

University of Puerto Rico  
Mayagüez Campus  
College of Arts and Sciences  
Department of Geology

**1. General Information:**

Course Number: GEOL 5996 / GEOL 6991  
Course Title: Applied Geology: Introduction to GIS for the Earth Sciences  
Credit-Hours: 3 credit hours. One hour of lecture and one 2-hour laboratory per week  
Pre-requisites: Authorization of the Department's Director

**2. Course Description:**

This is an introduction to the theory and applications of geographic information systems in the earth sciences. Several components of the ArcGIS system will be used to create GIS maps, explore and analyze the data behind the maps, and apply methods to easily share your maps. By the end of the course, you will have a solid understanding of how GIS maps and ArcGIS tools can be used for earth sciences applications by discovering patterns, obtaining information, and communicating that information.

**3. Course Objectives:**

- A. Learn the basics of ArcGIS Desktop software and its applications for the earth sciences.
- B. Learn how to make maps, carry out spatial analysis, and build and edit spatial databases.
- C. Find and organize geographic data and other GIS resources for a mapping project.
- D. Create and share a GIS database using ArcGIS web-based tools.

**4. Course time frame and thematic outline:**

Topic	Contact Hours
1 Introduction to the course	1
2 Introducing GIS and ArcGIS	2
3 Interacting with maps and data	3
4 Exploring online resources	3
5 Map projections and coordinate systems	3
6 Classifying and labeling features	3
7 Making maps for presentation	3
8 Creating and editing data	3
9 Getting information about features	3
10 Analyzing geospatial data	3
11 Integrating Field GPS Points	3
12 Geologic and Topographic Maps	3
13 Shoreline Changes	3
14 Research Projects	9
<b>TOTAL HOURS</b>	<b>45</b>

## 5. Instructional Strategies:

- A. Conference
- B. Laboratory
- C. Computation
- D. Discussion
- E. Oral Presentations
- F. Written Reports
- G. Scientific Readings
- H. Research Activities
- I. Course Project

## 6. Instructional Resources Available or Required:

This course includes 2 hours of laboratory work per week for learning the skills of geographic information systems, interpretation and analysis of databases, ArcGIS, and free software. This activity will be performed in the computing laboratory of the Geology Department that is equipped with the required resources.

All course material, including lectures notes, data, tutorials and additional readings will be given in digital form to the students. It is highly recommended that students bring an external hard drive to store the files due to the high volume of data used in the course.

## 7. Evaluation Strategies and Grading System:

Mid-term examination (100 pts.)

Final examination (100 pts.)

Laboratory reports (100 pts.)

Research project (100 pts.)

Final grade will be based on 400 points and using the following ranges:

A = 100-89%

D = 64-55%

B = 88-78%

F = 54-0%

C = 77-65%

## 8. Bibliography:

Getting to Know ArcGIS

Michael Law and Amy Collins (2015)

Fourth Edition, ESRI Press (ISBN 978-1-58948-382-8)

GIS Fundamentals: A First Text on Geographic Information Systems

Paul Bolstad (2016)

Fifth Edition, Ebook ISBN 978-1-50669-588-4

[www.xanedu.com](http://www.xanedu.com)

Other readings, like peer-review papers, will be assigned during the semester.

## 9. Requirements and Policies:

Class attendance: Class attendance is compulsory. The University of Puerto Rico at Mayaguez reserves the right to deal at any time with individual cases of non-attendance. Professors are expected to record the absences of their students. Frequent absences affect the final grade, and may even result in total loss of credits. Arranging to make up work missed because of legitimate class absence is the responsibility of the student. (See Bulletin of Information Undergraduate Studies)

Absence from examinations: Students are required to attend all examinations. If a student is absent from an examination for a justifiable reason acceptable to the professor, he or she will be given a special examination. Otherwise, he or she will receive a grade of zero or "F" in the examination missed. (See Bulletin of Information Undergraduate Studies)

Final examinations: Final written examinations must be given in all courses unless, in the judgment of the Dean, the nature of the subject makes it impracticable. Final examinations scheduled by arrangements must be given during the examination period prescribed in the Academic Calendar, including Saturdays. (See Bulletin of Information Undergraduate Studies).

Partial withdrawals: A student may withdraw from individual courses at any time during the term, but before the deadline established in the University Academic Calendar. (See Bulletin of Information Undergraduate Studies).

Complete withdrawals: A student may completely withdraw from the University of Puerto Rico at Mayaguez at any time up to the last day of classes. (See Bulletin of Information Undergraduate Studies).

Disabilities: All the reasonable accommodations according to the Americans with Disability Act (ADA) Law will be coordinated with the Dean of Students and in accordance with the particular needs of the student.

Academic Integrity: Any academic fraud is subject to the disciplinary sanctions described in article 14 and 16 of the revised General Student Bylaws of the University of Puerto Rico contained in Certification 018-1997-98 of the Board of Trustees. The professor will follow the norms established in articles 1-5 of the Bylaws. Each student is expected to work individually on all projects, exams and laboratory assignments. You may not share your answers to the laboratory assignments. Failure to comply with these requirements will result in a grade of F in the course for the student(s) breaking these rules. Unauthorized group efforts, particularly during exams, will be considered academic dishonesty and the students involved will receive an F in the course. You should read Article 10 of the "Reglamento General de Estudiantes de la Universidad de Puerto Rico" to learn more about the possible sanctions that you might experience if caught in an act of academic dishonesty.

## 10. Instructor Information:

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