Physical Geology (GEOL 121) at Towson University

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Towson University is a predominantly undergraduate, public institution with ~18,800 undergraduates (~35% growth from fall 2003 to fall 2013) and ~3,700 graduate students, almost exclusively at the masters level. The Geology program at Towson is located within the Department of Physics, Astronomy, and Geosciences. Currently, the Geology program has 3 tenure/tenure-track faculty, a visiting assistant professor, and two full-time lecturers. The second lecturer was added this academic year in response to growth in the number of students taking introductory Geology courses as well as upper-level courses.

Physical Geology (GEOL 121) at Towson University is a course that predominantly serves non-science majors. It is offered in the fall and spring semesters as well as during intensive summer sessions. Most students, 80–85% of students in my sections over the last five semesters, are not science majors. Each semester, 200–275 students take GEOL 121 in several sections of 30–35 students, and in the summers, two sections of 20–25 students are offered. Typical two to five sections (70–175 students) are combined for three hours of lecture each week and then each individual section has a weekly three–hour laboratory. Most of the time, lecture and laboratory instructors are different with 4–6 people typically involved in course instruction each semester. The large number of students instructed each semester is important for maintaining the number of students instructed per faculty member at the program and departmental levels. Instructing a large number of students is an important contribution to the university given the growth in the student population.

GEOL 121 meets the university core curriculum (general education) requirement for a laboratory science. The large number of students instructed each semester, at least compared to the number of faculty, provides many opportunities for students to fulfill their core curriculum requirement. GEOL 121 is a required course for four majors: Geology (15–25 majors), Environmental Science (~150 majors, Environmental Studies (~50 majors), and Earth-Space Science (10–15 majors, pre-service secondary educators). Secondary education majors in Biology, Chemistry, and Physics can take GEOL 121 as one of their elective courses. Elementary and middle school pre-service teachers do not have the option to take GEOL 121 to meet their science course requirement. Instead, they take one or two combined physical science or earth-space science courses that may include some earth science coverage and are taught by science educators.

The course is a survey course with the extent and depth of topical coverage varying among instructors. That said, all instructors cover minerals, the three major rock types, the rock cycle, and plate tectonics. One major goal of the course is to educate non-science majors about geology along with the nature of science more generally since GEOL 121 may be one of only two science courses they take in college. A second major goal is to give geology, environmental science, and other science majors a solid intellectual foundation for upper–level geology courses. A third goal is to recruit geology majors though a recent study of the pathways into the geology major indicates only ~10–15% of geology majors are recruited through GEOL 121.

Anecdotally, several Earth-Space Science majors have been recruited through GEOL 121 in recent years. Goals for all students are development of observational skills, quantitative skills (to some degree), and scientific reasoning.

As mentioned above, the course is a lecture/laboratory course. The GEOL 121 lecture format varies by section, including traditional lecture or lecture plus small group activities that employ interactive or guided inquiry techniques. Guided inquiry activities are used at frequencies that vary from several times a semester to weekly. In the last few years, some instructors have introduced the use of electronic response systems (aka clickers) where the students more actively engage in the material. Instructors that use clickers employ them every class period. Also, one instructor devotes parts of several class periods to reading and discussion of essays about the nature of the geosciences (and science more broadly) or about the interaction between science and society. Some sections of GEOL 121, particularly those offered in summer sessions, are smaller and are offered in a combined lecture/laboratory format, which has allowed more opportunities for an interactive and inquiry-based approach.

The laboratory portion of the course is perhaps the most variable part of the course. Some instructors lean strongly toward an inquiry-based approach, some use more guided inquiry, and others, particularly part-time faculty, teach in a more traditional fashion that sticks closely to the laboratory manual. Training and mentoring part-time faculty, as well as new full-time faculty, in how to move away from more traditional approaches presents perhaps the biggest challenge for this course. We are currently working to start including more frequent field experiences into the lab, primarily using resources around Towson's campus such as a rock outcrop, streams, and building stones. Perhaps the main goal for the lab portion of the course in the future is to introduce more, or to improve existing, inquiry-based activities that involve answering questions through measurements, working with data, and other activities that more closely resemble the practices and habits of scientists. The assumption underlying this effort is that it may attract more students to consider majoring in geology as well as better introducing non-scientists to scientific practices and culture.

GEOL 121 at Towson University represents the bulk of the students taught by the Geology program and represents a large teaching contribution to the department, college, and institution. I personally enjoy teaching GEOL 121 and the challenge of reaching non-science students. Last semester, several top students were non-science majors (business, political science, and art). I work to incorporate still and moving imagery, animations, along with connections to current events in an effort to give students opportunities to see the relevance of geology to society and how exciting geology can be.