16:550:545 | INTRODUCTION TO GEOMATICS

Rutgers, the State University of New Jersey
School of Environmental and Biological Sciences
SPRING 2020

Meeting Place: Room 129, Blake Hall
Meeting Times: Tuesday, 12:35 PM – 1:55 PM
Friday, 12:35 PM – 1:55 PM

Credits: 3

Instructor: Dave Smith
Office: Blake Hall, Room 224
Email: dave.c.smith@rutgers.edu
Office Hours: Tuesday 2:30 p.m. – 4:00 p.m.

Course Website: *https://canvas.rutgers.edu/*-- course site is listed as "Intro to Geomatics SP20"

This course fulfills the geomatics requirement for the Masters of Landscape Architecture program.

Course Learning Objectives:

1. Understand and describe the field of geomatics, its different facets—geographic information systems (GIS), remote sensing, and global navigation satellite systems—and the relevance of these technologies to a variety of other fields.
2. Understand and describe the fundamental concepts, tools, and methods for computer-aided spatial data analysis and representation, and how they are applied.
3. Perform basic functions and apply tools for visualizing, manipulating, analyzing, and generating spatial datasets in ArcGIS.
4. Apply these tools together to perform complex spatial analysis of real-world environmental phenomena.

Prerequisites:

This course has no formal prerequisites. However, students are expected to have basic computer skills and a general understanding of spatial concepts. Students who do not feel comfortable in either one of these areas will need to work outside of class to develop those skills.

Course Description:

Geomatics is a rapidly growing field that has applications in a wide array of different disciplines including landscape architecture, urban and environmental planning, ecological analysis and modeling, epidemiology, and emergency response and management to name just a few. It incorporates Geographic Information Systems (GIS), Remote Sensing, and Global Navigation Satellite Systems (*e.g.* GPS), along with other spatial sciences. The reason for the growing popularity and broad appeal of Geomatics is simple: if the location of the thing you are asking about is meaningful to the question you are asking, then chances are that Geomatics provides the best tools for finding the answer.
This course provides hands-on experience with some of the tools and methods commonly used by Geomatics professionals as well as the theoretical principals that underlie them.

Readings:

Required Text: There is no required text for this course. Required readings will be provided.

Assignments and Grading:

Lab Assignments:

This course will emphasize practical hands-on experience with the tools of GIS through lab exercises. These exercises will consist of two parts. First, students will work though a step-by-step walkthrough of a real-world analysis or application at their own pace. Second, students will apply the tools presented in the walkthrough to a related application with limited instructions.

Practical Exam:

Toward the end of the semester there will be a practical exam. This will consist of a number of geospatial problems that students will have to complete with minimal instructions.

Term Project:

Students will propose and complete an independent term project. Each student will define a research question to explore using geomatics tools and methods. Students will be expected to acquire the necessary data, apply appropriate analytical methods, and interpret and present the results of their analysis. The deliverable for this will be a formal written report.

Composition of Final Grade:	
Lab Assignments:	50%
Lecture Exercises:	5%
Practical Exam:	10%
Term Project:	20%
Attendance:	See Below

Numerical Ranges for Letter Grades:			
A:	90-100%		
B:	80-86%	B+:	87-89%
C:	70-76%	C+:	77-79%
D:	60-69%		
F:	under 60%		

Attendance Policy:

The Department of Landscape Architecture's policy on attendance, as outlined in the student handbook, states:

> *The individual student's development as a landscape architect is largely dependent upon two aspects of education. First is the exposure to and assimilation of a body of information which relates to the field. Second is the application of this knowledge through studio projects and problem-solving skills developed through critiques, reviews and interactions during each project.*
>
> *The Rutgers Landscape Architecture curriculum is designed to develop both areas. Attendance and participation in all lectures and studios are essential if the student is to achieve his/her maximum potential.* ***More than three unexcused absences will result in a step reduction in your semester grade. Each additional three absences will result in another step reduction.***

Late Submission Policy:

- ***Any lab submitted less than one week late will be docked 10 points.***
- ***Any lab submitted more than one week late will NOT be accepted.***

Ownership of Student Work:

The Rutgers Department of Landscape Architecture maintains a permanent archive of student work. While you will retain authorship and intellectual property rights, all completed and submitted assignments belong to the department with full permission for the department to publish and publicize the work.

Academic Integrity Policy:

While students are allowed to discuss and collaborate on exercises and assignments within reasonable limits, ***all submitted work must be the individual work of the student submitting it***. If any student is caught submitting work completed by another student, both will receive a grade of 0 for that assignment. For a second infraction of this rule, the offending student will be reported to the administration for further discipline.

In addition, ***any written or graphical material submitted as a part of any assignment must be the original work of the student***. Exceptions will be made for authoritative works, when specifically referencing the authority of that work (*e.g.* a diagram the process of applying for buyouts under the Green Acres program produced by the NJDEP is acceptable because that organization is responsible for that process). ***Any work not produced by the student must be properly cited***.

The University's Policy on Academic Integrity can be found at:
http://academicintegrity.rutgers.edu/academic-integrity-policy/

Course Schedule:

TUES	CLASS MATERIAL	FRI	CLASS MATERIAL
Jan. 21	Introduction (Lecture/Lab)	Jan. 24	Maps and Data Representation (Lecture)
Jan. 28	Basic Cartography Tools (Lab)	Jan. 31	Coordinate Systems, Map Projections, and scale (Lecture)
Feb. 4	More Cartography Tools (Lab)	Feb. 7	GIS Data (Lecture)
Feb. 11	**TBA**	Feb. 14	Data Storage and Portability (Lab)
Feb. 18	Spatial Analysis (Lecture)	Feb. 21	Attribute Tables (Lecture)
Feb. 25	Attribute Tables (Lab)	Feb. 28	Analysis of Vector Data (Lecture)
Mar. 3	Analysis of Vector Data I (Lab)	Mar. 6	Analysis of Vector Data II (Lab)
Mar. 10	Analysis of Raster Data (Lecture)	Mar. 13	Analysis of Raster Data (Lab)
Mar. 17	**SPRING BREAK**	**Mar. 20**	**SPRING BREAK**
Mar. 24	Analysis of Raster Data II (Lab)	Mar. 27	Terrain Analysis (Lab)
Mar. 31	Modeling Movement (Lecture/Lab)	Apr. 3	Data Gathering and Management (Lecture)
Apr. 7	Gathering Data I (Lab) ***Project: proposal due***	Apr. 10	Gathering Data II (Lab)
Apr. 14	GIS Research (Lecture)	Apr. 17	Critical Thinking (Lecture)
Apr. 21	Practical Exam Handed Out ***Project: data list and analysis overview due***	Apr. 24	Work Session ***Practical Exam Collected***
Apr. 28	Work Session	May 1	Work Session ***Project: report draft due***
May 5	No Classes	May 8	No classes
May 15	***Project: final report due***		