

GEOLOGY DEPARTMENT
Capstone Course GEOL494

Assessment Characteristics

Refer to the recent syllabus from Steve Moshier (attached) for documentation of the statements below.

The Geology capstone is specifically designed to assess the degree to which majors can demonstrate educational objectives of the department as well as those embedded from the general education curriculum. Particular objectives are met according to specific assignments.

➤ **CRITICAL THOUGHT AND USE OF EVIDENCE:**

An integrative project, involving data collation and interpretation results in a written report with oral presentation before the class. Three such projects are described on the attached "List #3". The subjective nature of this project does not allow quantitative evaluation other than a grade awarded for effort and evidence of creative integration. Copies of project reports are kept as data by instructors.

➤ **INTEGRATION OF FAITH AND LEARNING AND BROADER INTEGRATION:**

Students prepare a personal reflection paper on the integration of faith and science (see syllabus). They are to indicate areas of growth in understanding. Reflections are discussed in class.

➤ **ORAL COMMUNICATION SKILLS:**

The principal integrative project and the faith-science reflection are presented to the class. In addition, each student will lead class discussion of a topic chosen by the instructor. There is no grade specifically assigned for speaking performance. However, the organization and content of presentations are evaluated as part of the overall activity. Also note that the class typically visits a nearby university to attend one or more professional presentations. The opportunity offers a model of presentation quality (good, bad or between).

➤ **WRITTEN COMMUNICATION SKILLS:**

There are no fewer than four assignments in writing to be completed each participant in the seminar. Evaluations of the writing include the usual concern for content accuracy and clarity but each effort is also considered in how it compares to expectations of sophistication. Senior students having completed Wheaton's general education requirements and a departmental major should be capable of demonstrating expertise at least at a level considered adequate.

The attached syllabus by itself does not offer specific assessment rubrics. In this particular case, Dr. Moshier can provide a sheet used for grading assignments.

Geology faculty consider it most important that the seminar course is constructed such that it can give students several venues to demonstrate their educational and spiritual growth. Our primary concern is over that which we can control and not student performance; that is ultimately their responsibility. If in evaluating student performance any systemic weakness is discovered, then assessment demands that modifications be made to improve what we offer. It should be noted that this is exactly how Geology has responded to previous experiences with the capstone seminar. In one particular instance, it was recognized that the integration project covered some topics not previously addressed, while others of significance were being neglected. Since that time (1994), two different improved permutations have been introduced with more emphases on multidisciplinary relationships (in the spirit of general education).

It may perhaps be that Geology majors are in a very advantageous situation, because of a distinctive requirement. The capstone seminar is not the only opportunity for a summative departmental experience. The two summer field courses now taken by all majors, serve as practica and excellent mechanisms for departmental assessment.

With respect to the three particular general education goals described in Scott Moreau's memo of July 28, 2005, these are assessed by way of the mechanisms listed above, specifically:

- 1) **Faith issues and Christian worldview**- via position paper and personal growth reflection.
- 2) **Connections between Geology and other disciplines**-via synoptic projects which integrate the other natural sciences with geoscience. The position paper in #1 also incorporates theological understanding. Depending on the projects selected, political science-law, economics, and cultural geography are also shown in relationship to geology.
- 3) **Professional aspects of Geology**-via preparation of a resume, discussion of the Hearn book.

GEOL 494 SENIOR SEMINAR

Spring 2004

Stephen O. Moshier, Instructor

Description Integration course for seniors, or for juniors who have completed most geology requirements. Reports and discussion of original monographs, and modern development and philosophy of geological science. (2)

Reading:

Hearn, Being a Christian in the Sciences

Selected articles

Activities:

1. Teach one Geol 211L lab
Arrange with Lacy. If you are a TA, you can teach during one of your sessions.
2. Attend Career Center program.
Feb 12 class will meet in the Career Center. Prepare personal resume.
3. Attend off-campus geoscience lecture.
Either a "class field trip" to a local university seminar or attend GSA -St. Louis.
Write a 250-300 word abstract (review) of the presentation (or session).
4. Position paper on faith-science integration
4-page reflection on how you are developing a personal, biblical view of science and how you are coming to terms with the integration of biblical and scientific concepts and descriptions of creation. Include how your thinking has changed on these matters over the past several years of education (pre-college, college). What reading or experiences have influenced your thinking on origins issues? Be prepared to share your story in class.
5. Short review of Hearn's book
2-page reflection on the book. Include useful insight from the author, things you disagree with, things you wish he had addressed.
6. Participate in the Mars exploration.
Become an expert on one or more of the rover experiments and keep up with data acquisition and interpretation. Be prepared for weekly updates. We will have a Mars Seminar near the end of the course when you will present an illustrated technical talk (powerpoint- no paper) to the class on your studies of the Mars Exploration program.
7. Basin Analysis paper and presentation
Reading example professional papers on basin analysis. You will prepare a 10-page research paper with illustrations on an assigned (or selected) sedimentary basin in North America (or foreign basin with approval). Technical writing will be discussed in class. A rough draft will be reviewed by instructor.

Schedule of Class Meetings:

Date	
1/16	Introduction. What is going on with Mars?
1/22	Preliminary reports on Mars exploration. Science and theology discussion.
1/29	Mars report. Introduction to basin analysis. Basin assignments.
2/5	Mars report. Tectonic controls on sedimentary basins.
2/12	Career Services Session
2/19	Mars report. Sedimentary basin fill. Implications for resource exploration (fossil fuels and groundwater).
2/26	Mars report. Personal resume due. Geology of the Black Hills redux.
3/4	Mars report. Technical writing in geology.
3/11	Spring Break
3/18	Mars report. Basin analysis research session; work in seminar room.
3/25	Integration position paper due. Share-time and discussion. Basin analysis research session; work in seminar room.
4/1	No class. GSA St. Louis.
4/8	Rough draft of Basin Analysis paper due.
4/15	Mars Seminar. Rough drafts returned.
4/22	Work on presentations.
4/29	Basin Analysis presentations and paper due. Geo-seminar abstract due.

Geology and Environmental Science Assessment List #3

SYNOPTIC PROJECT FOR GEOL 494 SENIOR CAPSTONE SEMINAR:

In addition to various topics selected for inclusion in the Senior Seminar, (for example, the consideration of ethics in geoscience as professionally practiced, or the evaluation of career and graduate school opportunities for graduates), a major term project is required. The objective of this assignment is similar to that in GEOL 443 or of the eight weeks of work during the summer field course, to integrate many skills and areas of knowledge. The three most recent projects with their integrative components are below.

A) Reconstruction of Geological History for a Given Continental Area

This is an individual project, presented as a paper including a series of paleogeographic maps. An oral report is also made to the class.

Project components are repeated for each major time division are:

- Paleomagnetic locations on the globe;
- Tectonic events and related features;
- Paleoclimate and environmental conditions;
- Paleobiology in ecological context, with special note of any significant extinction or radiation occurrences;
- Stratigraphic correlation to other continental areas;
- Petrologic, geochemical, and economic distinctives.

B) Compilation Map of U.S. Sedimentary Basins

This is a team project with each participant responsible for specific regions. The map and oral presentations are the results of labor over the entire term. Project components are as follows:

- Compilation of unified, regional and state data on key sedimentary units;
- Application of seismic and seismotectonic profiles in interpretation;
- Production of fence diagrams to indicate directional changes in facies and unit thicknesses;
- Facies analysis to correlate with tectonic changes;
- Topographic changes as related to eustatic sea-level variation and tectonic influences (epeirogeny);
- Recognition of existing hydrocarbon resources and future exploration potential.

C) Review Synthesis of all Major Geoscience Subdisciplines in the Context of Global Plate Tectonics

Each participant completes the entire review but is also responsible to lead seminar discussion in two of the integrative areas. Subdiscipline areas include:

- Ocean-floor tectonism and geophysics;
- Mountain building and continental tectonics;
- Sedimentation patterns;

- Paleobiology and evolutionary trends;
- Volcanic provinces delineated by geochemistry, petrology and tectonic environment;
- Economic geology in a geographic-geologic framework;
- Metamorphism in variable tectonic environments;
- Comparative planetology, based on internal forces and compositional variation;
- Geomorphic provinces of the oceans and continents;
- Hydrologic features and their human modification;
- Climatic relationships to tectonic and topographic conditions.