UNIT EFFECTIVENESS PROCESS
PHASE 1 – ASSESSMENT PLAN for STUDENT LEARNING OUTCOMES
2006-2007

Unit Name: Program in Environmental and Earth Sciences

Degree Program (For Academic Instructional Units)
Please use a separate Form B for each degree program
Ph.D. in Environmental and Earth Sciences

Student Competencies (Statements of knowledge, skills, attitudes, behaviors that program majors should be able to demonstrate upon completion of the degree program.)
Knowledge of scientific and engineering principles from a range of disciplines relevant to the environment. Ability to apply knowledge of science and engineering principles to analyzing and solving problems. Ability to analyze, synthesize, and summarize in writing concepts and evidence related in science and engineering literature. Ability to communicate technical information to other environmental professionals from diverse disciplinary backgrounds. Ability to conduct original research in environmental sciences, including posing hypotheses, planning and execution of studies, analysis and interpretation of data, reaching conclusions, and drawing generalizations.

Intended Outcome 1
Graduate students will demonstrate a breadth of knowledge of scientific and engineering across multiple disciplines.

Related Student Competency (If intended outcome is derived from student competency)
Knowledge of scientific and engineering principles from a range of disciplines relevant to the environment.

Action Steps to Achieve Intended Outcome
Graduate students will take a number of elective and required core courses from five academic disciplines in which discipline-specific knowledge will be presented. Each student's major advisor and supervisory committee will guide the student through a program of coursework that assures their exposure to all aspects of environmental sciences.

Assessment Methodology
Include the following:

- *full description of the planned assessment activity*
- *the criteria for success*
- *the timetable for assessment activity*
- *responsible persons (by job title, not name) and specific duty*

Embedded questions in written exams given in selected core and elective courses will be used to assess the extent of students' knowledge of a range of scientific and

engineering principles. Each question will be scored on a four point scale indicating excellent, good, fair, or poor mastery of knowledge. Success will be judged if 80% of questions are scored as displaying excellent or good mastery of knowledge. Assessment will begin in fall 2006 and continue until spring 2007. Responsible persons are the Program Director and course instructors.The student's general knowledge of environmental sciences will be assessed in a diagnostic evaluation conducted by their Doctoral supervisory committee under the auspices of the program's Graduate Advisor. This evaluation will consist of a review of the students' prior degrees and coursework, professional experience and professional goals, and an oral discussion of these matters to assess the student's background and preparation for further doctoral studies. After completion of the examination, members of the supervisory committee will confer and decide whether the student has demonstrated sufficient knowledge of the field to (1) pass the examination, (2) require further assigned study after which they may retake the examination, or (3) have not acquired enough knowledge of the field to warrant continuation in the degree program. Success will be judged if at least 85% of students pass the examination. Assessment will begin in fall 2006 and continue until spring 2007. Responsible persons are the Program Director, Graduate Advisor, and program faculty.

Intended Outcome 2
Graduate students will demonstrate the ability to apply knowledge of science and engineering principles to analyzing and solving problems.

Related Student Competency (If intended outcome is derived from student competency)
Ability to apply knowledge of science and engineering principles to analyzing and solving problems.

Action Steps to Achieve Intended Outcome
Graduate students will take a number of elective and required core courses from five academic disciplines in which science and engineering principles will be applied to analyzing and solving environmental problems.

Assessment Methodology
Include the following:

- *full description of the planned assessment activity*
- *the criteria for success*
- *the timetable for assessment activity*
- *responsible persons (by job title, not name) and specific duty*

Embedded questions in written exams given in selected core and elective courses will be used to assess the extent of students' ability to apply scientific and engineering principles to analyzing and solving environmental problems. Each question will be scored on a four point scale indicating excellent, good, fair, or poor demonstration of analytical and problem solving capability. Success will be judged if 80% of questions are scored as displaying excellent or good capability. Assessment will begin in fall 2006 and continue until spring 2007. Responsible persons are the Program Director and course instructors.

Intended Outcome 3

Graduate students will be able to analyze, synthesize, and summarize in writing concepts and evidence related in science and engineering literature.

Related Student Competency (If intended outcome is derived from student competency)

Ability to analyze, synthesize, and summarize in writing concepts and evidence related in science and engineering literature.

Action Steps to Achieve Intended Outcome

Graduate students will be assigned to write literature-based research papers in selected elective and required core courses.

Assessment Methodology

Include the following:

- *full description of the planned assessment activity*
- *the criteria for success*
- *the timetable for assessment activity*
- *responsible persons (by job title, not name) and specific duty*

Papers written by graduate students will be scored for their demonstration of the ability to analyze, synthesize, and summarize concepts and evidence related in science and engineering literature, using a 100-point scale on a rubric developed by the program. Success will be judged if 80% of the students achieve a rubric score of greater than 80%. Assessment will begin in fall 2006 and continue until spring 2007. Responsible persons are the Program Director and course instructors.

Intended Outcome 4

Graduate students will be able to communicate technical information to other environmental professionals from diverse disciplinary backgrounds.

Related Student Competency (If intended outcome is derived from student competency)

Ability to communicate technical information to other environmental professionals from diverse disciplinary backgrounds.

Action Steps to Achieve Intended Outcome

Graduate students will be required to take two one-hour seminar courses during their program of study, during which written and oral presentations will be made to students from this and other academic programs. Presentations will be followed by discussion among seminar participants.

Assessment Methodology

Include the following:

- *full description of the planned assessment activity*
- *the criteria for success*
- *the timetable for assessment activity*
- *responsible persons (by job title, not name) and specific duty*

Presentations and discussions led by students will be assessed using a 100-point

scale on a rubric developed by the program. Success will be judged if 80% of the students achieve a rubric score of greater than 80%. Assessment will begin in fall 2006 and continue until spring 2007. Responsible persons are the Program Director and course instructors.

Intended Outcome 5
Graduate students will demonstrate the capability to pose hypotheses and plan research studies.

Related Student Competency (If intended outcome is derived from student competency)
Ability to conduct original research in environmental sciences, including posing hypotheses, planning and execution of studies, analysis and interpretation of data, reaching conclusions, and drawing generalizations.

Action Steps to Achieve Intended Outcome
Doctoral students will prepare a written dissertation research proposal, and present and defend it orally to their doctoral supervisory committee.

Assessment Methodology
Include the following:

- *full description of the planned assessment activity*
- *the criteria for success*
- *the timetable for assessment activity*
- *responsible persons (by job title, not name) and specific duty*

Doctoral students will prepare a written dissertation research proposal. This proposal shall be presented orally and defended to their doctoral supervisory committee, whose members will review the proposal and examine the student's capability to conduct the proposed dissertation research. After completion of the proposal defense, members of the supervisory committee will confer and decide whether the student has demonstrated sufficient knowledge of the field to (1) pass the examination and proceed with further research, (2) require further assigned study after which they may retake the examination, or (3) have not demonstrated sufficient capability to conduct research to warrant continuation in the degree program. Success will be judged if at least 85% of students pass the examination. Assessment will begin in fall 2006 and continue until spring 2007. Responsible persons are the Program Director, Graduate Advisor, and program faculty

---

Intended Outcome 6
Graduate students will conduct original research in environmental sciences, gathering, analyzing and interpreting data, reaching conclusions, and drawing generalizations.

Related Student Competency (If intended outcome is derived from student competency)
Ability to conduct original research in environmental sciences, including posing hypotheses, planning and execution of studies, analysis and interpretation of data, reaching conclusions, and drawing generalizations.

Action Steps to Achieve Intended Outcome
Doctoral students will write a research dissertation, and present and defend it orally to their doctoral supervisory committee.

Assessment Methodology
Include the following:

- *full description of the planned assessment activity*
- *the criteria for success*
- *the timetable for assessment activity*
- *responsible persons (by job title, not name) and specific duty*

Doctoral students will prepare a written dissertation presenting their original research. This propo
presented orally and defended to their doctoral supervisory committee. After completion of the di
members of the supervisory committee will confer and decide whether the student has demonstra
knowledge of the field to (1) pass the examination, (2) require further research and writing after
redefend the dissertation, or (3) have not demonstrated sufficient capability to conduct research
continuation in the degree program. Success will be judged if at least 85% of students pass the e
Assessment will begin in fall 2006 and continue until spring
2007.??Responsible??persons??are??the??Program??Director,??Graduate??Advisor,??and??progra