

## 16:550:545 | INTRODUCTION TO GEOMATICS

Rutgers, the State University of New Jersey  
School of Environmental and Biological Sciences  
SPRING 2017

**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](mailto:dave.c.smith@rutgers.edu)  
Office Hours: Tuesday 2:30 p.m. - 3:30 p.m.

**Course Website:** <https://sakai.rutgers.edu> -- course site is listed as "Intro to Geomatics S18"

***This course fulfills the geomatics requirement for students in 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.
5. Apply these techniques to carry a geomatics-based project or study from proposal to completion.

### 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.

Recommended text: *GIS Fundamentals, 4th Edition* by Paul Bolstad (ISBN 978-0-9717647-3-6)

### 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 through 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 middle of the semester, there will be a take-home practical exam. This will consist of three geospatial problems that students will have to complete with minimal instructions.

#### Synthesis Lab:

Toward the end of the semester, students will independently apply all of the knowledge gained to solve a complex geospatial problem with limited instructions.

#### Term Project:

Finally, students will be expected to 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 the results. The deliverable for this will be a formal written report.

#### 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.***

*A minimum level of participation is defined as being in attendance for the entire duration of a class session. It is the student's responsibility to be in attendance at all required classes and all personal plans should be made in accordance with the schedule*

**Composition of Final Grade:**

Lab Assignments:	50%
Practical Exam:	10%
Synthesis Lab:	15%
Term Project:	25%
Attendance:	See Above

**Numerical Ranges for Letter Grades:**

A:	90-100%	B+:	87-89%
B:	80-86%	C:	70-76%
C:	70-76%	D:	60-69%
D:	60-69%	F:	under 60%

**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:**

Students will be held to the University's Policy on Academic Integrity, which can be found at:

<http://academicintegrity.rutgers.edu/policy-on-academic-integrity>

**Course Schedule:**

<b>TUES</b>	<b>CLASS MATERIAL</b>	<b>FRI</b>	<b>CLASS MATERIAL</b>
16-Jan	Introduction (Lecture/Lab)	19-Jan	GIS and Data Models (Lecture)
23-Jan	Data Storage and Portability (Lab)	26-Jan	Maps and Data Representation (Lecture)
30-Jan	Coordinate Systems, Map Projections, and scale (Lecture)	2-Feb	Basic Cartography in ArcGIS (Lab)
6-Feb	Developing a GIS Analysis (Lecture)	9-Feb	Spatial Analysis (Lecture)
13-Feb	Attribute Tables (Lecture/Lab)	16-Feb	Vector Analysis I: Selection, Buffering, Dissolving (Lecture/Lab)
20-Feb	Vector Analysis II: Vector Overlays (Lecture/Lab)	23-Feb	Raster Analysis: Map Algebra (Lecture/Lab)
27-Feb	Raster Analysis II: Terrain Analysis and Viewsheds (Lecture/Lab)	2-Mar	Analyzing Distance and Density (Lecture/Lab)
6-Mar	Modeling Movement (Lecture/Lab)	9-Mar	Suitability Analysis (Lecture/lab)
13-Mar	<b>SPRING BREAK</b>	16-Mar	<b>SPRING BREAK</b>
20-Mar	Data Management (Lecture/Lab) <b>Practical Exam Handed Out</b>	23-Mar	Data Transfer (Lecture/Lab)
27-Mar	Secondary Data Capture (Lecture/Lab) <b>Practical Exam Collected</b>	30-Mar	Primary Data Capture (Lecture/Lab)
3-Apr	Map Design (Lecture)	6-Apr	Map Design (Lab)
10-Apr	Synthesis (Lab)	13-Apr	Synthesis (Lab)
17-Apr	Tools for Improved Workflow (Lab)	20-Apr	Critical Thinking (Lecture)
24-Apr	Work Session	27-Apr	Work Session