Unit Plan for Assessing and Improving
Student Learning in Degree Programs

Unit: **Department of Geology**

Unit Head approval: Wang-Ping Chen, Acting Head Date: 5/5/08

SECTION 1: PAST ASSESSMENT RESULTS

(1) Revision of GEOL 118 + GEOL 280/380 - Approved in 2002

The Problem - Before 2002, GEOL 118 (Earth and the Environment) and GEOL 280 (Environmental Geology) covered similar material except that GEOL 280 was at a more advanced level. The content of both courses was applied aspects of geology including geologic hazards (earthquakes, volcanoes, landslides, floods, sinkholes, subsidence, coastal erosion, and global climate change), energy (fossil fuel, alternative energy), groundwater (supply, pollution), and waste management (municipal, hazardous chemical and nuclear). Because both GEOL 118 and GEOL 280 were required for one of our undergraduate degree concentrations (Earth & Environmental Sciences), some students raised the issue that the two courses were overly repetitive.

The Solution - In response to student feedback, we revised GEOL 118 and changed its title to Natural Disasters. We significantly changed the content of GEOL 118 to emphasize geologic hazards mentioned above and also to include smaller sections on severe weather (thunderstorms, lightning, tornadoes, and hurricanes) and meteorite impacts. In addition, we changed the content of GEOL 280 (now numbered GEOL 380) to applied aspects of geology excluding geologic hazards. GEOL 380 now covers energy, groundwater, waste management as well as land use planning, and environmental health (radon, trace elements). These changes eliminated overlaps between GEOL 118 and GEOL 380.

Assessment - Changes to GEOL 118 and GEOL 380 have been highly successful. GEOL 118 (Natural Disasters) is now extremely popular with students, reaching annual enrollments of about 1,000, compared to ~50 students in the previous version of GEOL 118. Instructors for both GEOL 118 and 380 now regularly appear on the List of Teachers Ranked as Excellent, e.g., see 2007 data <http://www.oir.uiuc.edu/dme/ices/Fall07List.pdf> and <http://www.oir.uiuc.edu/dme/ices/Sp07Incl.pdf>.

(2) Revision of GEOL 108 to GEOL 208 - Approved in 2007

The Problem - Before 2007, the two introductory geology courses required of students in all six concentrations of the Geology Major as well as the Geology minor were a physical geology course (GEOL 100 – Planet Earth, GEOL 101 – Introductory Physical Geology, GEOL 103 – Planet Earth QRII, or GEOL 107 – Physical Geology) and GEOL 108 (Historical Geology). Traditionally, undergraduate Geology majors took GEOL 107

before taking GEOL 108 but now with the expansion of our introductory courses, ~60% of our Geology majors take a physical geology course other than GEOL 107, i. e., GEOL 100, 101, or 103.

The Solution - In response to student feedback and in order to create a common, firm foundation for advanced Geology courses, we changed GEOL 108 (Historical Geology) to GEOL 208 (History of the Earth System). Compared to GEOL 108, GEOL 208 covers a broader range of topics and provides a more modern and comprehensive approach to the disicpline. GEOL 108 emphasized paleobiology (origin and evolution of life on Earth) and stratigraphy (successions of sedimentary rocks over geologic time) whereas GEOL 208 covers Earth formation (greater emphasis on nucleosynthesis and chemical differentiation/composition); development of Earth's internal layers and formation of the Moon; formation and evolution of the atmosphere and the oceans; chemical constraints on the origin of life; formation of the continental crust and tectonics of the Archean crust; assembling and breaking-up of continents during the Proterozoic; interpretation of the rock record; radiometric dating; long-term isotopic records; Phanerozoic history of the Earth (sea-level changes and the sedimentary rock record; plate tectonics and mountain-building episodes; evolution of life and biogeography); development and evolution of biogeochemical cycles; links among life, the atmosphere and weathering; concept of Earth systems and global change (long-term climate changes, Holocene climate changes). GEOL 208 has greater academic rigor and more emphasis on cognate science and math. Finally, a major geology field trip (three days to St. Francois Mountains in southeast Missouri) was moved from GEOL 107 to GEOL 208 so that all of our majors participate in this important educational opportunity.

Assessment - Because GEOL 208 is being offered for the first time this semester, it is too early to assess student outcomes. However the instructor of GEOL 208 (Dr. Michael Stewart) reports that the class atmosphere is excellent, with enthusastic and significant student participation in all aspects of the course in lectures, labs, and the extensive field trip.

SECTION 2: REVISED ASSESSMENT PLAN

(a) PROCESS:

This unit plan has been revised based on the previous version implemented in 1999. In revising the plan, Dr. Jonathan Tomkin (Associate Director of Academic Affairs) consulted with the Chairman of the Geology Courses and Curriculum Committee, Dr. Steve Altaner and the Acting Head of Geology, Dr. Wang-Ping Chen.

(b) STUDENT OUTCOMES:

The Department of Geology is committed to provide our students with the knowledge and skills to:

1. Critically evaluate geologic issues, problems, information and literature;

2. Present geological information clearly in written and oral form;

3. Apply appropriate tools from chemistry, physics, biology, mathematics and computing to geological questions; and

4. Develop the necessary qualifications for employment after graduation.

In addition, the department also has separate, goal-specific missions for our undergraduate and graduate students. For our undergraduate students, the department is committed to provide them with:

1. A knowledge of the physical, chemical, and biological evolution of the Earth; the nature of Earth materials; and mineralogy and petrology of igneous, metamorphic, and sedimentary rocks;

2. An understanding of interactions of the solid Earth with the hydrosphere, atmosphere, and biosphere, as well as the effects of those interactions on mankind and the environment;

3. An awareness of the roles of physics, chemistry, biology, and mathematics in understanding geological processes;

4. A knowledge of the history of discoveries and ideas that have contributed to our present understanding of the Earth and the planetary system; and

5. A knowledge of appropriate techniques and field methods for measuring and recording both past and present Earth structures and processes.

For our graduate students, the department is committed to provide the necessary training so that they will:

1. Gain in-depth knowledge in one or more specialized areas;

2. Be able to identify problems in geoscience and to develop solutions;

3. Complete and defend a thesis or a technical project report; and

4. Understand scientific ethics.

(c) MEASURES AND METHODS USED TO MEASURE OUTCOMES:

The department proposes to assess its success in attaining its stated teaching and training goals by using a series of customized survey instruments. It is intended that each instrument be Web-based.

1) An Undergraduate Exit Survey. Administered to graduating majors at the time of graduation. This instrument will be used to determine student satisfaction with their geology training and apparent attainment of stated department goals.

2) A Three-Year Post-graduation Survey for Undergraduates. The assumption underpinning this survey is that the student is likely to be in a stable career position at this time. In addition, it is assumed that thereafter it will become increasingly difficult to maintain a representative cohort of samples.

3) A Graduate Exit Survey Administered to graduating masters and doctoral students at the time of graduation. This instrument will be used to determine: student satisfaction with geology training and apparent attainment of stated department goals.

4) A Three-Year Post-graduation Survey for Graduate Students. The assumption underpinning this survey is that the student is likely to be in a stable career position at this time.

SECTION 3: PLANS FOR USING RESULTS

(a) PLANS:

The results of the above measurements will be summarized annually and provided to the Head of the Department. The Head will then disseminate the information, together with the University Senior Surveys and the periodic graduate alumni surveys, to the Department's Undergraduate Committee, Courses & Curriculum Committee, Graduate Study Committee, and the Placement Coordinator. These Committees shall review their specific programs to seek program improvement based on data collected. The feedback will also be used by the placement coordinator in planning future placement efforts.

Deficiencies identified will be used to propose curriculum changes, and those changes will then be subjected to evaluation as they are implemented.

(b) TIMELINE FOR IMPLEMENTATION:

The exit surveys will be developed and administered from the 2008-09 AY onward. A graduate survey has been administered to all recent graduates in 2008; three-year graduate surveys will begin in 2011.