A&S-US NEW COURSE PROPOSAL

UNIVERSITY OF PITTSBURGH
November 1, 2004

I. Cover Sheet

A. Course: Biological Sciences 1610
Title: Conservation Biology
Number of Credits: 3

B. Instructor: Peter A. Quinby

C. Departmental Approval: _____
Dr. Graham Hatful (Chair) Date

D. Rationale:

1. *Audience.* The target audience for this course includes students and the sophomore, junior, and senior levels majoring in Ecology and Evolution, Biological Sciences, or Environmental Studies. Conservation Biology is not currently offered on the main campus or at the Pymatuning Laboratory of Ecology (PLE). It will serve as an elective for biology majors and non-majors in related areas.

2. *Demonstrated need.* This course adds diversity to the Biological Sciences and PLE curriculum. The uniqueness of this course is its broad approach to the issues that are paramount to conservation of biological systems. The courses we currently offer, such as Ecological Management (BIOSC 1040) and Wildlife Management (BIOSC 1420), touch on a few of these issues, but cannot address them all or in the depth that is necessary for a full understanding of conservation biology. These management courses cover topics such as techniques for maintaining and restoring mammal and fish populations and for assessing aquatic ecosystem functions and would therefore be complementary to Conservation Biology. However, in addition to addressing issues related to mammals, fish, and aquatic ecosystems, Conservation Biology will examine effects on other taxa in the content of issues such as habitat fragmentation, invasive species, pollution, disease, overpopulation, and resource exploitation. Local and regional policies affecting the conservation of biodiversity will be included and are not an integral component of any existing course in the biological or environmental sciences.

3. *Courses at the University that partially overlap with the proposed course BIOSC0370 - Ecology*. This course is offered as a lecture course on campus during the academic year and at PLE as a field course during the summer. It focuses on organismal, population, community, and ecosystem levels of organization, and the application of ecological concepts to environmental problem solving.

BIOSC 1420 - Wildlife Management. This PLE field course covers the management practices used to manipulate animal populations and their habitats.
BIOSC 1040 - Ecological Management. This PLE field course focuses on the principles and field methods of ecology applied to environmental regulation, ecosystem assessment, and management.
BIOSC 1220 - Ecological Field Studies. This course is held at PLE on an irregular basis. Its focus changes depending on the instructor. In 2004, it focused on wildlife and the previous offering (1996) focused on forestry.
BIOSC 1160 - Forest Ecology. This PLE field course covers the study of the ecology, management, and conservation of forest ecosystems.
BIOSC 1380 - Global Ecology. This course is offered primarily through Semester at Sea although it has been offered at PLE in the past. It addresses areas of major environmental concerns after a foundation in selected ecological principles is established. The course is a retrospective review of the "environmental state of the world" and a consideration of pathways leading to possible solutions. Conservation is not stressed.
GEOL 0860 - Environmental Geology. This course, offered on campus by the Department of Geology and Planetary Science, looks at the impact of population growth and technological change upon the environment. Geological examples of environmental disruption are emphasized, such as volcanism, landslides, oil spills, earthquakes, resource depletion, sea-level rise, greenhouse effect, ozone depletion, and radon threats.
GEOL 1055 - Environmental Sciences, Ethics and Public Policy. This course is offered on campus by the Department of Geology and Planetary Science. It examines the interrelationships among environmental science, ethics, and policy. It covers such topics as the environmental movement, environmental values and attitudes, enactment and mechanics of environmental regulation and statues, environmental economics and politics, and future environmental scenarios.
GEOL 3963 - Topics in Environmental Geology. This is a graduate-level series of courses within geology that focuses on the history, progress, and current events of a single environmental issue in southwestern Pennsylvania that also have application throughout the region and U.S. Emphasis is on a balanced presentation of the issues, discussions of various approaches to solving problems, and development of writing skills. It features guest lectures and presentations by government regulators and policymakers, interest groups, corporate leaders, and experts.

II. Course Description. This field course will focus primarily on the applied aspects of conservation biology by examining the degradation and loss of species populations and ecosystems due to human activities and by considering alternatives for avoiding and/or mitigating these impacts. The perspectives of science, management, and polity will be elucidated in the context of historical, current, and future strategies designed to conserve the diversity of life.

A. Content, methods, and purposes. Conservation Biology will provide an introduction to (1) the unique set of methods, techniques, and processes involved

in assessment, management, and policy development for the conservation of plants, animals, and the habitats they depend upon, and (2) the unique body of knowledge stemming from the application of these methods. This course provides training for undergraduate students in the Ecology and Evolution, Biological Sciences, and Environmental Studies majors by providing them with additional knowledge and field experience that will be useful for either graduate school or entry-level biology careers. The material will be presented in five sections.

1. *Introduction to the discipline of conservation biology and values of biological diversity.* This part of the course will present and discuss: conservation biology as a complement to the traditional disciplines of population biology, physiological ecology, genetics, and biogeography; conservation biology as a crisis discipline; a brief history of the development of the field including such competing perspectives as the genetic, species and ecosystem aspects of biological diversity; and related ecological concepts. Habitat influences on species diversity at a variety of spatial scales and the world's biodiversity hotspots will also be addressed.

2. *Threats to biological diversity.* This section will consider human activities that result in the degradation and loss of species and ecosystems, and will include a number of case studies that can be pursued in the immediate environs of PLE. A forestry case study will examine the effects of harvesting (e.g. clearcutting, shelterwood, selection) and other forest management activities on the hardwood forests of northwestern Pennsylvania. An agricultural case study will focus on the terrestrial consequences of the loss of riparian zones, the draining of wetlands, and eutrophication of local streams and lakes. An urbanization case study will address the ecological impacts of roads and other issues at the urban-rural interface. An alien species case study will focus on purple loosestrife as a wetland invader that is modifying large areas of wetland resulting in the decline of many native bird species. A case study of overabundant species will consider one of three issues including high population densities of deer, geese or American lotus. And finally, using a few of the many fragmented forests in the region, a case study will be devoted to the problem of edge effects and small habitat areas for maintaining viable populations.

3. *Protected areas.* A number of protected areas and enhanced management areas are located close to PLE including state parks (Pymatuning, Presque Isle), a national park (Cuyahoga), a national forest (Allegheny), a state forest (Cornplanter), state game lands (Pymatuning, Conneaut Marsh), a national wildlife refuge (Erie), and a private reserve (Tyron-Weber Woods, Western PA Conservancy). Some of these areas will be visited and species management and ecosystems management policies will be studies. In addition, the concept of wildlife corridors will be explored and investigated for its potential to create ecological connectivity between Pymatuning State Park and Allegheny National Forest.

4. *Restoration ecology and* ex situ *conservation strategies.* The principles of restoration ecology will be addressed within the context of some local projects being managed by the Crawford County Conservation District Office - primarily on agricultural lands - such as creating riparian buffers on grazing lands. In addition the conservation programs at the Erie Zoo will be observed first-hand.

5. *Regional conservation case study.* The French Creek project, run jointly by the Western PA Conservancy and The Nature Conservancy, will be used as an example of a multifaceted program focusing on the development of conservation strategies that recognize the connectivity of landscapes at the regional level. This grassroots effort involves citizens collecting data under the supervision of qualified scientists, contacting and educating local landowners about conservation efforts within the watershed, and integrating conservation science into formal K-12 education.

B. Prerequisites. The prerequisite for this course is a grade of C or better in BIOSC 0160.

C. Course requirements and exams.

1. *Lecture and Field Notes* (20%) - students will be evaluated on the thoroughness of both their lecture and field notes.

2. *Group Project* (30%) - in groups of 2-3, students will choose a topic form a list provided by the instructor, will work as a team to address the topic, will produce a written report, and will present the project to the class. A final project grade will reflect contributions from peer assessment of each student within the group (30%), assessment of each individual student by the instructor (40%), and group assessment by the instructor (30%).

3. *Mid-Term Exam* (25%) - a mid-term exam will assess student knowledge of the material covered in the first half of the course.

4. *Final Exam* (25%) - the final exam will assess student knowledge covered during the second half of the course.

D. Recitations. This course does not have a recitation section.

E. Expected course size. It is expected that the course will have an enrollment of approximately 15-20 students.

F. Frequency of course offering. This course will be offered regularly during a three-week summer session at the PLE.

III. Course Syllabus - see attached sample syllabus.

Conservation Biology **- Proposed Syllabus**

Instructor: Dr. Peter Quinby, Pymatuning Laboratory of Ecology, (814) 683-5813, e-mail: pquinby@pitt.edu
Lectures: Monday through Friday, 8:30 am to 4 pm
Textbook: Primack, R. B. 2002. *Essentials of Conservation Biology*. Sinauer Assoc., Sunderland, MA

Other Readings:

D'Antonio, C., L. A. Meyerson, and J. S. Denslow. 2001. Exotic species and conservation: Research needs. In: *Conservation Biology: Research Priorities for the Next Decade,* ed. by M. E. Soule and G. H. Orians, Island Press, Washington, DC. Pp. 59-80.

Dobson et al. 1999. Corridors: Reconnecting fragmented landscapes. In: *Continental Conservation: Scientific Foundations of Regional Reserve Networks,* ed. by M. E. Soule and J. Terborgh, Island Press, Washington, DC. Pp. 129-170.

Haila, Y. 1999. Islands and fragments. In: *Maintaining Biodiversity in Forest Ecosystems,* ed. by M. L. Hunter, Jr. Cambridge University Press, New York, NY. Pp. 234-264.

Mack, N. R. 2000. Assessing the extent, status, and dynamism of plant invasions: Current and emerging approaches. In: *Invasive Species in a Changing World,* ed. by H. A. Mooney, Island Press, Washington, DC. Pp. 141-170.

Matlack, Gr. R. and J. A. Litvaitis. 1999. Forest edges. In: *Maintaining Biodiversity in Forest Ecosystems,* ed. by M. H. Hunter, Jr. Cambridge University Press, New York, NY. Pp. 210-233.

Owen, O. S., D. D. Chiras and J. P. Reganold. 2001. Soil conservation and sustainable agriculture. In: *Natural Resource Conservation,* Prentice-Hall, New York, NY. Pp. 123-148.

Seymour, R. S. and M. L. Hunter. 1999. Principles of ecological forestry. In: *Maintaining Biodiversity in Forest Ecosystems,* ed. by M. L. Hunter, Jr. Cambridge University Press, New York, NY. Pp. 22-61.

Course Objectives

Upon successful completion of this course students will be able to

- describe the major approaches to conservation, including their differences and common threads,
- demonstrate an understanding of the ecological principles upon which conservation are based,

- demonstrate how ecological principles are currently applied to the conservation, and cite examples,
- demonstrate an appreciation for, and some understanding of, the social, political, and economic factors that affect conservation, and
- demonstrate an understanding of basic conservation biology issues.

Grading Policy

Lecture and Field Notes (20%)
Group Project (30%)
Mid-Term Exam (25%)
Final Exam (25%)
Attendance is expected. Excess absences may result in a 25 point penalty.
Make-up exams should be cleared in advance or at earliest possible time. Late work will result in grade deductions.

Students with Disabilities

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and the Office of Disability Resources and Services, 216 William Pitt Union (412) 624-7890 as early as possible in the term.

Academic Integrity

Cheating, plagiarism, and other forms of academic dishonesty are not tolerated. A zero grade is assigned for the work in question and University sanctions may result in suspension or expulsion.

The integrity of the academic process requires fair and impartial evaluation on the part of faculty and honest academic conduct on the part of students. To this end, students are expected to conduct themselves at a high level of responsibility in the fulfillment of the course of their study. It is the corresponding responsibility of faculty to make clear to students those standards by which students will be evaluated, and the resources permissible for use by students during the course of their study and evaluation. The educational process is perceived as a joint faculty-student enterprise which will perforce involve professional judgment by faculty and may involve - without penalty - reasoned exception by students to the data or views offered by faculty. Senate Committee on Tenure and Academic Freedom, February 1974.

Course Schedule

Day	Topic	Reading
1	**Introduction to Conservation Biology** *what is conservation biology? what is biological diversity? Global pattern of biological diversity*	Text 1-3
2	**Valuing Biological Diversity** - *economics and ethics*	Text 4-6
3	**Threats to Biological Diversity I** - *habitat degradation, fragmentation and destruction; extinction*	Text 7-9
4	**Threats to Biological Diversity II** - *global climate change, overexploitation, overabundance, alien species, disease*	Text 9-10
5	**Threats to Biological Diversity III** - *forestry case study*	Seymour & Hunter 1999
6	**Threats to Biological Diversity IV** - *agriculture case study*	Owen et al. 2001
7	**Threats to Biological Diversity VI** - *alien species case study*	D'Antonio et al. 2001
8	**Threats to Biological Diversity VII** - *overabundant species case study*	Mack 2000
9	**Threats to Biological Diversity VII** - *habitat fragmentation case study*	Matlack & Livaitis 1999 Haila 1999
10	**Protected Areas I** - *parks, nature reserves and wildlife refuges*	Text 15-17
11	**Protected Areas II** - *wildlife corridors*	Dobson et al. 1999
12	**Restoration Ecology**	Text 19
13	***Ex situ* Conservation Strategies** - *Erie Zoo case study*	Text 14
14	**Regional Conservation Case Study** - *French Creek Project*	WPC & FCP 2002
15	*Student Presentations &Final Exam*	

BIOSC_____Conservation Biology - Course Description

This field course will focus primarily on the applied aspects of conservation biology by examining the degradation and loss of species populations and ecosystems due to human activities and by considering alternatives for avoiding and/or mitigating these impacts. The perspectives of science, management, and policy will be elucidated in the context of historical, current, and future strategies designed to conserve the diversity of life. ***There is a $50 lab fee.***
Prerequisites: Grade of C or better in BIOSC 0150 and 0160
Recitation: None
Expected class size: 15-20 students
Terms: Occasionally during the Summer Term