PROGRAM REVIEW
GEOSCIENCE 2014

Name of Program: Geoscience

Name of Program Chair: John Luczaj

Date of Last Program Review: November 15, 2007

Date the Current Self-Study Report was approved by the Geoscience Program Executive Committee: November 21, 2014

Section A. Mission Statement and Program Description

State your program's mission, describe its requirements and explain how they relate to UW-Green Bay's select mission and the institution's overall strategic plan. Note any changes that have been made to your program mission and requirements since the last review. Then provide a description of your program's curricular strengths and areas in need of improvement.

Geoscience is the study of Earth materials (e.g., rocks, minerals, soil, water, and air), the processes that shape and alter those components, and the interplay between the biosphere and the Earth. The program strongly emphasizes the fundamentals of geoscience, but it also focuses on groundwater management, soils, and other Earth system processes.

The Geoscience program relates to the select mission of the University primarily through its emphasis on teaching excellence. The program takes an application-focused, interdisciplinary approach, known as Earth system science, in which the physical environment is investigated as many interacting systems. The Geoscience curriculum addresses pressing environmental issues and encourages critical thinking, both in and outside the classroom. The program provides fundamental knowledge about Earth systems in a historical context that is vital to understanding the processes that limit natural resources and impact world climate. This understanding is essential to effective promotion and teaching of the environmental sustainability goals of the UWGB select mission. In addition, the Geoscience faculty has compiled an excellent record of applied scholarship that often involves students in field and laboratory research.

Several changes were made to the Geoscience program during the past seven years. The successful transition of the program's name from "Earth Science" to "Geoscience" formally occurred during Fall 2008. Reasons for requesting the name change included 1) the name "Earth Science" is frequently used either for extremely large combined programs with individual specific majors within the program, or for very small programs with minimal requirements, 2) the name "Geoscience" has gained in popularity nationally as a name for interdisciplinary programs that include geology, hydrology, hydrogeology, soil science, oceanography and meteorology, and 3) whether fairly or not, the name "Earth Science" often carries a connotation of less rigor than specifically titled majors like geology or meteorology. We are concerned that students considering a choice of majors or campuses might be deterred from enrolling by a perception of reduced rigor or a less attractive name on their transcript.

In addition to the program name change, several new changes occurred with the course program requirements for the major and minor during Fall 2012. The most substantial changes include the following:

- Introduction to Mineralogy & Petrology (4 credits; Geoscience 340). This course is now a required upper-level course, for both of the major emphases and for the minor, which takes the place of Environmental Geology (Geoscience 342). It contains three hours of lecture and one

three-hour lab per week. Intro Mineralogy & Petrology replaces Rock and Mineral Resources, which did not have a lab and was an upper-level elective. The rationale for this curriculum change came from many directions. All Geoscience and Earth Science programs we are aware of nationwide require at least one core upper-level course in mineralogy and petrology. This was an obvious deficiency in our program, which was pointed out by many, including a very successful graduate of ours, Howard Mooers, who is now a professor at the University of Minnesota – Duluth. In addition, several students who attempted to enter graduate programs at other universities struggled to gain admission because they were missing this critical piece of the geoscience discipline. Separate courses in mineralogy and petrology would be offered in a larger, more diverse geoscience program, but we feel that this course adequately addresses the needs of most of our graduates in this area.

- Introduction to Field Methods (2 credits; Geoscience 301). This course had been traditionally offered as a 3-credit lecture/lab special topics course (Geoscience 492). Because of successful enrollment and the fact that this is offered in most geoscience programs, we felt it was appropriate to include this as a separately listed offering, and 2 credits is adequate coverage of the topic.
- Principles of Physics I (Physics 201). This course has been added as a supporting course for the Geoscience major (Geoscience emphasis). This change was made for several reasons. Students will benefit significantly by gaining the necessary background in physics principles to better understand geologic phenomena and data collection methods. In addition, students wishing to pursue graduate education in Geoscience are typically required to take two semesters of calculus-based physics.
- Natural Hazards (Geoscience 102). This course is a new offering that was based on the previous “Introduction to Earth Science”. While it is not part of the major requirements, it is a NPS1 and Physical Science general education requirement. There were a number of reasons for changing this course. A major reason was that there was significant confusion by students and student advising as to what the purpose of this class was. On multiple occasions, students would take this course thinking it was the gateway course for the major, but would not get credit toward the major. They would then need to take Physical Geology (Geoscience 202), which had significant overlap, but for which students would not get credit for both courses. To avoid this unnecessary confusion, and to transition some of the content from Environmental Geology into an elective course, the new course “Natural Hazards” now fulfills the role of Geoscience 102.
- Environmental Geology (Geoscience 342). This course was removed from the list of major and minor requirements for several reasons. We felt that the best way to fix the problem of the program’s mineralogy & petrology deficiency without increasing course load was to replace Environmental Geology with Intro to Mineralogy & Petrology. We feel that the core coverage of most environmental geology topics is adequately

covered in other required courses, and this was pointed out by several students. In addition, newly listed elective courses such as Groundwater: Resources & Regulations (Env. Sci. 433) and Natural Hazards (Geoscience 102) offer some of the material once covered in Environmental Geology.

- While freshman seminars are not courses in Geoscience major or minor, Dr. Ryan Currier responded to a call from Dean Furlong for new Freshman Seminars. Geoscience 198 “Nature and American History” is being offered during Fall 2014.

With regard to curricular strengths, there are a few items of significance. A particular strength involves our program’s hands-on approach in both the laboratory and in the field. An important focal point of our program includes the regional 3-4 day field geology opportunities offered every semester as part of Env. Sci. 421, “Soils & Geology of Wisconsin Field Trip”. This course takes a substantial time commitment from two faculty members to run these trips, and limits the possibility of longer trips to other regions of the country. However, it is very popular, and students often remark on course evaluations how much they learned about the region’s geology. We also offer field trips for many of our other classes, along with many independent research opportunities for students seeking additional experience using field, laboratory, and GIS tools.

A few areas in the program might be considered in need of improvement. Our program offers most of the introductory and advanced courses that typical geoscience programs might offer. However, we are limited in our environmental geochemistry offerings, which will be partially addressed by the elective Env. Sci. 433 “Groundwater: Resources & Regulations” during the Spring 2015 semester. Our program is not large enough to sustain a course in paleontology or summer field camp, but these are not seen as major problems because many programs expect that students will take summer field camp from other institutions, and paleontology concepts are introduced in Geoscience 203/204 “Earth System History”.

At present, the Geoscience faculty feels that our program provides a solid experience for Geoscience majors and minors, and that our graduates are better prepared for graduate school than a decade ago. Continued vigilance in offering field, lab, and independent research opportunities is required to prepare students for graduate school or to enter the workforce.

Section B. Student Learning Outcomes Assessment

Describe the program's intended student learning outcomes and the methods used to assess them. Analyze the assessment results and describe the conclusions drawn from that analysis. Finally, describe what specific actions were taken as a result of the assessment of student outcomes learning.

a) Geoscience Student Learning Outcomes

All Student Learning Outcomes are contingent on students fulfilling their responsibilities, including:

- Completion of all assignments
- Spending a minimum of 3 hours of work (in & out of class) per credit per week
- Consulting with the instructor whenever problems arise

1. Students will demonstrate a knowledge base in the principles of physical and historical geology with special emphasis on the unifying theory of plate tectonics and the linkage between geological processes and global biogeochemical cycles.

2. Students will apply the scientific method to investigations of geological processes, Earth systems, and interactions among the various physical and biological realms utilizing standard scientific field and laboratory methods.

3. Students will apply their knowledge base and research skills to current Earth system based issues such as mining and management of Earth resources with emphasis on related economic, social, and public policy dimensions.

4. Students will demonstrate an understanding of the concept of geologic time and major events in the evolution of Earth and its plant and animal life.

5. Students will demonstrate an understanding of the various landscape forming processes that act on the Earth's surface (agents of weathering and erosion) and those that act from the planet's interior (mountain building, volcanism, earthquakes).

6. Students will demonstrate an understanding of how knowledge of Earth system science aids in land use decisions and mitigation of natural hazards such as flooding, earthquakes, and landslides.

7. Students will demonstrate an understanding of the functioning of hydrologic systems and the challenge of maintaining surface and ground water quality.

8. Students will demonstrate an understanding of the genesis of Earth resources including fossil fuels, metals, and nonmetallic minerals and in this way they will appreciate their finite nature.

9. Students will analyze, interpret, and report on laboratory and field findings

using appropriate statistical techniques and computer applications.

Additional student learning outcomes specific to the Earth Science education subplan:

1. Students will demonstrate knowledge in theories of the structure, origin, and evolution of the universe and solar system.
2. Students will demonstrate an understanding of the fundamental processes of the atmosphere, the resulting weather and climate, and the effects of the atmosphere on other aspects of the Earth's environments and on humans.

b) Student Learning Outcomes Assessed

Most of the outcomes are assessed by student performance in the courses most closely associated with each outcome listed above, using standard tools of examinations and research assignments. Assessment methods include course specific exams and quizzes, laboratory reports, written papers, project reports, classroom presentations, performance on lab and field practicum exercises, and participation in various field trips. Additionally, two individual learning outcomes were assessed during Spring 2014 in two different courses.

- **Learning Outcome #1** was assessed by John Luczaj in Geologic Evolution of the Earth (Geoscience 203) using two exam questions that linked geological processes and global biogeochemical cycles. The first question, which was newly designed for this assessment, was a rather difficult essay question that asked students to remember large scale processes that link geologic processes and biogeochemical cycles on Earth in the distant past. Overall, nearly all students performed at an acceptable level for all of the questions, with two exceptions. Average scores for the three criteria used were acceptable in 11 of 12 cases.

  The second question evaluated was a short answer question that Luczaj typically asks on his final exam every year. Students were asked to list and explain the causes of two specific changes on a given graph that were the result of major plate tectonic changes in Earth's history during the Cenozoic Era (the last 66 million years). Overall, nine of the twelve students answered the question at an acceptable level or above.

- **Learning Outcome #3** was assessed by Ryan Currier in a new course that we plan to offer again in the future, Special Topics: Ore Deposits (Geoscience 492). Individual research projects were assigned that focused on a target material (e.g. thorium, mercury, rubies, etc.). Students were tasked with discovering properties and uses for their material, how ore deposits formed regarding their material, and hazards associated with their material. The assessment took place as an exam question regarding material that was researched earlier in the semester. One of the course

goals was for students to attempt to integrate multiple lines of thought into the feasibility of ore extraction. Ryan Currier indicated that he was fairly pleased with the results of the assessment. All criteria assessed resulted in above acceptable averages. Most students did very well answering all aspects of the question, and all did well in at least two of the three criteria. The outcome does not warrant significant overhaul of the course content, however, but the course content will be slightly adjusted in the next course offering to tie in environmental and political aspects more strongly.

The faculty occasionally meets and discusses student performance based on the learning outcomes. Because specific learning outcomes are typically addressed within specific courses, these discussions tend to deal with broader issues, such as overall performance, common problems, and level of motivation. The most significant problems noted are poor retention of material between courses, weak mathematical and spatial visualization skills, and sometimes, limited motivation.

Based on the outcome of both targeted assessments, in conjunction with other assessment in all courses, we are generally pleased with the performance of the students during this assessment. Furthermore, we do not believe that curricular changes or faculty development changes are necessary in response to the assessment. Since the last Program Review in 2007, we have seen continued improvement in performance and overall motivation with the increase in available high-impact activities such as laboratories, field courses, and independent research projects.

c) Other Information

ASBOG (Association of State Boards of Geology) has formulated two certification examinations: Fundamentals of Geology and Practice of Geology. The Practice examination is normally taken after the five years' professional experience required by most state licensure boards, but the Fundamentals examination is given at a number of institutions as an exit exam. The high cost of the examination precludes our doing so here, but their task list is a useful basis for planning our teaching and learning objectives.

Three attempts to contact ASBOG (one phone call and two emails) were made to request statistical information for the period between 2010 and 2014, but no information was received regarding these inquiries. However, a report generated by ASBOG in 2010 for the period including all of 2008 and 2009 does provide some limited information. During this time, three candidates from UWGB took the exam, with 2 of 3 (66.7%) passing the Fundamentals of Geology exam. While this represents a very small pool, the results compare favorably with a 57.5% passing rate for all candidates nationally on this exam during this period. The mean scores in several sections were passing overall, but a few sections including mineralogy, petrology, petrography, and environmental geochemistry had lower performance. We believe that the new Geoscience program requirements since 2013 that include Mineralogy and Petrology will help improve future performance in this area.

Section C. Program Accomplishments and Student Success

Describe your program's major accomplishments and student successes since the last Academic Program Review (e.g., internship program; enrollment increases; student achievements, awards, publications, and presentations; faculty scholarly activity, graduate school admission, diversification of students and faculty; program and faculty awards). Also describe faculty and staff professional development activities and how they impacted your program.

Since the last review in 2007, the Geoscience Program has seen significant modifications, stable enrollment, and vigorous faculty scholarship activities.

a) New Faculty, Awards and Recognition, and Procurement of Resources

With the retirement of Professor Steven Dutch in May 2012, the Geoscience program successfully filled the open position with the hire of Dr. Ryan Currier. Dr. Currier brought with him an array of expertise in the fields of mineralogy, igneous petrology, structural geology, and others, along with a vigorous research program that involves the plumbing of magma systems in Earth's crust.

The Geoscience unit has been successful in acquiring limited modern and used microscope equipment for the Intro Mineralogy & Petrology and other courses through laboratory modernization grants and one-time funds. These have substantially improved our ability to provide students with the ability to investigate rocks and rock-forming processes at the microscopic scale, which is standard in geoscience courses nationwide. At present, we have enough petrographic microscopes so that only 2 students need to share a microscope. Ideally, one microscope should be available for each student during lab time. In addition, we have supplemented our limited supply of binocular specimen microscopes with surplus scopes from human biology. However, these microscopes are difficult to work with, and we have no capability for image capture that is necessary for high quality student projects. We plan to seek Laboratory Modernization funds for additional microscopes in the future. As of Fall 2014, we have a request in for Laboratory Modernization funds to improve our collection of rock thin sections for use under petrographic microscopes in two of our upper level courses.

All four Geoscience faculty have received recognition for either research, teaching, or service activities. We are very happy to note that in 2014, Geoscience Professor Kevin Fermanich was awarded the Barbara Hauxhurst Cofrin Professorship in Natural Sciences for his outstanding research and service contributions. Steve Meyer was a recipient of both the Outstanding Support Staff Award in 2010-2011 and a Student Nominated Teaching Award in 2012. He was nominated for other Student Nominated Teaching Awards. Ryan Currier was nominated for a Student Nominated Teaching Award in 2013, and John Luczaj was also nominated for the same award in 2011 and 2012. Ryan Currier and John Luczaj were recognized by Chancellor Tom Harden in 2014 with a letter of commendation for outstanding service to the Green Bay Learning in Retirement program. John also received the UWGB TriBeta Club's "Professor of the Month" for February 2012 and the "Rockhound of the Year" award from the Neville Public Museum Geology Club in 2008.

b) Student Internships and Independent Research Successes

While Geoscience does not have a formal internship program, many of our students have obtained internship opportunities through local and regional partners such as the Wisconsin DNR, NEW Water, the Neville Public Museum, WFRV-TV, Clean Water Action Council, the Planetary Sciences Institute, and others.

Some of our students have been recognized as worthy recipients of scholarships, both from the Department of Natural & Applied Sciences, as well as outside organizations, such as the Neville Public Museum Geology Club.

Geoscience professors have supervised over two-dozen undergraduate independent research projects for Geoscience students over the past seven years. These include projects on groundwater quality, rock chemistry, meteorology, stream monitoring, paleontology, and others. Several of these have resulted in student presentations at scientific meetings such as the American Water Resources Institute. Two students who have recently completed projects are planning to present at 2015 meetings.

c) Faculty Scholarly Activity

Faculty members in the Geoscience program are productive scholars. Several internal and externally funded grants were awarded during the 2007-2014 period. Many of these projects supported student research, student employment, and an academic researcher. An overview of some of these projects is given below.

- The Lower Fox River Watershed Monitoring Program (Kevin Fermanich Director). This is a project that has been ongoing since 2003, with generous multi-million dollar support from Arjo Wiggins Appleton, Inc. (a private corporation) to establish a watershed monitoring program in the Lower Fox River basin. It is a cooperative effort between UW-Green Bay (NAS and the Cofrin Center for Biodiversity), UW-Milwaukee, US Geological Survey, five high schools, the Oneida Nation, and the Green Bay Metropolitan Sewerage District. The project enabled us to hire an academic researcher with extensive experience in watershed modeling and GIS (Geographical Information System) landscape analysis. The project also provided a number of opportunities for Geoscience and Environmental Science students to learn about watershed monitoring through field trips, hands-on projects and interaction with the watershed analysis efforts.
- Several well-funded research projects focus on the health of Green Bay and its tributaries (Kevin Fermanich). Various cooperative projects, including partners such as NOAA, UW-Milwaukee, NEW Water, and The Oneida Tribe of Indians focus on stream analysis and monitoring, comprehensive modeling of the watershed inputs to Green Bay, along with direct monitoring of Green Bay.
- Additional collaborative grant-funded research by Kevin Fermanich addressed establishment of biomass grasslands in Wisconsin and groundwater quality

research in northeastern Wisconsin.

- Geologic Mapping of the Bedrock of Brown County involved two-years of funding through the U.S. Geological Survey and UW-Extension (Wisconsin Geological & Natural History Survey). This project was directed by John Luczaj and involved several student researchers and outside organizations.
- Two additional externally funded projects, along with other internally funded projects, were supervised by John Luczaj that focused on the groundwater quality and bedrock chemistry of northeastern Wisconsin. All of these projects involved undergraduate or graduate students. One of these projects, which focused on dissolved strontium in groundwater, has received considerable media attention.
- John Luczaj coauthored the 4th edition of a major textbook in 2014 entitled "Earth System History", along with award-winning author Steven M. Stanley.
- Ryan Currier has continued research on physical modeling of the magma movement in Earth's crust, and currently has several papers in manuscript. He and Patrick Forsythe included this research into Env. Sci. 467 (now Capstone in Environmental Science), a hands-on upper level course in which students are directly involved in a research project. This work will is included in a manuscript targeted for submittal to a peer-reviewed journal in 2015, and students have the opportunity to participate as coauthors.
- Steve Meyer continues his long-term research on evaluating the quality of meteorological predictions by the National Weather Service and the Weather Channel. An excellent presentation of his research was given at a 2013 NAS Departmental Science Seminar.

Faculty development opportunities are numerous, and include a year-long sabbatical by Kevin Fermanich during 2012-2013, participation in teaching conferences, etc. These activities have positively impacted our program in several ways. First, the participation in teaching conferences that focus on high-impact practices has allowed us to better manage and incorporate these practices into our program, as well as showcase what we've done in our program. Professor Fermanich's sabbatical allowed him to improve his understanding of environmental monitoring technologies and to incorporate these into the teaching program for environmental science.

Section D. Program Enrollment Trends and Analysis

Provide an analysis of the data (both survey and institutional enrollment data) provided by the Office of Institutional Research and Assessment. Pay close attention to the demographic information. What trends are present? Are there any imbalances in terms of gender, race, or ethnicity? Describe what specific actions, if any, were taken or are intended to be taken based on the conclusions drawn from the analysis.

Please note: Due to the program name change from Earth Science to Geoscience, new historical data has been generated by the Office of Institutional Research and Assessment that may differ from the original data in the URL from

spring 2014. ***The new information containing a merged dataset for Earth Science and Geoscience is located here***:
http://www.uwgb.edu/oira/reports/ProgramReviewFiles/GEO-ES.htm

Two sets of data were used to make an analysis of enrollment trends. A recently modified set for 2008-2013 includes both Earth Science and Geoscience data because of the name change in the program. I have also compared these results with data available for Fall 2014. First, it is apparent that our enrollment is generally steady, with an average of just under 20 majors at any given time. This steady enrollment appears to continue in Fall 2014, with 18 declared majors (and at least one additional student that has indicated he will be declaring soon). This steady enrollment is encouraging, especially because of the apparent decline in science majors who are seeking certification for teaching at the high school level. In previous years, a significant proportion of Earth Science/Geoscience majors were education minors who were seeking teaching certification. This is not presently the case, possibly due to negative perceptions among students regarding the teaching profession in the State of Wisconsin.

The numbers of declared Geoscience minors appear a bit more variable, with numbers ranging between 5 and 14 per year. It is unclear why the minors are more variable, but some of these students were education majors with a geoscience minor. Fewer education majors appear to have declared as geoscience minors recently.

With regard to demographic information, it is difficult to assess these data because only 1 or 2 students have a strong affect on the overall percentages. It appears that during any given year, the Geoscience program has had 1 or 2 majors who are minorities over the past 6 years, which is equivalent to 5-11%. This is not greatly different than UWGB's average of about 9%. This trend is similar to the national trend, based upon available data, which indicate that between about 3% and 9% of the Geoscience degrees awarded went to underrepresented minorities (American Geosciences Institute, 2014). http://www.americangeosciences.org/sites/default/files/currents/Currents-83-MinorityDegreesAwarded.pdf

Female Geoscience students vary between about 20% and 40%. While this is lower than the percentage of women at UWGB, it is at times similar to the national average of geoscience students, which has recently grown to just under 40% (American Geosciences Institute, 2014). The data show significant variation from year to year due to the small dataset. As of October 2014, 6 of 18 majors were female, which is 33%.
http://www.americangeosciences.org/sites/default/files/currents/Currents-086-GenderDegrees2013.pdf

Based upon the available information, no action has been taken over the past several years to address any imbalances. We also do not feel that there are significant imbalances or trends in data that would warrant action at the present time.

Section E. Program's Vision for Future Development

Describe your program's plan for future development including the program's major goals for the next seven-year period. These goals should established with the understanding that they will be used to guide program planning and development and serve as a framework for your program's next Self-Study Report.

Our program has been relatively stable during this period, despite a faculty retirement/rehire, the program name change, a modification of the program requirements, and a decline in secondary education teachers. Our goals for the future are four-fold. We feel it is important to:

1. Reach out to high schools and two-year campuses in the region to seek out incoming freshman or transfer students interested in majoring in Geoscience.

   A large number of our students have historically been transfer students. With the unfortunate passing of Catherine Helgeland (UW-Manitowoc) in 2011, we have noticed that the number of transfer students from UW-Manitowoc in Geoscience has decreased (only 2 at present). Her program supplied a number of high quality Geoscience students through the years, and we feel that reaching out to the new instructor there, at other regional two-year campuses, and at regional high schools would be potentially very helpful for recruiting new students.

2. Improve the content of the Geoscience website to market our program and its opportunities.

   After the retirement of Steve Dutch in 2012, an important web presence for UWGB Geoscience became stagnant, and we would like to reinvigorate this outlet for our program. A display of our field trips, research projects, and student achievements would be a significant tool to attract high quality students. We have noticed that other programs are doing this, and our website has been lacking in relevant content and support to keep that content updated.

3. Increase the number of UWGB Geoscience graduates who pursue a graduate degree.
   While a number of our graduate students in Geoscience have continued on in our Environmental Science & Policy graduate program here at UWGB, we feel that we can prepare our students to succeed in traditional Geoscience graduate programs elsewhere. This is difficult because so many of our students end up with private loan debt, which prevents them from continuing on immediately, which is often the best plan. It is important to recognize that our program cannot prosper on the demand for local geoscientists. Better preparing our students for future careers in graduate school (or secondary education) will provide the best path forward for our program to grow.

4. Increase opportunities for student research and travel opportunities.

   This is especially important in light of the attention student research receives from prospective employers. This is important for many reasons, including the

fact that UWGB lost the Wisconsin Space Grant Consortium in 2014 with the departure of Dr. Aileen Yingst. It will be necessary to replace some of these student experiences that were available through WSGC through the years.

Ryan Currier has recently made an agreement with Chad Deering (Michigan Tech) to collaborate on Michigan research projects with UWGB undergraduates and Michigan Tech. graduate students. We hope this new partnership will allow for interesting and fruitful opportunities for our majors.

Ryan Currier also plans to resubmit a collaborative proposal to NSF Polar Programs. The project will include students and faculty from St. Norbert's University, Michigan Tech., and UWGB. If funded, students and faculty will spend several weeks in Antarctica, followed with several semesters of data collection and analysis, and presentations at national conferences.

We are also looking into the possibility of extended length field trips to places such as the Black Hills of South Dakota or Death Valley, California. These are classic geology field localities that students have expressed interest in visiting.

Recently, significant attention at the University has been given to high impact practices, which require intensive and personal faculty contact and experiential learning. Although this desire for high impact practices has not come with additional funding, there can be little doubt of the merit to these practices. In the geosciences, field trips to different places are the best way to illustrate the variability in rocks, soils, and groundwater that occur at various geographic and spatial scales. For example, beginning in the fall of 2005, our program began offering 3- or 4- day offerings of Environmental Science 421, "Soils and Geology of Wisconsin Field Trip". We have continued this practice over the past seven years to numerous places in the upper Midwest, including the Baraboo, Wisconsin area, the Upper Peninsula of Michigan, Northeast Wisconsin, Central Wisconsin, and Northern Minnesota. We feel that this course has played an integral role in improving camaraderie and enthusiasm among the students, and it has kept our major enrollments stable during a period of decreasing enrollment.

Resources necessary to continue this type of successful practice include:

- Easy access to vehicles
- Support for trips to help relieve the cost burden on the students
- Freeing up faculty time to permit preparation and conduct of trips
- Elimination of bureaucratic obstacles: permitting student travel even if not specifically required for courses (for example, to scientific meetings).

Liability concerns have restricted the use of large vans (12-15 passengers) and created concern about the ability to conduct field trips not just on this campus but the entire UW-System. It is more costly to rent a larger number of small vans, harder to obtain the required number of licensed drivers, and harder to maintain group integrity on the road. The addition of two medium-capacity vans (12 passenger vans with a seat removed so that 8 passengers will fit), has been a welcome change at the motorpool. However, the availability of vehicles is still

somewhat limited, with some dates having no fleet vehicles of any kind available (even cars). Outside rental through Enterprise requires significant additional time and hassle, vehicle shuttling, extra fees, etc., that add additional challenges.

We would also like to respond to student interest to offer longer trips, such as over spring break, late August, or just after the spring semester. Rules regarding the collection of fees from students for such trips pose significant barriers. As far as we can ascertain from the study of other campuses, other campuses do not seem to have such a rigid and inflexible approach to field trip fees. The ideal mechanism would be for the Office of International Education to assume responsibility for the logistics of all long trips, not merely those outside the U.S. Also, the present system fails to allow for the possibility of trips on short notice. For example, if students spontaneously express a desire for a Spring Break field trip, there is no mechanism now available for offering it as a course or collecting fees.

Section F. Summary and Concluding Statement

Respond specifically to the results and recommendations from the last review and end your report with a general concluding statement.

In the 2008 report, the AAC noted that there was not sufficient faculty to provide collegial coverage in case of sabbatical. Indeed, only about half of the course load by the four Geoscience faculty is devoted to courses required for the major. The rest of the course contact includes substantial contributions to general education, the environmental science program, or the ES & P graduate program. At present, typical semesters require overloads to cover the necessary courses, and sabbatical coverage may require substantial overloads or outside coverage. This is a challenge that we have been able to meet, albeit with an extensive number of faculty course preparations and overloads. Additional faculty or lecturer expertise could certainly help alleviate some of these concerns going forward.

Other issues noted in 2008 were an improvement in the assessment plan and a perceived gender imbalance in the program. We feel that the assessment concerns were adequately addressed in Section B by recent assessments and analysis of available outside data from ASBOG. With regard to perceived gender and minority imbalances, we feel that our program demographics are similar to the nationwide averages for Geoscience, and that this should not be a major concern going forward.

Significant recent changes in the Geoscience Program have placed us on a more solid footing for the future. Our enrollments have been stable, despite several challenges, and we feel that our recent curriculum changes will provide students with much improved Geoscience skills to aid them in graduate school and the workforce. All of our four faculty members are actively engaged in scholarship and/or service. The active research focus in our program provides students with strong opportunities for diverse academic preparation and research skills in the geosciences.

Section G. Required Attachments

Four attachments (and only these four) should be included with the Self-Study Report:

1. *A series of tables, prepared by the Office of Institutional Research and Assessment. A list of these tables is included in Appendix C.*
2. *The program's current official description and requirements as published in the most recent Undergraduate Catalog;*
3. *The Academic Affairs Council and Dean's conclusions and recommendations from the program's last review; and*
4. *The program's Assessment Plan and Annual Updates on Student Outcomes Assessment (see the descriptions below). These processes will be coordinated by the University Assessment Council, the UAC's Academic Program Assessment Subcommittee and are described in the University Assessment Plan.*

http://www.uwgb.edu/oira/reports/ProgramReviewFiles/GEO-ES.htm

Academic Plan: Geoscience or Earth Science

Institutional Research - Run date: 27OCT2014

	Fall Headcounts						
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Declared Majors, end of term	21	18	16	17	19	19	15
Declared Minors, end of term	5	7	13	10	14	9	5

Fall Declared Majors - Characteristics

	2007		2008		2009		2010		2011		2012		2013	
Female	8	38%	7	39%	5	31%	3	18%	7	37%	8	42%	6	40%
Minority	0	0%	1	6%	1	6%	1	6%	1	5%	2	11%	1	7%
Age 26 or older	0	0%	3	17%	3	19%	2	12%	3	16%	3	16%	2	13%
Location of HS: Brown County	3	14%	1	6%	2	13%	3	18%	5	26%	6	32%	5	33%
Location of HS: Wisconsin	20	95%	18	100%	16	100%	17	100%	18	95%	18	95%	12	80%
Attending Full Time	18	86%	16	89%	15	94%	16	94%	15	79%	15	79%	12	80%
Freshmen	3	14%	1	6%	0	0%	1	6%	0	0%	0	0%	0	0%
Sophomores	9	43%	2	11%	1	6%	1	6%	2	11%	2	11%	4	27%
Juniors	4	19%	9	50%	5	31%	7	41%	7	37%	4	21%	5	33%
Seniors	5	24%	6	33%	10	63%	8	47%	10	53%	13	68%	6	40%

Fall Declared Majors - Characteristics							
	2007	2008	2009	2010	2011	2012	2013
Average HS Cumulative G.P.A.	3.38	3.24	3.21	3.31	3.27	3.34	3.38
Average ACT Composite Score	23.5	23.3	22.8	22.9	22.4	22.4	23.8
Average ACT Reading Score	23.9	23.4	21.5	22.1	22.9	23.8	24.6
Average ACT English Score	22.1	22.0	22.5	21.4	20.7	20.9	22.1
Average ACT Math Score	23.9	23.5	23.3	23.9	23.0	22.7	23.9
Average ACT Science Score	24.2	24.0	23.6	23.4	22.9	22.3	24.5

Academic Plan: Geoscience or Earth Science

Institutional Research - Run date: 27OCT2014

	Fall Declared Majors - Characteristics						
	2007	2008	2009	2010	2011	2012	2013
Percent started as Freshmen	38%	39%	38%	53%	32%	37%	53%
Percent started as Transfers	62%	61%	63%	47%	68%	63%	47%
Percent with prior AA degree	10%	11%	13%	18%	21%	16%	20%
Percent with prior BA degree	14%	11%	13%	6%	16%	5%	13%

	Calendar Year Headcounts						
	2007	2008	2009	2010	2011	2012	2013
Graduated Majors (May, Aug. & Dec.)	4	4	4	5	5	5	5
Graduated Minors (May, Aug. & Dec.)	2	3	1	6	4	5	5

Characteristics of Graduated Majors	2007		2008		2009		2010		2011		2012		2013	
Graduates who are... Women	2	50%	1	25%	3	75%	1	20%	1	20%	0	0%	1	20%
... Students of Color	0	0%	0	0%	0	0%	1	20%	0	0%	0	0%	0	0%
... Over 26 Years Old	2	50%	2	50%	0	0%	1	20%	2	40%	2	40%	1	20%
Graduates earning Degree Honors	1	25%	3	75%	0	0%	1	20%	1	20%	1	20%	2	40%

	Characteristics of Graduated Majors						
	2007	2008	2009	2010	2011	2012	2013
Average Credits Completed Anywhere	173	143	136	153	137	167	133
Average Credits Completed at UWGB	161	113	119	89	114	154	121
Average Cum GPA for Graduates	3.30	3.57	2.84	2.96	3.04	2.98	3.07

Academic Subject: GEO-ES

Institutional Research - Run date: 27OCT2014

			Headcount Enrollments, Credit-bearing Activities						
			2007	2008	2009	2010	2011	2012	2013
Lectures	1-Lower	1-Spring	271	277	278	289	271	224	253
		2-Summer	16	9	.	.	.	.	.
		3-Fall	378	305	339	333	253	221	209
		All	665	591	617	622	524	445	462
	2-Upper	1-Spring	7	12	18	17	19	12	18
		2-Summer	.	.	.	.	.	.	.
		3-Fall	14	9	12	10	29	17	6
		All	21	21	30	27	48	29	24
	All		686	612	647	649	572	474	486
IST/FEX	1-Lower	1-Spring	1	.	.	1	.	1	.
		2-Summer	.	.	.	.	.	.	.
		3-Fall	.	.	1	2	.	.	.
		All	1	.	1	3	.	1	.
	2-Upper	1-Spring	2	1	.	2	1	1	5
		2-Summer	.	.	.	.	.	2	1
		3-Fall	.	2	2	1	.	2	.
		All	2	3	2	3	1	5	6
	All		3	3	3	6	1	6	6
All			689	615	650	655	573	480	492

Academic Subject: GEO-ES

Institutional Research - Run date: 27OCT2014

			Student Credit Hours, Credit-bearing Activities						
			2007	2008	2009	2010	2011	2012	2013
Lectures	1-Lower	1-Spring	795	819	817	858	806	663	743
		2-Summer	48	27	.	.	.	.	.
		3-Fall	1132	923	1017	996	762	652	632
		All	1975	1769	1834	1854	1568	1315	1375
	2-Upper	1-Spring	21	36	54	51	50	36	50
		2-Summer	.	.	.	.	.	.	.
		3-Fall	42	27	36	30	87	51	18
		All	63	63	90	81	137	87	68
	All		2038	1832	1924	1935	1705	1402	1443
IST/FEX	1-Lower	1-Spring	1	.	.	1	.	1	.
		2-Summer	.	.	.	.	.	.	.
		3-Fall	.	.	1	2	.	.	.
		All	1	.	1	3	.	1	.
	2-Upper	1-Spring	6	1	.	2	3	1	6
		2-Summer	.	.	.	.	.	3	1
		3-Fall	.	3	3	1	.	2	.
		All	6	4	3	3	3	6	7
	All		7	4	4	6	3	7	7

Academic Subject: GEO-ES

Institutional Research - Run date: 27OCT2014

			Lectures and Lab/Discussion Sections (#)						
			2007	2008	2009	2010	2011	2012	2013
Lectures	1-Lower	1-Spring	6	6	6	6	6	6	6
		2-Summer	1	1	.	.	.	.	.
		3-Fall	5	4	5	5	5	4	4
		All	12	11	11	11	11	10	10
	2-Upper	1-Spring	1	2	2	2	2	2	2
		2-Summer	.	.	.	.	.	.	.
		3-Fall	2	1	1	1	2	2	1
		All	3	3	3	3	4	4	3
	All		15	14	14	14	15	14	13
Lab/Disc	1-Lower	1-Spring	2	2	2	2	2	2	2
		2-Summer	.	.	.	.	.	.	.
		3-Fall	2	2	2	2	2	2	2
		All	4	4	4	4	4	4	4
	2-Upper	1-Spring	2	2	2	1	1	2	2
		2-Summer	.	.	.	.	.	.	.
		3-Fall	2	.	1	1	2	2	.
		All	4	2	3	2	3	4	2
	All		8	6	7	6	7	8	6
All			23	20	21	20	22	22	19

Academic Subject: GEO-ES

Institutional Research - Run date: 27OCT2014

			Average Section Size of Lectures						
			2007	2008	2009	2010	2011	2012	2013
Lectures	1-Lower	1-Spring	45.2	46.2	46.3	48.2	45.2	37.3	42.2
		2-Summer	16.0	9.0	.	.	.	.	.
		3-Fall	75.6	76.3	67.8	66.6	50.6	55.3	52.3
		All	55.4	53.7	56.1	56.5	47.6	44.5	46.2
	2-Upper	1-Spring	7.0	6.0	9.0	8.5	9.5	6.0	9.0
		2-Summer	.	.	.	.	.	.	.
		3-Fall	7.0	9.0	12.0	10.0	14.5	8.5	6.0
		All	7.0	7.0	10.0	9.0	12.0	7.3	8.0
	All		45.7	43.7	46.2	46.4	38.1	33.9	37.4

Unique Lecture Courses Delivered in Past Four Years							
	2007	2008	2009	2010	2011	2012	2013
1-Lower	4	4	4	4	4	4	4
2-Upper	5	5	5	5	5	5	6

General Education as a Percent of all Credits in Lectures							
	2007	2008	2009	2010	2011	2012	2013
1-Lower	98%	97%	98%	97%	96%	96%	98%
2-Upper	0%	0%	0%	0%	0%	0%	0%

Alumni Survey: 2009, 2010, 2011, 2012 & 2013

	Survey year	Graduation Year	Geoscience	UWGB Overall
Graduates:	2009	2005-2006	5	1087
	2010	2006-2007	2	1148
	2011	2007-2008	5	1162
	2012	2008-2009	2	1133
	2013	2009-2010	6	1295
Response Rate*	2009-2013		3/20 (15%)	882/5825 (15%)

* Note: % response misses double-majors who chose to report on their other major.

Table 1. Preparation & Importance ▪ **Preparation by UWGB (5-pt. scale; 5 = excellent)** ▪ **Importance to current job or graduate program (5-pt. scale; 5 = very important)**	**Unit of Analysis**	**2009-2013**					
		Preparation			**Importance**		
		n	**Excellent or Good**	**Mean**	**n**	**Very important or Important**	**Mean**
Critical analysis skills.	GEOSC	2	100%	4.0	1	100%	4.0
	UWGB	702	67%	3.8	684	91%	4.5
Problem-solving skills.	GEOSC	2	50%	3.5	1	100%	4.0
	UWGB	704	69%	3.8	679	94%	4.7
Understanding biology and the physical sciences.	GEOSC	2	100%	4.0	1	100%	5.0
	UWGB	672	46%	3.4	671	30%	2.6
Understanding the impact of science and technology.	GEOSC	2	100%	4.5	1	100%	5.0
	UWGB	670	47%	3.4	675	43%	3.2
Understanding social, political, geographic, and economic structures.	GEOSC	2	100%	4.0	1	0	3.0
	UWGB	689	60%	3.7	676	57%	3.5
Understanding the impact of social institutions and values.	GEOSC	2	100%	4.5	1	0	3.0
	UWGB	692	68%	3.9	676	63%	3.7
Understanding the significance of major events in Western civilization.	GEOSC	2	100%	4.5	1	0	3.0
	UWGB	682	53%	3.5	673	28%	2.6
Understanding a range of literature.	GEOSC	2	100%	4.0	1	0	3.0
	UWGB	678	50%	3.5	669	32%	2.7
Understanding the role of the humanities in identifying and clarifying individual and social values.	GEOSC	1	100%	4.0	1	0	3.0
	UWGB	676	57%	3.6	663	39%	3.0
Understanding at least one Fine Art, including its nature and function(s).	GEOSC	1	100%	5.0	1	0	3.0
	UWGB	682	60%	3.7	667	25%	2.5
Understanding contemporary global issues.	GEOSC	1	0	3.0	1	0	3.0
	UWGB	680	54%	3.6	665	52%	3.4
Understanding the causes and effects of stereotyping and racism.	GEOSC	1	100%	5.0	1	0	3.0
	UWGB	682	63%	3.8	668	56%	3.5
Written communication skills.	GEOSC	1	100%	4.0	1	100%	4.0
	UWGB	694	80%	4.1	672	92%	4.7

Table 1. Preparation & Importance
- **Preparation by UWGB (5-pt. scale; 5 = excellent)**
- **Importance to current job or graduate program (5-pt. scale; 5 = very important)**

	Unit of Analysis	2009-2013					
		Preparation			Importance		
		n	Excellent or Good	Mean	n	Very important or Important	Mean
Public speaking and presentation skills.	GEOSC	1	100%	4.0	1	100%	4.0
	UWGB	690	60%	3.7	676	85%	4.4
Reading skills.	GEOSC	1	0	3.0	1	100%	4.0
	UWGB	689	73%	4.0	670	91%	4.6
Listening skills.	GEOSC	1	100%	4.0	1	100%	4.0
	UWGB	689	74%	4.0	672	96%	4.8
Leadership and management skills.	GEOSC	1	100%	4.0	1	100%	4.0
	UWGB	691	65%	3.8	668	94%	4.7

Table 2. Educational experiences
(5-pt. scale; 5 = strongly agree)

	Unit of Analysis	N	Strongly Agree or Agree	Mean
My educational experiences at UW-Green Bay helped me to learn or reinforced my belief that learning is a lifelong process.	GEOSC	3	100%	4.0
	UWGB	877	93%	4.4
While at UW-Green Bay, I had frequent interactions with people from different countries or cultural backgrounds than my own.	GEOSC	3	100%	4.3
	UWGB	870	51%	3.4
Students at UW-Green Bay are encouraged to become involved in community affairs.	GEOSC	3	67%	3.7
	UWGB	866	59%	3.6
My experiences and course work at UW-Green Bay encouraged me to think creatively and innovatively.	GEOSC	3	100%	4.3
	UWGB	877	87%	4.1
The interdisciplinary, problem-focused education provided by UW-Green Bay gives its graduates an advantage when they are seeking employment or applying to graduate school.	GEOSC	3	67%	3.7
	UWGB	870	78%	4.0
UW-Green Bay provides a strong, interdisciplinary, problem-focused education.	GEOSC	3	100%	4.0
	UWGB	877	83%	4.1
Students at UW-Green Bay have many opportunities in their classes to apply their learning to real situations.	GEOSC	3	67%	4.0
	UWGB	872	73%	3.9
I would recommend UW-Green Bay to co-worker, friend, or family member.	GEOSC	3	67%	3.7
	UWGB	879	90%	4.4
The General Education requirements at UWGB were a valuable component of my education.	GEOSC	3	67%	3.7
	UWGB	840	58%	3.5
UWGB cares about its graduates.	GEOSC	3	33%	3.3
	UWGB	846	61%	3.7
I feel connected to UWGB.	GEOSC	3	67%	3.7
	UWGB	866	45%	3.3

Table 3. "If you could start college over"	Unit of Analysis	n	UW-Green Bay		Another college		No bachelor's degree anywhere
			Same major	Different major	Same major	Different major	
2009–2013 percent	GEOSC	3	0	100%	0	0	0
	UWGB	876	64%	24%	7%	4%	1%

Table 4. Rating the MAJOR (Scale: A = 4, B = 3, etc.)	Unit of Analysis	2009–2013			
		n	A or B	C or D	mean
Quality of teaching.	GEOSC	3	100%	0	3.0
	UWGB	880	95%	5%	3.5
Knowledge and expertise of the faculty.	GEOSC	3	100%	0	3.7
	UWGB	878	98%	2%	3.7
Faculty-student relationships (e.g., helpfulness, sensitivity, acceptance of different views).	GEOSC	3	100%	0	3.0
	UWGB	877	91%	9%	3.5
Importance and relevance of courses to professional and academic goals.	GEOSC	3	67%	33%	2.7
	UWGB	872	89%	11%	3.4
Advising by faculty (e.g., accuracy of information).	GEOSC	3	33%	67%	2.3
	UWGB	861	87%	12%	3.4
Availability of faculty (e.g., during office hours).	GEOSC	3	100%	0	3.3
	UWGB	859	93%	7%	3.6
Overall grade for the major (not a sum of the above).	GEOSC	2	100%	0	3.0
	UWGB	867	94%	6%	3.5

Table 5. Highest degree planned	Unit of Analysis	n	Bachelor's	Master's	Specialist	Professional	Doctoral
2009-2013 percent	GEOSC	3	67%	0	0	0	33%
	UWGB	878	36%	46%	1%	5%	12%

Table 6. Graduate/professional study plans	Unit of Analysis	n	Already graduated	Currently enrolled	Accepted, not enrolled	Rejected	Have not applied
2009-2013 percent	GEOSC	1	0	0	0	0	100%
	UWGB	592	22%	23%	4%	3%	48%

Table 7. Current employment status	GEOSCI (n = 3)	UWGB (n = 879)
Employed full-time (33 or more hours/week)	67%	78%
Employed part-time	33%	12%
Unemployed, seeking work	0	4%
Unemployed, not seeking work	0	2%
Student, not seeking work	0	3%

Table 8. Satisfaction with current job (5-pt. scale; 5 = very satisfied)	Unit of Analysis	n	Very satisfied or satisfied	mean
2009-2013 percentage	GEOSC	3	67%	3.3
	UWGB	793	72%	3.9

Table 9. Minimum educational requirements for current job	GEOSCI (n = 3)	UWGB (n = 788)
High school or less	0	19%
Certificate	33%	3%
Associate's degree	0	14%
Bachelor's degree	67%	57%
Graduate degree	0	8%

Table 10. Extent to which job relates to major	GEOSCI (n = 3)	UWGB (n = 789)
Very related	33%	51%
Somewhat related	33%	30%
Not at all related	33%	20%

Table 11. Current income	GEOSCI (n = 3)	UWGB (n = 766)
Under $20,000	33%	13%
$20,000 to $25,999	0	11%
$26,000 to $29,999	0	8%
$30,000 to $35,999	67%	22%
$36,000 to $39,999	0	13%
$40,000 to $49,999	0	15%
$50,000 or more	0	18%

Employers, Locations, and Job Titles

Festival Foods	De Pere	Wisconsin	Meat Clerk
County of Door	Sturgeon Bay	Wisconsin	Conservationist
PPG Industries	Oak Creek	Wisconsin	Development Technician III

Graduating Senior Survey:
2009, 2010, 2011, 2012 & 2013

	Graduation Year	Geoscience	UWGB Overall
Graduates:	2009	4	1051
	2010	5	1106
	2011	5	1185
	2012	5	1293
	2013	5	1229
Response Rate*	2009-2013	14/24 (58%)	2897/5864 (49%)

* Note: % response misses double-majors who choose to report on their other major.

Table 1: Rating the MAJOR (A = 4, B = 3.0, etc.)	**Unit of Analysis**	**2009-2013**						
		N	**mean**	**A**	**B**	**C**	**D**	**F**
Clarity of major requirements	GEOSCI	14	4.0	64%	21%	0	7%	7%
	UWGB	2890	3.5	57%	35%	6%	2%	<1%
Reasonableness of major requirements	GEOSCI	14	4.0	57%	29%	14%	0	0
	UWGB	2885	3.5	55%	37%	6%	1%	<1%
Variety of courses available in your major	GEOSCI	14	3.0	14%	43%	21%	21%	0
	UWGB	2872	3.0	33%	42%	19%	5%	1%
Frequency of course offerings in your major	GEOSCI	14	2.0	7%	29%	36%	28%	0
	UWGB	2874	2.7	20%	40%	28%	9%	3%
Times courses were offered	GEOSCI	14	3.0	29%	50%	7%	14%	0
	UWGB	2823	2.9	26%	42%	24%	6%	2%
Quality of internship, practicum, or field experience	GEOSCI	10	4.0	80%	20%	0	0	0
	UWGB	1625	3.3	57%	27%	10%	4%	2%
Quality of teaching by faculty in your major	GEOSCI	14	4.0	64%	36%	0	0	0
	UWGB	2869	3.4	52%	38%	8%	1%	<1%
Knowledge and expertise of the faculty in your major	GEOSCI	14	4.0	93%	7%	0	0	0
	UWGB	2885	3.6	69%	27%	4%	<1%	<1%
Faculty encouragement of your educational goals	GEOSCI	14	4.0	64%	29%	0	7%	0%
	UWGB	2851	3.4	55%	30%	11%	3%	1%
Overall quality of advising received from the faculty in your major	GEOSCI	14	4.0	57%	36%	0	0	7%
	UWGB	2748	3.2	52%	26%	12%	6%	4%
Availability of your major advisor for advising	GEOSCI	14	4.0	79%	14%	0	0	7%
	UWGB	2737	3.3	58%	25%	10%	4%	3%
Ability of your advisor to answer university questions	GEOSCI	14	4.0	64%	21%	0	7%	7%
	UWGB	2699	3.4	63%	22%	9%	4%	2%
Ability of your advisor to answer career questions	GEOSCI	13	4.0	69%	15%	8%	0	8%
	UWGB	2446	3.2	52%	27%	13%	5%	3%
In-class faculty-student interaction	GEOSCI	14	3.5	50%	21%	0	29%	0
	UWGB	2795	3.1	43%	30%	13%	12%	<1%
Overall grade for your major (**not** an average of the above)	GEOSCI	14	3.0	43%	43%	14%	0	0
	UWGB	2848	3.4	47%	44%	8%	1%	<1%

Table 2. Job related to major while completing degree?	Unit of Analysis	n	Full-time		Part-time		No
			Paid	Non-paid	Paid	Non-paid	
2009-2013 percent	GEOSCI	14	0	0	36%	0	64%
	UWGB	2879	14%	1%	33%	5%	47%

Table 3. "If you could start college over"	Unit of Analysis	n	UW-Green Bay		Another college		No BA degree
			Same major	Different major	Same major	Different major	
2009-2013 percent	GEOSCI	14	57%	0	14%	29%	0
	UWGB	2875	69%	12%	12%	5%	1%

Table 4. Plans regarding graduate/professional study	Unit of Analysis	n	Already admitted	Have applied	Plan to eventually attend	NA/have not applied yet
2009-2013 percent	GEOSCI	12	0	8%	75%	17%
	UWGB	2206	8%	12%	65%	15%

Table 5. Highest degree planned	Unit of Analysis	n	Bachelor's	Master's	Specialist's	Professional	Doctoral
2009-2013 percent	GEOSCI	14	21%	64%	0	0	14%
	UWGB	2879	30%	51%	1%	5%	13%

Table 6. General Education preparation Current proficiency vs. Contribution of Gen Ed to current proficiency (3-pt. scale; 3 = high, 2 = medium, 1 = low)	Unit of Analysis	Current Proficiency			Gen Ed Contribution		
		n	% High	mean	n	% High	mean
Critical analysis skills.	GEOSCI	11	55%	3.0	12	33%	2.0
	UWGB	2674	64%	2.6	2600	29%	2.1
Problem-solving skills.	GEOSCI	11	73%	3.0	12	33%	2.0
	UWGB	2667	70%	2.7	2590	29%	2.1
Understanding biology and the physical sciences.	GEOSCI	10	60%	3.0	13	46%	2.0
	UWGB	2623	26%	2.0	2478	26%	2.0
Understanding the impact of science and technology.	GEOSCI	11	55%	3.0	13	39%	2.0
	UWGB	2620	34%	2.2	2489	25%	2.0
Understanding social, political, geographic, and economic structures.	GEOSCI	11	55%	3.0	13	31%	2.0
	UWGB	2629	34%	2.2	2549	28%	2.1

Table 6. General Education preparation

Current proficiency vs. Contribution of Gen Ed to current proficiency
(3-pt. scale; 3 = high, 2 = medium, 1 = low)

	Unit of Analysis	Current Proficiency			Gen Ed Contribution		
		n	% High	mean	n	% High	mean
Understanding the impact of social institutions and values.	GEOSCI	11	27%	2.0	13	31%	2.0
	UWGB	2647	50%	2.4	2560	36%	2.2
Understanding the significance of major events in Western civilization.	GEOSCI	11	36%	2.0	13	39%	2.0
	UWGB	2629	33%	2.2	2530	32%	2.1
Understanding the role of the humanities in identifying and clarifying values.	GEOSCI	11	36%	2.0	13	31%	2.0
	UWGB	2639	38%	2.2	2551	33%	2.1
Understanding at least one Fine Art.	GEOSCI	11	46%	2.0	13	46%	2.0
	UWGB	2631	39%	2.2	2520	33%	2.1
Understanding contemporary global issues.	GEOSCI	11	27%	2.0	13	31%	2.0
	UWGB	2633	34%	2.2	2528	25%	2.0
Understanding the causes and effects of stereotyping and racism.	GEOSCI	11	55%	3.0	13	31%	2.0
	UWGB	2644	62%	2.6	2560	38%	2.2
Written communication skills	GEOSCI	11	46%	2.0	13	31%	2.0
	UWGB	2654	66%	2.6	2595	41%	2.3
Public speaking and presentation skills	GEOSCI	10	60%	3.0	12	33%	2.0
	UWGB	2632	44%	2.3	2517	28%	2.0
Computer skills	GEOSCI	11	64%	3.0	13	39%	2.0
	UWGB	2634	55%	2.5	2490	26%	1.9

Table 7. Educational experiences
(5 pt. scale; 5 = strongly agree)

	Unit of Analysis	2009-2013		
		n	Strongly Agree or Agree	mean
Because of my educational experiences at UW-Green Bay, I have learned to view learning as a lifelong process.	GEOSCI	14	79%	4.0
	UWGB	2789	90%	4.4
While at UW-Green Bay, I had frequent interactions with people from different countries or cultural backgrounds than my own.	GEOSCI	13	62%	4.0
	UWGB	2694	44%	3.2
The UW-Green Bay educational experience encourages students to become involved in community affairs.	GEOSCI	13	77%	4.0
	UWGB	2677	55%	3.5
My experiences at UW-Green Bay encouraged me to think creatively and innovatively.	GEOSCI	14	86%	4.0
	UWGB	2785	82%	4.1
My education at UW-Green Bay has given me a “competitive edge” over graduates from other institutions.	GEOSCI	14	36%	3.0
	UWGB	2672	63%	3.7
UW-Green Bay provides a strong, interdisciplinary, problem-focused education.	GEOSCI	13	69%	4.0
	UWGB	2759	74%	3.9
Students at UW-Green Bay have many opportunities in their classes to apply their learning to real situations.	GEOSCI	14	86%	4.0
	UWGB	2782	71%	3.8

Table 7. Educational experiences
(5 pt. scale; 5 = strongly agree)

	Unit of Analysis	2009-2013		
		n	Strongly Agree or Agree	mean
I would recommend UW-Green Bay to a friend, co-worker, or family member.	GEOSCI	13	62%	4.0
	UWGB	2782	83%	4.2
There is a strong commitment to racial harmony on this campus.	GEOSCI	13	46%	3.0
	UWGB	2503	56%	3.7
The faculty and staff of UWGB are committed to gender equity.	GEOSCI	14	64%	4.0
	UWGB	2608	75%	4.0
This institution shows concern for students as individuals.	GEOSCI	14	86%	4.0
	UWGB	2743	74%	3.9
The General Education requirements at UWGB were a valuable component of my education.	GEOSCI	13	54%	4.0
	UWGB	2641	49%	3.3

Table 8. Activities while at UW-Green Bay

	Unit of Analysis	n	Independent study	Student org	Internship	Professional organization	Community service	Worked with a faculty member	Study group	Study abroad
2009-2013 percent	GEOSCI	14	36%	57%	64%	21%	29%	50%	86%	14%
	UWGB	2894	26%	47%	55%	21%	57%	22%	53%	14%

Table 9. Rating services and resources
(A = 4, B = 3, etc.)

	Unit of Analysis	2009-2013		
		n	A or B	mean
Library services (hours, staff, facilities)	GEOSCI	12	100%	3.5
	UWGB	2436	91%	3.4
Library collection (books, online databases)	GEOSCI	14	100%	3.0
	UWGB	2372	90%	3.4
Admission Office	GEOSCI	11	100%	3.0
	UWGB	2294	92%	3.4
Financial Aid Office	GEOSCI	11	100%	3.0
	UWGB	2144	87%	3.3
Bursar′s Office	GEOSCI	14	100%	3.0
	UWGB	2687	87%	3.3
Career Services	GEOSCI	8	75%	3.0
	UWGB	1595	84%	3.3
Academic Advising Office	GEOSCI	12	42%	2.0
	UWGB	2237	76%	3.1

Table 9. Rating services and resources (A = 4, B = 3, etc.)	**Unit of Analysis**	**2009-2013**		
		n	**A or B**	**mean**
Student Health Services	GEOSCI	7	86%	3.0
	UWGB	1429	88%	3.4
Registrar's Office	GEOSCI	12	92%	4.0
	UWGB	2402	92%	3.5
Writing Center	GEOSCI	0	0	0
	UWGB	995	83%	3.2
University Union	GEOSCI	11	91%	3.0
	UWGB	2333	88%	3.3
Student Life	GEOSCI	9	89%	3.0
	UWGB	1382	83%	3.2
Counseling Center	GEOSCI	2	50%	2.5
	UWGB	554	78%	3.2
Computer Facilities (labs, hardware, software)	GEOSCI	14	100%	4.0
	UWGB	2450	95%	3.5
Computer Services (hours, staff, training)	GEOSCI	11	91%	4.0
	UWGB	2229	92%	3.5
Kress Events Center	GEOSCI	9	100%	4.0
	UWGB	1940	96%	3.7
Dining Services	GEOSCI	10	70%	3.0
	UWGB	1989	56%	2.6
American Intercultural Center	GEOSCI	0	0	0
	UWGB	358	86%	3.3
International Office	GEOSCI	0	0	0
	UWGB	381	80%	3.1
Residence Life	GEOSCI	6	83%	3.5
	UWGB	1159	76%	3.0
Bookstore	GEOSCI	12	50%	2.5
	UWGB	2758	79%	3.1

Geoscience

Disciplinary Major or Minor (http://catalog.uwgb.edu/undergraduate/planning/disciplinary-majors-minors)
(Bachelor of Science)

Professor - Kevin Fermanich
Associate Professors – John Luczaj (chair), Steven Meyer
Assistant Professor – Ryan Currier

Geoscience is the study of Earth materials (e.g., rocks, minerals, soil, water, and air), the processes that shape and alter those components, and the interplay between the biosphere and the Earth. The program strongly emphasizes the fundamentals of geoscience, but also places special emphasis on groundwater management, soils, and other earth system processes.

The Geoscience program takes an application-focused, interdisciplinary approach, known as earth system science, in which the physical environment is investigated as many interacting systems. Earth system science emphasizes the interactions between the different systems that make up the Earth. Although earth system science is considered a new approach at many institutions, it has been an integral part of the Geoscience program since the very founding of UW-Green Bay. Interested students should also check Environmental Science course listings for several courses on soils, field geology, and ground water.

Geoscientists can find career opportunities in state and federal government agencies, consulting firms, and private industry. Demand for geoscientists will continue into the future, as demand for resources and energy grow with increasing population. Furthermore, responsible mining practices, remediation of contaminated sites, and forecasting the evolution of Earth conditions requires well-trained geoscientists with a broad understanding of how the Earth works.

Students interested in planning, natural resource or land management, or environmental policy issues typically select interdisciplinary minors in Environmental Science, Public and Environmental Affairs, or Urban and Regional Studies. For those interested in an earth system science perspective in business, Geoscience may also be combined with Business Administration. Many states and localities now require geoscience in their curricula, and high schools offering geoscience courses, in addition to the traditional science courses, is becoming the norm. Geoscience education includes geology, astronomy, oceanography, and weather and climate — with the goal of fostering a better understanding of our home, and encouraging responsible stewardship of our planet. Those seeking teacher certification can pursue several options:

- They can pursue a broad-field science certification in Education and take Geoscience courses to match their interests and employment goals.
- Students interested in elementary and middle school teaching can take an Education major and Geoscience minor.
- Students interested in teaching at the secondary level can take a Geoscience major and Education minor.

All Education students should consult with advisers in Geoscience and Education early in their studies to make sure that their academic program meets all state requirements for certification. Careful planning is essential since the Education course requirements are substantial and state requirements change periodically. Students seeking teacher certification in Geoscience should seriously consider satisfying the certification requirements in another discipline as well, because certification in additional fields will increase their employment opportunities.

This disciplinary major also requires:

Completion of an interdisciplinary major or minor (http://catalog.uwgb.edu/undergraduate/planning/interdisciplinary-majors-minors)

Completion of one of the following area of emphasis:

- Geoscience Emphasis (http://catalog.uwgb.edu/undergraduate/programs/geoscience/major/disciplinary-emphasis)
- Geoscience Emphasis for Students Seeking Teaching Certification (http://catalog.uwgb.edu/undergraduate/programs/geoscience/major/teaching-emphasis)

This disciplinary minor also requires:

Completion of an interdisciplinary major (http://catalog.uwgb.edu/undergraduate/planning/interdisciplinary-majors-minors)

Completion of one of the following area of emphasis:

- Geoscience Emphasis (http://catalog.uwgb.edu/undergraduate/programs/geoscience/minor/disciplinary-emphasis)
- Geoscience Emphasis for Students Seeking Teaching Certification (http://catalog.uwgb.edu/undergraduate/programs/geoscience/minor/teaching-emphasis)

Courses

GEOSCI 102. Natural Hazards. 3 Credits.
Explores the dynamic character of the Earth System by characterizing and understanding the causes and consequences of natural hazards. Hazards considered will include earthquakes, tsunamis, volcanic hazards (local, regional, global scales), meteorological hazards (hurricanes, tornadoes, flooding, coastal erosion), and landslides.
Fall and Spring.

GEOSCI 198. First Year Seminar. 3 Credits.

GEOSCI 202. Physical Geology. 4 Credits.
Description and analysis of the geological processes that shape the earth's major internal and external features. Origins, properties and use of the earth's rock and mineral resources. Students will not receive credit for both Geosci 202 and Geosci 102.
Fall and Spring.

GEOSCI 203. Geologic Evolution of the Earth. 3 Credits.
The physical history of the earth through geologic time and the attendant evolution of plants and animals; principles governing interpretation of the rock and fossil record; unraveling of events culminating in modern landscape and life forms.
P: Geosci 202 with at least a C grade.
Spring.

GEOSCI 204. Geologic Evolution of the Earth Laboratory. 1 Credit.
Practical application of geologic principles and techniques to interpretation of earth history.
P: Geosci 203 with at least a C grade or conc enr.
Spring.

GEOSCI 222. Ocean of Air: Weather and Climate. 3 Credits.
Fundamental processes of the atmosphere, the resulting weather and climate, and the effects of the atmosphere on other aspects of the earth's environments and on humans.
Fall and Spring.

GEOSCI 223. Ocean of Air: Weather and Climate Laboratory. 1 Credit.
Laboratory course to accompany Geosci 222 / Geog 222. Application of physical principles learned in lecture through a combination of data analysis, problem solving, and experimentation.
P: conc enr in Earth Sc/Geog 222 lec.
Fall and Spring.

GEOSCI 299. Travel Course. 1-4 Credits.
Travel courses are conducted to various parts of the world and are led by one or more faculty members. May be repeated to different locations.
P: cons of instr & prior trip arr & financial deposit.

GEOSCI 301. Introduction to Geoscience Field Methods. 2 Credits.
A survey of methods of field investigations including description and measurement of rock sequences, introduction to geological mapping, surveying, and writing geological reports.
P: Geosci 202.
Spring Odd.

GEOSCI 340. Introduction to Mineralogy & Petrology. 4 Credits.
Explores mineral chemistry and structures, identification, association, and occurrence. Surveys the distribution, chemistry, and mineral associations in relation to tectonic environment to interpret rock forming processes.
P: Geosci 202 with at least a C grade.
Fall Only.

GEOSCI 402. Sedimentology & Stratigraphy. 3 Credits.
Modern concepts and techniques used to study and interpret the origins and distribution of sediments and sedimentary rocks; principles of bio-stratigraphy and physical stratigraphy and sedimentology.
P: Geosci 202 with at least a C grade and 203 with at least a C grade.
Fall Even.

GEOSCI 425. Global Climate Change. 3 Credits.
Examines changes in global climate with emphasis on the processes by which climate change occurs. Focuses on the recent changes in the concentration of atmospheric greenhouse gases and their impact on the earth's global energy budget. Examines the potential environmental impact of a changed climate.
P: Geosci 222 with at least a C grade, Geog 222 with at least a C grade or Env Sci 102 with at least a C grade.

GEOSCI 432. Hydrogeology. 3 Credits.
Introduction to the geological and physical principles governing ground water flow. Description of aquifer properties, chemical processes, equation of flow, well hydraulics, and environmental concerns.
P: Geosci 202 with at least a C grade; REC: Env Sci 330 with at least a C grade; Math 202.
Spring.

GEOSCI 470. Quaternary Geology. 3 Credits.
Understanding the extremes in environmental behavior which characterize Pleistocene time. Principles of glaciology and the impact of glaciation on the landscape.
P: Geosci 202 with at least a C grade; REC: Geosci 203.
Spring Even.

GEOSCI 478. Honors in the Major. 3 Credits.
P: min 3.50 all cses req for major and min gpa 3.75 all UL cses req for major.
P: min 3.50 all cses req for major and min gpa 3.75 all UL cses req for major.

GEOSCI 492. Special Topics in Earth Science. 1-4 Credits.
Topics not covered by regular courses, such as mineralogy-petrology, crustal movements, geologic field methods, geology of Wisconsin, and others. Offerings of different topics can be repeated for credit.
Fall and Spring.

GEOSCI 497. Internship. 1-12 Credits.
Supervised practical experience in an organization or activity appropriate to a student's career and educational interests. Internships are supervised by faculty members and require periodic student/faculty meetings.
P: jr st.
Fall and Spring.

GEOSCI 498. Independent Study. 1-4 Credits.
Independent study is offered on an individual basis at the student's request and consists of a program of learning activities planned in consultation with a faculty member. A student wishing to study or conduct research in an area not represented in available scheduled courses should develop a preliminary proposal and seek the sponsorship of a faculty member. The student's advisor can direct him or her to instructors with appropriate interests. A written report or equivalent is required for evaluation, and a short title describing the program must be sent early inthe semester to the registrar for entry on the student's transcript.
P: fr or so st with cum gpa > or = 2.50; or jr or sr st with cum gpa > or = 2.00.
Fall and Spring.

GEOSCI 499. Travel Course. 1-6 Credits.
Travel courses are conducted to various parts of the world and are led by one or more faculty members. May be repeated to different locations.
P: cons of instr & prior trip arr & financial deposit.

Geoscience Emphasis (Major)

This disciplinary emphasis also requires:

- Completion of an interdisciplinary major or minor (http://catalog.uwgb.edu/undergraduate/planning/interdisciplinary-majors-minors)

Supporting Courses		34
CHEM 211 & CHEM 213	Principles of Chemistry I and Principles of Chemistry I Laboratory	
CHEM 212 & CHEM 214	Principles of Chemistry II and Principles of Chemistry II Laboratory	
GEOSCI 202	Physical Geology	
GEOSCI 203	Geologic Evolution of the Earth	
GEOSCI 204	Geologic Evolution of the Earth Laboratory	
MATH 202	Calculus and Analytic Geometry I	
MATH 260	Introductory Statistics	
PHYSICS 201	Principles of Physics I	
COMM 133	Fundamentals of Public Address	
or ENG COMP 105	Expository Writing	
Upper-Level Courses		26
ENV SCI 320	The Soil Environment	
ENV SCI 330	Hydrology	
GEOSCI 340	Introduction to Mineralogy & Petrology	
GEOSCI 432	Hydrogeology	
Choose 12 credits from the following courses:		
ENV SCI 421	Soils and Geology of Wisconsin Field Trip (Offerings of trip to different areas may be repeated for credit)	
ENV SCI 425	Global Climate Change	
GEOSCI 301	Introduction to Geoscience Field Methods	
GEOSCI 402	Sedimentology & Stratigraphy	
GEOSCI 470	Quaternary Geology	
GEOSCI 492	Special Topics in Earth Science [1]	
Total Credits		60

[1] Course topics vary. Typical topics include structural geology, ore deposits and geomorphic processes. Offerings of different topics can be repeated for credit.

Geoscience Emphasis for Students Seeking Teaching Certification (Major)

This disciplinary emphasis also requires:

- Admission to the Education Program
- Completion of the minor in Secondary Education

Supporting Courses [1]		30-35
CHEM 211 & CHEM 213	Principles of Chemistry I and Principles of Chemistry I Laboratory	
ENV SCI 141	Astronomy	
GEOSCI 202	Physical Geology	
GEOSCI 203	Geologic Evolution of the Earth	
GEOSCI 204	Geologic Evolution of the Earth Laboratory	
GEOSCI 222	Ocean of Air: Weather and Climate	
Choose two of the following courses:		
MATH 104	Elementary Functions: Algebra and Trigonometry	
MATH 202	Calculus and Analytic Geometry I	
MATH 260	Introductory Statistics	
COMM 133	Fundamentals of Public Address	
or ENG COMP 105	Expository Writing	
Upper-Level Courses		26
ENV SCI 320	The Soil Environment	
ENV SCI 330	Hydrology	
GEOSCI 340	Introduction to Mineralogy & Petrology	
GEOSCI 432	Hydrogeology	
Choose 12 credits from the following courses:		
ENV SCI 421	Soils and Geology of Wisconsin Field Trip	
ENV SCI 425	Global Climate Change	
GEOSCI 301	Introduction to Geoscience Field Methods	
GEOSCI 402	Sedimentology & Stratigraphy	
GEOSCI 470	Quaternary Geology	
GEOSCI 492	Special Topics in Earth Science [2]	
Total Credits		56-61

1 Candidates for teacher certification are strongly urged to also take CHEM 212 and CHEM 214.

2 Course topics vary. Typical topics include structural geology, ore deposits, and geomorphic processes. Offerings of different topics can be repeated for credit.

Geoscience Emphasis (Minor)

This disciplinary emphasis also requires:

- Completion of an interdisciplinary major (http://catalog.uwgb.edu/undergraduate/planning/interdisciplinary-majors-minors)

Supporting Courses		20
GEOSCI 202	Physical Geology	
GEOSCI 203	Geologic Evolution of the Earth	
At least 5 credits of Chemistry at the 100-200 level		
Choose two of the following courses:		
MATH 104	Elementary Functions: Algebra and Trigonometry	
MATH 202	Calculus and Analytic Geometry I	
MATH 203	Calculus and Analytic Geometry II	
MATH 260	Introductory Statistics	
Upper-Level Courses		12
GEOSCI 340	Introduction to Mineralogy & Petrology	
Choose at least 8 additional credits from the upper-level course list for the Geoscience major		
Total Credits		32

Geoscience Emphasis for Students Seeking Teaching Certification (Minor)

This disciplinary emphasis also requires:

- Admission to the Education Program.
- Completion of the interdisciplinary major in Education

Supporting Courses [1]		**19**
GEOSCI 202	Physical Geology	
GEOSCI 203	Geologic Evolution of the Earth	
GEOSCI 222	Ocean of Air: Weather and Climate	
At least 5 credits of Chemistry at the 100-200 level		
Choose one of the following courses:		
MATH 104	Elementary Functions: Algebra and Trigonometry	
MATH 202	Calculus and Analytic Geometry I	
MATH 203	Calculus and Analytic Geometry II	
MATH 260	Introductory Statistics	
Upper-Level Courses		**12**
GEOSCI 340	Introduction to Mineralogy & Petrology	
or GEOSCI 402	Sedimentology & Stratigraphy	
Choose at least 9 credits from the upper-level course list for the Geoscience major.		
Total Credits		**31**

[1] Candidates for teacher certification are strongly urged to also take CHEM 212 and CHEM 214.

ACADEMIC AFFAIRS COUNCIL
UNIVERSITY OF WISCONSIN-GREEN BAY
MEMORANDUM

DATE: MAY 17, 2004

TO: CAROL BLACKSHIRE-BELAY, DEAN, LIBERAL ARTS & SCIENCES

FROM: VICTORIA GOFF, CHAIR, ACC

RE: EARTH SCIENCE PROGRAM REVIEW

CC: STEVE DUTCH, CHAIR, EARTH SCIENCES
TIMOTHY SEWALL, ASSOCIATE PROVOST, ACADEMIC AFFAIRS

EARTH SCIENCE PROGRAM REVIEW

On May 17, 2004, the Academic Affairs Council completed its program review of the disciplinary program in Earth Science. The Academic Affairs Council met with Steve Dutch, chair of the Earth Science program on May 3 to discuss the program's Self-Study Report. Professor Dutch responded to questions that had been sent to him prior to this meeting. What follows are AAC recommendations based on this discussion and on the Earth Science program's self-study document and additional materials:

OVERVIEW

Earth Science is a small, stable disciplinary program with a good faculty, which provides a major and minor and supports the General Education program. This program and its outstanding faculty symbolize the university's historic mission of addressing the region's environmental concerns. The Academic Affairs Council anticipates that the program's newer faculty, like their more seasoned colleagues, will also make outstanding contributions to the program.

One of the main problems facing the program is that while most of Earth Science students apparently want to work and live in this area, there is not significant local demand for majors in Earth Science. This results in some graduates being dissatisfied with the major. Perhaps students need to be better informed about career opportunities and the need for many graduates to go on to graduate school in order to be marketable.

The program's size may or may not be another problem, depending on one's perspective. If the Earth Science faculty feels it's a problem, then continued low enrollments might be alleviated with a more aggressive approach to attracting students. This might include

presentations to graduating high school students, transfer students, and incoming UWGB students and/or partnerships with high school science organizations.

RECOMMENDATIONS

CURRICULUM:

Lower-level courses in Earth Science contribute tremendously to the university's General Education program as well as to many other programs on campus, e.g., Environmental Policy and Planning, Environmental Science, etc. On the other hand, the Earth Science program unfortunately offers a limited number of upper-level courses. As a consequence of the latter situation, the Academic Affairs Council recommends that Earth Science look into cooperative educational opportunities with other UW System schools in our region and throughout the state to broaden and enrich its course offerings at the upper level. This is an approach the UW System has been encouraging of late. Besides increasing the number of upper-level course offerings for UWGB Earth Science students, this strategy could also increase opportunities for students to go on field trips or attend special camps, etc., in other parts of the state, thus allowing the students to use the region as a laboratory. This would also provide UWGB students more interaction with like-minded students, perhaps thus creating a greater sense of camaraderie than they may be experiencing on campus.

The Academic Affairs Council suggests that the Earth Science program might also take up the issue of student motivation. Professor Dutch seemed to feel strongly that not all Earth Science students put their academic life first — or second, third, etc. — and that this made it difficult to "read" test results, senior survey responses, and even grades. He believes students would not come on weeklong field trips that many Earth Science programs find vital to learning and to morale. The AAC suggests that the department take the initiative and make an energetic effort to improve motivation, attitudes, and morale. Perhaps fieldwork should be designed to impact student motivation. Perhaps unit projects could involve students in significant issues and connect them to students in other programs.

ASSESSMENT:

The Academic Affairs Council has determined that Earth Science's assessment process could be improved. In particular, the results of the Alumni Survey were probably disappointing to the Earth Science faculty. There may be serious issues in need of redress if future survey results show continued dissonance. The survey results indicated that chronic underemployment plagued the program graduates who responded to the survey. This may suggest unrealistic expectations on the part of students or miscommunication between students and advisers. Professor Dutch indicated that some of the top students in the program failed to respond to the survey. If the Earth Science faculty finds this survey suspect, the AAC recommends that Earth Science devises its own assessment tool, preferably something that is quantifiable. However, it is very likely that useful qualitative information would be gleaned as well. As an added bonus, this may help the faculty build the program. The AAC also suggests that Earth Science entertain the idea of running a

focus group. This should not be too time consuming and could yield useful information. The AAC also encourages the program to track its majors every five years on a continuing basis.

In order to assess Earth Science's nine learning outcomes, the Earth Science faculty uses two methods: 1) embedded assessment of student activities, such as tests, lab reports, papers, project reports, presentations, participation in field trips, etc.; and 2) a faculty review of student portfolios. At a May 2001 faculty meeting where the student achievement of the program's learning outcomes was discussed, faculty decided to implement several changes, including more focused field trips. During the AAC's discussion with Professor Dutch, he said it was difficult to get Earth Science students to participate in field trips. Since field trips are 1) part of the embedded assessment and 2) were one of the items identified as in need of improvement at the 2001 meeting, the AAC recommends that the discipline determines additional ways to encourage participation in an activity that is a vital ingredient in the education of many science students.

The AAC also concurs with the Vice Provost's report, which stated that it was not possible to discern the extent to which Earth Science students were achieving individual learning outcomes and that it was difficult to evaluate faculty action in response to assessment data.

There was also some confusion in regard to portfolios. The current catalog states: "As part of the program assessment in Earth Science, students will be required to produce a portfolio in their junior and senior years." However, when the AAC met with Professor Dutch, he said that it was difficult to require portfolios from the students and that the faculty was taking responsibility for saving assignments to put in student portfolios. The AAC discourages allowing students to relinquish their responsibilities vis-à-vis assessment. In addition, many items that the catalog states should be included in the portfolio ("evidence of attendance at conferences or field trips, award, and any other records of significant activity") would be missing from the portfolio if faculty members were taking responsibility for gathering portfolio contents. Lucy Arendt's memorandum noted that it "is not clear as to whether the program's students have been counseled about creating and submitting portfolios." The AAC is more concerned that the students are not creating their own portfolios.

Finally, the Academic Affairs Council requests that Earth Science establish, at once, a systematic evaluation procedure for examining program outcomes. If in-class assignments are significant, then the faculty should meet at least once a year to look at the records of majors and consider how to support student growth. The small size of the program might make individual recommendations possible. If the portfolio is the most significant measure, then a clear, annual procedure for portfolio evaluation and a formal response to each student would be most appropriate. Reflections on programmatic development in response to these results would be healthy.

RESOURCES:

At this time, there does not appear to be a need for additional resources.

UNIVERSITY of WISCONSIN
GREEN BAY

January 21, 2004

MEMORANDUM

TO: Victoria Goff, Chair, Academic Affairs Council

FROM: Lucy Arendt, Coordinator, Assessment Services

COPY: Carol Blackshire-Belay, Dean, Liberal Arts and Sciences
Steven Dutch, Chairperson, Earth Science
Timothy Sewall, Associate Provost, Academic Affairs

SUBJECT: Earth Science Self-Study Report: Learning Outcomes Assessment Process

As part of the program review process for Earth Science, I have reviewed the student learning outcomes assessment portion of the program's Self-Study Report and would like to offer the following observations.

The Earth Science faculty has articulated nine learning outcomes for its major program, with two additional outcomes identified for the earth science education subplan. The major learning outcomes address both content knowledge (learning outcomes #1, #3, #4, #5, #6, #7, #8) and process skills (learning outcomes #2 and #9). The learning outcomes appear straightforward and inclusive of the curriculum, and should facilitate an ongoing discussion of what UWGB Earth Science program graduates should know and be able to do. I wholeheartedly agree with the "contingency" statement that precedes the list of learning outcomes in the Self-Study Report, and hope that this statement is communicated to students alongside the program's learning outcomes. Regular communication of the program's learning outcomes to students – especially as the outcomes relate to both individual courses and the curriculum overall – should help students to understand and appreciate the program's nature and purpose, and should help students to align their learning expectations with those of the faculty. One means of promoting these learning outcomes would be to include them in the printed "Undergraduate Catalog" and online at http://www.uwgb.edu/nas/. Besides publicizing the outcomes as written, the faculty might illustrate the various learning outcomes with concrete descriptions of what earth science faculty members and students do in the classroom, lab, and field. Such descriptions might then be used to clarify the meaning of the program's learning outcomes to current students, and to promote the Earth Science major to undeclared or otherwise prospective students.

According to the Self-Study document, the Earth Science faculty has used two assessment methods to evaluate achievement of its programmatic learning outcomes: (1) faculty assessment of students' in-class assignments (to include exams, lab reports, written papers, project reports, classroom presentations, performance on practical exercises, and participation in field trips); and (2) faculty review of student portfolios. Both methods are highly appropriate given the program's relatively small size (in terms of majors, graduates, and faculty members), and what seem to be direct links between the topics addressed by the program's curriculum and the individual learning outcomes. Specifically, both

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portfolio evaluation and "embedded assessment" (secondary assessment of in-class assignments) are most effective when they do not demand an excessive amount of student or faculty time, and when it is clear which criteria will be used to assess the various in-class and portfolio "products."

The "Summary of Results" and "Use of Results" (pp. 4-5) narratives briefly discuss the faculty's May 2001 meeting to assess students' achievement of the program's learning outcomes. Whether the meeting used in-class, portfolio, or both sources of information is not clear. Using the 2001 meeting as a springboard, the faculty has implemented several mechanisms for increasing student engagement, including: more focused field and research projects, more student teaching opportunities, and a lab for "Ocean of Air: Weather and Climate." Results of these changes are described as "mixed."

I offer two suggestions for the future. *First*, it would be most helpful if assessment results were reported by outcome, or by outcome "groups." In other words, future Self-Study authors should list and discuss what different assessment data sources say about the individual learning outcomes (e.g., #1, #2). As written, it is not possible to discern the extent to which students are achieving the individual learning outcomes. Consequently, it is difficult to evaluate the faculty's actions in response to assessment data. Finally, it is difficult to offer suggestions for tightening, expanding, or modifying the list of student learning outcomes. *Second*, the faculty should articulate a schedule for routinely gathering assessment data. For example, the faculty might agree to meet and review students' in-class achievements at least once per year, and to meet and review graduating students' cumulative portfolios every two-three years. Supporting this second recommendation, the faculty should clarify exactly *what* will be reviewed (whether in-class assignment or portfolio component), along with the evaluative criteria to be used by reviewing faculty members. Besides not being clear about what is reviewed, when, and how, the Self-Study Report is not clear as to whether the program's students have been counseled about creating and submitting portfolios. Also, how is the information in students' portfolios reviewed in comparison and contrast to information from in-class assignments? For example, are students told to include explanatory narrative in their portfolios that is evaluated in addition to their in-class products and research projects?

Routine sharing and discussion of assessment results among members of the program's faculty should result in an ever-more productive assessment process. The Earth Science faculty should be ***commended*** for identifying a sound and parsimonious approach to the assessment of student learning, and ***encouraged*** to further develop its assessment process so that it may support desired curricular and programmatic modifications. Finally, Earth Science faculty members should be praised for carefully reflecting on their students' needs and perceptions (as evidenced, in part, by their thorough evaluation and use of the Graduating Senior and Alumni survey results), and for creating and nurturing a program that serves their students "as they are now," while encouraging them to expand their horizons.

If you have questions, or would like to discuss the student learning outcomes portion of the Self-Study Report further, please contact me at 2221 or via e-mail. Should the program's faculty members want assistance as they continue to implement their assessment processes (e.g., writing emphasis-specific surveys), I encourage them to contact me. I am always happy to assist!

UNIVERSITY of WISCONSIN
GREEN BAY

To: Sue Hammersmith
Provost and Vice Chancellor for Academic Affairs

From: Scott Furlong
Dean of Liberal Arts and Sciences

Date: May 21, 2008

Re: Report on the Earth Science Program Review

I have examined the Self-Study Report prepared by the faculty in Earth Science, as well as the Program Review conducted by the Academic Affairs Council. Based on my examination of these materials I recommend continuation of the Earth Science program. Specific comments that I made to the faculty include the following:

1. There is some concern regarding the number of majors in the program and the number graduating. Improvement in this area could potentially be made by linking more direction with the environmental programs on campus. There also is a gender imbalance with relatively few female majors and limited minorities, but given the size of the program small changes can have large percentage impacts.

2. Faculty in Earth Science are involved in the graduate program in Environmental Science and Policy (ES&P) and are also involved in international travel courses particularly to Costa Rica and Panama, which provides some exciting opportunities for our campus and students.

3. A number of faculty have been very successful in grant development.

4. More clarity is necessary for their assessment plan.

5. Important curricular changes, particularly in the use of field trips, which would seem to be a critical component for this major, have been added. Because of the current size of the program, there is some concern regarding the offerings of upper-level courses and ensuring adequate enrollment.

6. The efforts to reinvigorate UW-Green Bay's environmental programs can provide a number of opportunities for the Earth Science program.

Cc: Steve Dutch, Chair Earth Science
Mark Everingham, Chair AAC

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UNIVERSITY of WISCONSIN
GREEN BAY

To: Steve Dutch
Chair, Chemistry

From: Scott Furlong
Dean of Liberal Arts and Sciences

Date: May 21, 2008

Re: Report on the Earth Science/Geoscience Program Review

The Earth Science/Geoscience program at the University of Wisconsin-Green Bay is a disciplinary program that has a special emphasis on environmental geology. This special emphasis is appropriate given the mission of the institution, the interrelationship between Earth Science and Environmental Science as well as the growing issues related to ground water, natural hazards and global warming. Faculty in the program are involved in international travel course opportunities in Costa Rica and Panama and some are active participants in the graduate program in Environmental Science and Policy. As stated by the AAC, the program provides "highly relevant practical and professional applications" and applauds the efforts of the faculty to offer more field trip opportunities to enhance the program. Some faculty in the program are active in soliciting outside grants that aids in research, acquiring equipment, and providing opportunities for student research. The program is in the process of submitting a name change to Geoscience, which is part of a nation-wide trend.

Enrollment Trends/Resource Issues:
The Earth Science program has averaged about 20 majors over the past five years and this has been somewhat steady during this time. During this period it has graduated an average of three students per year. There is hope that current issues surrounding global warming, water conservation, and others related to Earth Science could increase these numbers in the future. It might be interesting for the faculty to explore what connections could be made with the Environmental Science major/minor program in terms of enrollments. The data is not available regarding students double-majoring or minoring in these programs. There is a clear synergy between these two programs and perhaps students may be interested in double majoring or minoring with this combination. It is important to note that enrollment issues can and have affected curriculum because situations of low enrollments, particularly for upper-level courses may lead to course cancellations.

The AAC notes a concern that there is not sufficient faculty to provide collegial coverage in the event of faculty absence. While this concern is legitimate, it is not necessarily a unique concern of this program. Primary resource issues appear to me related to instructional issues, cataloging and storage of material, and support for field trips, which is seen as an important component of the program.

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Assessment:
Student assessment occurs primarily through course-based assessment with specific courses addressing the learning outcomes defined by the program. It is a bit unclear from the self-study if the program specifically assesses the individual learning outcomes. For example, how does the faculty in Environmental Geology assess learning outcomes 3, 5, 6, 7, and 8? The program appears to be set up in such a way that embedded assessment could be utilized, but I would like to see a bit more information here. The small number of graduates makes generalization problematic as well. This is also the case in terms of evaluating the data provided by the graduating student survey.

Curriculum Development/General Education:
Changes in the Earth Science curriculum have mainly been renaming of courses, reoffering courses that had been dropped, and creating a Special Topics course that would have rotating topics. As noted, there has also been a focus on increasing the use of field trips as a way to get important hands-on experience for the students. The Earth Science program is involved in teaching a number of general education courses in the NPS-1 and NPS-2 areas. Finally, as noted above, the major is in the process of renaming itself Geosciences.

In summary, the program in Earth Science/Geoscience is a potentially emerging field that relates well to the mission of UW-Green Bay. The plans to emphasize our environmental programs should serve the program well especially if they work to make explicit connections with the other environmental program around campus.

Cc: Mark Everingham, Academic Affairs Council
✓Tim Sewall, Associate Provost

UNIVERSITY of WISCONSIN
GREEN BAY

May 8, 2008

To: Sue Hammersmith, Provost and Vice Chancellor for Academic Affairs

From: Mark Everingham, Academic Affairs Council chair

Re: Earth Science Program Review Self-Study Report

Introduction

The Academic Affairs Council completed its evaluation of the Earth Science Program Review Self-Study Report. Earth Science promotes the study of the physical components of the environment, the various processes affected by those components, and the interactions between the physical environment and living organisms. The program's special emphasis is on environmental geology in view of the growing need to apply principles of geology to environmental issues such as natural hazard mitigation, ground water conservation, and land reclamation. The program takes a problem-focused, interdisciplinary approach in which the physical environment is investigated as many interacting systems. The program is in the process of requesting a name change to Geosciences.

Student Learning

The program uses course-based assessment to generate data on student learning. The effect of assessment data is relatively small compared to the impact of day-to-day observations and course updates. Assessment data corroborate judgments with evidence of actual student performance. The program aims to incorporate more quantitative assignments into courses to improve poor student quantitative skills. The structural adjustments implemented as a result of assessment are small compared to the adjustments made based on observation from one student cohort to the next. For example, the program identified a much greater tendency toward rote memorization and much weaker integrative skills among Physical Geology students. This is reflected in much lower test scores which require a response other than modifications of lecturing style and the use of visual aids.

Program Accomplishments and Strengths

Earth Science is an emerging field that emphasizes the interactions between the different systems that make up the earth. Although earth system science is considered a new approach at many institutions, it has been an integral part of the earth science program since the very founding of UW-Green Bay. The program astutely recognizes that it cannot prosper on the local demand for earth scientists. Therefore, the program seeks to recruit students by stressing opportunities for travel and graduate school.

The program offers extended field trips locally and nationally which contribute to improved camaraderie and enthusiasm. Faculty members and students reap rewards from these experiences despite some logistical and financial barriers in university policy. The program chair should be consulted directly on this matter to address concerns about university policy on field trips.

Some faculty and students participate in travel courses to Costa Rica and Panama.

Graduates of the program find jobs in local and state industry and teaching fields. There is an increased student interest in graduate school as well as increased interest in earth science on the part of education majors.

Areas in Need of Attention

The program lacks a sufficient number of faculty members to provide collegial coverage of courses in case of faculty absence or sabbatical leave.

Specific needs for faculty positions are a Remote Sensing and GIS specialist and a full time hydrologist with expertise in water chemistry.

The program's capacity to offer required upper division courses and electives over a four-semester period is under considerable pressure.

Maintenance and updating of equipment is a concern.

Conclusion

Earth Science is a well managed academic program with highly relevant practical and professional applications. The ongoing efforts to make curricular changes and to offer more field trip opportunities attest to the faculty's commitment to deliver a high quality program.

CC: Steve Dutch, Earth Science chair
Scott Furlong, Dean of Liberal Arts and Sciences
Tim Sewall, Associate Provost for Academic Affairs
Pat Przybelski, Program Associate, Secretary of the Faculty and Academic Staff

2013-2014 Geoscience Program Assessment Plan

Academic Program Assessment Plan (2013-2014)

The questions below will form the outline for your programmatic assessment for this academic year. All assessment plans should be implemented during the spring semester with results reported in May 2014.

1. Which outcome will you assess?

   We will assess Geoscience Learning Outcomes 1, 3, and 7 (one for each of 3 faculty)

2. Which technique will you use to assess this outcome? Examples of techniques are tests, embedded assessment, competence interviews, and portfolios. More information on each of these methods, including pros and cons can be found here: http://assessment.uconn.edu/docs/Summary_of_Direct_Assessment_Techniques.pdf

   For Learning Outcome #1, we will use an exam question that links geological processes and global biogeochemical cycles.

   For Learning Outcome #3, we will use either exam questions or embedded assessment.

   For Learning Outcome #7, we will use embedded assessment in a field laboratory exercise that involves surveying, data collection, and data processing. Aspects of groundwater quality will be included in the lab.

3. Which course or group of students will you assess on the outcome chosen above and when? Please keep in mind that assessment should be a snapshot of what you're doing. You do not need to assess every single student in your major, but rather a sample group that is large enough to get reliable data.

   For Learning Outcome #1, assessment will involve students in Geologic Evolution of the Earth and it will involve one or more exam questions during the last month of the semester.

   For Learning Outcome #3, assessment will involve students in Special Topics: Ore Deposits. This will occur in the second half of the semester.

   For Learning Outcome #7, this will include students in Hydrogeology (Geoscience 432), and it will involve a field laboratory near the end of the semester.

4. Who will do the assessment and coordinate the data collection and reporting?

   For Learning Outcome #1, John Luczaj will do the assessment and reporting.

   For Learning Outcome #3, Ryan Currier will do the assessment and reporting.

   For Learning Outcome #7, Kevin Fermanich will do the assessment and reporting.

2013-2014 Geoscience Program Assessment of Learning Outcomes

Geoscience Assessment For Learning Outcome #1 (May 2014)

John Luczaj (Geoscience Unit Chair)

OVERVIEW OF THE DATA COLLECTED:

Geoscience 203 (Geologic Evolution of the Earth) is a required course for Geoscience Majors and Minors, as well as those pursuing a Broad Field Science Licensure in Education. Learning Outcome #1 was assessed during the Final Exam on May 13, 2014 in Geoscience 203 using two separate questions. One of these was a new question designed for this assessment (#1). The other (#55) was a question that I typically ask on the final exam each time the course is offered.

Learning Outcome #1: Students will demonstrate a knowledge base in the principles of physical and historical geology with special emphasis on the unifying theory of plate tectonics and the linkage between geological processes and global biogeochemical cycles.

Two separate written questions on the course final exam were used to assess this learning outcome, and the detailed rubric and assessment results are presented on the pages below. The first question evaluated (#1) was a rather difficult essay question that asked students to remember large scale processes that link geologic processes and biogeochemical cycles on Earth in the distant past. Overall, nearly all students performed at an acceptable level for all of the questions, with two exceptions. Average scores for the three criteria used were acceptable in 11 of 12 cases (see page 2).

The second question evaluated (#55) was a short answer question. Students were asked to list and explain the causes two specific changes on a given graph that were the result of major plate tectonic changes in Earth's history during the Cenozoic Era (the last 66 million years). Overall, nine of the twelve students answered the question at an acceptable level or above (see page 3).

USE OF THE DATA COLLECTED:

The data were useful to determine whether students understood some of the large-scale processes that have operated in Earth's history. Based on the results, I feel that the students performed well, and I don't believe that curricular changes or faculty development changes are necessary. However, the results of the assessment will be presented to the geoscience faculty for further discussion. I will likely use similar questions in the future on the final exam.

Essay Exam Question #1 (1 of 2): This course has dealt a lot with the linkage between geological processes and global biogeochemical cycles that operate over long time scales. ***Describe in detail at least one of these processes***, along with an explanation of what evidence was used to understand these systems. Topics could include carbon burial cycles, seawater chemistry change, etc.

Rubric for Assessment of Outcome #1, using Question #1 on the Final Exam:

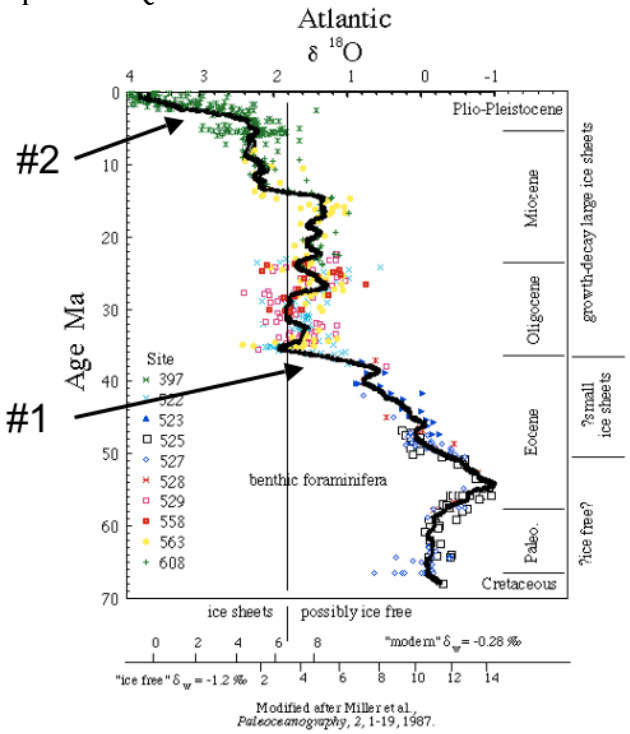
Criterion	1 = Unacceptable	2 = Acceptable	3 = Good	4 = Outstanding
A. Identification of geological process (GP) and a related global biogeochemical cycle (GBC)	Failed to communicate <u>both</u> a geologic process and a related biogeochemical cycle.	Identified a relevant GP or GBC but not both.	Identified both a GP and GBC.	Clearly and fully identified both the geologic process and the global biogeochemical cycle involved.
B. Mechanism or Hypothesis	Failed to explain the mechanism for how GP relates to GBC and failed to describe a system that operated over a long time scale.	Mentioned causal mechanism, but it was not fully explained or had some errors.	Adequately communicated the mechanism linking the GP and GBC.	Clearly defined the hypothesis that explains how the GP and GBC are linked through a causal mechanism.
C. Evidence	Failed to provide any correct evidence from the rock record.	Mentioned only one piece of evidence in support of a GP/GBC.	Adequately communicated the evidence for this GP/GBC. No major errors in evidence.	Clearly identified multiple lines of evidence used to support the linkage between one or more GP and GBCs. Explained how the evidence supports the link.

EXAM QUESTION #1: Data for the 12 students taking the final exam. Up to four (4) points were possible for each criterion.

Student #	Criterion A	Criterion B	Criterion C	Average Score		Student #	Criterion A	Criterion B	Criterion C	Average Score
1	4	4	3	3.6		7	4	4	3	3.6
2	3	4	2	3		8	3	2	3	2.6
3	2	2	2	2		9	3	1	2	2
4	3	2	2	2.3		10	4	4	3	3.6
5	4	4	3	3.6		11	2	1	2	1.6
6	4	3	3	3.3		12	4	4	3	3.6
						Average (n=12)	**3.3**	**2.9**	**2.6**	**2.9**

Short Answer Exam Question #55 (2 of 2): Two major plate tectonic changes are thought to be partly responsible for climatic cooling and glaciation during the Cenozoic. These are indicated by oxygen isotopic records in benthic foraminifera fossils indicated by arrows #1 and #2 below. ***Briefly*** explain the plate tectonic changes thought to be responsible for each of the two changes indicated below.

Graphic for Question 55:



EXAM QUESTION #55 Results: Data were for 12 students taking the final exam. Up to four (4) points were possible.

Student #	Criterion "Plate Tectonic Changes"
1	4
2	3.5
3	1.5
4	3
5	3
6	3
7	4
8	3
9	2
10	3.5
11	1
12	1.5
Average	**2.75**

Rubric for Assessment of Outcome #1, using Question #55 on the Final Exam:

Criterion	1 = Unacceptable	2 = Acceptable	3 = Good	4 = Outstanding
Plate Tectonic Changes responsible for cooling of Earth's climate during the Cenozoic Era (Cases #1 and #2)	Failed to correctly identify <u>either</u> of the plate tectonic changes responsible for climate cooling.	Correctly Identified only one one of the plate tectonic changes responsible.	Identified both plate tectonic changes responsible; correct explanation for one of the cases	Clearly and fully identified both the plate tectonic changes responsible for climate cooling AND supplied additional details to explain why <u>both</u> changes occurred.

GEOSCIENCE ASSESSMENT: OUTCOME #3

Ryan Currier

May 2014

I. INTRODUCTION

Outcome #3

Students will apply their knowledge base and research skills to current Earth-system based issues such as mining and management of Earth resources with emphasis on related economic, social, and public policy dimensions

Course Assessed

Special Topics in the Earth Sciences—Ore Deposits is an upper level course designed to integrate many aspects of the geosciences. The course explores environmental, economic, and political ramifications of mining in addition to the core material of the course—how ore deposits form.

Nature of Assessment

In February of 2014, I assigned individual research projects that focused on a target material (e.g. thorium, mercury, rubies, etc.). Students were tasked with discovering properties and uses for their material, how ore deposits formed regarding their material, and hazards associated with their material.

Assessment of Outcome #3 took place as an exam question regarding their target material that was researched earlier in the semester. Because the course was designed to be integrative, I wanted the students to attempt to integrate multiple lines of thought into the feasibility of ore extraction.

II. ASSESSMENT

Exam Question

Using your term project target material, discuss the decision process as to whether or not an ore deposit of your target material (or containing your target material) is mined. (20pts)

Consider:
1) supply and demand fluctuations over time,
2) environmental and physical hazards,
3) location,
4) politics,
5) any other considerations

Rubric Used

Criterion	0 = Unacceptable	1 = Acceptable	2 = Exceeds Expectations
A. Economics	Did not discuss any supply and demand issues	Considered supply and demand with at least one specific example	Includes several specific examples on supply and demand, including technological advancements
B. Hazards	Did not consider any health or environmental issues	Considered either a health hazard or environmental hazard associated with mining their target material	Includes discussion on both health hazards and environmental hazards associated with their target material
C. Politics	Did not consider any governmental regulation or public opinion	Brief discussion on governmental regulation or public opinion	Thorough discussion of government and public interaction

III. RESULTS

Student	A	B	C	Average
1	2	2	1	**1.7**
2	2	2	2	**2**
3	1	1	2	**1.3**
4	2	1	1	**1.7**
5	1	2	0	**1**
6	2	1	2	**1.7**
7	1	1	1	**1**
8	2	0	2	**1.3**
9	1	1	1	**1**
Average	**1.6**	**1.2**	**1.3**	**1.4**

IV. DISCUSSION

I was fairly pleased with the results of the assessment. All criteria assessed resulted in above acceptable averages (A=1.6, B=1.2, C=1.3). Most students did very well answering all aspects of the question (6 out of 9), whereas all did well in at least two of the three criteria. I do not believe that the outcome warrants a major overhaul of the course content, however, I do plan to tweak conversations in the next course offering to tie in environmental and political aspects more strongly.

2014-2015 Geoscience Program Assessment Plan

Program: _____Geoscience_____

Date: ___November 24, 2014_____

Academic Program Assessment Plan (2014-2015)

The questions below will form the outline for your programmatic assessment for this academic year. All assessment plans should be implemented by the end of the spring semester with results compiled in May 2015. (Reports including those results are due June 8, 2015).

1. *Which outcome will you assess?*

   We will assess two outcomes. Outcome #6 will by assessed by Ryan Currier and Outcome #7 will be assessed by Kevin Fermanich.

2. *Which technique will you use to assess this outcome?*

   [You may, for example, wish to include a combination of direct and indirect methods. For example. tests, embedded assessment, papers, projects, laboratory procedures, competence interviews or musical performance (all measured against a set of explicit criteria drawn from program goals for student learning) and/or indirect measures, for example, student perceptions and experiences, survey data, portfolios, records of job placement, graduate admissions, etc.) More information on direct methods, including pros and cons can be found here: http://assessment.uconn.edu/docs/Summary_of_Direct_Assessment_Techniques.pdf

   We will use embedded assessment to evaluate both outcomes.

3. *Which course or group of students will you assess on the outcome chosen above and when?*

   (Please keep in mind that assessment should be a snapshot of what you're doing. You do not need to assess every single student in your major, but rather a sample group that is large enough to get reliable data.)

   Outcome #6 will be assessed in Physical Geology (Geoscience 202) during the Spring 2015 semester.

   Outcome #7 will be assessed in Hydrogeology (Geoscience 432) during the Spring 2015 semester. This course is required in the major.

4. *Who will do the assessment and coordinate the data collection and reporting?*
   Outcome #6 will by assessed by Ryan Currier and Outcome #7 will be assessed by Kevin Fermanich. They will report to the Geoscience Chair who will compile and forward the materials onward.