newsletter, space, budget, etc.

In the process of developing an MS degree in Environmental Science

Chairman: Lake Ontario Facilities Development. As Chair, we have developed a campus-wide consensus report that has been approved by the President of the college to initiate the development of a research/education facility on the shores of Lake Ontario. At present, ~$100,000 in funding has been received for preliminary drawings. Activities completed include negotiations with NYS Parks and Recreation on siting of the facility at a State Park, development of brochures, and initiatives for funding through federal and state sources. This included meetings and presentations with appropriate state and federal congressional representatives. Preliminary architectural drawings are now underway with Bergmann Associates, Inc.

Chairman, Department of Biological Sciences (1991-1997), SUNY College at Brockport.
14 faculty, 2 research associates, 4 service personnel, 300+ undergraduate majors, 30 graduate students.
Developed and instituted an undergraduate assessment procedure.
Developed and published a departmental newsletter.
Doubled enrollments in the undergraduate major in Biological Sciences through a multifaceted colleges instructors, letter writing and a phone campaign to students.
Implemented the major in Medical Technology
Lead the development and passage through administrative channels of the
Received funding from the college to set up a 24 station computer facility for the
Initiated the renovation of the Lennon Hall Science building through a National Science Foundation Infrastructure grant with matching funding from the SUNY Construction Fund. Total amount of funds attracted for renovation was $13 million.
Hired five new faculty and developed and hired a new position titled instructional support assistant.

Responsible for Brockport's interest in developing a research consortium of colleges for research on the Great Lakes. Brockport and SUNY Oswego received two development grants for this project. As of 1986 the Consortium was officially formed and received funding from the New York State Assembly and has an annual budget of $150,000.

Chairman, Articulation & Recruitment Committee (1982-1984), SUNY Brockport.
Responsible for developing articulation programs with community colleges for the Department of Biological Sciences. This necessitated working with administrators at various colleges while negotiating 10 successful agreements.
The strategy developed has served as a model for other programs and increased enrollment by approximately 20% within the department within two years.

Principal Investigator of contracts and grant.
Administered and managed 73 grants and contracts ($4,400,000+).

RESEARCH AGENDA:

Applied aspects of environmental science, lake and watershed resource management, including such topics as watershed and ecosystem approaches to determining point and non-point sources of nutrients in urban and rural watersheds, hydrologic and nutrient budgets, indicators of successful remediation, strategies and demonstrations projects for reducing nutrient and organic hydrocarbon from watersheds, atmospheric deposition rates on ecosystems, uptake dynamics of chlorinated hydrocarbons in aquatic food-webs, top-down and bottom-up effects on plankton community structure, environmental education, environmental impact statements, plankton as indicators of success of the phosphorus reduction program in the Great Lakes and methods of reducing pesticide levels in fish grown in polluted waters. Because of my former association with the Hubbard Brook Ecosystem Study in New Hampshire, I also have continuing interest in acid precipitation and analysis using the small watershed approach.

Environmental Science and Biology - 18
GRANTSMANSHIP: Administered and managed over 73 grants and contracts ($4,400,000+).


Livingston County Planning Department. 1990-1993. Land use as a determinant of watershed chemistry, Conesus Lake. P.I.


Great Lakes Research Consortium. 1989. Equipment (G.C) and student support. $13,500.


New York Sea Grant Institute. 1990-91. Trophic interactions: relative importance of Dreissena and Daphnia grazing on phytoplankton abundance and water clarity. $6,050.

Great Lakes Research Consortium. 1990. Concentration and metabolism of pesticides at the air-water interface in Lake Ontario. $20,000.


New York Sea Grant Institute. 1987. Macrophyte development on Wautoma Shoals. $7,000.


NYS Department of Agriculture and Markets. 1988. Uptake and retention of contaminants by fish cultured on prepared diets in waters of Lake Ontario. $37,500.


Monroe County Health Department. 1987. Urban runoff: a watershed approach. $32,000.

Environmental Protection Agency. 1987. Acid precipitation monitoring at Grand Isle, Olcott and Sodus Bay. $56,700.


Department of Transportation. 1983. Fishery survey of the Champlain Section of the NYS Barge Canal. Project Director. $42,840.

Department of Education. 1983. Development of an interdisciplinary course in Population Biology. Funded by the Creating Connections Project Director, Center for Professional Development, Wichita State University. Project Director. $1,500.
Department of Transportation, 1982. Evaluation of dredging in the NYS Barge Canal (Erie Canal). Principal Investigator. $1,000.


Research Incentive Fund Award, 1981. SUNY Brockport. Principal Investigator. $800.


RESEARCH/CONSULTING:

Have provided expertise to lawyers (e.g., Kehoe & Kehoe). Engineering firms (e.g., Malcolm-Pirnie, Beak, Ebasco, Halfmoon Generation, Saiki, Larsen, Ecology and Environment) and private associations (e.g., Port Bay Association, Black Lake Association).

PUBLICATIONS - JOURNALS AND BOOKS:


PUBLICATIONS - TECHNICAL REPORTS:
Makarewicz, J.C., and T.W. Lewis. 2002. Segment analysis of Sheldon Creek, the location of pollution sources, part of the Lake Neatahwanta watershed. Technical Report to the Oswego County Soil and Water Conservation District. Fulton, NY.
Makarewicz, J.C., and T.W. Lewis. 2001. Segment analysis of Johnson Creek, the location of sources of pollution. Technical report to the Niagara County Soil and Water Conservation District, Albion, NY.
Makarewicz, J.C., and T.W. Lewis. 2001. Segment analysis of Marsh Creek, the location of sources of pollution. Part of the Lake Ontario watershed located in Orleans County, NY. Technical report to the
Orleans County Soil and Water Conservation District, Albion, NY.


Makarewicz, J.C., and T.W. Lewis 2000. Nutrient and sediment loss from a Niagara County watershed, the East branch of Twelvemile Creek. Technical report to the Niagara County Soil and Water Conservation District, Lockport, NY.

Makarewicz, J.C., and T.W. Lewis 2000. Segment analysis of Johnson Creek, the location of sources of pollution. Technical report to the Orleans County Soil and Water Conservation District, Albion, NY.


Canandaigua, NY.


Makarewicz, J.C., and T.W. Lewis 1999. Soil and nutrient loss from sub-watersheds in the Southwest quadrant of Conesus Lake. Technical report to the Livingston County Health Department and the Livingston County Planning Department, Mount Morris, NY.


Makarewicz, J.C. and T. Lewis. 1995. Sources of pollutants in the Kendig Creel watershed. Seneca County Soil and Water Conservation District.


Makarewicz, J.C. 1990. Chemical analysis and nutrient loading of Salmon and Black Creek. Monroe County Health Department.


Makarewicz, J.C. 1983. Fisheries Survey of Regions 5, 6 and 7 of Erie Section of the New York State Barge Canal. New York State Department of Transportation. 74 p.


SEMINARS AND INVITED PRESENTATIONS including keynote speaker

Available on request.

AWARDS

Among 38 scientists honored by the Chancellor of the SUNY system for outstanding scholarship and grantsmanship. 2002


Named a member of the "Environmental 25". In celebration of the Rochester Center for Environmental Studies 25th Anniversary, 25 people from New York State were named "Environmentalist of the quarter century. 1999.


New York State Conservation Districts Special Award. In recognition of his desire to educate and advance Soil and Water Conservation Districts in their understanding of water resources management.

Phi Beta Delta College International Scholar's Award. 1995.

SUNY Chancellor's Award for Excellence in Teaching. 1994.

Senior Fulbright Research Fellow. 1989/90. Max Planck Institute fur Limnologie. Germany.


Wayne County Soil and Water Conservation District. Acknowledgment and Appreciation
for assistance and excellence in the development of the District's water quality monitoring program.

Researcher of the Month Award (1984) - SUNY Researcher
Faculty Research Award (1983) - Society of Sigma Xi at Brockport
New York State Scholar Incentive Award (1974)
Commonwealth of Massachusetts Scholarship (1968)

COURSES TAUGHT:


PROFESSIONAL SERVICE

Member of Board of Representatives, Great Lakes Consortium (1985-present)
Chairman, Search Committee for Director of Sponsored Research
Scientific Advisory Committee, New York Sea Grant and Federation of Lake Associations
Reviewer for NSF (24 grants)
Member of Board of Representatives, Great Lakes Consortium (1985-present)
Chairman, Search Committee for Director of Sponsored Research
Reviewer for EPA (8 grants)
Reviewer for New York Sea Grant (16 grants)
Reviewer for USDA (2 grants)
Individual and panel reviewer for the Great Lakes Research Consortium (>50 grants)
Reviewer for the Great Lakes Protection Fund (4 grants)
Reviewer for Ohio Sea Grant (3 grants)
Reviewer for Michigan Sea Grant (one grant)
Reviewer for Louisiana Sea Grant (one grant)
Reviewer for ERDA (one grant)
Reviewer for Hydrobiologica
Reviewer for International Association for Great Lakes Research
Reviewer for Ohio Journal of Sciences.
Reviewer for the Canadian Journal of Aquatic Biology and Fisheries
Reviewer for Ecology
Reviewer for Physiology and Behavior
Reviewer for Limnology and Oceanography
Reviewer for Canadian Journal of Aquatic and Fish Biology
Reviewer for Journal of Freshwater Ecology
Session Convener (Ecology), Annual Meeting of the Rochester Academy of Sciences (1976, 1980)
Liaison Officer, Rochester Meeting of the International Association of Great Lakes Research
Program Committee, Oswego Meeting of the International Association of Great Lakes Research
Session Convener, Rochester Academy of Sciences, Brockport and St. John Fisher Meetings.
Program Committee Participant, Buffalo Symposium on Research at SUNY Colleges.
Session Chair - Lake Ontario Fishery, Symposium on Lake Ontario, Center for Environmental Information. This is an International Symposium on the status of Lake Ontario held in Rochester, N.Y.
Sea Grant Advisory Committee, 1985-1992, New York Sea Grant
Undergraduate Course Improvement Grant reviewer, 1986-1989, Research Foundation of the State of New York.
Great Lakes Initiative Development Committee, 1987. Formed cooperatively by Sea Grant and the National Marine Fishery Service to develop collaborative research on the Great Lakes.
Chair, 1991-1997, Student Award Committee, Great Lakes Research Consortium Annual Meeting.
JAMES M. HAYNES

CURRENT POSITION: Professor, Department of Environmental Science and Biology, State University of New York, Brockport, New York 14420 haynes@brockport.edu

EDUCATION:
Carleton College, Northfield, MN - B.A., Biology, 1973
University of Minnesota - M.S., Fisheries, 1975
University of Minnesota - Ph.D., Ecology, 1978

PROFESSIONAL EXPERIENCE
Professor (1991 to present), Associate Professor (1984-1990) and Assistant Professor (1978-83) of Environmental Science and Biology, SUNY College at Brockport. Teach undergraduate and graduate courses in Environmental Impact Analysis, Fisheries Science/Management, Fish Biology/Ecology, Fishery Techniques/Fish Identification, Pollution Biology, and Marine Biology/Geology-Bahamas, plus undergraduate courses in Environmental Science, Eco-Citizenship, Biological Oceanography, Evolution, and laboratories for General Biology. Lead instructor or project director for nine National Science Foundation Undergraduate Faculty Enhancement and National Dissemination programs: Summer Practicum for Applied Environmental Problem-Solving (Great Lakes Research Consortium) and Stressed Stream Analysis (Center for Applied Aquatic Science & Aquaculture).

RESEARCH

Principal or Co-Principal Investigator for 30+ grants and contracts for fisheries and aquatic ecology research and education in the lower Great Lakes region totaling $2.7 million since 1978, including impacts of zebra mussels on native benthic invertebrate communities; invertebrates and fish as indicators of aquatic system health; radiotelemetry/netting studies of movements, habitats and diets of fishes in Lake Ontario; impacts of thermal discharges, dredging and recreation development on coastal ecology and fishes in Lakes Ontario/Erie and the St. Lawrence River; photographic and illustrated guides to Great Lakes, Hudson River, and Bahamas fishes; and development of aquaculture ponds and a wet laboratory for aquatic organism culture at SUNY Brockport. Sabbatical leave research in 1988 with the NOAA/NMFS SE Fisheries Center Mississippi Laboratories explored techniques for determining the distribution and abundance of aquatic animals along environmental fronts and reefs in the Gulf of Mexico and SW Atlantic Ocean. Used radio telemetry to study movements and habitats of chinook salmon and white sturgeon in relation to hydroelectric dams and gas super-saturation in the Snake and Columbia Rivers with Battelle Pacific Northwest Laboratories, 1975-78. These research and related teaching efforts have resulted in 25+ refereed-publications, 20+ major technical reports, a book, and over 60 professional presentations since 1976.

PUBLICATIONS


* student author

Books and Media


Proceedings


Haynes, J.M., and J.N. McNamara. 1998. Indicators of change in water quality and environmental health in the Irondequoit 30 of 104

2003-2004-43.res.doc


Haynes, J.M. 1994. Survey of Buttonwood Creek, Monroe County, NY to determine habitat availability for and relative abundance of a species of special concern, the pirate perch (Aphredoderus sayanus). Monroe County Dept. of Transportation.


Haynes, J.M. 1987-88. Attraction of fishes to the thermal plume at Somerset Station under two-pump operating conditions. Stone and Webster Engineering Corp.


Haynes, J.M. 1986-87. Activity and survival of winter-impinged fish at Somerset Station. NY State Electric and Gas Corp.


Haynes, J.M. 1983. Recreation facility design and environmental impacts on the Great Lakes. NY Sea Grant/NOAA.

Haynes, J.M. 1983. Photographic and illustrated key of selected NY fishes. Faculty Grant for the Improvement of Undergraduate Instruction. SUNY.


CHRISTOPHER NORMENT

CURRENT POSITION: Associate Professor, State University College at Brockport, Department of Environmental Science and Biology, Brockport, New York
(585) 395-5748 cnorment@brockport.edu

EDUCATION

1992  PhD, Systematics and Ecology, University of Kansas, Lawrence, KS.
1982  M.S., Zoology, Washington State University, Pullman, WA.
1975  B.S., Biology, Southern Oregon State College, Ashland, OR.

PROFESSIONAL EXPERIENCE

1998-present  Associate Professor (tenured), Department of Environmental Science and Biology, State University of New York, College at Brockport, Brockport, NY. Instruct courses in Mammalogy, Animal Behavior, Conservation Biology, Ornithology, Herpetology, Wildlife Ecology, General Ecology
1993-1998  Assistant Professor, Department of Biological Sciences, State University of New York, College at Brockport, Brockport, NY.
1990-1993  Lecturer, School of Basic Life Sciences, University of Missouri, Kansas City, MO. Instruct courses in Introductory Biology, Comparative Vertebrate Anatomy. Data Manager, Kansas Biological Survey, University of Kansas, Lawrence, KS.
1990-1994  1992-1993  Adjunct Curator, Museum of Natural History, University of Kansas, Lawrence, KS.

1988-1992  Graduate teaching assistant, Division of Biological Sciences, University of Kansas, Lawrence, KS.
1979-1982  Graduate teaching assistant, Department of Zoology, Washington State University, Pullman, WA.
1975-1976  Biologist, United States National Park Service, University of Nevada, Las Vegas, NV.

RESEARCH

Current   Avian community structure, breeding biology, and conservation biology in northeastern grasslands; population biology of Frasera speciosa (Gentianacea); reproductive ecology of Zonotrichia sparrows; breeding biology of Australian Pipits (Anthus spinolletta) spring stopover ecology of Neotropical migrant songbirds; wildlife use of created and natural wetlands.
1989-1991  Comparative breeding ecology of Harris’ Sparrows and White-crowned Sparrows in the Northwest Territories, Canada.

External Funding (recent)

2003-4  New York State Biodiversity Research Institute ($18,983 for research on grassland birds in the St. Lawrence River Valley)
2003  Fish and Wildlife Service ($15,000 for grassland bird research)
2002  Fish and Wildlife Service ($19,000 for grassland bird research)
2000-2003  Biological Study of Irondequoit Bay. (J. M. Haynes, Principal Investigator, $50,000).
2001  Fish and Wildlife Service ($4,800 for grassland bird research)
2001  New York State Department of Environmental Conservation ($4,900 for wetlands research).
2000  Bergen Swamp Preservation Society ($1,600 for small mammal study in Bergen Swamp)
1999  Department of Environmental Conservation ($3,600 for study on Grasshopper Sparrows)
1999  New York State Office of Parks, Recreation and Historic Preservation ($46,000 for biological inventory of Yanty Creek Marsh, J. Makarewicz, principal investigator).
1998-1999  Great Lakes Research Consortium ($20,000 for stopover ecology research with Dr. T. Donovan of SUNY ESF).
1998  Department of Defense, Fort Drum, NY. ($40,000 for study on breeding biology of Henslow's Sparrow)
1997  National Science Foundation Grant: Stressed Stream Analysis: Addressing
PUBLICATIONS


Real Environmental Problems to Stimulate Undergraduate Science

Faculty and Students (J. M. Haynes, Principal Investigator, $120,000).

1997-1998 United States Fish and Wildlife Service Challenge Grants ($15,500 for grassland bird research)

1997-1998 United States Fish and Wildlife Service Challenge Grant ($14,700 for wetlands research).

1994-1996 United States Fish and Wildlife Service Challenge Grants ($24,200 for grassland bird research)

1995-1998 Department of Environmental Conservation, New York State, ($2,700 for grassland bird research)

1996 Bergen Swamp Preservation Society ($1,100 for assessment of bog turtle populations)

1994 National Science Foundation Grant: Stressed Stream Analysis: Addressing Real Environmental Problems to Stimulate Undergraduate Science Faculty and Students (J. M. Haynes, Principal Investigator, $113,593).
(Inviited presentation)
GEOFFREY C. GARDNER

CURRENT POSITION:

Assistant Professor, Department of Environmental Science and Biology, State University of New York, Brockport, New York 14420 ggardner@brockport.edu

EDUCATION

The State University of New York at Albany December 2002
Ph.D. Ecology, Evolution and Behavior program
Dissertation: Persistence and Spread of Cryptococcus fagisuga, the initiating agent in Beech Bark Disease
Advisor: Dr. George Robinson

The State University of New York at Albany May 2002
Graduate Certificate in Geographic Information Systems
And Spatial Analysis

Union College June 1995
Bachelor of Science in Biology, magna cum laude

PROFESSIONAL EXPERIENCE

C. SUNY College at Brockport August 2002 to Present
Qualified Academic Rank, Lecturer
ENV 303 Ecology
ENV 495/595 Plant Ecology
ENV 499 Independent Study: Evolution and Impact of Angiosperms, REV 437/614 Biological Investigation and Data Analysis

The State University of New York at Albany September 1995 to August 2002
Instructor
Biology 320 Ecology
Teaching Assistant
Biology 110 Introduction to Biology I,
Biology 111 Introduction to Biology II
Biology 455/555 Plant Ecology,
Biology 497/601 Restoration Ecology
Study Group Facilitator Biology 110

A. RESEARCH


The State University of New York at Albany May 1996 to August 1998
Research Assistant
Field assistant in survey of E.N. Huyck Preserve.
Computer work in study of epidemics using TEMPEST computer program.

Union College Summer 1994
Research Assistant
Field assistant in study of eutrophication of an Adirondack lake.

PUBLICATIONS


Associate Faculty

Mark R. Noll, Ph.D.

B. EDUCATION

Ph.D. University of Delaware, Newark, Delaware, May 1989 in Soil Physical Chemistry.
M.S. New Mexico Institute of Mining and Technology, Socorro, New Mexico, May 1985 in Geology.

EXPERIENCE

Associate Professor. State University of New York College at Brockport, Department of The Earth Sciences, Sept. 2003 to present, Asst. Prof. Aug. 1997 to Aug. 2003. Responsible for courses in Physical Geology (majors and non-majors), Mineralogy, Geochemistry, Groundwater.
Science Teacher. Tower Hill School, Wilmington, De., February 1988 to June 1988. I was responsible for teaching 2 sections of ninth grade physical science and 3 sections of eighth grade earth science.

C. GRANTS AND CONTRACTS AT BROCKPORT

Principal Investigator

Co-Principal Investigator

Collaborator

D. PUBLICATIONS AT BROCKPORT
(’ denotes undergraduate student co-author)
Journal Articles

Other Peer Reviewed Documents


Conference Abstracts


F. Other Reports


PUBLICATION PRIOR TO BROCKPORT

G. Patents


Journal Articles


Chapter in Edited Volume


Conference Proceeding Papers


Invited Conference Proceeding Paper


Conference Abstracts


H. **GRADUATE STUDENT COMMITTEES**

Roger J. Ward
Daniel J. White
Hillary Richardson

HONORS, AWARDS, AND FELLOWSHIPS

- Special Recognition Award, USEPA Region III, 1996
- DuPont Chemicals R&D, Oscar Award for Achievement, 1992 and 1993.
- Distinguished Alumni Fellow, Millersville University, 1990.
- Outstanding Teaching Award, University of Delaware, 1987.

PROFESSIONAL MEMBERSHIPS

- Geological Society of America
- Soil Science Society of America
- National Association of Geoscience Teachers
Markus M. Hoffmann

CURRENT POSITION: Assistant Professor, Department of Chemistry, State University of New York at Brockport, Brockport, New York 14420 mhoffman@brockport.edu

EDUCATION

“Vordiplom” 1991, Chemistry, Darmstady University of Technology, Germany
M.A.  1996, Physical Chemistry, Washington University, St. Louis, MO
Ph.D.  1997, Physical Chemistry, Washington University, St. Louis, MO

PROFESSIONAL EXPERIENCE

1999-2000 Adjunct, Columbia Basin College, Department of Math and Science, Pasco, WA
1999-2000 Post Doctoral Associate, Pacific Northwest National Laboratory, Supercritical Fluids Groups, Richmond, WA
1994-1997 Graduate Assistant, Washington University, Department of Physics, St. Louis, MO
1993-1994 Teaching Assistant, Washington University, Department of Physics, St. Louis, MO
1992-1993 Teaching Assistant, Florida State University, Department of Chemistry, Tallahassee, FL

GRANTSMMANSHIP

2003 Petroleum Research Fund Award from the American Chemical Society
2003 Workshop Project Associate Program Starter Grant for Team Learning
2000 Camille and Henry Dreyfus Faculty Start-up Grant for Undergraduate Institutes.
2001 Recipient of an educational grant from the Quadrille Ball of the Germanistic Society of America in 1995.

PUBLICATIONS

A Classroom Exercise Aiming at the Development of an Intuitive Understanding of P-V-T Phase Behavior of Fluids. Hoffmann, M.M. Journal of Chemical Education in press.


David Allen Holtzman

Personal
Department of Psychology
135 Holmes Hall
SUNY Brockport
Brockport, NY 14420

Education and Positions Held
2001-Present
Assistant Professor
Department of Psychology
SUNY Brockport
Brockport, NY

1997-2001
Assistant Professor
Department of Brain & Cognitive Sci.
University of Rochester
Rochester, NY

1992-1997
Assistant Professor
Neuroscience Program
Oberlin College
Oberlin, OH

1990-1992
Postdoctoral Fellow
Laboratory of Neurobiology & Behavior
The Rockefeller University
New York, NY

1984-1990
Ph.D., Program in Neural and Behavioral Sciences
State University of New York Health Science Center
at Brooklyn
Brooklyn, NY

1980-1984
B.S., Anatomy and Physiology
Cornell University
Ithaca, NY

Research Interests
Spatial ecology, memory, and learning in reptiles and amphibians
Development of sensory systems and their use in naturally-occurring behaviors
Chemical senses in reptiles and amphibians
Comparative neuroanatomy

Refereed Publications
Holtzman, D.A., Stosic, C.S., and J. Wyatt (In review) Movement of resident and displaced boa constrictors (Boa constrictor imperator) on Ometepe Island, Nicaragua. Herpetologica.


**Non-refereed Publications**


**External support**


$334,000 (direct costs) - NIH FIRST (R29) Award entitled, “Neurogenesis in the Olfactory and Vomeronasal Systems” (1994-1999)

$100,000 (direct costs) - NIH Shannon Award for expanding on ideas described in a R01 grant application entitled, “Neurogenesis in the Olfactory and Vomeronasal Systems” (1992-1994)

NIH Postdoctoral Fellowship: "Effects of steroids on axial muscle reflexes" (1990-1991); "Interactions of steroids and noxious stimulation on opiate expression in the ventromedial hypothalamus and spinal cord" (1992)

**Honors and Awards**

1999-2003 NSF Award – “Learning-Dependent Neurogenesis”
1994 W.M. Keck Foundation Fellowship in the Natural Sciences
1993 Excellence in Teaching Award from the Faculty for Undergraduate Neuroscience
1993-1998 NIH FIRST Award (R-29)
1992 NIH Shannon Award
1990-1992 NIH Postdoctoral Fellowships
1983 Cornell Tradition Summer Fellowship
1981-1984 Greene Scholarship
1980-1984 New York State Regents Scholarship

Research and Professional Experience

1992-Present Independent research focusing on spatial learning and memory and embryonic and postnatal neurogenesis in the vomeronasal and olfactory systems and hippocampus; orientation behavior/spatial ecology in snakes
1990-1992 Postdoctoral research with Drs. S. Schwartz-Giblin and D.W. Pfaff at the Rockefeller University studying the interactions of steroid hormones with dorsal horn neurons of the spinal cord
1984-1990 Graduate study with Dr. Mimi Halpern at SUNY Health Science Center at Brooklyn examining the neuroanatomical development of the vomeronasal and olfactory systems in garter snakes
1983, 1984 Independent research at Cornell University studying the competitive interactions of two species of darters in an artificial stream
1983 Research assistant with L. Greenberg studying the interactions between various species of benthic stream fishes in the Little River, TN
1980-1984 Curatorial assistant in the Cornell Herpetological and Ichthyological Museum Collections

Teaching Experience

1999-Present Ometepe, Nicaragua and La Suerte, Costa Rica Field Stations: Tropical Animal Behavior and Tropical Herpetology
1997-2001 Assistant Professor, Univ. of Rochester: Neuroethology, Introductory Neuroscience Lab and Lecture, Biomedical Research Ethics, Learning and Memory, Developmental Neurobiology
1992-1997 Assistant Professor, Oberlin College: Introductory Neuroscience Lab and Lecture, Developmental Neurobiology, and Animal Behavior
1990, 1991 Instructor, Nassau County Community College: Human Anatomy and Physiology
1988, 1989 Lecturer, SUNY Health Science Center at Brooklyn: Medical Neuroscience
1986, 1987 Graduate Teaching Assistant, SUNY Health Science Center at Brooklyn: Medical Neuroanatomy
1983 Undergraduate Teaching Assistant, Cornell University: Comparative Vertebrate Anatomy

Scientific Organization Memberships
Cornell University Herpetological Society
International Brain Research Organization
Sigma Xi
Society for Neuroscience
Society for the Study of Reptiles and Amphibians

Journal and Professional Reviews
American Naturalist
Behavioral Neuroscience
Brain, Behavior and Evolution
Brain Research
Chemical Senses
Copeia
Herpetologica
Journal of Chemical Ecology
Journal of Comparative Neurology
Journal of Comparative Psychology
Journal of Herpetology

Study section for Small Grants for National Institute of Deafness and Communication Disorders
Ad hoc reviewer for National Science Foundation-Ecological and Evolutionary Physiology, Sensory Systems, and Developmental Neuroscience Programs
ENVIRONMENTAL SCIENCE AND BIOLOGY
List of periodical titles held by Drake Memorial Library, SUNY Brockport. Holdings were last updated in July, 2001. Items which are currently received in print or microform are indicated by an *. Titles which are available in an electronic version are indicated by the words --available online-- after the title.

- AIBS education review v.1-7, 1972-1978 Conts: CUEBS news
- * Ambio v.11, 1982 (Mic-1); v.26, 1997-date
- * American bee journal v.120, 1980; v.122, 1982; v.124, 1984-date
- * American biology teacher v.18, 1956-date
- American fern journal v.1-66, 1910-1976
- American forests --available online-- v.46-90, 1940-1984; v.92-103, 1986-1998; v.105, 1999/00
- * American naturalist --available online-- v.94, 1960-date
- American scientist --available online-- v.30-33, 1942-1945; v.35-87, 1947-1999
- * Animal behaviour v.6, 1958-date, Conts: British journal of animal behaviour
- * Animal learning & behavior v.1, 1973-date
- * Annals of the Entomological Society of America v.1, 1908-date
- Annals of the Missouri Botanical Garden v.30-33, 1943-1946; v.35-70, 1948-1983 (scattered issues missing)
- Apicultural abstracts v.13-47, 1962-1996 (scattered issues missing)
- Apidologie v.20-26, 1989-1995
- Aquacultural engineering --available online-- v.15-23, 1996-2000
- Aquaculture digest v.10-14, 1985-1989
- * Aquaculture magazine v.15, 1989-date (scattered issues missing)
- Atlantic naturalist v.23-24, 1968-1969
- Audubon --available online-- v.43-101, 1941-1999
- * Auk --available online-- v.1-77, 1884-1960 (Mic-1); v.78-112, 1961-1995; v.116, 1999-date (scattered issues missing)
- Australian journal of marine & freshwater research v.11-36, 1960-1985 (scattered issues missing)
- * Bee culture v.121, 1993-date Conts: Gleanings in bee culture
- Bee world v.33-77, 1952-1996
- * Behavior genetics v.1, 1970- date
- * Behavioral ecology & sociobiology --available online-- v.1-2, 1976-1977; v.34,
1994-date

- Behavioral neuroscience v.97, 1983-
- Behaviour --available online-- v.20-23, 1963-1964; v.26, 1966-
- Biogeochemistry v.36, 1997-date
- Biological conservation --available online-- v.1-14, 1968- v.32-43, 1966-
- Biometrics v.7-53, 1951-1997
- Botanica Marina v.12-17, 1969-1974
- Botanical gazette v.121-144, 1959-1983
  Conts: Journal of the Linnean Society of London. Botany
- Botanical review --available online-- v.1-50, 1935-1984
- British journal of animal behaviour v.1-5, 1953-1957 Cont by: Animal
  Cont by: Bulletin of marine science
- Bulletin of the Ecological Society of America v.49-71, 1968-1990 (scattered issues missing)
- Bulletin of the Torrey Botanical Club v.73-123, 1946-1996 Cont by: Journal of the Torrey Botanical
- Canadian entomologist v.52, 1920; v.70-80, 1938-1948; v.83, 1951; v.90-116, 1958-1984
- Canadian field naturalist v.65, 1951; v.79, 1965-date
- Canadian fish culturist no.32-40, 1964-1969
- Canadian journal of animal science v.48-54, 1968-1974
- Canadian journal of botany v.29-63, 1951-1985 Conts: Canadian journal of research. Section C: Botanical sciences
  * Canadian journal of fisheries & aquatic sciences --available online-- v.37, 1980-date (scattered issues missing) Conts: Journal of the Fisheries Research Board of Canada
  * Conservation biology v.8, 1994-date
- * Copeia 1913-date
- * Cornell focus v.3, 1994-date (scattered issues missing
- Curtis's botanical magazine v.175-183, 1967-
- EHP: Environmental health perspectives no.2-100, 1972-1993
  Cont by: Environmental health perspectives, and Environmental health perspectives supplements
- * Ecological applications v.4-5, 1994-1995; v.7, 1997-date
- * Ecological monographs --available online-- v.1, 1931-date
• Ecology (Akademiia nauk SSSR) 1970 Cont by: Soviet journal of ecology
• * Ecology (Ecological Society of America) --available online-- v.1, 1920-date
• Ecology of western North America v.2, 1969/70
• * Environment --available online-- v.11, 1969-date (scattered issues missing)
• Environment & behavior --available online-- v.1-31, 1969-1999
• ..........Environment international v.2, 1979 (Mic-1); v.13-18, 1987-1992
• Environmental action v.7-16, 1976-1984 (scattered issues missing)
• * Environmental biology of fishes v.10, 1984-date
• Environmental education v.1, 1969/70 Cont by: Journal of environmental education
• Environmental education report v.3-12, 1975-1984
• * Environmental ethics v.1, 1979-date
• * Environmental health perspectives --available online-- v.101, 1993-date (scattered issues missing)
• * Environmental health perspectives supplements --available online-- v.101, 1993-date Conts in part: EHP: Environmental health perspectives
• * Environmental management --available online-- v.1-2, 1976-1978; v.9, 1985; v.11, 1987-date
• Environmental mutagenesis v.2-9, 1980-1987 (scattered issues missing)
• Environmental pollution v.1-20, 1970-1979 Cont in part by: Environmental pollution. Series A
• * Environmental pollution (1987) --available online-- v.95, 1997-date Conts: Environmental pollution. Series A
• * Environmental science & technology v.1, 1967-
• European journal of soil science v.45-51, 1994-2000, Conts: Journal of soil science
• * Evolution --available online-- v.1, 1947-
• Fish & wildlife news 1980-1993 (scattered issues missing)
• * Fisheries v.1, 1976-date
• * Fishery bulletin --available online-- v.74, 1976-date (scattered issues missing)
• * Freshwater biology v.1, 1971-date
• * Great Lakes entomologist v.4, 1972-date Conts: Michigan entomologist
• Herpetological review 1967-
• Horticulture --available online-- v.44-62, 1966-1984
• HortScience v.4-19, 1969-1984 (scattered issues missing)
• * Hydrobiologia v.24, 1964-date (scattered issues missing)
• * Ibis v.110, 1968-
• International wildlife --available online-- v.1-30, 1971-2000
• Internationale revue der gesamten hydrobiologie v.56-59, 1971-1974
• * Invertebrate biology v.114, 1995-date Conts: Transactions of the American Microscopical
• Journal (American Water Works Association) v.84-88, 1992-1996
• Journal (Water Pollution Control Federation) v.32-61, 1960-1989 (scattered issues missing) Cont by: Research journal of the Water Pollution Control
• * Journal of animal ecology v.1, 1932-date
• * Journal of apicultural research v.1, 1962-date
• Journal of applied aquaculture v.4, 1994; v.6-10, 1996-2000
• * Journal of applied ecology v.1-5, 1964-1968; v.31, 1994-date
• Journal of applied phycology v.1-6, 1989-1994
• * Journal of aquatic animal health v.1, 1989-date
• Journal of arboriculture v.1-2, 1975-1976; v.5-10, 1979-1984
- Oikos v.16, 1965-date
- Phycologia v.3-24, 1963-1985 (scattered issues missing)
- * Proceedings of the National Academy of Sciences ... --available online-- v.1-21, 1915-1935; v.23-26, 1937-1940; v.28, 1942-date
- * Proceedings of the Rochester Academy of Science v.1, 1889-
- Progressive fish-culturist v.41-60, 1979-1998 Cont by: North American journal of
- Research journal of the Water Pollution Control Federation v.61-63, 1989-1991 Conts in part: Journal (Water Pollution Control Federation). Cont by: Water environment research
- * Scientific American --available online-- v.2-14, 1846-1859; new ser., v.1-93, 1859-1905 (Mic-55 LAC 31486-593); v.76, 1897-date
- Sea frontiers (1988) --available online-- v.34-42, 1988-
- Smithsonian --available online-- v.1-32, 1970-2001 (scattered issues missing)
- Snowy egret v.37-46, 1974-1983; v.48, 1985 (scattered issues missing)
- * Transactions of the American Entomological Society (1890) v.94, 1968-date
- * Transactions of the American Fisheries Society v.1-75, 1872-1945 (Mic-1); v.75, 1945-date
- Transactions of the American Microscopical Society v.84-113, 1965-1994
- * Trends in ecology & evolution --available online-- v.9, 1994-date
- * Water environment research v.64, 1992-date Conts: Research journal of the Water Pollution Control Federation Water research --available online-- v.1-35, 1967-2001
- Water resources bulletin v.5-32, 1969-1996 Cont by: Journal of the American Water Resources Association
- * Water resources research v.1, 1965-date (scattered issues missing)
- Watsonia v.6-14, 1964-1983
- Wilderness --available online-- v.46-59, 1982-1995 (scattered issues missing)
- * Wildlife monographs no.4, 1960-date (scattered issues missing)
- * Wildlife Society bulletin v.1, 1973-date (scattered issues missing)

**EARTH SCIENCES**

- List of periodical titles held by Drake Memorial Library, SUNY Brockport. Holdings were last updated in August, 2001. Items which are currently received in print or microform are indicated by an *. Titles which are available in an electronic version are indicated by the words --available online-- after the title. Please check the library's web catalog for access information.
- * AAPG bulletin v.58, 1974-date
- Acta crystallographica. Section B: Structural crystallography & crystal chemistry v.25-30, 1969-1974
- Agricultural & forest meteorology --available online
List of periodical titles held by Drake Memorial Library, SUNY Brockport. Holdings were last updated in February, 2002. Items which are currently received are indicated by an *. Titles which are available in an electronic version are indicated by the words --available online-- after the title. Please check the library's web catalog or the list of electronic full text titles for access information. SUNY Brockport online catalog Full text electronic journal list

**CHEMISTRY**

- Accounts of chemical research v.1, 1968-date
- Analytica chimica acta --available online—v.29-428, 1963-2001; v.337, 1997-date (online)
- Analytical biochemistry v.1-215, 1960-1993
- * Analytical chemistry v.19, 1947-date
  Conts: Industrial & engineering chemistry. Analytical edition
- * Applied spectroscopy --available online—

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• * Journal of chemical education --available online--
• * Journal of chemical physics --available online-- v.13, 1945-date
• Journal of chromatography --available online-- 1997-date (online)
• Journal of coordination chemistry v.9-14, 1979-1986
• Journal of electroanalytical chemistry v.1-12, 1959-
• * Journal of electroanalytical chemistry (1992) --available online--
• * Journal of histochemistry & cytochemistry --available online--
• Journal of inorganic & nuclear chemistry Cont by: Polyhedron
• Journal of neurochemistry v.1-45, 1956-1985
• * Journal of organic chemistry v.1, 1936-date
• * Journal of organometallic chemistry -- v.527, 1997-date (online)
• * Journal of physical chemistry v.1 -100, 1896-1996
• * Journal of physical chemistry A v.101-102, 1997-1998; v.104, 2000-date
• * Journal of physical chemistry B v.101-102, 1997-1998; v.104, 2000-date
• * Journal of research of the National Institute of Standards & Technology -- available online-- v.94-104, 1989-1999; v.100, 1995-date (online)
• * Journal of the American Chemical Society v.1, 1879-date
• Journal of the Chemical Society (1926) 1935-
• Journal of the Chemical Society. Faraday transactions 2 v.68-83, 1972-
• Journal of the Chemical Society. Perkin transactions 1 1972-1988
• * Nature 1945-date
• New scientist --available online--
• * Phytochemistry --available online-- v.3-7, 1964-1968; v.9-20, 1969-1981; v.44, 1997-date (online)
• * Polyhedron --available online-- v.16, 1997-date (online)
• Proceedings of the American Chemical Society v.1-2, 1876-1878
• * Proceedings of the National Academy of Sciences --available online
• Record of chemical progress v.32, 1971
• * Review of scientific instruments --available online-- v.1, 1930-date
• * Science --available online-- v.1-22, 1883-1894; new ser., v.13, 1901-date
• * Scientific American --available online-- v.2-14, 1846-1859; new ser. v.1-93, 1859-1905 (Mic-55 LAC 31486-593); v.76, 1897-date
• Scientific monthly v.1-85, 1915-1957
• SciQuest v.52-55, 1979-1982 Conts: Chemistry Spectrochimica acta. Part A: Molecular spectroscopy --available online-- v.53,
• * Spectrochimica acta. Part A: Molecular & biomolecular spectroscopy --available online-- v.53, 1997-date (online) Conts: Spectrochimica acta. Part A: Molecular spectroscopy
• * Spectrochimica acta. Part B: Atomic spectroscopy --available online-- v.52, 1997-date (online)
• * Synthesis 1969-date
• * Tetrahedron --available online-- v.53, 1997-date (online)
• * Tetrahedron: Asymmetry --available online-- v.8, 1997-date (online)
• * Tetrahedron letters --available online-- v.1-41, 1959-2000; v.38, 1997-date (online)
• * Trends in analytical chemistry: TrAC --available online-- v.1-4, 1981-1985; v.16, 1997-date (online)
• * Trends in biochemical sciences --available online-- v.16, 1991-date
• * Vibrational spectroscopy --available online-- v.1-9, 1990-1995; v.13, 1997-date (online)
Appendix E. Syllabi of selected graduate courses in Environmental Science and Biology.

E. ENV 614
F. Experimental Design

Fall 2003

Dr. Geoffrey Gardner
ggardner@brockport.edu

Hours: M W 5:30 – 7:00

Room: 218 Lennon

Office: Lennon 117

Phone: 395-5743

Office Hours: T-TH 11:30 – 12:30, Wed 12-1 or by appointment

Required Text:

Readings:


Calculator:
You will need a calculator for this class. On quizzes and exams you may NOT share calculators so it’s important that every student has access to their own calculator.

Objective: This course provides the basic knowledge of introductory statistics. Students will learn the importance of statistics in biological research. They will be exposed to the underlying concepts of statistics as well as computations for various statistical tests.

Course Requirements:
Competence will be evaluated by 7 homework assignments, 4 quizzes, and 3 exams. All quizzes and exams will be a combination of multiple choice questions and short answer questions based on lectures and the text. Please bring two pencils with erasers and a calculator to each quiz and exam.

Homework assignments: Homework will be made up of problem sets assigned approximately every two weeks and will be collected. Each assignment will be worth 20 points for a total of 140 points. Problem set assignments will be collected at the beginning of the class on the day they are due. 1 point will be deducted for every day that an assignment is late. (For example, if due Monday and you hand it in Wednesday, 2 points will be deducted from that assignment). Assignments will not be accepted for a given week once that assignment has been graded and returned to the class. You will be assigned 7 problem sets over the course of the semester. It is in your best interest to do every homework.
While I encourage you to work in groups on homework assignments be aware that directly copying someone else’s work will not help you learn the material. The purpose of homework assignments is for you to actively learn statistics through practice. This practice will be of value for quizzes and exams.

**Quizzes:** It is important in a statistics class to keep up with the material. Quizzes will be given periodically to ensure that everyone is understanding the material. Four quizzes will be given throughout the semester however, you may drop your lowest quiz grade. Each quiz will be worth 50 points for a total of 150 points. Make-up quizzes will **NOT** be given. You should take all 4 of the quizzes as this information will also be tested on the exams.

**Exams:** All exams will be comprehensive in nature. In a statistics course information builds on itself. What you learn earlier in the course will be needed to understand the material later in the course. Exams will be worth 100 points each for a total of 300 points. Tentative exam dates are noted on the syllabus. Make-up exams will only be given in cases where you can provide documentation for your absence.

**Computer Lab:** We will spend a portion of some class periods working in the Computer Lab. Three assignments will be collected and graded, each worth 10 points, for a total of 30 Computer Lab points.

**Angel:** Course materials and course information will be placed online. Students should enroll in the course to access materials. I will also place updated class announcements, reminders and review material on Angel.

**Grading:**

Final course grades will be determined as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes</td>
<td>3 x 50 = 150 pts</td>
</tr>
<tr>
<td>Exams and Final</td>
<td>3 x 100 = 300 pts</td>
</tr>
<tr>
<td>Problem Sets</td>
<td>7 x 20 = 140 pts</td>
</tr>
<tr>
<td><strong>Computer Lab</strong></td>
<td>3 x 10 = 30 pts</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>620 pts</td>
</tr>
</tbody>
</table>

Final grades will be determined by adding the scores on your three highest quizzes, your three exam grades and problem set assignments. Final letter grades will be determined based upon the following scale:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>93% and above</td>
</tr>
<tr>
<td>A-</td>
<td>90 - 92%</td>
</tr>
<tr>
<td>B+</td>
<td>87 - 89%</td>
</tr>
<tr>
<td>B</td>
<td>83 - 86%</td>
</tr>
<tr>
<td>B-</td>
<td>80 - 82%</td>
</tr>
<tr>
<td>C</td>
<td>73 - 76%</td>
</tr>
<tr>
<td>C-</td>
<td>70 - 72%</td>
</tr>
<tr>
<td>D+</td>
<td>67 - 69%</td>
</tr>
<tr>
<td>D</td>
<td>63 - 66%</td>
</tr>
<tr>
<td>D-</td>
<td>60 - 62%</td>
</tr>
<tr>
<td>E</td>
<td>Below 60%</td>
</tr>
</tbody>
</table>
**Attendance**: Regular class attendance is expected and is the responsibility of each student. I will periodically take attendance in class. You will be responsible for all materials covered in class. If you miss class for some reason it is your responsibility to get the notes from another student in class. Lecture notes will not be available from the instructor.

**Class Conduct and Punctuality**: It is my goal to develop a relationship with students based on mutual respect and courtesy. To create an environment conducive to learning we all must exercise discipline and self-restraint. Behaviors that are disruptive and insulting to me or to other students in the class will not be tolerated. Examples of these behaviors include arriving late to class, leaving class early, and talking during the lecture or any other actions that would be distracting to other students in the class.

**Academic Integrity**: SUNY Brockport has a firm policy concerning academic dishonesty. Please familiarize yourself with definitions and college policies regarding academic honesty in the College Student Handbook.

**One final note**: Statistics is generally thought of as a hard class. The key to this class is keeping up on the material, attending class and doing homework assignments. If you find that you are having a problem understanding the material or keeping up with the class do not hesitate in coming to talk to me.

### Tentative Course Schedule

<table>
<thead>
<tr>
<th>Date (week of)</th>
<th>Topic</th>
<th>Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/25</td>
<td>Introduction - Measurements and Graphs</td>
<td>Ch 1, Ch 2</td>
</tr>
<tr>
<td>9/3</td>
<td>Measures of central tendency and variability</td>
<td>Ch 3–4</td>
</tr>
<tr>
<td>9/8 - 9/10</td>
<td>Probability - Computer Lab I (9/10)</td>
<td>Ch 5, 24.1</td>
</tr>
<tr>
<td>9/15* – 9/17</td>
<td>Standard scores, Normal Distribution, Distributions of Means</td>
<td>Ch 6 – 6.3</td>
</tr>
<tr>
<td>9/22 – 9/24</td>
<td>Hypothesis testing: Introduction - One- Sample test</td>
<td>Ch 6.4, Ch 7.0-7.2</td>
</tr>
<tr>
<td>Wen 9/24 - 10/1</td>
<td>Research design - Confidence Intervals</td>
<td>Ch 7.3 – 7.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hurlbert, Heffner et al.</td>
</tr>
<tr>
<td>10/6 – 10/8*</td>
<td>Two Sample hypotheses: Independent groups t test</td>
<td>Ch 8.0 – 8.3, 8.5</td>
</tr>
<tr>
<td><strong>10/13 - NO CLASS – FALL BREAK</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10/15</td>
<td>Non- Parametric Test</td>
<td>Ch 8.9-8.10</td>
</tr>
<tr>
<td>10/20 - 10/22</td>
<td>Correlated groups t test - Computer Lab II (10/22)</td>
<td>Ch 9.0 – 9.5</td>
</tr>
<tr>
<td>10/27 – 10/29</td>
<td>Goodness of Fit</td>
<td>Ch 22.0-22.6</td>
</tr>
<tr>
<td><strong>10/29 - EXAM 2 Chapters 7-9</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
11/3 – 11/5  One way between subjects ANOVA  Ch 10.0-10.1
11/10 – 11/12*  Nonparametric Test - Multiple comparisons  Ch 10.4, Ch 11.0
11.2 - 11.6
11/17 - 11/19  Two – Factor ANOVA, Repeated measures ANOVA  Ch 12.1-2.2,12.5
11/24 – 11/26  Computer Lab III (9/24)

11/26 - NO CLASS - Thanksgiving Break

12/1* – 12/3  Regression - Correlation  Ch 17.1 – 17.3,  Ch 19.0-19.2

TO BE ANNOUNCED  ** FINAL EXAM **

**QUIZ DATES**
Monday 9/15  Quiz 1

Wednesday 9/25: EXAM 1 Chapters 1-6

Wednesday 10/8: Quiz 2

**Wednesday 10/29: EXAM 2 Chapters 7-9**

Monday 11/12: Quiz 3

Monday 12/1: Quiz 4
BIO 621  
Water Chemistry  
Instructor: J. Makarewicz, 125 Lennon Hall  

SPRING 2004  

READING LIST: Articles are available on the World Wide Web. Titles of reading are in **bold**. To access the reading you will need to have Acrobat installed on your computer and have capability to reach the World Wide Web. Our password will be "mercury". Acrobat is available "free of charge" at http://www.Adobe.com/proindx/acrobat/readstep.htm  

Optional TEXT: Standard Methods for the Examination of Water and Wastewater, **20th Edition**  

<table>
<thead>
<tr>
<th>SM = Standard Methods</th>
<th>HO= Handout</th>
<th>UN= Unknown</th>
<th>RC= Regression Curve, QC= Quality Control</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>WEEK OF</th>
<th>LECTURE</th>
<th>READING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/28</td>
<td><strong>Background</strong>, Lab Orientation</td>
<td>SM:1-25 to 56, HO (Background 1,2,3,4)</td>
</tr>
<tr>
<td>2/4</td>
<td><strong>Background</strong>, Safety in the LAB, Standards</td>
<td>HO, UN</td>
</tr>
<tr>
<td>2/11</td>
<td><strong>pH, Alkalinity, and Conductivity</strong></td>
<td>...SM: 2-26 to 2-29,2-44 to2-47,4-86 to 4-91</td>
</tr>
<tr>
<td>2/18</td>
<td><strong>Sulfate</strong> (Turbidimetric)</td>
<td>SM: 4-176 to 4-181, UN, RC</td>
</tr>
<tr>
<td>2/25</td>
<td><strong>Nitrate</strong> (Cadmium Column) (Wash)</td>
<td>SM: 4-114 to 4-122, UN, RC</td>
</tr>
<tr>
<td>3/3</td>
<td><strong>Nitrate</strong> (Cadmium-automated)</td>
<td>SM: 4-114 to 4-122, HO, UN, RC</td>
</tr>
<tr>
<td>3/10</td>
<td>EXAM</td>
<td></td>
</tr>
<tr>
<td>3/17</td>
<td>VACATION WEEK</td>
<td></td>
</tr>
<tr>
<td>3/24</td>
<td><strong>Phosphate</strong> (Ascorbic-automated)</td>
<td>SM:4-139 to 4-153, HO, UN, RC</td>
</tr>
<tr>
<td>3/31</td>
<td><strong>Metals and Introduction to Procedures</strong> (Na - Atomic Absorption)</td>
<td>SM:1-1 to 1-24; 3-1 to 3-6; 3-13 to 3-18 780, Video # QD96.A8 A76 1992</td>
</tr>
<tr>
<td>4/7</td>
<td><strong>Calcium and Sodium</strong></td>
<td>&quot;A.A. Book&quot;, Video, HO, UN, RC, QC, Video#</td>
</tr>
<tr>
<td>4/14</td>
<td>Lead (Graphite Furnace)</td>
<td>SM: 3-24 to 3-31, HO, UN, RC, Video #875</td>
</tr>
<tr>
<td>4/21</td>
<td><strong>Pesticides</strong> (Gas Chromatography)</td>
<td>SM:6-1 to 6-7, 6-91 to 6-104, HO, Video #3439</td>
</tr>
<tr>
<td>4/28</td>
<td><strong>Organochlorine Pesticides</strong></td>
<td>(Extraction FiltersHO, Filmstrip</td>
</tr>
<tr>
<td>5/5</td>
<td>Review</td>
<td></td>
</tr>
<tr>
<td>5/14</td>
<td><strong>FINALS WEEK</strong></td>
<td></td>
</tr>
</tbody>
</table>
WATER QUALITY ANALYSIS                                      SPRING, 2004

EXAMS: Two Exams - 26 March 2004, Final on assigned day

QUIZZES: Several (unannounced)

UNKNOWNs: Many! Students are to work on their own. Each student is responsible for knowing how to operate the equipment. For each unknown, you will have to provide a regression curve, the correlation coefficient and a short paragraph. Each week this paragraph will address a question about the quality of the water in your unknown.

PAPERS: NONE

MAKE-UP POLICY: There will be no make-up exams or quizzes. Unknowns are due by 2:30 PM the day they are assigned. After 2:30 PM, 10 points per day will be deducted for lateness.

ATTENDANCE: The college policy states that you must attend all classes. If you have any special needs or requirements, please see me after class.

GRADING: Two Exams 60%
          Unknowns 30%
          Quizzes 10%
          Total 100%

Optional TEXT: Standards Methods for Examination of Water and Wastewater, 20th edition

LABORATORY RULES:
1. No smoking ever!
2. The Laboratory will be open during the (8:30 AM to 5 PM) for your use. Please keep in mind that the lab. will close promptly at 5PM. Enter this factor into your planning.
3. Keep the laboratory clean. Other people doing research use this laboratory continuously.
4. Safety classes and lab coats must be worn in the lab at all times.
5. Answers to unknowns will be due the following laboratory.
6. Report on broken equipment to Dr. Makarewicz immediately. Excessive and continuous damage to equipment by one student will be charged to the student. A GRADE WILL NOT BE GIVEN UNTIL BROKAGE FEES HAVE BEEN PAID.
7. Each student will have a mutually agreeable time slot to perform the laboratory. These times are from 8:30 AM to 12:30 and 12:30 PM to 4:30PM.
BIOL 406/506 – WILDLIFE ECOLOGY – FALL 2002

Note: (Instructions for graduate students are indicated in parentheses)

Prerequisites: Introductory Biology, Ecology (ENV 303)

Instructor: Dr. Chris Norment
Office: 119 Lennon
Office hours: T R 2:55-3:55 p.m., F 9:00-11:00 a.m., or by Appt.
Phone: 395-5748 (office)
637-0252 (home; before 9:00 p.m.)
E-Mail: cnorment@brockport.edu

General Course Objectives:
1. Introduce basic concepts of wildlife ecology.
2. Develop an understanding of the basic principles necessary to successfully manage wildlife populations.
3. Develop the ability to think critically about issues related to the ecology and management of wildlife populations.
4. To improve students’ written and spoken communication skills.

Class Meets: T R 9:45-11:15 a.m., B0006 Holmes; F 1:15-5:15.

A large three-ring binder also will be valuable.

Course Structure: The course format will include lectures, discussions, cooperative learning exercises, laboratory and field work.

Grading: Grades will be assigned based upon the following scheme:
Lecture tests - 2 at 100 points each  200
Final exam - 1 at 125 points  125
Papers  150
Problem sets and other written assignments  150
Quizzes  60
Total points 685(approximate)

(Graduate Students (BIO 506): Graduate students are expected to develop a deeper and broader understanding of wildlife ecology than is the case for undergraduates enrolled in ENV 406. Requirements for BIO 506 are given on page 2 of the syllabus.)

Attendance: Attendance is expected; please come prepared for class. During the term I will take attendance; if you are not present and do not have a valid excuse (doctor's note, etc.), 7 points (about 1% of your grade) will be deducted from your point total. If you miss a scheduled lab without a valid excuse, 3% of the total points will be deducted. If you do miss a class, it is your responsibility to talk to me about what material was missed, and to obtain notes from a classmate. It is particularly important that all lab sessions be attended, as they may be difficult to make up. If an unannounced quiz is missed, it may not be made up.

Grading and Test policy: Lecture tests and the final exam must be taken on the scheduled dates and may not be made up unless arranged in advance, or with a doctor's written excuse. The following guidelines will be used to assign grades: 90% = A range; 80-89% = B range; 65-79% = C range; 55-65% = D range; < 55% = E. The grade scale will be established by reference to undergraduates only, so that performance of graduate students will not affect the grades of undergraduates. Last day to drop the course is September 24. Withdrawal policies are described in Your Right to Know & Academic Policies Handbook. Unless prior arrangements have been made, 63 of 104
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late work will be discounted at the rate of 5%/school day. Tests will be based primarily on material discussed during lectures and study group sessions. However, approximately 10% of the points on each test may be based on material covered in your text, but not in class.

Surviving BIOL 427/527:
1. Come to class and be prepared.
2. If you have to miss a class, obtain the notes from another student.
3. Seek help when you need it, and ask questions.
4. Anticipate problems beforehand and discuss them with the instructor.
5. Be aggressive in your approach to studying; for example, review and think about class notes after the lecture.
6. "Don't worry, be happy." (Mehr Babba)

Statement on Disability: I would appreciate hearing from anyone in this class who has a special need that may be a result of a disability. I am reasonably sure we can work out whatever arrangement is necessary, be it special seating, testing, or other accommodation. See me after class, or during my office hours, as soon as possible.

Statement on Academic Integrity: I take the need to maintain academic integrity seriously, and refer students to pp. 9-11, "The Policy on Student Academic Dishonesty" in the SUNY Brockport publication, "Your Right to Know & Academic Policies Handbook, 2000-2001". The most common problem that I have encountered is the submission of written work clearly related to that of another student in the class, or in a previous class. (In order to account for this last, unfortunate possibility, I keep a random subset of major papers from previous classes on file.) A wise policy might be to discuss freely, but write with complete independence. Failure to adhere to the standard of independent written work may result in a 0 on the assignment or the course. If you are at all unclear as to your responsibilities or the conventions of the discipline, please talk with me.

(REQUIREMENTS FOR BIO 506. In addition to the requirements for ENV 406, graduate students in BIO 506 will:
1. Develop more-in depth knowledge of the subject. Thus, graduate student exams and papers will be graded more rigorously.
2. Complete a habitat management plan for either a wetland or upland habitat at Iroquois National Wildlife Refuge. The habitat management plan will include recommendations for management based on previous experiences at the refuge and relevant literature.
3. Complete additional technical readings from the following source: Journal of Wildlife Management: Two current papers from the most recent volume of the primary journal in the field. These readings will be discussed with the instructor during two out-of-class meetings. )

SCHEDULE

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Readings*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aug 27</td>
<td>Introduction</td>
<td>Chapters 1,2</td>
</tr>
<tr>
<td></td>
<td>Some successes in wildlife mgmt</td>
<td>Er. Educational needs</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug 30</td>
<td>No lab (I'll make it up to you later!)</td>
<td></td>
</tr>
<tr>
<td><strong>Week 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sept 3</td>
<td>Guest lecture: History of attitudes towards nature (Ralph Black, English Dept.)</td>
<td>Handouts</td>
</tr>
<tr>
<td>Sept 5</td>
<td>An overview of management issues</td>
<td>JWM assignment due</td>
</tr>
<tr>
<td>Sept 6</td>
<td>Quiz: Heart and Blood, Chapter 1</td>
<td>Er: Selecting deer management options</td>
</tr>
<tr>
<td>Date</td>
<td>Topic</td>
<td>Reading/Assignment</td>
</tr>
<tr>
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</tr>
<tr>
<td>Oct 24</td>
<td>Hunting and trapping, animal rights</td>
<td>Chapter 10 (pp. 178-183)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Extension quest due</strong></td>
</tr>
<tr>
<td>Oct 25</td>
<td>Computer lab: logistic population models</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Discussion: exotic species/hunting; <em>Heart and Blood</em></td>
<td></td>
</tr>
<tr>
<td>Week 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct 29</td>
<td>Predators</td>
<td>Chapter 9</td>
</tr>
<tr>
<td>Oct 31</td>
<td>Harvesting effects</td>
<td>pp. 183-192</td>
</tr>
<tr>
<td>Nov 1</td>
<td>Computer lab: harvest models</td>
<td></td>
</tr>
<tr>
<td>Week 11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov 5</td>
<td>Nongame issues</td>
<td>Chapter 19</td>
</tr>
<tr>
<td>Nov 7</td>
<td>Lab: deer dentition</td>
<td><strong>Harvest model questions due</strong></td>
</tr>
<tr>
<td>Nov 8</td>
<td>Computer lab: life tables</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Introduction: wolves and ungulates</em></td>
<td></td>
</tr>
<tr>
<td>Week 12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov 12</td>
<td><strong>Test 2</strong> (covers material from Oct 4-Nov 8)</td>
<td>Chapter 21</td>
</tr>
<tr>
<td>Nov 14</td>
<td>Conservation Biology</td>
<td><em>Er. Conservation</em></td>
</tr>
<tr>
<td></td>
<td>biology trailblazers</td>
<td>er: 6 papers</td>
</tr>
<tr>
<td>Nov 15</td>
<td>Population analysis problem: wolves and ungulates</td>
<td></td>
</tr>
<tr>
<td>Week 13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov 19</td>
<td>Case study: caribou</td>
<td><em>er: Watchful world</em></td>
</tr>
<tr>
<td>Nov 21</td>
<td>HEP/HSI</td>
<td></td>
</tr>
<tr>
<td>Nov 22</td>
<td>Lab: HEP/HSI</td>
<td></td>
</tr>
<tr>
<td>Week 14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov 26</td>
<td>Economics</td>
<td>Chapter 20</td>
</tr>
<tr>
<td>Nov 28</td>
<td>NO CLASS</td>
<td></td>
</tr>
<tr>
<td>Week 15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec 3</td>
<td>Wildlife and the public</td>
<td>Chapter 22</td>
</tr>
<tr>
<td>Dec 5</td>
<td>Wrap-up: discussion</td>
<td><em>Irondequoit deer paper due</em></td>
</tr>
<tr>
<td>Week 16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thursday, Dec 10 (8:00 – 10:00)</td>
<td><strong>Final exam</strong> (Includes <em>H &amp; B</em>)</td>
<td></td>
</tr>
</tbody>
</table>

*Unless otherwise noted, all readings refer to those in Bolen and Robinson.

**Note:** I assume that students in BIO 406/506 are familiar with the basic concepts in Chapter 4 (Ecosystems and Natural Communities).
Note: (Instructions for graduate students are indicated in parentheses)

ENV BIO 419/519  Limnology  FALL 2003

Prerequisite – ENV 303 (Ecology), CHM 205, 206 (College Chemistry preferred)

Dr. Makarewicz         395-5747                                               Room 125  Lennon
E-Mail  Jmakarew@brockport.edu

Recommended Text:  - See attached reading list

Date                  Lecture (Tentative)
Aug. 26              Properties of Water, The Late Great Lakes
Sep. 2               Origins of Lake Basins
Sep. 9               Solar Radiation
Sep. 16              Water Currents
Sep. 23              Carbonate cycle, Acid ppt., Acid Precipitation
Sep. 30              Exam 1
Oct. 7               Dissolved oxygen, Primary production
Oct. 14              No Class: Mid-semester break
Oct. 21              Phytoplankton "TERM PAPER DUE"
Oct. 28              Limiting Nutrient Controversy

Nov. 4               Exam 2, Lotic Environment
Nov. 11              Stressed Stream Analysis,
Nov. 18              Effects of Clear Cutting
Nov. 25              Thanksgiving recess begins at 10 PM
                        Palaeolimnology
Dec. 2               Final Exam:  6 to 8pm
Dec. 9               Wetlands System, Lake Ontogeny

Graduate Students (ENV 519):  A deeper and broader understanding of Limnology is expected of graduate students: that is, the expectation level for graduate students are significantly different from undergraduates. These include an extra term paper, extra readings and more rigorous grading of exams. Items in parentheses represent graduate student requirements.

Attendance Policy: The college policy allows excused absences for documented illnesses, official representation of the college, death of a close relative, religious holiday and other circumstances beyond the control of the student. Students whose unexcused absences exceed 15% of the scheduled classes and laboratories may receive a lowered grade or failure at the instructor's discretion.

Make-up Policy - There are no make-ups for exams.

Term Paper - Ten points will be deducted for each day the paper is late. (Graduate students will complete two term papers). All students will do a critical review of a paper from the Journal of Great Lakes Research. The second graduate student term paper will focus on some aspect of your research.

Disability - If anyone has a special need due to a disability, please see me after class.
Grading -  

<table>
<thead>
<tr>
<th>Grading</th>
<th>UG</th>
<th>Grad</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam 1</td>
<td>25% (20%)</td>
<td></td>
</tr>
<tr>
<td>Exam 2</td>
<td>25% (20%)</td>
<td></td>
</tr>
<tr>
<td>Final</td>
<td>30% (20%)</td>
<td></td>
</tr>
<tr>
<td>Term Paper</td>
<td>20% (40%)</td>
<td></td>
</tr>
</tbody>
</table>

**Drop Policy:** You may drop up to 1 December with no penalty. After this date, you need the permission of the department chairperson. Withdrawals are given only for illness or unusual circumstances.

**READING LIST:** Journal articles are available on the World Wide Web. To access the reading you will need to have Acrobat installed on your computer and have capability to reach the world Wide web. Acrobat is available "free of charge" at [http://www.Adobe.com/proindx/acrobat/readstep.htm](http://www.Adobe.com/proindx/acrobat/readstep.htm)

**Undergraduates:** Chapter numbers in the first column refer to Wetzel’s “Limnology: Lake and River Ecosystems. “THIRD EDITION”. This is not required for undergraduates! Recommended only !!

**Graduates:** Chapter’s listed in the third column are from either Mackie’s Applied Aquatic Ecosystem Concepts (“Second Edition) or Wetzel’s Limnology. (Extra graduate student readings are in parentheses!!!)

<table>
<thead>
<tr>
<th>Week of</th>
<th>Author</th>
<th>Title</th>
<th>Journal</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 Sept Chap. 9, 10, 11</td>
<td>Likens, G. et al. (1979)</td>
<td>Acid Rain</td>
<td>Scientific American. 241(40): 43.</td>
</tr>
<tr>
<td>Date</td>
<td>Authors</td>
<td>Title</td>
<td>Journal/Source</td>
</tr>
<tr>
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<td>----------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>-----------------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Chapter 12, Water Quality Assessment)</td>
<td>(Mackie’s Applied Aquatic Ecosystem)</td>
</tr>
<tr>
<td></td>
<td>Spencer et al. (1991)</td>
<td>Shrimp Stocking, Salmon Collapse, and Eagle Displacement</td>
<td>Bioscience 41:14</td>
</tr>
<tr>
<td>11 Nov.</td>
<td>Bormann, F.H. et al. (1968)</td>
<td>Nutrient loss accelerated by clear-cutting of a forest ecosystem</td>
<td>Science - 159:882</td>
</tr>
<tr>
<td></td>
<td>Makarewicz, J.C. (1993)</td>
<td>Stressed stream analysis</td>
<td>Waterworks - Spring : 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Chapter 13, Water Pollution and Control…)</td>
<td>(Mackie’s Applied Aquatic Ecosystem)</td>
</tr>
</tbody>
</table>
Environmental Science 422/522  
Population Biology  
(Prerequisite: Ecology, ENV 303)  

Note: (Instructions for graduate students are indicated in parentheses)

Spring 2004

Dr. Geoffrey Gardner
ggardner@brockport.edu
Office: Lennon 117
Phone: 395-5743
Office Hours: M + T 11:30-12:30 or by appointment

Required Text:

Supplemental articles will be available on ANGLE.

Calculator:
You will need a calculator for this class. On exams you may NOT share calculators so it’s important that every student has access to their own calculator.

Objective: This course considers the evolution and function of populations. It combines population genetics with population ecology.

Course Requirements:
Competence will be evaluated by homework assignments and exams. All exams will be a combination of multiple choice questions and short answer questions based on lectures, the text and readings. A topic paper will also be required.

(Graduate Students (ENV 522): Graduate students will be expected to have a broader and deeper understanding of Population Biology, therefore, the expectation level for graduate students are significantly higher than for undergraduates. Graduate students will be expected to complete an extensive research paper and are subject to a more rigorous grading of problem sets and exams. In addition, graduate students will be responsible for leading class discussions on current topics in population biology.)

Homework assignments: Homework will be made up of problem sets. Each assignment will be worth 50 points for a total of 150 points. Problem set assignments will be collected at the beginning of the class on the day they are due. 1 point will be deducted for every day that an assignment is late. (For example, if due Tuesday and you hand it in Thursday, 2 points will be deducted from that assignment). Assignments will not be accepted for a given week once that assignment has been graded and returned to the class. You will be assigned 3 problem sets over the course of the semester.
While I encourage you to work in groups on homework assignments, be aware that directly copying someone else’s work will not help you learn the material. The purpose of homework assignments is for you to actively learn through practice. This practice will be of value for exams.

**Exams:** Exams will be worth 100 points each for a total of 300 points. Tentative exam dates are noted on the syllabus. Make-up exams will only be given in cases where you can provide documentation for your absence.

**Paper:** This will be a term paper reviewing research on one particular topic of population biology, using reference material and primary literature. Choose a topic early in the semester. The topic is your choice, and this is a solo project. A topic must be submitted by the scheduled deadline. The format will be as follows:

- 5-10 pages, double-spaced, including references. *(Graduate students papers should be 10-15 pages).*
- begin with a title, your name, course number and date
- pages must be numbered
- use subheadings to organize your writing
- state the underlying scientific question clearly, and describe how it arose.
- describe research methods used to probe the question, and their results.
- draw your own conclusions, and suggest further research.
- use the Latin binomial to introduce a species. Common names can be used thereafter.
- minimum of 10 references, primary scientific papers.
- cite last names of authors and dates in parentheses; don't use numbers or footnotes.
- for the bibliography, list references in same format as in your textbook.
- do not use direct quotations; use your own words
- grammar and spelling will be checked.

**Participation**
You are expected to attend every class. Periodically we will have class discussions on various papers/topics/issues. *(Graduate students will be assigned to a date to lead a discussion on a current issue in population biology. Graduate students will select the paper for the topic, which will be assigned to the class. A written review of the paper is also expected)*

**Angel:** Course materials and course information will be placed online. Students should enroll in the course to access materials. I will also place updated class announcements, reminders and review material on Angel.

**Grading:**
Final course grades will be determined as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exams and Final</td>
<td>3 x 100 = 300 pts</td>
</tr>
<tr>
<td>Problem Sets</td>
<td>3 x 50  = 150 pts</td>
</tr>
</tbody>
</table>
Paper = 100 pts
Total 550 pts (575 pts)

Final grades will be determined by adding the scores on your three exam grades, problem set assignments and paper.

Attendance: Regular class attendance is expected and is the responsibility of each student. I will periodically take attendance in class. You will be responsible for all materials covered in class. If you miss class for some reason it is your responsibility to get the notes from another student in class. Lecture notes will not be available from the instructor.

Class Conduct and Punctuality: It is my goal to develop a relationship with students based on mutual respect and courtesy. To create an environment conducive to learning we all must exercise discipline and self-restraint. Behaviors that are disruptive and insulting to me or to other students in the class will not be tolerated. Examples of these behaviors include arriving late to class, leaving class early, and talking during the lecture or any other actions that would be distracting to other students in the class.

Academic Integrity: SUNY Brockport has a firm policy concerning academic dishonesty. Please familiarize yourself with definitions and college policies regarding academic honesty in the College Student Handbook.

Tentative Course Schedule

<table>
<thead>
<tr>
<th>Date (week of)</th>
<th>Topic</th>
<th>Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/27 – 1/29</td>
<td>Introduction - Species Concept</td>
<td>Birch, Davis, Hay</td>
</tr>
<tr>
<td>2/3 – 2/5</td>
<td>Geographical Variation and Speciation</td>
<td>Lack, Grant, Brown</td>
</tr>
<tr>
<td>2/10 - 2/12</td>
<td>Genetic Variability, Hardy Weinberg law</td>
<td>Bishop and Cook,</td>
</tr>
<tr>
<td>2/17 – 2/19</td>
<td>Population Genetics</td>
<td>King and Lawson</td>
</tr>
<tr>
<td>2/24 – 2/26</td>
<td>Genetics con’t</td>
<td>Elena et al</td>
</tr>
<tr>
<td>Thurs 2/26 - EXAM 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/2- 3/4</td>
<td>Estimating population density, Distribution of Species population</td>
<td>Mills</td>
</tr>
<tr>
<td>3/9 – 3/11</td>
<td>Life Tables</td>
<td>BMT Ch 1, Luckinbill, Reznick</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Topics due</td>
</tr>
<tr>
<td>3/16 – 3/18 - NO CLASS – SPRING BREAK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/23 – 3/25</td>
<td>Models of population Growth</td>
<td>BMT ch 3</td>
</tr>
</tbody>
</table>
3/30 – 4/1      Competition                                    Brown and Davidson
                 BMT ch 4
4/6 – 4/8        Competition cont                             Goldberg and Barton
4/8 - EXAM 2

4/13 – 4/15     Population Cycles - Predation                 Korpimaki and Krebs
                 BMT ch 5
4/20 – 4/22     Parasites and Parasitoids and Disease        BMT ch 5
4/27 - 4/29     Population Regulation                       BMT ch 6
                 Murdoch
5/4 – 5/6       Species Diversity                             Pimm
                 Hughes
                 Grassle

TO BE ANNOUNCED ** FINAL** EXAM - 3 **

Additional Readings. – you will need Acrobat installed to view articles. These should be available on Angel. Some are available through library e-reserves in addition.


Bishop and Cook 1975 Moths, melanism and clean air. Scientific American 231(1) 90-99


Non-required texts.- these may be helpful, but are not required. Can be used as reference.


G. BIO 423/523 "BIOLOGY OF POLLUTION"

Note: (Instructions for graduate students are indicated in parentheses)

H. Prerequisites

It is assumed that you have had at least one ecology course and one general biology course at
the college-level before attempting this course. Otherwise, you must have permission from me to
remain in the course.

Course Information

I. Meetings
Semester: Spring 2003
Time: 3:45 - 5:15 pm; Monday and Friday
Place: 215 Holmes Hall

J. Office
Hours: J. Haynes. 3:00 - 4:30, Tuesday; 9:30 - 12:00 Thursday; or by appointment
Place: 121 Lennon Hall
Telephone: 395-5783
E-Mail: jhaynes@brockport.edu

I will be happy to discuss any aspect of the course or your performance with you briefly
after class meetings, during scheduled office hours, or by appointment. You should
come to me as soon as you perceive that you may be having difficulty with any aspect
of the course. Please bring your notebook and any other relevant course materials to our
meetings.

Syllabus

<table>
<thead>
<tr>
<th>Week/Date</th>
<th>Topics</th>
<th>Reading Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1/27</td>
<td>Introduction and History</td>
<td>WHSP: xi, xiii-xvi, 3-22; LY: 1-19</td>
</tr>
<tr>
<td>1/31</td>
<td>Ecological Foundations</td>
<td>This Guide; WHSP: 23-45; 195-219</td>
</tr>
<tr>
<td>2 2/3</td>
<td>Adaptation and Tolerance</td>
<td>WHSP: 220-237; LY: 111-130</td>
</tr>
<tr>
<td>2/7</td>
<td>Bioassay Procedures</td>
<td>WHSP: 93-98, 107-118; LY: 21-37</td>
</tr>
<tr>
<td>3 2/10</td>
<td>Bioassay Analysis 1: Median Survival</td>
<td>LY: 55-92; <strong>Topic/10 References due</strong></td>
</tr>
<tr>
<td></td>
<td>Times, Asymptotic LC50's, Latent Period</td>
<td>WHSP: 153-161, 179-192</td>
</tr>
<tr>
<td>2/14</td>
<td>Bioassay Analysis 2: Chronic Tests, Application Factors, Multiple Toxicants</td>
<td>LY: 37-53, 133-140</td>
</tr>
<tr>
<td>4 2/17</td>
<td>Good Laboratory Practices</td>
<td>RR #1</td>
</tr>
<tr>
<td>2/21</td>
<td><strong>EXAM 1</strong></td>
<td></td>
</tr>
<tr>
<td>5 2/24</td>
<td>Temperature</td>
<td>RR# 2</td>
</tr>
<tr>
<td>2/28</td>
<td>Hypoxia</td>
<td>LY: 131-133, 140-151; RR# 5</td>
</tr>
<tr>
<td>6 3/3</td>
<td>Acute Gill Effects</td>
<td>WHSP: 46-58; <strong>3 Annotations due</strong></td>
</tr>
<tr>
<td>3/7</td>
<td>Inorganics: Metals, pH, Ammonia</td>
<td>LY: 177-190; RR# 6</td>
</tr>
</tbody>
</table>
Organics 1: Sewage, Eutrophication RR# 10, 15

Organics 2: Detergents, Pulp Mills, Oils RR# 13, 14, 16

SPRING BREAK!

Chronic Effects: Physiology WHSP: 119-139; LY: 93-104

EXAM 2

EXAM 3

Special Topics: Graduate Student Presentations

Special Topics: Graduate Student Presentations

Pollutant Presentations All Students

Pollutant Presentations All Students

Pollutant Presentations All Students

Pollutant Presentations All Students

Pollutant Presentations All Students

(Additional Expectations for Graduate Students in ENV 523)

Graduate students are expected to develop and demonstrate a broader and deeper understanding of pollution biology than undergraduates. Several assignment, evaluation and assessment techniques are used to determine whether or not graduate students demonstrate a higher level of competence in pollution biology.

1. Additional readings, and testing on them, to develop understandings of concepts more broadly and deeply (see study questions).

2. More rigorous evaluation of performance on examinations. Do graduate students exhibit a thorough understanding (breadth and depth) of the material required to answer questions fully? Do they competently answer more complex questions, not given to undergraduates, about theory and mechanism?

3. Additional project, beyond the annotated bibliography and short presentation required of all students, and presentation. Small teams of graduate students (2-4) will work with me to identify pollution biology topics of interest that are not covered in depth in the course. Each team will prepare a 10 - 15 page paper on the topic and will make a 45 min presentation to the class. Both parts of the project will be graded according to the expectation of the Department of Environmental Science and Biology that its MS graduates are prepared to teach introductory biology at a community college. Alternatively, a team may choose to design, conduct and report on a toxicity test conducted in my laboratory.

4. More rigorous assignment of a final grade. For the purpose of assigning final grades, graduate students’ final course averages are compared only to other graduate students. To earn a grade equal to that of an undergraduate, a graduate student must have a final average about 2% higher (e.g., 90% is an A- for an undergraduate and a B+ for a graduate student; see below).
K. Texts


L. Library Readings

Because my notes and lectures may not always be clear to you, below I list a source (on reserve in Drake Library) from which I have taken information for lectures during weeks 6-10.


Assigned readings from other references, placed on electronic or paper reserve in Drake Library, are listed below; they should be completed before coming to class. Reserve readings come from a variety of books, journals and other sources. The volume of reading is high in this course, especially for graduate students. Guided by the study questions that follow, you should read these articles to get a sense of the breadth and depth of pollution biology. Reserve readings (RR) are listed in numerical order as indicated on the syllabus. Ignore non-consecutive numbering. (Items in bold below are required for graduate students only.)


Note: (Instructions for graduate students are indicated in parentheses)

Prerequisites

Instructor: Dr. Chris Norment
Office: Lennon 119
Office hours: M: 10:40 - 11:40; W: 2:30 - 3:30; F: 10:45-1:00 or by Appt.
Phone: 395-5748 (Office); 637-0252 (Home; before 9:00 p.m.)
e-mail: cnorment@brockport.edu

Course Objectives:
1. To describe patterns of biological diversity, and to investigate factors which affect this diversity and vulnerability to extinction.
2. To characterize genetic and demographic characteristics of endangered populations.
3. To discuss design and protection of natural areas.
4. To introduce important research and management methods.
5. To think about the implications of ecology and evolution for conservation biology, the implications of conservation biology for society, and the relationship between values, science, and conservation.

Class Meets: 9:30-10:30, MW, 127 Hartwell


Course Structure: The course format will emphasize lectures, with supplemental discussions, guest presentations, and student projects.

Grading: Grades will be assigned based upon the following:
- Lecture tests - 2 at 100 points each 200
- Quizzes - 1 40
- Final exam 100
- Short papers 100
- "Issues" assignment - presentation 120
- Homework assignments (approximate pts) 80
- Total points 680'

(Graduate Students (BIO 539): Graduate students are expected to develop a deeper and broader understanding of conservation biology than is the case for undergraduates enrolled in ENV 439. Requirements for BIO 539 are given on page 2 of the syllabus.)

Attendance: Attendance is required; please come prepared for class. During the term I will take attendance at the start of every class; if you are not present and do not have a valid excuse (doctor's note), 7 points (ca. 1% of the total) will be deducted from your total points for the term. If you do miss a class, it is your responsibility to talk to me about why you missed and what material was missed, and to obtain notes from a classmate. I reserve the right to give unannounced quizzes that cannot be made up.

Grading and Test policy: Lecture tests and the final exam must be taken on the scheduled dates and may not be made up unless arranged in advance, or with a doctor's written excuse. The following guidelines will be used to assign grades: = 90% = A range; 80-89% = B range; 65-79% = C range; 55-65% = D range; < 55% = E. The grade scale will be established by reference to undergraduates only, so that performance of graduate students will not affect the grades of undergraduates. Late assignments are penalized 5% per class day (MTWRF). Last day to withdraw from the course with departmental approval is April 30th.
Surviving BIOL 439/539:
1. Come to class and be prepared.
2. If you must miss a class, obtain the notes from another student.
3. Seek help when you need it, and ask questions.
4. Anticipate problems beforehand and discuss them with the instructor.
5. Be aggressive in your approach to studying; for example, review and think about class notes after each class.
6. "Don't worry, be happy."

Statement on Disability: I would appreciate hearing from anyone in this class who has a special need that may be a result of a disability. I am reasonably sure we can work out whatever arrangement is necessary, be it special seating, testing, or other accommodation. See me after class, or during my office hours, as soon as possible.

Statement on Academic Integrity: I take the need to maintain academic integrity seriously, and refer students to the discussion on pp. 9-12 of Your Right to Know: Academic Policies Handbook, 2032-2004, which is published by the Division of Student Affairs. The most common problem that I have encountered is the submission of written work clearly related to that of another student in the class. A wise policy might be to discuss freely, but write with complete independence, unless clearly instructed to collaborate. **Failure to adhere to the standard of independent written work may result in a 0 on the assignment.** If you are at all unclear as to your responsibilities or the conventions of the discipline, please talk with me.

(REQUIREMENTS FOR BIO 539. In addition to the requirements for ENV 439, graduate students in BIO 539 will:
1. Develop more-in depth knowledge of the subject. Thus, graduate student exams and papers will be graded more rigorously.
2. Complete an additional group research project on Habitat Conservation Plans (HCPs). This additional project will require an in-depth analysis of an HCP of the students' choosing. The graduate student group will then make an hour-long oral presentation on HCPs to the class.
3. Complete additional technical readings from the following source: Conservation Biology: Two current papers from the most recent volume of the primary journal in the field. These readings will be discussed with the instructor during two out-of-class meetings. Students will complete a written critical review of one of the papers.)

SCHEDULE - CONSERVATION BIOLOGY, 2004

<table>
<thead>
<tr>
<th>Date</th>
<th>Topics</th>
<th>Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UNIT 1 - Introduction, history, values</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jan 26</td>
<td>Introduction</td>
<td>Chap 2 (pp. 27-43)</td>
</tr>
<tr>
<td>Jan 28</td>
<td>Biodiversity - description/patterns,</td>
<td>Chap 3 (pp. 62-82)</td>
</tr>
<tr>
<td>Jan 30</td>
<td>Biodiversity</td>
<td>pp. 11-24</td>
</tr>
<tr>
<td>Feb 2</td>
<td>History of Conservation - North America</td>
<td>Internet assignment due</td>
</tr>
<tr>
<td>Feb 4</td>
<td>History of Conservation - North America</td>
<td></td>
</tr>
<tr>
<td>Feb 6</td>
<td>Value of Biodiversity</td>
<td>Chap 4; Chap 5 (pp. 111-114, 118-124, 131-134); skim Chap 6</td>
</tr>
<tr>
<td>Feb 9</td>
<td>Endangered Species Act</td>
<td>pp. 558-565; papers by Rohlf, O'Connell²</td>
</tr>
<tr>
<td>Feb 11</td>
<td>Film: Varmints</td>
<td>Study questions due</td>
</tr>
<tr>
<td>Feb 13</td>
<td>Discussion - value of biodiversity Return of the wolf</td>
<td>Discussion question due</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>Topics</th>
<th>Readings</th>
</tr>
</thead>
</table>
Unit 2 - Loss of biodiversity: patterns and causes
Feb 16 Quiz: Unit 1; catch-up Chap 7
Feb 18 Lecture: Extinctions Chap 7
Feb 20 Lecture: Extinctions Chap 7 Complete question set # 1 Essay # 1 due
Feb 23 Discussion: Primack, Chapter 7
Feb 25 Vulnerability to extinction Chap 8
Feb 27 Lecture: Habitat fragmentation Chap 9 (pp. 197-229)
Mar 1 Global change Chap 9 (pp. 252-260)
Mar 3 Lecture: Introduced species Chapter 10 (pp. 276-292)
Mar 5 Discussion: Lomborg Complete question set # 2
Mar 8 Discussion # 3: Synthesis Complete question set # 3
Mar 10 Test # 1 (Units 1 and 2)
Mar 12 Habitat Conservation Plans (grad students) pp. 562-565

Unit 3 - Biology of small populations
Mar 13-21 SPRING BREAK – NO CLASS!!
Mar 22 Population genetics I Chap 11 (pp. 297-320)
Mar 24 Population genetics II
Mar 26 Demographic/environmental variation Chap 11 (pp. 32-327)
Disc. Return of the Wolf (pp 105-210)\(^3\)
Mar 29 Metapopulations Chap 12 (pp. 348-351)) Pop. gen. assign due
Mar 31 Metapopulations; PVA Chap 12 (pp. 344-348)
Apr 2 In-class PVA project using RAMAS/metapop (computer lab)
Apr 5 In-class PVA project, continued

Unit 4 - Management issues and methods
Apr 7 Design of protected areas Chapter 16, 15 (pp. 427-444) Apr 9 Review PVA project
Apr 12 Managing protected areas Chap 12 (329-344)
Chap 17 (pp. 473-487)
Chap 18 (pp. 509-514)
Ludwig et al.\(^2\)
Apr 14 Scholar’s Day (no class)
Apr 16 International issues Asquith\(^2\)
Apr 19 Test 2 (Units 3, 4)
Apr 21 Ex situ strategies/Reintroductions Chap 13 Return of the wolf (McNamee, pp. 211-323)
Apr 23, 26 Group I presentations
Apr 28, 30 Group II presentations
May 3, 5 Group III presentations
May 7 Consensus (Groups I, II, III)
Final exam: Friday, May 14, 8-10 am
\(^1\)All readings refer to material in Primack unless otherwise noted.
\(^2\)These papers are on electronic reserve in Drake, where they are listed by title. I list them by author to save
space. The authors/titles for those papers listed in the syllabus are given below.
\(^3\)Thomas McNamee, The Return of the Wolf to Yellowstone

Electronic reserve readings from syllabus (by date)
Rohlf: Six biological reasons why the Endangered Species Act doesn’t work and what to do about it
O’Connell: Response to “Six biological reasons why...."
Blaine: Basic science
Christian: Fraud discovered in endangered species studies
PEER (Public Employees for Environmental Responsibility): Lynx "biofraud" myth
Hagan: Environmentalism and the science of conservation biology
Asquith: Misdirections in conservation biology
Ludwig et al.: Uncertainty, resource exploitation, and conservation: lessons from history
BIO 440/540 - HERPETOLOGY - SPRING 2003

Note: (Instructions for graduate students are indicated in parentheses)

Prerequisites
Instructor: Dr. Chris Norment
Office: Lennon 119
Office hours: M: 10:40 - 11:40; W: 2:30-3:30; F: 10:45-1:00, or by appointment.
Phone: 395-5748 (office)
637-0252 (home; before 9:00 p.m. only; weekends okay)
email: cnorment@brockport.edu

Course Objectives:
1. To develop an appreciation for the diversity of form and function in amphibians and reptiles.
2. To understand the evolutionary history of reptiles and amphibians.
3. To expose students to some basic techniques used in studying amphibians and reptiles in the field.
4. To develop the ability to think critically and ask questions about herps.
5. To investigate conservation issues related to reptiles and amphibians.

Class Meets: MWF 1:15 - 2:15 p.m., 033 Hartwell; F 2:15 - 5:15 p.m., 110 Lennon.

You will also need a 3-ringed field notebook that takes either 6"X9" or 8 1/2"X5 1/2" paper.

Course Structure: The course format will emphasize lecture, field exercises, and laboratory work.

Grading: Grades will be assigned based upon the following scheme (point totals are approximate):

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture tests - 2 at 100 points each</td>
<td>200</td>
</tr>
<tr>
<td>Quizzes</td>
<td>150</td>
</tr>
<tr>
<td>Final exam - 1 at 100 points</td>
<td>100</td>
</tr>
<tr>
<td>Lab tests - 1, plus 2 quizzes</td>
<td>150</td>
</tr>
<tr>
<td>Field notebook</td>
<td>75</td>
</tr>
<tr>
<td>Misc. homework assignments</td>
<td>175</td>
</tr>
<tr>
<td>Lab reports</td>
<td>150</td>
</tr>
<tr>
<td>Total points</td>
<td>1,000(approximate)</td>
</tr>
</tbody>
</table>

GRADUATE STUDENTS (BIO 540): Graduate students are expected to develop a deeper and broader understanding of herpetology than is the case for undergraduates enrolled in ENV 440. Requirements for BIO 540 are given on page 2 of the syllabus.

Attendance: Attendance is expected; please come prepared for class. During the term I sometimes will take attendance; if you are not present and do not have a valid excuse (doctor's note), 10 points (ca. 1% of the total) will be deducted from your total points. It is particularly important that all lab sessions be attended, as they may be difficult to make up; an unexcused absence from a lab will result in a deduction of 3% from your grade! If an unannounced quiz is missed, it may not be made up. If you do miss a class, it is your responsibility to talk to me about what material was missed, and to obtain notes from a classmate.

Grading and Test policy: Lecture and lab tests and the final exam must be taken on the scheduled dates and may not be made up unless arranged in advance, or with a doctor's written excuse. The following guidelines will be used to assign grades: 90% = A range; 80-89% = B range; 65-79% = C range; 55-65% = D range; < 55% = E. The grade scale will be established by reference to undergraduates only, so that performance of graduate students will not affect the grades of undergraduates. Last day to drop the course is February 24. Unless prior arrangements have been made, late work will be discounted at the rate of 5%/ class day (MTWRF).

Surviving BIOL 440/540:
1. Come to class and be prepared.
2. If you have to miss a class, obtain the notes from another student.
3. Seek help when you need it, and ask questions.
4. Anticipate problems beforehand and discuss them with the instructor; this includes the need for extensions on assignments.
5. Be aggressive in your approach to studying; for example, review and think about class notes after class.
6. "Don't worry, be happy."

Statement on Disability: I would appreciate hearing from anyone in this class who has a special need which may be a result of a disability. I am reasonably sure we can work out whatever arrangement is necessary, be it special seating, testing, or other accommodation. See me after class, or during my office hours, as soon as possible.

Statement on Academic Integrity: I take the need to maintain academic integrity seriously, and refer students to the discussion in “Your Right to Know, 2002-2003” (pp. 9-12), which is published by the Division of Student Affairs. The most common problem that I have encountered is the submission of written work clearly related to that of another student in the class. A wise policy might be to discuss freely, but write with complete independence. Failure to adhere to the standard of independent written work may result in a 0 on the assignment. If you are at all unclear as to your responsibilities or the conventions of the discipline, please talk with me.

(REQUIREMENTS FOR BIO 540. In addition to the requirements for ENV 440, graduate students in BIO 540 will:
1. Develop more-in-depth knowledge of the subject. Thus, graduate student exams and papers will be graded more rigorously.
2. Complete a research term paper on any area of herpetology, subject to approval by the instructor.
3. Complete two additional technical readings from recent volumes of the primary journals in the field. These readings will be discussed with the instructor during two out-of-class meetings. One of the readings will be analyzed in a short review/analysis article.)

SCHEDULE - BIO 440/540     Note: (L) = lab/field day; lectures occur prior to lab/field exercises

<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture</th>
<th>Topic</th>
<th>Readings*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 27</td>
<td></td>
<td>Characters and taxa of amphibians</td>
<td>Pp.1-8, Chapter 3 (skim)</td>
</tr>
<tr>
<td>Jan 29</td>
<td></td>
<td>Characters and taxa of reptiles</td>
<td>Pp. 8-20, Chapter 4 (skim)</td>
</tr>
<tr>
<td>Jan 31(L)</td>
<td></td>
<td>Systematics</td>
<td>Pp 21-25; Fig. 2-1</td>
</tr>
<tr>
<td>Feb 3</td>
<td></td>
<td>Evolution - Amphibia</td>
<td>Pp. 25-36</td>
</tr>
<tr>
<td>Feb 5</td>
<td></td>
<td>Evolution - Reptilia</td>
<td>Pp. 36-40</td>
</tr>
<tr>
<td>Feb 7(L)</td>
<td></td>
<td>Quiz (basic taxonomy, characters)</td>
<td>Phylogenetics worksheet due</td>
</tr>
<tr>
<td>Feb 10</td>
<td></td>
<td>Dinosaur biology (a diversion!)</td>
<td>Pp. 171-190</td>
</tr>
<tr>
<td>Feb 12</td>
<td></td>
<td>Homeostasis - temperature regulation</td>
<td>Pp. 159-170, 190-195</td>
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<tr>
<td></td>
<td></td>
<td><strong>Bibliography due</strong></td>
<td></td>
</tr>
<tr>
<td>Feb 14(L)</td>
<td></td>
<td>Homeostasis - finish</td>
<td></td>
</tr>
<tr>
<td>Feb 17</td>
<td></td>
<td>Energetics</td>
<td>Chapter 6 (skim)</td>
</tr>
<tr>
<td>Feb 19</td>
<td></td>
<td>Catch-up day</td>
<td></td>
</tr>
<tr>
<td>Feb 21(L)</td>
<td></td>
<td>No lecture; lab only</td>
<td></td>
</tr>
<tr>
<td>Feb 24</td>
<td></td>
<td>Test # 1 (Lecture material from Jan 27-Feb 19)</td>
<td>Pp. 335-352</td>
</tr>
<tr>
<td>Feb 26</td>
<td></td>
<td>Spacing and movements</td>
<td></td>
</tr>
<tr>
<td>Feb 28(L)</td>
<td></td>
<td>Orientation (guest lecture, Dr. Dave Holtzman)</td>
<td>Pp. 353-364</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Lab quiz (see next page)</strong></td>
<td></td>
</tr>
<tr>
<td>Mar 3</td>
<td></td>
<td>Feeding/diet</td>
<td>Chapter 9 (skim 292-325)</td>
</tr>
<tr>
<td>Mar 5</td>
<td></td>
<td>Venomous/toxic herps</td>
<td>Pp. 325-332</td>
</tr>
<tr>
<td>Mar 7(L)</td>
<td></td>
<td>Reproduction I</td>
<td>Chapter 7 (pp. 228-243)</td>
</tr>
<tr>
<td>Mar 10</td>
<td></td>
<td>Reproduction II</td>
<td>Chapter 7 (pp. 243-259)</td>
</tr>
<tr>
<td>Mar 12</td>
<td></td>
<td>Reproduction III</td>
<td></td>
</tr>
<tr>
<td>Mar 14</td>
<td></td>
<td>No lecture; <strong>lab exam</strong> (see next page)</td>
<td></td>
</tr>
</tbody>
</table>
Mar 17-21   Spring break (down)
Mar 24   Mating Systems I   Chapter 12 (pp. 398-413)
Mar 26   Mating Systems II   Chapter 12 (pp. 413-430)
Mar 28(L)   Mating Systems III
Mar 31   Test 2 (Lecture material from Feb 26-Mar 28)
Apr 2   No class: Scholar’s Day
Apr 4(L)   No lecture: field trip to zoo
Apr 7   Population biology I
Apr 9   Population Biology II
Apr 11(L)   No lecture; quiz, field trip
Apr 14   Census methods
Apr 16   Foraging ecology/interactions   Chapter 13
Apr 18(L)   No lecture; field trip
Apr 21   Community ecology I   Chapter 14
Apr 23   Community ecology II
Apr 25(L)   No lecture; field trip to Iroquois NWR
Apr 28   Biogeography and evolution
Apr 30   Conservation Biology I   Chapter 15
May 2   No class
May 5   No class
May 7   Conservation Biology II   Iroquois NWR assignment due
May 9 (L)   Finish up; field work

Final exam: Wednesday, May 14, 10:30-12:30
*All readings, unless otherwise indicated, are from Pough et al.

Lab Schedule

<table>
<thead>
<tr>
<th>DATE</th>
<th>TOPIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 31</td>
<td>Anatomy I (Integument/External Anatomy)</td>
</tr>
<tr>
<td>Feb 7</td>
<td>Set up UV lab Note: a formal lab writeup will be required; due date depends upon how quickly larval development proceeds</td>
</tr>
<tr>
<td>Feb 14</td>
<td>Anatomy II (Skeleton)</td>
</tr>
<tr>
<td>Feb 21</td>
<td>Anatomy III (Digestion/Respiration/Circulation)</td>
</tr>
<tr>
<td>Feb 28</td>
<td>Lab quiz (Anatomy 1 and 2); Habitat selection lab</td>
</tr>
<tr>
<td>Mar 7</td>
<td>Anatomy IV (Excretion/Reproduction/Sensory systems); Review</td>
</tr>
<tr>
<td>Mar 14</td>
<td>Lab Test (Labs I - IV)</td>
</tr>
<tr>
<td>Mar 28</td>
<td>Taxonomy: local reptiles and amphibians UV lab report due</td>
</tr>
<tr>
<td>Apr 4</td>
<td>Field trip - Buffalo Zoo: taxonomy</td>
</tr>
<tr>
<td>Apr 11</td>
<td>Field trip; Quiz – local taxonomy</td>
</tr>
<tr>
<td>Apr 18</td>
<td>Field trip - Ossian State Forest; late return</td>
</tr>
<tr>
<td>Apr 25</td>
<td>Field trip – Iroquois National Wildlife Refuge</td>
</tr>
<tr>
<td>May 2</td>
<td>No class</td>
</tr>
<tr>
<td>May 9</td>
<td>Field trip</td>
</tr>
<tr>
<td>May 12</td>
<td>Field notebooks due.</td>
</tr>
</tbody>
</table>

Note 1: Beginning after spring break, I will be leading evening (± 1.5 hr) field trips about once/week (weather permitting). Each student must participate in at least one evening outing.

Note 2: “Taxon” quizzes (n = 8) will be given every Friday, unless otherwise noted.
BIOL 427/527 - ANIMAL BEHAVIOR – FALL 2003

Note: (Instructions for graduate students are indicated in parentheses)

Instructor: Dr. Chris Norment
Office: 119 Lennon
Office hours: T R 2:55-3:55 p.m., F 9:00-11:00 a.m., or by Appt.
Phone: 395-5748 (office)
637-0252 (home; before 9:00 p.m.)
E-Mail: cnorment@brockport.edu

General Course Objectives are to:
1. Describe the diversity of animal behavior.
2. Understand the influence of genes, developmental pathways, and anatomy on behavior.
3. Examine patterns of behavior in an evolutionary context.
4. Develop the ability to think critically and ask testable questions about behavior.
5. Develop improved scientific writing skills.

Class Meets: T R 1:15-2:45 p.m., 030 Hartwell

A large three-ring binder also will be valuable.

Electronic reserves password: raptor

Course Structure: The course format will include lectures, discussions, and cooperative learning exercises. Although no formal lab time is scheduled, several field and lab exercises will be conducted during the term.

Grading: Grades will be assigned based upon the following scheme:
Lecture tests - 2 at 100 points each  200
Final exam - 1 at 125 points  125
Lab reports  225
Problem sets and other written assignments  155
Unannounced quizzes (possible)  30
Total points  705(approximate)

(Graduate Students (BIO 527): Graduate students are expected to develop a deeper and broader understanding of animal behavior than is the case for undergraduates enrolled in ENV 427. Requirements for BIO 527 are given on page 2 of the syllabus.)

Attendance: Attendance is expected; please come prepared for class. During the term I will take attendance; if you are not present and do not have a valid excuse (doctor's note, etc.), 7 points (about 1% of your grade) will be deducted from your grade. If you do miss a class, it is your responsibility to talk to me about what material was missed, and to obtain notes from a classmate. It is particularly important that all lab sessions be attended, as they may be difficult to make up. If an unannounced quiz is missed, it may not be made up. See p. 8 of Your Right to Know & Academic Policies Handbook for an explanation of the college's policy on attendance.

Grading and Test policy: Lecture tests and the final exam must be taken on the scheduled dates and may not be made up unless arranged in advance, or with a doctor's written excuse. The following guidelines will be used to assign grades: 90% = A range; 80-89% = B range; 65-79% = C range; 55-65% = D range; < 55% = E. The grade scale will be established by reference to undergraduates only, so that performance of graduate students will not affect the grades of undergraduates. Last day to withdraw from the course is December 1. Withdrawal policies are described in Your Right to Know & Academic Policies Handbook. Unless prior arrangements have been made, late work will be discounted at the rate of 5%/school day. Tests will be based primarily on material discussed during lectures and study group sessions. However, approximately 10% of the points on each test may be based on material covered in your text, but not in class.

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2003-2004-43.res.doc
Surviving BIOL 427/527:
1. Come to class and be prepared.
2. If you have to miss a class, obtain the notes from another student.
3. Seek help when you need it, and ask questions.
4. Anticipate problems beforehand and discuss them with the instructor.
5. Be aggressive in your approach to studying; for example, review and think about class notes after the lecture.
6. "Don't worry, be happy." (Mehr Babba)

Statement on Disability: I would appreciate hearing from anyone in this class who has a special need which may be a result of a disability. I am reasonably sure we can work out whatever arrangement is necessary, be it special seating, testing, or other accommodation. See me after class, or during my office hours, as soon as possible.

Statement on Academic Integrity: I take the need to maintain academic integrity seriously, and refer students to pp. 9-11, "The Policy on Student Academic Dishonesty" in the SUNY Brockport publication, "Your Right to Know & Academic Policies Handbook, 2000-2001". The most common problem that I have encountered is the submission of written work clearly related to that of another student in the class, or in a previous class. (In order to account for this last, unfortunate possibility, I keep a random subset of major papers from previous classes on file.) A wise policy might be to discuss freely, but write with complete independence. Failure to adhere to the standard of independent written work may result in a 0 on the assignment or the course. If you are at all unclear as to your responsibilities or the conventions of the discipline, please talk with me.

(REQUIREMENTS FOR BIO 527. In addition to the requirements for ENV 427, graduate students in BIO 527 will:
1. Develop more-in depth knowledge of the subject. Thus, graduate student exams and papers will be graded more rigorously.
2. Complete a research term paper that involves analysis of a current, controversial topic in animal behavior. The paper will require comparison of opposing viewpoints, analysis, and defense of the student’s position on the controversy.
3. Complete additional technical readings from the following sources:
   Animal Behaviour: Two current papers from the most recent volume of the primary journal in the field. These readings will be discussed with the instructor during two out-of-class meetings.)

SCHEDULE

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Readings*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aug 26</td>
<td>Introduction, Squirrel Assignment I</td>
<td>pp. 1-9</td>
</tr>
</tbody>
</table>
| Aug 28| Methods of studying behavior               | Clotfelter (e-reserves) | Aug 29
Week 2
Sept 2  Lab time (honeybee orientation)  Lopez essay due
Sept 4  Statistics and hypothesis testing  Handouts
        Scientific writing

Week 3
Sept 9  Evolution and Natural Selection  pp. 9-18
Sept 10 Evolution of behavior: geographical  Squirrel assignment I due
        variation

Week 4
Sept 16 Discussion: methods/Lopez essay  Chapter 3
       Development of behavior: genes and
       environment I
Sept 18 Development of behavior: genes and  Chapter 4
       environment II

Week 5
Sept 23 Finish development;  Bee report
draft and review due
       Neural systems and behavior  Chapter 5 (115-142)
Sept 25 Continue neural systems  Discussion: *Ravens in Winter*, pp. 11-104

Week 6
Sept 30 Test 1 (Aug 26 – Sept 225; includes *Ravens in Winter*, pp. 11-104)
       Guest lecture: Dr. Dave Holtzman,
       Nasal chemical senses
Oct 2

Week 7
Oct 7  Lab: Vomeronasal use in snakes  Pp. 78-79, Chapter 6
Oct 9  Endocrine systems and behavior

Week 8
Oct 14 NO CLASS!
Oct 16 Discussion of vomeronasal lab/  Final draft of bee report due
       Foraging behavior  Chapter 8

Week 9
Oct 21 Film/Foraging behavior
Oct 23 Male and female tactics I  Chapter 11

Week 10
Oct 28 Male and female tactics II  Optimality model problem set
due
Oct 30 Mating systems  Chapter 12

Week 11
Nov 4  Mating systems, continued  Mating tactics problems due
       Discussion: *RIW*, pp. 105-207
Nov 6  Test II (Covers material from Oct 2 - Nov 4; includes *RIW*, pp. 105-207)

Week 12
Nov 11 Social systems  Chapter 14 (422-445)
Nov 13 Social systems  Chapter 14 (445-455)

Week 11
Nov 18 Behavior of domestic animals  Vomeronasal lab due
Nov 20  Animal intelligence  Discussion questions due
Cheney & Seyfarth (e-reserves)

Week 14
Nov 25  Animal intelligence/discussion
Nov 27  No class; give Thanks!

Week 15
Dec 2  Evolution of human behavior  Chapter 15
Dec 4  Discussion: human behavior  Discussion questions due
RIW, pp. 208-301

Week 16
Thursday, Dec 9 (10:30-12:30)  Final exam (Includes RIW, pp. 208-301)
*Unless otherwise noted, all readings are from Alcock.
BIO 459/559 - MAMMALOGY - FALL 2003

Note: (Instructions for graduate students are indicated in parentheses)

Instructor: Dr. Chris Norment
Office: Lennon 119
Office hours: T R 2:50-3:50 p.m., F 9:00-11:00 a.m., or by appointment.
Phone: 395-5748 (office)
637-0252 (home; before 9:00 p.m.)
E-mail: cnorment@brockport.edu

Course Objectives:
1. To develop an appreciation for the diversity of mammalian form and function, in anatomical, physiological, and ecological contexts.
2. To understand the evolutionary relationships among mammals, and the relationship of mammals to other vertebrates.
3. To expose students to some basic techniques used in studying mammals in the field.
4. To develop the ability to think critically and ask questions about mammals.

Class Meets: T R 9:45-11.15 a.m., 121 Smith, F 1:15-5:00 p.m., 110 Lennon

Texts and Materials:
A large, 3-ringed binder will also help in organizing course materials.

Electronic reserves password: rhino

Course Structure: The course format will emphasize lecture, field exercises, and laboratory work.

Grading: Grades will be assigned based upon the following scheme:
Lecture tests and quizzes 250
Final exam - 1 at 125 points 125
Lab tests - 2 at ± 75 points each 150
Peromyscus research paper/lab report 100
Annotated Bibliography 50
Problem sets 50
Taxon quizzes (8 @ 15 pts. ea) 120
Total points 845 (approximate)

(graduate students (BIO 559): Graduate students are expected to develop a deeper and broader understanding of mammalogy than is the case for undergraduates enrolled in ENV 459. Requirements for BIO 559 are given on page 2 of the syllabus.)

Attendance: Attendance is expected; please come prepared for class. If you do miss a class, it is your responsibility to talk to the instructor about what material was missed, and to obtain notes from a classmate. It is particularly important that all lab sessions be attended, as they may be difficult to make up. If an unannounced quiz is missed, it may not be made up. I will take attendance before each lecture class; if you are absent and do not have a legitimate excuse, your grade will be lowered 9 points (about 1% of the total possible); an unexcused absence from a lab class will result in the loss of 27 points (about 3% of your grade). See p. 8 of “Your Right to Know & Academic Policies Handbook” for an explanation of the college’s policy on attendance.

Grading and Test policy: Lecture tests and the final exam must be taken on the scheduled dates and may not be made up unless arranged in advance, or with a doctor’s written excuse. The following guidelines will be used to assign grades: 90% = A range; 80-89% = B range; 70-79% = C range; 55-69% = D range; < 55% = E. The grade scale will be established by reference to undergraduates only, so that performance of graduate students will not
affect the grades of undergraduates. Last day to withdraw from the course is December 1. **Unless prior arrangements have been made, late work will be discounted at the rate of 5%/school day.**

Surviving BIOL 459/559:
1. Come to class and be prepared.
2. If you have to miss a class, obtain the notes from another student.
3. Seek help when you need it, and ask questions.
4. Anticipate problems beforehand and discuss them with the instructor.
5. Be aggressive in your approach to studying; for example, review and think about class notes after class.
6. "Don't worry, be happy."  (Mehr Baba)

Statement on Disability: I would appreciate hearing from anyone in this class who has a special need that may be a result of a disability. I am reasonably sure we can work out whatever arrangement is necessary, be it special seating, testing, or other accommodation. See me after class, or during my office hours, as soon as possible.

Statement on Academic Integrity: I take the need to maintain academic integrity seriously, and refer students to pp. 9-12, “The Policy on Student Academic Dishonesty” in the SUNY Brockport publication, “Your Rights to Know & Academic Policies Handbook”. The most common problem that I have encountered is the submission of written work clearly related to that of another student in the class. A wise policy might be to discuss freely, but write with complete independence. Failure to adhere to the standard of independent written work may result in a 0 on the assignment, or an E grade in the course. If you are at all unclear as to your responsibilities or the conventions of the discipline, please talk with me.

**(REQUIREMENTS FOR BIO 559. In addition to the requirements for ENV 459, graduate students in BIO 559 will:**
1. Develop more-in depth knowledge of the subject. Thus, graduate student exams and papers will be graded more rigorously.
2. Complete an additional research project associated with the *Peromyscus leucopus* lab report that all students complete. This additional project will require an in-depth analysis of data in the 11-year database for *Peromyscus* populations in the Brockport woods. The statistical analysis and write-up, with relevant literature, will be presented as an addendum to the regular *Peromyscus leucopus* lab report.
3. Complete additional technical readings from the following source: *Journal of Mammalogy*: Two current papers from the most recent volume of the primary journal in the field. These readings will be discussed with the instructor during two out-of-class meetings. )

**SCHEDULE - BIO 459/559 - Fall 2003**

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Readings*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Week 1</strong></td>
<td></td>
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</tr>
<tr>
<td>Aug 26</td>
<td>Introduction/Characteristics</td>
<td>Chap 2 (pp. 8-27)</td>
</tr>
<tr>
<td>Aug 28</td>
<td>Classification/origin of mammals I</td>
<td>Chap 1 (pp. 2-6)</td>
</tr>
<tr>
<td>Aug 29</td>
<td>Bats: lecture (1:15-2:15)</td>
<td>pp. 138-149, 404-411</td>
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<tr>
<td></td>
<td><strong>Field trip: bats (7-10 pm)</strong></td>
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<tr>
<td><strong>Week 2</strong></td>
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<tr>
<td>Sept 2</td>
<td>Classification/Origin of mammals II</td>
<td>Chap 3</td>
</tr>
<tr>
<td>Sept 4</td>
<td><strong>Quiz - mammalian orders</strong></td>
<td>476-482</td>
</tr>
<tr>
<td>Sept 5 (L)</td>
<td>Distribution of mammals I</td>
<td>Phylogeny problems due</td>
</tr>
<tr>
<td></td>
<td>Mammal trapping (lecture)</td>
<td></td>
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<tr>
<td></td>
<td>Set mammal traps</td>
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<tr>
<td><strong>Week 3</strong></td>
<td></td>
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<tr>
<td>Sept 9</td>
<td>Distribution of mammals II</td>
<td>Chap 25 (esp. pp. 528-540)</td>
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<tr>
<td></td>
<td>Group problem</td>
<td></td>
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<tr>
<td><strong>Date</strong></td>
<td><strong>Topic</strong></td>
<td><strong>Readings</strong>*</td>
</tr>
<tr>
<td>Sept 11</td>
<td>Mammalian communities I - patterns</td>
<td>pp. 483-505</td>
</tr>
<tr>
<td>Sept 12 (L)</td>
<td><strong>Quiz - characteristics, classification, origins</strong></td>
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</tbody>
</table>
### Week 4
- **Sept 16**
  - Mammalian communities II - processes
  - 
  - **Bring diskette to class**
- **Sept 18**
  - Catch-up, group problem
- **Sept 19(L)**
  - Analysis of *Peromyscus* data

### Week 5
- **Sept 23**
  - Population dynamics I
  - pp. 506-526
- **Sept 25**
  - Population dynamics II
  - *Peromyscus* bibliography due
- **Sept 26(L)**
  - Buffalo Zoo field trip

### Week 6
- **Sept 30**
  - Reproduction I
  - pp. 334-346, 352-363
- **Oct 2**
  - **Test 1 - material from Aug 26 – Sept 25**

### Oct 3(L)
- **Group dissection**
- **Group problem (populations)**

### Week 7
- **Oct 7**
  - Reproduction II
  - pp. 346-352
- **Oct 9**
  - Reproduction III
- **Oct 10(L)**
  - Dentition lab
  - Group problem (reproduction)

### Week 8
- **Oct 14**
  - No class - Fall Break
- **Oct 16**
  - Metabolism and temperature regulation I
  - pp. 364-378
- **Oct 17(L)**
  - Skeleton lab

### Week 9
- **Oct 21**
  - Metabolism and temp reg II
  - pp. 380-388, 394-403
  - *Peromyscus* paper due (draft), with peer review

### Week 10
- **Oct 28**
  - Feeding/digestive specializations I
  - pp. 272-273
- **Oct 30**
  - Film - Monotremes and marsupials
- **Oct 31(L)**
  - Noneutherians, Insectivora/Chiroptera

### Week 11
- **Nov 4**
  - Feeding/digestive specializations II
  - Group problem
  - pp. 433-436
- **Nov 6**
  - Catch-up
- **Nov 7(L)**
  - Carnivora

### Week 12
- **Test 2 - from Sept 30 - Nov 6**
- **Sexual selection and mating systems**
  - pp. 450-456
- **Rodents**

### Week 13
- **Nov 18**
  - Social systems I
  - pp. 456-475
  - *Peromyscus* lab report due
- **Nov 20**
  - Social systems II/Group problem
- **Nov 21(L)**
  - Subungulates/Artiodactyla/Perissodactyla

### Week 14
- **Nov 25**
  - Social systems III
- **Nov 27&28**
  - No class: Give Thanks!

### Week 15
- **Dec 2**
  - Conservation of mammals
  - Chap 26
- **Dec 4**
  - Review for lab test

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Dec 5(L)  Lab practical II
Dec 11  Final exam: 10:30-12:30

*Unless otherwise indicated, all readings are from Vaughn et al.; M = Martin et al.

LABS: From September 19th on, bring both Vaughn et al. and Martin et al. to lab!!!

Note: Once we get going there will be a cumulative “taxon quiz” every Friday for eight weeks
**ENV 488/588: Environmental Impact Analysis**

**Note:** (Instructions for graduate students are indicated in parentheses)

**Prerequisites**

It is assumed that you have had at least one college-level ecology course or some background in general science before attempting this course. Otherwise, you must have permission from me to remain in the course.

**Course Information**

**Meetings**

Semester: Summer 2004, Session I, May 17 - 28  
Time: 9:00 am - 5:00 pm; Monday through Friday  
Place: 118 Lennon Hall

**Office**

J. Haynes. Hours: During regular class time  
Place: 121 Lennon Hall  
Telephone: 716-395-5783  
E-Mail: jhaynes@brockport.edu

I will be happy to discuss any aspect of the course or your performance with you during class meetings. In particular, you should come to me as soon as you perceive that you may be having difficulty with any aspect of the course.

**Text**


**Syllabus**

**Mon, May 17**

am: Introductions: Course, Participants, Environmental Analysis/NEPA  
pm: Tour Project Area; Preliminary Scoping  
**Assignment:** SEQRA/Permit Materials; Bregman--Chapters. 1, 2

**Tue, May 18**

am: EIA/EIS Procedures  
pm: Organize and Work on Team Special Projects  
**Assignment:** SEQRA/Permit Materials; Bregman--Chapter 3

**Wed, May 19**

am: Teams Identify and Summarize Laws and Regulations Relevant to the Project  
pm: Regulatory Perspective: SEQRA, Permits, Scoping the Class Project  
(Mr. Albert Butkas, NYSDEC, retired)  
**Assignment:** This Guide, p. 1-15; Bregman--Chapter 6

**Thu, May 20**

am: Assessing Environmental Impacts  
pm: Work on Team Special Projects  
**Assignment:** Bregman--Chapter 7

**Fri, May 21**

am: EIA/EIS Methodologies; Teams Prepare Environmental Impact Assessment (EIA)  
pm: Teams Complete EIA; Make Positive or Negative Declaration; **Quiz #1**

**Mon, May 24**
am: Complete Team Special Projects  
pm: Teams Organize and Tabulate Information for EIS; Develop EIS Outline

**Tue, May 25**

am: Citizen Participation in EIA; Present Special Projects to Class  
pm: Teams Begin Drafting EISs  
Assignment: Bregman--Chapter 4

**Wed, May 26**

am/pm: Teams Continue Drafting EISs

**Thu, May 27**

am: **Quiz #2; Graduate Student Presentations**  
pm: Permit Hearing Preparation; Continue Drafting EISs

**Fri, May 28**

am: Complete and Turn In Team EISs  
pm: Permit Hearing (Mr. Albert Butkas, NYSDEC);

(Additional Expectations for Graduate Students in ENV 588)

Graduate students are expected to develop and demonstrate a deeper understanding of environmental impact analysis than undergraduates. Several assignment, evaluation and assessment techniques are used to determine whether or not graduate students demonstrate a higher level of competence in environmental impact analysis.

5. More rigorous evaluation of performance on examinations. Do graduate students exhibit a thorough understanding (breadth and depth) of the material required to answer questions fully? Do they competently answer more complex questions, not given to undergraduates, about theory and mechanism?

6. Additional project, beyond the assignments required of all students, and presentation. Small teams of graduate students (2-4) will review an existing EIS, then prepare a 10 - 15 page critique of the EIS. Writing style and mechanics will be graded according to the expectation of the Department of Environmental Science and Biology for MS thesis-quality writing.

7. More rigorous assignment of a final grade. For the purpose of assigning final grades, graduate students’ final course averages are compared only to other graduate students. To earn a grade equal to that of an undergraduate, a graduate student must have a final average about 2% higher (e.g., 90% is an A- for an undergraduate and a B+ for a graduate student; see below).
ENV 484/584 "FISH ECOLOGY"

Note: (Instructions for graduate students are indicated in parentheses)

Prerequisites

It is assumed that you have had at least one ecology course and one general biology course at the college-level before attempting this course. Otherwise, you must have permission from me to remain in the course.

Course Information

Meetings

Semester: Spring 2004
Time: 3:45 - 5:15 pm; Monday and Friday
Place: 218 Lennon Hall

Office

Hours: J. Haynes, 2:30 - 3:30, MF; 9:30 - 12:00, W; or by appointment
Place: 121 Lennon Hall
Telephone: 395-5783
E-mail: jhaynes@brockport.edu

I will be happy to discuss any aspect of the course or your performance briefly after class meetings, during scheduled office hours, or by appointment. In particular, you should come to me as soon as you perceive that you may be having difficulty with any aspect of the course. Please bring your notebook and any other relevant course materials to our meetings.

Texts to Purchase

Traverse City, MI.


Library Reserve Texts


Reading assignments for each class meeting are listed in the Syllabus below and should be completed before coming to class. The reading can be heavy going at times, but your text and library readings provide valuable reinforcement and complementary material for topics covered in lecture. The abbreviations for assigned readings, shown on the syllabus below, are coded as follows: B = Bond, D = Diana, J = Jobling, and KH = Kohler and Hubert.

<table>
<thead>
<tr>
<th>Week/Date</th>
<th>Topics</th>
<th>Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1/26</td>
<td>Introduction/Basics</td>
<td>D:xiii-iv, 1-11; B:3-16; this Guide</td>
</tr>
<tr>
<td>1/30</td>
<td>Movement</td>
<td>J:251-273, 286-295; D:294-311</td>
</tr>
<tr>
<td>2 2/2</td>
<td>Feeding/Nutrition</td>
<td>D:12-57</td>
</tr>
<tr>
<td>3 2/9</td>
<td>Gas Bladder: Buoyancy</td>
<td>J:273-286</td>
</tr>
</tbody>
</table>

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Graduate students are expected to develop and demonstrate a deeper understanding of fish ecology than undergraduates. Several assignment, evaluation and assessment techniques are used to determine whether or not graduate students demonstrate a higher level of competence in fish ecology.

1. Additional readings, and testing on them, to develop understandings of concepts more deeply and mathematically (see study questions).

2. More rigorous evaluation of performance on examinations. Do graduate students exhibit a thorough understanding (breadth and depth) of the material required to answer questions fully? Do they competently answer more complex questions, not given to undergraduates, about theory and mechanism?

3. Additional project, beyond the fish life history paper required of all students, and presentation. Small teams of graduate students (2-4) will work with me to identify fish ecology topics of interest that are not covered in depth in the course. Each team will prepare a 10 - 15 page paper on the topic and will make a 45 min presentation to the class. Both parts of the project will be graded according to the expectation of the Department of Environmental Science and Biology that its MS graduates are prepared to
teach introductory biology at a community college.

4. More rigorous assignment of a final grade. For the purpose of assigning final grades, graduate students’ final course averages are compared only to other graduate students. To earn a grade equal to that of an undergraduate, a graduate student must have a final average about 2% higher (e.g., 90% is an A- for an undergraduate and a B+ for a graduate student; see below).
Prerequisites

It is assumed that you have had at least one ecology course and one general biology course at the college-level before attempting this course. Otherwise, you must have permission from me to remain in the course.

Course Information

Meetings

IDENTIFICATION"

Semester: Fall 2003

Time: 12:00 - 5:00 pm; Tuesday

Place: 118 Lennon Hall

Office

J. Haynes. Hours: 2:30 - 3:30 pm, MW; 9:30 - 11:00 am TW; or by appointment

Place: 121 Lennon Hall

Telephone: 585-395-5783

E-mail: jhaynes@brockport.edu

I will be happy to discuss any aspect of the course or your performance with you during class meetings and scheduled office hours, or by appointment. In particular, you should come to me as soon as you perceive that you may be having difficulty with any aspect of the course. Please bring your notebook and any other relevant course materials to our meetings.

Texts


Reading assignments for each week's meeting are listed in the syllabus below and should be completed before coming to class. There are no formal lectures in this course, but you are responsible for mastering material in your texts and other handouts. Study questions at the end of this Course Guide will guide your reading. Be sure to bring Smith's fish key to each of the fish identification lab periods listed on the syllabus and to Exam 2.

Syllabus

<table>
<thead>
<tr>
<th>Week/Date</th>
<th>Topics</th>
<th>Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 8/26</td>
<td>Introduction/References (R)</td>
<td>This Guide: 1-17; MW:1-15, 63-81</td>
</tr>
<tr>
<td>2 9/2</td>
<td>Backpack Electrofish/Seines</td>
<td>MW:221-253, 121-155</td>
</tr>
<tr>
<td>3 9/9</td>
<td>Gill/Trawl Nets/Pop Estimate (R)</td>
<td>MW:157-192, 433-446</td>
</tr>
<tr>
<td>4 9/16</td>
<td>Trap Nets/Boat Electrofish</td>
<td>MW:193-220, 303-333</td>
</tr>
<tr>
<td>5 9/23</td>
<td>Community Spreadsheets (R)</td>
<td>MW:353-383</td>
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<tr>
<td>6 9/30</td>
<td><strong>Exam 1</strong>/Fish Identification 1</td>
<td>S:1-24 (plus pages in this Guide)</td>
</tr>
<tr>
<td>7 10/4</td>
<td>Fish Identification 2</td>
<td>MW:255-302, 555-590</td>
</tr>
</tbody>
</table>
8 10/14 No Class: Mid-semester Break
9 10/21 Fish Identification 3 MW: 385-432, 533-554
10 10/28 Fish Anatomy (R) Lagler Chp. 3 (pages in this Guide)
11 11/4 Exam 2/Food Habits (R) MW: 513-532
12 11/11 Aging and Growth (R) MW: 483-512
13 11/18 Length/Weight/Fecundity (R) MW: 447-482
14 11/25 Bioenergetics Modeling (R) Hewett and Johnson (pages in this Guide)
15 12/2 Exam 3/Technique Presentations

(R) Report due at the beginning of class the following week

M. (Additional Expectations for Graduate Students in ENV 590)

Graduate students are expected to develop and demonstrate a deeper understanding of fishery techniques and fish identification than undergraduates. Several assignment, evaluation and assessment techniques are used to determine whether or not graduate students demonstrate a higher level of competence in fishery techniques and fish identification.

8. Additional readings, and testing on them, to develop understandings of concepts more deeply and mathematically (see study questions).

9. More rigorous evaluation of performance on examinations. Do graduate students exhibit a thorough understanding (breadth and depth) of the material required to answer questions fully? Do they competently answer more complex questions, not given to undergraduates, about theory and mechanism?

10. Additional projects beyond the oral presentation on a fishery technique required of all students. Each graduate student will also write a 6 – 8 page paper on the fishery technique that he or she chooses to speak about. The paper will be graded according to the expectation of the Department of Environmental Science and Biology for MS thesis-quality writing, and the presentation will be graded according to standards for presentation at a professional society meeting. Collectively, the graduate students will work together to improve the fish museum at SUNY Brockport by collecting fish in the field and properly identifying, preserving and cataloging specimens.

11. More rigorous assignment of a final grade. For the purpose of assigning final grades, graduate students’ final course averages are compared only to other graduate students. To earn a grade equal to that of an undergraduate, a graduate student must have a final average about 2% higher (e.g., 90% is an A- for an undergraduate and a B+ for a graduate student; see below).

**Laboratories**

We will begin each 5 h class period with a brief introduction to the day's activities at 12:00 sharp, then leave for field work or begin lab exercises. There are no formal lectures, but you must be familiar with information from assigned readings and the laboratory exercises to successfully complete this course. Our emphasis is hands-on experience with fishery techniques and fish identification. Following a few general guidelines will make laboratory/field sessions and lab report writing more enjoyable and beneficial for you and other students.
Plant Ecology ENV 495/595  
Spring 2003
Prerequisite - Ecology, ENV 303
(Graduate Requirements are in parentheses and are highlighted)
Class meets: Monday, Wednesday, and Friday, 12:00 – 1:00 PM,
Lab meets:

Instructor: Geoffrey Gardner, Ph.D.  
Office: Lennon 117  
Phone: 395-5743  
Email: ggardner@brockport.edu  
Office Hours: Tues+Thurs 11:30-12:30; Wed 1:30-2:30

Supplemental readings: any supplemental readings necessary will be available on reserve.

Grading: 100 total points
Two exams (2 best scores from 3 exams given, including the final): 30 pts each
Topic Paper: 20 pts
Lab: 15 pts
Participation: 5 pts

Tentative schedule

<table>
<thead>
<tr>
<th>Day</th>
<th>Date</th>
<th>Topic</th>
<th>Reading</th>
<th>Lab</th>
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<tbody>
<tr>
<td>M</td>
<td>1/27</td>
<td>Course Introduction</td>
<td></td>
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<tr>
<td>W</td>
<td>1/29</td>
<td>Consequences of being a Plant</td>
<td>Ch 1</td>
<td>No Lab</td>
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<tr>
<td>F</td>
<td>1/31</td>
<td>Photosynthesis + Light</td>
<td>Ch 2</td>
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<tr>
<td>M</td>
<td>2/3</td>
<td>Photosynthesis + Gas exchange</td>
<td>Ch 2</td>
<td>Competition Lab I</td>
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<td>W</td>
<td>2/5</td>
<td>Photosynthesis</td>
<td>Ch 2</td>
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<tr>
<td>F</td>
<td>2/7</td>
<td>Water Relations</td>
<td>Ch 3</td>
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<tr>
<td>M</td>
<td>2/10</td>
<td>Water Relations</td>
<td>Ch 3</td>
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<tr>
<td>W</td>
<td>2/12</td>
<td>Life Below Ground: Soil</td>
<td>Ch 4</td>
<td>Competition Lab II</td>
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<td>2/14</td>
<td>Soil</td>
<td>Ch 4</td>
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<td>M</td>
<td>2/17</td>
<td>Ecological effects of Global change</td>
<td>Ch 22</td>
<td>Winter Botany</td>
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<td>W</td>
<td>2/19</td>
<td>Evolution – Processes</td>
<td>Ch 5</td>
<td>Photosynthesis Lab</td>
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<td>F</td>
<td>2/21</td>
<td>Evolution – Outcomes</td>
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<td>2/24</td>
<td>Discussion</td>
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<td>W</td>
<td>2/26</td>
<td>Exam #1</td>
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<td>F</td>
<td>2/28</td>
<td>Plant population dynamics</td>
<td>Ch 7</td>
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<td>Chapter</td>
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<td>W</td>
<td>3/5</td>
<td>Plant reproduction – dispersal</td>
<td>Ch 8</td>
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<td>F</td>
<td>3/7</td>
<td>Plant reproduction – pollination</td>
<td>Ch 8</td>
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<td>M</td>
<td>3/10</td>
<td>Plant Life history</td>
<td>Ch 9</td>
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<td>Ch 9</td>
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<td>F</td>
<td>3/14</td>
<td>Interspecific Competition</td>
<td>Ch 10</td>
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<td>3/17-3/21</td>
<td>No Class (Spring Break)</td>
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<td>No Lab</td>
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<td>3/24</td>
<td>Intraspecific Competition</td>
<td>Ch 10</td>
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<tr>
<td>W</td>
<td>3/26</td>
<td>Parasitism – Herbivory</td>
<td>Ch 11</td>
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<td>F</td>
<td>3/28</td>
<td>Parasitism – Disease ecology</td>
<td>Ch 11</td>
<td></td>
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<tr>
<td>M</td>
<td>3/31</td>
<td>Community properties</td>
<td>Ch 12</td>
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<td>4/2</td>
<td>No Class (Scholars Day)</td>
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<td>F</td>
<td>4/4</td>
<td>Fire and other disturbances</td>
<td>Ch 13</td>
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<td>M</td>
<td>4/7</td>
<td>Succession and Plant communities</td>
<td>Ch 13</td>
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<td>W</td>
<td>4/9</td>
<td>Discussion</td>
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<td>4/11</td>
<td>Exam #2</td>
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<td>4/14</td>
<td>Plant Species Diversity</td>
<td>Ch 12</td>
<td>Succession I</td>
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<td>4/16</td>
<td>Plant Species Diversity</td>
<td>Ch 14</td>
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<td>4/18</td>
<td>Rarity/ conservation</td>
<td>Ch 14</td>
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<td>4/21</td>
<td>Biological Invasions</td>
<td>Ch 14</td>
<td>Succession II</td>
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<td>4/23</td>
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<td>Ch 14</td>
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<td>F</td>
<td>4/25</td>
<td>Landscape Ecology</td>
<td>Ch 17</td>
<td>Wetland invasives</td>
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<td>4/28</td>
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<td>Ch 17</td>
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<td>4/30</td>
<td>Paleoecology</td>
<td>Ch 21</td>
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<td>M</td>
<td>5/5</td>
<td>Conservation and Restoration</td>
<td></td>
<td>No Lab</td>
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<tr>
<td>W</td>
<td>5/7</td>
<td>TBA</td>
<td></td>
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<tr>
<td>F</td>
<td>5/9</td>
<td>Discussion</td>
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Examinations and Assignments

**Graduate Students (ENV 595):** Graduate students will be expected to have a broader and deeper understanding of Plant Ecology. Therefore, the expectation level for graduate students is significantly higher than for undergraduates. Graduate students will be expected to complete an extensive research paper and are subject to a more rigorous grading of labs and exams. In addition, graduate students will be responsible for leading class discussion on current topics in plant ecology. )
1. Exams (60 pts.)
The two midterm exams and the final will be the same length and carry equal weight. Each will cover 1/3 of the course material. All three will have the following format:

- half the exam will consist of short answers and definitions; half will consist of extended essay questions, which will be distributed before the exam.
- one week in advance of each exam, you will be give a list of 4-5 essay questions taken from material covered in lecture and lab in the previous 1/3 of the course.
- from this list, 2 questions will be chosen for the exam, exactly as written.
- you are encouraged to discuss these questions with classmates, and draw from your text and any available literature. Your instructor may be consulted for clarification only.
- preparing for the two essay questions will also help you prepare for the rest of the exam.
- during each exam, you will be on your own, with no notes allowed.

Your two best scores from the three exams will be counted. Make-up exams will not be given. If you miss either of the first two exams, you must take the third.

2. Topic Paper (20 pts.)
This will be a term paper reviewing research on one particular topic of plant ecology, using reference material and primary literature. Choose a topic early in the semester. The topic is your choice, and this is a solo project. A topic must be submitted by the scheduled deadline, followed by an outline. The format will be as follows:

- 5-10 pages, double-spaced, including references. *(Graduate students papers should be 10-15 pages).*
- pages must be numbered
- use subheadings to organize your writing
- state the underlying scientific question clearly, and describe how it arose.
- describe research methods used to probe the question, and their results.
- draw your own conclusions, and suggest further research.
- use the Latin binomial to introduce a species. Common names can be used thereafter.
- minimum of 10 references, mostly primary scientific papers.
- cite last names of authors and dates in parentheses; don't use numbers or footnotes.
- for the bibliography, list references in same format as in your textbook.
- do not use direct quotations; use your own words
- emphasize content over appearance (fancy binders get you NO extra credit. In fact, they make a paper hard to read. We will not be pleased.
- grammar and spelling will be checked.

3. Participation (5 pts.)
You are expected to attend every class and participate in all Tuesday laboratories. Periodically we will have class discussions on various papers/topics/issues. *(Graduate students will be assigned to a date to lead a discussion on a current issue in plant ecology. Graduate students will select the paper for the topic, which will be assigned to the class. A written review of the paper is also expected).*
4. Lab (15 pts)
Lab assignments will account for 15 pts of your grade.