GEOL 8040
Principles & Environmental Applications of Remote Sensing & GIS

Instructor: Dr. Adam Milewski, Geology, Room #134, 706-542-4263, milewski@uga.edu

Textbooks: (Not Required)


Grading:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Exam(s)</td>
<td>15%</td>
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<tr>
<td>Exercises</td>
<td>60%</td>
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<tr>
<td>Final Project</td>
<td>25%</td>
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Course Description and Objectives:

The course provides rigorous hands-on-exercises on the applications of remote sensing and GIS techniques in geological and environmental sciences. The hands-on exercises are primarily based on previous and ongoing research projects in varying physical and climatic environments (most of which was published in peer-reviewed journals). While solving the exercises, students will master image processing and spatial analysis techniques (e.g., radiometric and geometric enhancement, image classifications, spatial interpolation, georeferencing, etc.). The course will cover the fundamentals of remote sensing and GIS with an emphasis on water.

There are two main objectives for this course:

1. Understand the fundamentals of remote sensing and numerical/spatial analysis techniques commonly used in the analysis of geological/environmental data sets
2. Master the applications of these techniques within an image processing (ENVI) and GIS framework to resolve geologic and environmental problems of interest

Course Outline:

January
What is GIS?
- History and Scope of Remote Sensing
- Electromagnetic Radiation

February
- Multispectral and Hyperspectral Remote Sensing
- Coordinate Systems and Projections
- Data Types: Raster & Vector

March
- Active/Passive Microwave and Lidar
- Managing Spatial Data and Models
Introduction to ArcSWAT

April
- Thermal Infrared Radiation
- Spatial Interpolation
- Projects

Examples of Class Exercises:
- Geology, Hydrology, and Landforms of Georgia
- Compositional and Structural Mapping Using Landsat
- Assessment of Groundwater Resources in Arid Lands
- Disintegration of Wetlands (Mesopotamian Marshlands)
- Terrestrial Water Storage Analysis
- Evaluation of Seismic Risk
- Origin and Evolution of Groundwater in the Middle East
- Development of an ArcSWAT Model
- Large Scale Structural Correlations in the Arabian-Nubian Shield

Class Project
The last few weeks will be spent on a group or individual project. Graduate students are encouraged to apply the gained expertise to their ongoing research. Preferably, this becomes a part of your thesis/dissertation research. A report and in-class presentation will be provided on the project detailing the objectives, location, data, analysis techniques, and findings.

University Honor Code and Academic Honesty Policy
As a University of Georgia student, you have agreed to abide by the University’s academic honesty policy, “A Culture of Honesty,” and the Student Honor Code. All academic work must meet the standards described in “A Culture of Honesty” found at: [www.uga.edu/honesty](http://www.uga.edu/honesty). Lack of knowledge of the academic honesty policy is not a reasonable explanation for a violation. Questions related to course assignments and the academic honesty policy should be directed to the instructor.

Note:
If you have a diagnosed disability (physical, learning, or psychological) which will make it difficult for you to carry out the course as outlined, or requires accommodations, please advise me during the first few weeks of the course so we may review possible arrangements.

*The course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary.*