Operational Plan for Environmental Biology Program

Section A

Program Coordinator: Andrea Nord **Date:** May 2019

Associated Faculty:

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Adjunct:

Welcome to Environmental Biology!

The environmental biology major prepares students for employment in an environmental career or graduate study in a number of related fields. Possible career paths include environmental consultant, field biologist, conservation, public policy, education or opportunities related to natural resources and renewable energy.

You will study how plants and animals interact within their species and as part of a larger ecosystem as well as the effects of human influence on the environment. You will also gain a strong foundation in biology, chemistry and mathematics.

Practical experience and internships are an important part of the major. As part of their major, recent graduates have worked with the

Army Corps of Engineers (in North Dakota, South Dakota, and Illinois), The Illinois Department of Natural Resources, East Side Health District, and The US Fish and Wildlife Service.

Greenville University students benefit from unique experiences afforded by the Ayers Science Field Station (140 acres) located 15 minutes from campus as well as the Hoiles Gardens offering over 40 acres of wooded property adjacent to campus. Greenville students also benefit from the University's participation in the Au Sable Institute of Environmental Studies (www.ausable.org). This means that GU students have the opportunity to take one of the 23 field-based intensive classes Au Sable offers at one of 4 locations. These courses include Marine Biology, Alpine Ecology, Animal Ecology, Lake Ecology and Management, and more.

Program Mission Statement

The Department of Biology is committed to excellence. Our mission is two-fold. First, preparing graduates in the biological sciences who demonstrate open-minded inquiry, integrity, service, and stewardship of God's creation. Our graduates will understand the study and practice of biology can be an expression of Christian faith. Second, helping students in the liberal arts better understand and appreciate their role in God's created order. We see this commitment as an affirmation of the mission of Greenville University.

Programmatic Faith Integration

In the biology department, our students are encouraged to explore the ethical and moral implications of biological science and are challenged to respond to these issues in a thoughtful and Christ-like manner. Faculty endeavor to model thoughtful Christian engagement with issues of relevance in the field of environmental biology.

Section B

Program/Major Objectives: *Qualities and competencies expected in graduates from this program/major*

At the close of their degree, students should be able to:

1. Think like an environmental biologist
    1. Demonstrate working knowledge of major areas in environmental biology (organismal biology, ecology, environmental science, and environmental policy).
    2. Describe ethical dimensions of environmental issues and articulate links between the study of environmental biology and a Christian worldview. [need better wording here]
2. Work like an environmental biologist
    1. Design studies, collect and analyze data to answer biological questions
    2. Appropriately utilize scientific literature
    3. Demonstrate standard laboratory skills
3. Communicate like an environmental biologist
    1. Orally present scientific information effectively
    2. Communicate scientific information in written form effectively

Environmental Biology's Fulfillment of the SLOs

Students demonstrate knowledge and skill (SLO 2) in the Environmental Biology major as they build a working knowledge of major areas of environmental biology (PO 1.1), as they collect, analyze and interpret data (PO 2.2), and as they utilize the scientific literature to refine and answer questions. Students demonstrate effective communication skills (SLO 4) in the environmental biology major as they accurately communicate scientific information in both written and oral form (PO 3.1, 3.2). Environmental biology students' character and application of Christian virtues (SLO 6) is demonstrated by their ability to engage relevant issues in environmental biology on an ethical and moral basis, as well as their ability to articulate links between the study of environmental biology and a Christian worldview.

Environmental Biology's Connections to Greenville University as a Whole

The environmental biology major has two major interactions with the GU general education curriculum. The first is that there are key foundations for biology majors that are built on elements of GE curriculum. Examples include writing, and particularly the documentation of use of information sources (ENGL 105), quantitative skills (MATH 106 or higher). In addition, the foundation of THEO 110, BIBL 205/215 and UNIV 301 are very important in helping environmental biology majors develop the ability to describe ethical dimensions of biological issues and articulate links between the study of biology and a Christian worldview (PO 1.2, SLO 6).

Section C

Program Learning Objectives	Required Courses / Learning Opportunities															Electives			
	108	110	112	CHEM 111	CHEM 112	PHYS 102	115	MATH 106	BIOL 302	215	309	365	370	395/405	410	245	341	345	360
1.1	I	I		I	I	I		I	D		D	D	M			D	D	M	D
1.2	I											D		D	M				
2.1			I										D		M				D
2.2			I										D		M				
2.3			I	I	I		I			D	M		M		M				
3.1													D		M				
3.2	I		I							D			D	D	M				D
Key: I = Introduced D = Developed M = Mastered																			

Section D

Streamlined SLOs	Program Objective	Level of Mastery	Term	Course number	Learning Activity	Benchmark	Assessment method
Year One							
SLO 2	1.1	I	Fall (evens)	108	Exams and labs	>70%	Average of exam and lab scores
		D	Spring (evens)	215	Lab keying exam, Collection	>70%	Average of keying exam and collection grades
		M	Fall	370	Exam 2, Final, Labs	>70%	Average of exams 2 & 3 and Labs
SLO 6	1.2	I		THEO 110	Introduced at I level in Gen Ed Curriculum		
		D	Fall/Spring	UNIV 301	Term Paper	>70%	Term paper grade
		M	Fall/Spring	410	Faith/Ethics Paper	>70%	Faith/Ethics paper grade
Year Two							
SLO 2	2.1	I	Spring	112	Independent Experiment	>70%	Sum of exam scores
		D	Fall	370	Lab Project	>70%	varies
		M	Fall/Spring	410	Research Paper Components	>75%	Introduction and Data Use grades
SLO 2	2.2	I	Spring	112	Primary Literature	>70%	Primary literature assignment grade
		D	Fall	370	Primary Literature	>70%	Primary literature assignment grade
		M	Fall/Spring	410	Research Paper	>75%	Literature Use grade
Year Three							
SLO 2	2.3	I	Fall	110	Labs and Practical Exams	>70	Average of Lab Skills Grades
		D	Spring	112	Labs and Practical Exams	>70	Average of Lab Skills Grades
		M	Fall	370	Lab scores	>70	Average of Lab Skills Grades

Year Four							
SLO 4	3.1	I			Introduced at I level in Gen Ed Curriculum		
		D	Spring	395/405	Final Presentation	>70%	Oral presentation score
		M	Fall/Spring	410	Long Presentation	>70%	Long Presentation score
SLO 4	3.2	I	Spring	112	Independent Experiment Report	>70%	Independent Experiment score
		D	Fall	370	Lab Project Report	>70%	Lab Project Report score
		M	Fall/Spring	410	Review Article	>70%	Final Paper score

Description of Assessment Processes

Program Objective	Introducing	Developing	Mastering
1.1. Think like an environmental biologist: Demonstrate working knowledge of major areas of biology as identified in the biology major (cellular/molecular, anatomical, ecology).	BIOL108*; Exams, Labs	BIOL215*; Lab keying exam, collection	BIOL370; Exams, Labs
1.2. Think like an environmental biologist: Describe ethical dimensions of biological issues and articulate links between the study of biology and a Christian worldview.	THEO 110. See note below	UNIV301: Term paper or mid-term	BIOL410 CLO Faith/Ethics reflection paper
2.1. Work like an environmental biologist: Design studies, collect and analyze data to answer biological questions	BIOL112; Independent experiment	BIOL370; Lab Project	BIOL410 Paper Introduction and Data Use grades
2.2. Work like an environmental biologist: Appropriately utilize scientific literature	BIOL115; Tree ID lab, Tree ID quiz	BIOL370; Primary Literature	BIOL410; Literature Use grade
2.3. Work like an environmental biologist: Competently utilize standard laboratory or field techniques	This program objective is still being developed - we are working to develop a list of lab competencies that we can develop across all our labs.		
3.1. Communicate like an environmental biologist: Orally present scientific information effectively	COMM 101. See note below	BIOL 395/405; oral presentation	BIOL410; Presentations
3.2. Communicate like an environmental biologist: Communicate scientific information in written form effectively	BIOL115; Lab reports	BIOL370 Lab Project	BIOL410; Writing grade

The table above shows that assessment of program learning objectives is intentionally based on a variety of assignments, including

exams, lab reports, oral presentations, and writing assignments, in order to better gauge student learning.

At the “Introducing” level, BIOL 108, BIOL 112 and BIOL 115 are heavily utilized for assessment, as they are the first courses in the major taken before other courses in the program. Currently, PO 1.1, 2.1, 2.2 and 3.2 are assessed on items from the BIOL 108/112/115 sequence.

At the “Developing” level, most assessment data will come from the intermediate level courses (BIOL 215: Plant Taxonomy; BIOL 370: Ecology; and BIOL 395: Practicum).

PO 1.2 Not assessed at the “I” or “D” level in the biology curriculum. The General Education curriculum provides two important building blocks; THEO 110 (Introduction to Christian Thought and Life, “I” level) and UNIV 301 (Science and Christianity; “D” level).

At the “Mastering” level, BIOL 410 (Senior Seminar) is the main source of assessment data, with five separate grade items assessing mastery of different course objectives.

There are currently several gaps in the assessment plan:

PO 2.3 relates to laboratory and field skills, and the specific skills we will assess and methods of assessment are still under development. This should be completed during the 2019-2020 academic year.

PO 3.1 Not assessed at the “I” level in the biology curriculum. Oral communication skills at the “I” level are developed within the General Education Curriculum, specifically in COMM 101.

Assessment Timetable

The departmental faculty meet approximately monthly throughout the academic year, and these meetings generally include discussion of observations and anecdotal information about course effectiveness and progress on program objectives.

At the end of every semester, the program coordinator will circulate the curriculum map among the program faculty to collect the relevant student learning data. The program coordinator will compile the end of term assessment report for the relevant program objectives and share it with program faculty.

At the end of every semester, the faculty convene a two-hour meeting in which faculty observations and anecdotal information

gathered and discussed through the semester are compiled along with all of the outcome data from the program's courses. These are discussed. The faculty try to determine whether any deficiencies seen in the data are related to program curriculum, and if so, what changes are needed to correct deficiencies, and when those changes should be made. These changes may be changes in the curriculum, or changes in objectives or assessment.

The department will assess the three major program objectives on a four-year rotating schedule. While we may not limit course and curriculum adjustments to the major objective being assessed in a given year, we will intentionally focus on one area each academic year. PO 1: Think like an environmental biologist (2019-2020); PO 2.1&2.2: Work like an environmental biologist (2020-2021); PO 2.3: Work like an environmental biologist (Lab Skills) (2021-2022): PO 3: Communicate like an environmental biologist (2022-2023).