

**University of Puerto Rico at Mayaguez (UPRM)**  
**Department of Geology**  
*geology.uprm.edu*



# **Geology Department Plan for the Assessment of Student Learning**

**Approved by the Faculty of the Geology Department  
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**Our Commitment:** *We at the University of Puerto Rico – Mayaguez will regularly and continuously assess student learning in each area of general education and in each academic program, and will use that information for improving all programs.*

## 1. Introduction

The University of Puerto Rico at Mayaguez (UPRM) is committed to continually review the institution's effectiveness. UPRM recognizes that excellent institutions are self-reflective and continually seeking to improve. The Department of Geology at UPRM follows this commitment and promotes the assessment of its program as part of a continuous process to achieve its mission and vision. It will eventually result in the development of new courses that respond to societal needs, providing the students with the knowledge needed to improve their learning and the faculty with the tools that will help in the planning of more effective instruction. The assessment of student learning is the most important of the components within the department's assessment plan. In order to initiate the formal assessment process an Assessment Committee consisting of various faculty members was organized. An Assessment Coordinator was appointed with the responsibility of developing and carrying out the assessment plan. The Geology Department Assessment Plan has been developed based on the Institutional and the Departmental vision and mission.

## 2. Purpose of Assessment

The fundamental purpose of assessing student learning in the Geology Department is to improve the quality of our program through a continuous revision of its educational objectives, curriculum, and program outcomes. A secondary purpose of this assessment is accountability; demonstrating to the accrediting agencies, governing bodies, constituencies, and other interested parties that we are effective in achieving the goals of our strategic plan. Our efforts will help with the institutional responsibility for producing, reporting, interpreting, and explaining learning outcomes.

This academic assessment ensures that our departmental reviews contribute in a fundamentally important way to the attainment of the Institution's Mission. Along with the purpose in the UPRM assessment plan, we will assure that ***the assessment of student learning in the Geology Department must demonstrate that our students have knowledge, skills, and competencies consistent with institutional goals and that at graduation have achieved appropriate higher education goals.***

## 3. Purpose of the Plan

The purpose of this plan is to guide the Department of Geology in the development of student learning outcomes assessment processes and continuous quality improvement (CQI) programs. This plan is focused in the development and implementation of several assessment processes based on goals and objectives stated in our strategic plan. It is intended to be a source of guidance without constraining experimentation or alternate approaches that may be developed in the future by the faculty.

The institutional approach for the assessment of student learning gives us the opportunity to take responsibility for our own plan and for those closest to the students to make decisions about what students should be learning. Therefore, the assessment of student learning at the Geology Department is primarily course-embedded and faculty experience-based.

Our department will use this initial plan as a basis for developing specific approaches and future plans. The choice of instruments/tools and assessment activities are grounded on the capabilities, idiosyncrasies, and in the teaching approach of earth sciences. The Geology Department assessment plan follows a format similar to the institutional assessment plan, but the content of such plan, the learning outcomes, and the means used to evaluate/assess them are specific to our discipline based on the vision and mission.

#### **4. Geology Department Vision**

The Geology Department of the University of Puerto Rico at Mayaguez seeks to provide the highest levels of education through continuous revision and expansion of our educational, research, and outreach programs in order to produce well-trained, competent, academic and professional geoscientists capable of responding to societal needs.

#### **5. Geology Department Mission**

The Geology Department will develop in each student, critical thinking, enthusiasm, initiative and the necessary skills to become lifelong students of Earth Sciences. Emphasis will be placed on learning basic concepts and techniques through research, in an environment that promotes the development of professionals with social, cultural and humanistic sensibility as well as profound ethical values. In this way, the department will contribute to the enrichment of science and society through the creation and dissemination of new knowledge through scientific research. The specific objectives of the Geology Department are:

1. Prepare students for professional positions in industry and government and for careers in academic research and teaching.
2. Increase awareness of Earth and Environmental Sciences in liberal arts, education, and other science majors.
3. Educate engineers in the geological concepts integral to competent engineering practices.
4. Establish the Department of Geology as the center for research in Caribbean Earth and Environmental Sciences.
5. Develop a greater awareness of Earth Sciences in the general public through outreach programs.

#### **6. UPRM Vision**

“Transform UPRM into a leader institution of higher education in Puerto Rico and the American hemisphere, responding to the needs of a modern society, in a dynamic and global environment, in the continuous search for truth, knowledge, justice and peace”.

## **7. UPRM Mission**

“Within the philosophical framework established by the University of Puerto Rico Act, the Mayaguez campus directs its efforts towards the development of educated, cultured citizens, capable of critical thinking, and professionally qualified in the fields of agricultural, social, and natural sciences, engineering, humanities and business administration. They should be able to contribute in an efficient manner to the cultural, social, and economic development of the Puerto Rican and international community. This process is aimed at endowing our alumni with a strong technical and professional background and to instill a strong commitment to Puerto Rico and our hemisphere. Our alumni should have the necessary skills and knowledge to participate effectively in the search for solutions to the problems facing us, to promote the enrichment of the arts and culture, the development and transfer of technology as well as to uphold the essential attitudes and values of a democratic society.”

## **8. Geology Student Profile**

The Geology Department Program aims to develop graduates with the following skills and values, as well as with proficiency in the following scientific concepts:

### **a. Skills and Values**

- Critical thinking and problem solving skills through the scientific method
- Team working skills
- Communication skills in Spanish and English
- Computer literacy and its scientific applications
- Knowledge of up-to-date scientific tools and techniques
- Awareness of contemporary scientific issues
- Awareness of ethical implications in science
- Ability to learn by him/herself (lifelong learners)
- Knowledge

### **b. Scientific Concepts**

- Paleontology
- Sedimentology and Stratigraphy
- Structure & Tectonics
- Igneous and Metamorphic Petrology (including volcanology)
- Geomorphology and Quaternary Geology
- Hydrogeology
- Geophysics and Seismology
- Environmental Geology
- Geochemistry
- Engineering Geology
- Mineralogy
- Knowledge of the Geology of Puerto Rico

**9. Geology Department Program Outcomes**

At graduation the students that meet the graduating student profile will have:

- Proficiency in a range of basic Earth Sciences concepts
- Ability to apply scientific technology and the scientific method to solve problems
- Computer literacy, problem solving, math reasoning skills, critical thinking, ability to judge scientific validity, able to write and speak effectively
- Up-to-date knowledge of scientific technology and issues related to Earth Sciences
- Ethical values
- Research experience and skills
- Interest in life-long learning

The Faculty involved in student assessment procedures will have:

- Assessment training and awareness of its importance
- Improved teaching/learning methods
- Capacity to teach up-to-date courses
- Potential to disseminate assessment outcomes

**10. Assessment Strategies**

The Geology Departmental Assessment Plan has been designed to evaluate how the Geology curriculum, research, outreach, and other activities complement each other to achieve the graduating student skills and knowledge. For this, the following activities are proposed and data will be collected:

**ASSESSMENT STRATEGIES & TIMING**

<b>ASSESSMENT TOOLS</b>	<b>TIMING (PERSON RESPONSIBLE)</b>
<i>Course Assessment</i>	
Exams, Quizzes, Homework, Projects	Throughout each semester (Professors/Instructors)
Laboratory Reports	During most Laboratory Courses (Lab Instructors)
Written Report Assessment	Whenever required whether lab or lecture (Seminar course, laboratories, others) (Professors/Instructors)
Oral Presentation Assessment	Whenever required whether lab or lecture (Seminar course, laboratories, others) (Professors/Instructors)
Teamwork Assessment Form	At end of any semester where work is performed in groups (Professors/Instructors)
Student’s Evaluation of Teaching Assistants (Geology Dep. Form)	At end of every Course and Laboratory (All students)
Professor’s (Coordinator) evaluation of Teaching Assistants	At end of every Laboratory Course

Student's Evaluation of Teaching (UPRM Form)	After 10 weeks of each semester (All students)
Student's Evaluation of Course Skills and Knowledge	At end of every course (All students)
Pre- and Post-General Earth Sciences Test	At beginning and end of each semester of Geol 3025 and Geol 3047 (All Geology majors students)
Faculty Course/Student Profile Correlation Form	When a professor teaches a new course and included with course syllabus (Professor)
Teaching Assistants Assessment of Laboratory Coordinator	Yearly (Teaching Assistants)
Course Portfolio	Core courses (Faculty teaching the course)
<b><i>Program Assessment</i></b>	
Career orientation in the General Geology Course (Pre-Post assessment)	At beginning and at end of presentation in General Geology Laboratory (By students)
Senior students curriculum assessment form	At end of Geol 4018 (Field Geology) and Geol 4049/4055 (Undergraduate research) Courses (All Geology majors students)
Undergraduate Research Assessment Form (Student Version)	At completion of research experience (Student)
Undergraduate Research Assessment Form (Mentor Version)	At completion of research experience (Mentor)
Field Geology Assessment Form (Student Version)	At end of course (All students)
Field Geology Assessment Form (Professor Version)	At end of course (Professor)
<b><i>Post Graduation</i></b>	
Alumni Assessment of Geology Curriculum	UPRM Geology Teaching Assistants who graduated from this Geology Department. Future efforts will be made to obtain additional alumni input.

**11. Assessment of Learning Outcomes**

<p><b>Learning Objectives/Outcomes Student Graduating Profile</b></p>	<p><b>Assessment Strategy</b></p>
<p>Critical thinking and problem solving skills through the scientific method</p>	<p>Lab Reports Exams, Quizzes, Homework, Projects, Written and oral Report Assessment Student Course Skills and Knowledge Assessment Form Faculty Course/Student Profile Correlation Form Undergraduate Research Experience Assessment Form (students and mentors)</p>
<p>Team work skills</p>	<p>Teamwork Assessment Form Student Course Skills and Knowledge Assessment Form Faculty Course/Student Profile Correlation Form Student Undergrad Research Experience Assessment Form (students and mentors)</p>
<p>Communication skills in Spanish and English</p>	<p>Lab Reports Exams, Quizzes, Homework, Course projects, Written and oral Report Assessment Student Course Skills and Knowledge Assessment Form Faculty Course/Student Profile Correlation Form Undergraduate Research Experience Assessment Form (students and mentors)</p>
<p>Computer literacy and its scientific applications</p>	<p>Lab Reports Written and oral Report Assessment Student Course Skills and Knowledge Assessment Form Faculty Course/Student Profile Correlation Form Undergraduate Research Experience Assessment Form (students and mentors)</p>
<p>Knowledge of up-to-date scientific tools and techniques</p>	<p>Lab Reports Student Course Skills and Knowledge Assessment Form Faculty Course/Student Profile Correlation Form Undergraduate Research Experience Assessment Form (students and mentors)</p>
<p>Awareness of contemporary scientific issues</p>	<p>Lab Reports Written and oral Report Assessment Student Course Skills and Knowledge Assessment Form Faculty Course/Student Profile Correlation Form Undergraduate Research Experience Assessment Form (students and mentors)</p>

<p>Awareness of ethical implications in science</p>	<p>Ethics Integration Assessment Form                  Student Course Skills and Knowledge Assessment Form                  Faculty Course/Student Profile Correlation Form                  Undergraduate Research Experience Assessment Form (students and mentors)</p>
<p>Ability to learn by him/herself (lifelong learners)</p>	<p>Undergraduate Research Experience Assessment Form (students and mentors)                  Faculty Course/Student Profile Correlation Form</p>
<p>Scientific concepts in Earth Sciences (as described in part 8)?</p>	<p>Lab Reports                  Exams, Quizzes, Homework, Course projects,                  Written and oral Report Assessment                  Student Course Skills and Knowledge Assessment Form                  Faculty Course/Student Profile Correlation Form                  Pre- and Post-General Geology test</p>



**13. Test Run for Learning Assessment in Undergraduate Research**

In the Department of Geology every undergraduate student has to take two semesters of undergraduate research (Geol 4049 and Geol 4055). These courses are a good opportunity to assess the skills and knowledge of the scientific concepts that define our student profile. Therefore, we ran a test of learning assessment in these courses during the last semester. In the appendix there are the two forms we used, one for the student and another for the professor. This first experience with the learning assessment of our students gave us some clear ideas for our plan and on how we should proceed in the future with such assessment. We were also able to identify some problems and limitations. We are now in the process of improving such forms.

**GEOLOGY UNDERGRADUATE RESEARCH  
Assessment Form To Be Completed By Student  
Semester \_\_\_\_\_ Year \_\_\_\_\_**

**Student Information**

Years at UPRM: \_\_\_\_\_

Major when you entered the UPRM: \_\_\_\_\_

Semester of Research:        \_\_\_\_\_ First                      \_\_\_\_\_ Second

**Description of Research Topic**

Research Topic: \_\_\_\_\_

The selected topic is related with:

- |  |   |                                       |
|--|---|---------------------------------------|
| <input type="checkbox"/> Sedimentology | <input type="checkbox"/> Mineralogy         | <input type="checkbox"/> GIS          |
| <input type="checkbox"/> Petrology     | <input type="checkbox"/> Structural Geology | <input type="checkbox"/> Geophysics   |
| <input type="checkbox"/> Geomorphology | <input type="checkbox"/> Seismology         | <input type="checkbox"/> Hydrogeology |
| <input type="checkbox"/> Stratigraphy  | <input type="checkbox"/> Remote Sensing     |                                       |

**Research Experience**

In a scale of 1 (strongly disagree) to 5 (strongly agree) assess your experience in undergraduate research in geology.

Criteria	1	2	3	4	5
A project with well defined goals was assigned					
Faculty met regularly to discuss progress					
I applied knowledge from my geology courses					
Became exposed to new concepts					
Developed analytical skills					
The experience was challenging					
I improved my oral and writing skills					
I gained confidence in my abilities to do research					

If this is your first undergraduate research, would you be interested in continuing the same research during the following semester?        Yes \_\_\_\_\_        No \_\_\_\_\_

Comments concerning this experience:

**GEOLOGY UNDERGRADUATE RESEARCH  
Assessment Form To Be Completed By Faculty  
Semester \_\_\_\_\_ Year \_\_\_\_\_**

**Student Information**

Years at UPRM: \_\_\_\_\_

Major when he/she entered the UPRM: \_\_\_\_\_

Semester of Research:        \_\_\_\_\_ First                    \_\_\_\_\_ Second

**Description of Research Topic**

Research Topic: \_\_\_\_\_

The selected topic is related with:

- |  |   |                                       |
|--|---|---------------------------------------|
| <input type="checkbox"/> Sedimentology | <input type="checkbox"/> Mineralogy         | <input type="checkbox"/> GIS          |
| <input type="checkbox"/> Petrology     | <input type="checkbox"/> Structural Geology | <input type="checkbox"/> Geophysics   |
| <input type="checkbox"/> Geomorphology | <input type="checkbox"/> Seismology         | <input type="checkbox"/> Hydrogeology |
| <input type="checkbox"/> Stratigraphy  | <input type="checkbox"/> Remote Sensing     |                                       |

**Research Experience**

STUDENT PERFORMANCE	EXCELLENT	GOOD	AVERAGE	POOR
Enthusiasm for the research project				
Ability to follow scientific methodology				
Organization skills				
Oral presentation skills				
Scientific Writing skills				
Interpersonal skills				
Potential for graduate work				
Quality of student contribution to the project				
<b>Expectations</b>				
Opportunity for future work in your laboratory				
Potential for presenting the work in a meeting				
Potential for attending graduate school				

Comments concerning the student's experience: