

PROGRAM REVIEW REPORT

June 2017

1. Reporting Institution	<u>Eastern Illinois University</u>
2. Program Reviewed	<u>B.S. in Geology (40.0601)</u>
3. Date	<u>June 2017</u>
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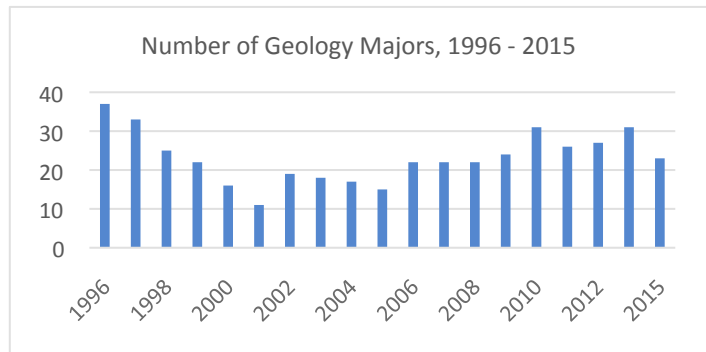
5. Overview

The Geology Program mission is to provide high-quality undergraduate education, achieve excellence in research, and interact with society and citizens by rendering the implications of research, through our outreach and service, for the benefit of the people of Illinois. As such, Geology has been taught at Eastern for approximately 60 years. The mid-1980s saw the greatest number of majors (over 120 per year) with subsequent ebb and flow that mirrors national trends in the discipline. It is expected that the upcoming decade will be one of growth and continued service to the citizens of the state since many of our graduates go on and gain employment within the state or enroll in graduate programs. While comprised of only three faculty, the Geology program encompasses all the traditional areas of Geology. The limited number of geology faculty requires that they teach a full 24 CU load each year allowing for minimal research and service. Majors are required to take a rigorous 73 credit hour curriculum that includes 49 credits in geology/earth science courses, and 24 credit hours of chemistry, physics, mathematics, and biology courses. In Spring 2016, the Geology faculty began an informal discussion concerning curriculum and the future hires within the discipline. That discussion and analysis form the basis for this report to the IBHE and all data are from the IBHE's

searchable Enrollments and Degrees Conferred Database. During the previous IBHE review period, 2002 – 2008, the absolute number of Geology majors increased 142% (see Figure 1), going from last in the state to being tied for fifth, out of seven other state schools.

It should be noted that Eastern Illinois University would be second if considering

only the three schools that offer just a B.S degree in Geology. The current percentage of Geology majors out of all students enrolled at Eastern has also **increased** since the last review period. During this review period, Geology faculty successfully received internal and external grants for research and service to the state. Research has been featured on Public Broadcasting Stations' NOVA program as well as presented and published at national conferences. In addition, student research is typically presented at regional or national conferences.



6. Major Findings and Recommendations

6.1 Description and assessment of any major changes in the program [e.g., (a) changes in the overall discipline or field; (b) student demand; (c) societal need; (d) institutional context for offering the degree; (e) other elements appropriate to the discipline in question; and (f) other].

- a) Changes in the Discipline. Since the mid-1990s, the general definition of “geology” began to change to “geoscience” – a more encompassing term that includes the environmental, climatological, and oceanographic sciences. Major agencies that track enrollments (e.g., AGI, NSF, and DOE) report enrollment changes that reflect the evolving courses and employment career paths that fall under the geoscience umbrella, rather than geology, *sensu stricto*. Departmental enrollments also reflect this trend to a more “Earth systems” approach. Students are requesting, and taking, a greater variety of courses away from the classical geology curriculum of years past.
- b) Student Demand. During the last IBHE review period (2003 – 2009), enrollments of full-time Geology majors ranged from 15-27 with an average of 20 per year. Since the last IBHE review (2009), enrollments have increased and averaged 27 majors per year, with a range of 23 to 31. Overall, the number of Geology majors has shown a modest increase since the last review and comparisons to other institutions in the state show that Eastern’s Geology program has made modest gains. Minority enrollments have improved slightly during the time-period, and the percentage of female students has remained stable at nearly 40% of the major. Comparing our major enrollments, per 1000 undergraduates, to those at other universities in the Illinois state system indicates that enrollments in the Geology program at Eastern have increased while major enrollments at some of the other schools have either remained flat (e.g., Western Illinois University) or have decreased (e.g., University of Illinois at Urbana-Champaign). It should be noted that ISU, NIU, and UIUC all have graduate programs. These trends are commendable considering that Geology is a “discovery” major since it is rarely, if ever, offered at secondary school levels.
- c) Societal Need. Along with the change in the perceived definition of a geology program, societal needs have shifted (based on BLS statistics), from energy-related industries (1980s) to environmental-related industries (early 2000s), and ultimately to environmentally friendly, or “green,” energy-related industries (2010s,) followed by the academy and government sectors. It is expected that demand for graduates from the Geosciences will be a dominant growth industry for the next decade or so and that they will experience “faster than average” growth of 10-12% nationally. Specifically, the growth rate in Illinois is expected to be greater than 16%, which places Geoscience growth in the top 30th percentile in Illinois, during that period (BLS’s Occupational Outlook Handbook, national and state/local data).
- d) Institutional Context for Offering the Degree. The Geology program complements well several other programs on campus (e.g., Biological Sciences, Chemistry, Mathematics and Physics) and our general education courses are an important component of the science requirement. The program also hosts many courses that students seeking a science teacher certificate are required to take. The department’s senior seminar, Spaceship Earth, is a geology-based course and is one of the most popular on campus.
- e) Other Elements. Within the science, technology, engineering and mathematics fields (STEM), the geosciences now attract the second highest proportion of female students, after biology. When it comes to racial diversity, however, the geosciences still lag. This lag may be due in part to the lack of geoscience programs at colleges and universities that serve large minority populations; lack of

geosciences courses at the secondary level and the perception that they are a difficult major; and may also be due to the lack of role models within the geosciences. Since the last IBHE review, 46.2% of graduates of the Geology program have gone directly into graduate school and 48.7% have gone into a geosciences industry (e.g., mining, environmental consulting, oil and gas), with the remaining 5.1% going into a non-geoscience career paths.

6.2 Description of major findings and recommendations, including evidence of learning outcomes and identification of opportunities for program improvement;

Major Assessment Profile (MAP). Annually, the Geology program is responsible for a Major Assessment Profile that summarizes the program's successes for the year and also identifies possible areas of improvement.

External Review. An October 2008 External Review by two outside faculty (one geologist and one geographer) from institutions similar to ours, provided affirmation that, while the Geology program is doing well with what we have, there is room for improvement. Many of these opportunities require little, if any, additional resources. The review made 8 recommendations specific to the Geology program: 1) Review course charges to see if levels are appropriate to support things like field trips and course materials. 2) Conduct a formal space study to identify areas of need and to be able to prove efficient use of current space. 3) Write equipment grants to upgrade and improve laboratory instruction and research. 4) Continue to foster relationships with the surrounding community and the University with respect to GIS. Student internships and money to support this type of work are beneficial to the Department and are to be commended. 5) Embrace transparency in regards to budget, scheduling and CU allocation. 6) Recruit majors from large introductory classes. A presentation could be delivered early each semester describing the field of geology and the current job market for graduates. 7) Look at individual program curricula to see if changes need to be made. 8) Investigate hiring a part-time person that could be shared with another department to help with budget issues and related paperwork. Based on the recommendations of the reviewers, new faculty hires will be expected to incorporate better the strengths of the program, department, college and university communities.

Annual Assessments. Administrative evaluation of the annual assessment process has been positive. Overall assessment of students from upper division, major courses have found over 75% meeting the superior or satisfying classifications. In the lower level, general education courses, a comparison of pre- versus post-testing indicates that more than approximately 80% have met the stated learning goals for the course as well as shown improvement during the course. Additional assessment activities will be implemented.

Alumni Surveys. Certainly, one of the best indicators of learning outcomes is the success of our Geology majors upon graduation. Indeed, the employment and graduate school acceptance rates of our graduates are impressive. Of the 31 graduates of the Geology program since 2002, 38.7% went directly to graduate school, 38.7% are employed in the geosciences, and 16.1% are employed outside the geosciences and 7.5% have lost touch with the department. Graduates that are employed in the Geosciences (either directly or following graduate school) are working in the mineral exploration and mining industry (35%), environmental consulting companies (35%), the energy industry (24%), and companies that specialize in GISci applications (6%). Comparing these data to the national trends compiled in 2000, EIU Geology majors are continuing their education in graduate school at significantly higher rates (38.5%) than the national average (23%). In the past 15 years, 6 of our graduates are either working towards or have acquired their Ph.D. in the Geosciences.

Based, in part, on the self-study, external review, annual assessments, and alumni surveys, the department curriculum committee will be meeting in the fall to discuss revisions to the program and possible inclusion of other electives for even better placement of graduates in industry and graduate school. Jointly with the Geography Program, a Facebook page for current majors and alumni has been created.

6.3 Description of actions taken since the last review, including instructional resources and practices, and curricular changes.

Since the last IBHE review, three new courses were added to the curriculum (*GEO 1320G – Geology of National Parks*, *GEO 2100 – Geology of Energy Resources*; *GEO 3085 – Vertebrate Paleoenvironments and Paleocology*), and several new courses have been piloted (e.g., Planetary Geology, X-Ray Diffraction, and Dinosaurs), and minor programmatic changes such as offering courses in an online or hybrid format have been made. At the recommendation of the previous external review, field trips are more self-supporting allowing more of the department's operating budget to help with faculty travel and research. Several dual-purpose lecture/laboratory rooms and special-purpose laboratories are also maintained for teaching/research and include: mineral separation, grain-size analysis, soil analysis, water quality testing, structural analysis, and geophysics.

Owing to a faculty member's year-long sabbatical this year and the sudden retirement of our senior geology faculty member two weeks before classes began in the fall of 2016, a comprehensive curriculum review was delayed from this academic year, but is now planned for fall 2017 with possible implementation of changes in Fall 2018. Hiring of young, enthusiastic geoscientists who are abreast of the most recent developments of our science would add a new vitality to our program and is critical to the continued success of the program; however, this is contingent on state funding for higher education. A new hire, or hires, will bring expertise in sub-disciplines that complement those of the current faculty and thus provide expanded curricular and research opportunities to our students. Curricular modifications that reflect their specialties and recent experience with academia and employment will be a certainty.

6.4 Description of actions to be taken as a result of this review, including instructional resource and practices, and curricular changes.

It is apparent that the geology curriculum needs revision to bring it in-line with the external forces that drive industry. Students going straight into graduate school report success; however, to better assess individual courses, the curriculum, the program, and graduate preparedness for industry, as well as graduate school, a culture of evidence needs to be fostered and developed. An upcoming Strategic Plan will address this issue. The Geography program, also undergoing an IBHE review this year as well, will be used as a model of assessment since they have received top marks in their assessment strategies and implementation. A survey of graduates over the last 10 years, as well as their employers should be undertaken to assess better the skills acquired by the graduates and required by the employers and how the program can best match those.

7. Responses to Institution-Assigned Issues

7.1 What strategies has the department implemented that will support the Integrative Learning experience at EIU?

The Geology program supports Integrative Learning by explicitly incorporating Biology, Chemistry, Mathematics and Physics courses into its required curriculum. Currently, the major encourages

students to take Geographic Information Science (GISci) and Remote Sensing (RS) courses as electives, which strengthens their prospects for employment and better graduate programs. One part of the curriculum review being considered for Fall 2017 is to reorganize the required courses to include at least one GISci and/or RS course. Such a reorganization not only will strengthen the bond between disciplines in the department, but would be in line with suggestions made in the Education for Professional Practice Report with Recommendations by the American Institute of Professional Geologists.

The capstone course that all Geology majors are required to take is a 6-week field camp course conducted by another institution (articulating as GEO 4800). Majors who have participated in the field camp with students from other institutions around the country are directly compared to the other students and have consistently received good reports on their preparedness, abilities and knowledge.

7.2 What one unique, noteworthy activity is the program involved in that will enable the IBHE to distinguish its program from other similar programs in the state?

The Geology Program has a history of getting our students involved in a variety of clubs and professional organizations to give back to the community and to network in preparation for careers or graduate school. For example, with nearly 200 chapters nationally, Eastern Illinois University's Gamma Chi chapter of Sigma Gamma Upsilon, The National Honor Society for Earth Sciences, has received the "Quality Chapter Award" each year since the award began in 2011 – the only chapter to be so honored. The award is designed to recognize chapters for achieving excellence by providing a quality program to its members.

8. Outcome

8.1 Decision:

- _____ Program in Good Standing
- _____ Program flagged for Priority Review
- _____ Program Enrollment Suspended

8.2 Explanation

Dean Comments

The Geology program has potential for effective local outreach which I encourage. Program faculty plan a curricular overhaul beginning in FA17 and, as part of this, possibly incorporating Geographic Information Science and Remote Sensing components into the program. This seems an excellent idea. I strongly encourage program faculty to look at other ways of consolidating and/or streamlining their offerings to adjust to fiscal constraints.

Provost's Comments

Adjusting to fiscal constraints is an ever present need for all programs particularly those scrambling for students, so I reiterate the Dean's comments in this regard. The curricular review will be an important part of this, and it needs to be taken serious. There is no doubt than GIS and Remote Sensing are hot fields, so looking for ways to bring this front and center would be wise.