

ANNUAL ASSESSMENT REPORT

Academic Year: 2015/2016

Department: Earth Sciences

Undergraduate

In 2012/13, the Department identified programmatic themes that directed the curriculum development for undergraduate majors. These themes are: Earth History, Earth Composition and Architecture, Earth's Surficial Processes, and Human Dimensions of Living on Earth. Coupled with course work covering themes, is a strategic development of course organization that allows a student to progress through Bloom's taxonomy to work toward higher level thinking skills in the junior and senior year. Student Learning Outcomes are consistent with the mastery of concepts and the mastery of discipline-specific skills. In addition to the Departmental Student Learning Outcomes, faculty have developed Learning Outcomes for each of their courses.

The Department's Assessment Plan strives to use four courses each that are representative of the themes identified above. Those courses are presented in the a matrix in the Assessment Plan. Each year faculty from each of the designated four courses report to the faculty answers to the following questions: 1) What were the student learning outcomes for your course?; 2) What are some instructional activities that address these SLO's?; 3) What are the metrics or evidence that students are achieving these goals?; and 4) What are lessons learned that will help you to modify your course to improve student learning? Other faculty are then encouraged to respond to the results for that course and to provide suggestions or alternative approaches if appropriate. Results over the past three years have been quite positive. The courses that were selected for 2015/16 were: Igneous Petrology, Glacial Geology, Geography of World Regions, and Applied GIS.

1. GEO 450: Igneous Petrology (Dr. Liane Stevens, Sabbatical Replacement of Dr. David Mogk)
 - A. Student Learning Outcomes:
 - a. Understand how igneous rocks are classified
 - b. Understand the physical and chemical properties of igneous rocks
 - c. Understand crystallization processes and phase diagrams
 - d. Understand basic principles in the production and differentiation of igneous melts
 - e. Understand the generation of magmas in different tectonic settings
 - f. Understand topics from historic and modern studies of igneous rocks
 - g. Develop skills in petrographic analysis used to identify igneous rocks and interpret rock-forming processes
 - B. Examples of instructional activities:
 - a. Classroom exercises with emphasis on concept sketches. These activities targeted discipline-specific knowledge.

- b. Laboratory assignments focusing on sample identification, data analysis and interpretation. These activities developed discipline-specific knowledge and skills.
 - c. Literature reviews that involved library searches, reading, summary, and synthesis. These tasks developed professional skills and knowledge.
 - d. Term Project on Igneous Controversies. This project required the synthesis of knowledge and developed “habits of mind” and professional skills.
 - C. Metrics or evidence of goal achievement
 - a. Students demonstrated informed synthesis of content in the term project and performed on the exam at levels exceeding 75%.
 - D. Lessons Learned
 - a. The Term project turned out to be an opportunity for students to demonstrate their knowledge. Lab activities are critical for the skills development. Students enter the class with little or no working knowledge of the petrographic microscope and exit with an ability to identify most igneous minerals.
2. GEO 445 Glacial Geology (Dr. Mark Skidmore)
- A. Student Learning Outcomes:
 - a. Describe the processes that govern the flow of ice masses
 - b. Recognize glacial landforms and explain the processes of erosion/deposition that led to their formation
 - c. Synthesize information on glaciology/glacial geology from scientific journals for oral presentation
 - B. Examples of instructional activities
 - a. Oral presentation
 - b. Class discussions
 - c. Mid-term exam
 - d. Final exam
 - C. Metrics of student achievement
 - a. Students were able to synthesize course content and apply it to topics chosen for oral presentation. Students demonstrated discipline-specific knowledge and thinking skills on the mid-term and the final exam.
 - D. Lessons Learned
 - a. The Oral Presentation provided an opportunity for students to work independently and to demonstrate their ability to critically evaluate the literature and to express their knowledge learned in class.
3. GPHY 141 Geography of World Regions (Dr. William Wyckoff)
- A. Student Learning Outcomes:
 - a. Be able to describe and understand *global patterns of environment, population distribution, and economic development.*
 - b. Understand the *processes driving globalization*; arguments for and against globalization
 - c. For 8 major world regions (Europe/Russian Domain/Latin America/Sub-Saharan Africa/SW Asia-North Africa/East Asia/South Asia/SE Asia), be able to....

- i. Locate major locations/features/place names for the region
 - ii. Identify patterns of *regional climate/physical geography/key environmental issues* shaping the region
 - iii. Describe current patterns of *population, migration, and settlement*
 - iv. Understand the evolution of *key cultural patterns* for the region (especially language, ethnicity, religion)
 - v. Describe major elements of the *region's political evolution* over time and also describe and explain current geopolitical issues for the region.
 - vi. Identify current patterns of *economic and social development* within the region
- B. Examples of instructional activities
- a. Weekly readings assigned to provide background on the major world regions
 - b. Students work on regional map identification/location with provided outline maps and place name lists
 - c. Students engage in lecture material/discussions of readings and additional case studies /examples from regions
 - d. Students complete an exercise that describes the ways their personal lives are linked to the world/global connections
 - e. Students complete a project in which they adopt an English-language foreign newspaper and assess course themes in the light of current news events in the region
- C. Metrics of Student Achievement
- a. Students complete 3 exams
 - b. Students have an assignment that evaluates their own global connections
 - c. Students graded on their foreign newspaper projects and essays
 - d. Course grades indicate that 169 students had grades of C or better with 33 students in the D/F category
- D. Lessons Learned
- a. Current methods are effective and will continue to be used, though the new book edition will be utilized.
4. Applied GIScience and Spatial Analysis (Stuart Challender)
- A. Student Learning Outcomes:
- a. Be able to describe how GIScience is being applied in various disciplines
 - b. Be able to identify spatial data models and describe how different models relate to various spatial analysis, synthesis and modeling methods
 - c. Be able to discuss spatial analysis, synthesis and modeling concepts
 - d. Be able to describe advanced modeling concepts and when they might be useful
 - e. Be able to research geospatial science concepts in professional journals and publications
 - f. Be able to describe GIS organizational and management concepts that are useful for project success
 - g. Be able to implement concepts and methods through hands on lab exercises and a semester project

B. Examples of instructional activities

- a. Readings- weekly reading assignments target advanced concepts and case studies
- b. Lab exercises-labs apply theory and concepts from lecture using state-of-the-art GIS software
- c. Concepts paper – topics related to spatial data are assigned and students then write a term paper that includes a literature review. The content includes a description of the modeling concept, a discussion of the type of issue or problem the modeling concept can address, and a case study.
- d. Project- allows the student to explore analysis, synthesis, and modeling methods and techniques relating to their discipline of interest. The project is summarized in a final paper and presentation.

C. Metrics of Student Achievement

- a. mid-term exam
- b. final exam
- c. lab exercises
- d. Modeling concept paper
- e. Individual project
- f. The median class grade was 88% with a mean of 85% indicating a that students are achieving the desired class outcomes.

D. Lessons Learned

- a. The current approach to Applied GIS teaching is working well and will be maintained for the upcoming semester.