# 11:372:232| Fundamentals of Environmental Geomatics

Rutgers, the State University of New Jersey
School of Environmental and Biological Sciences
SPRING 2015

**Meeting Place:** Room 110, Cook-Douglass Lecture Hall
**Meeting Times:** Tuesday, 5:35 PM - 6:55 PM
Thursday, 5:35 PM - 6:55 PM

**Credits:** 3

**Instructor:** Dave Smith
Office: Room 127, Environmental and Natural Resources Building
Email: dave.c.smith@rutgers.edu
Office Hours: Tuesdays s 3:00 PM – 5:00 PM

**Course Website:** *https://sakai.rutgers.edu* -- course site is listed as "FUND ENV GEOMATICS S15"

**This course is REQUIRED** for all ***Environmental Planning and Design*** options. It is also required for the ***Environmental Geomatics Certificate*** program.

## Course Description:

Geomatics is a rapidly growing field that has applications in a wide array of different disciplines including 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 like 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 is designed to give students an introduction to spatial information and the current and emerging technologies for accessing, analyzing, and communicating that information. The purpose of this course is to provide students with an understanding of how these tools and methods work so that students understand ***when*** and ***how*** to apply the techniques learned here and in the associated lab (11:372:233).

## Prerequisites:

There is no prerequisite for this course. However, students are strongly encouraged to take both the lecture and lab courses. ***Both the lecture and lab courses are required for all EPD options and for the Environmental Geomatics Certificate program.***

## Textbook:

There is ***no required textbook*** for this course. However, the following book is recommended for students who are looking for additional detail or a second explanation of the material covered in the lecture.

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

You can buy it online at http://www.bookmasters.com/marktplc/00729.htm or a digital copy from http://www.brytewave.com/ (if you buy the digital version, be sure to read the FAQ to understand their DRM and usage limitations), or you can rent it from Amazon.com.

### Course Structure and Learning Objectives:

The course is divided into five sections, each geared toward a specific learning objective:

1. An introduction to the field of Geomatics, its different facets, and its application in a variety of other fields.
2. An introduction to conceptualization and representation of spatial information.
3. An introduction to GIS and an examination of standard geoprocessing and analytical methods.
4. An examination of topics related to different methods of data collection, management, and distribution.
5. A look at the field of Geomatics in terms of practice, institutions, and developing trends.

### Assignments, Exams, and Quizzes

**Discussion Paper:** Each student will research an example of a project in which Geomatics plays a major role in the analysis or design process, and write a short summary and discussion of how Geomatics tools contributed to that projects results.

**Exams:** The course will have two hourly multiple-choice exams. The second exam is not cumulative.

**Quizzes:** Quizzes will be given every two weeks. Each quiz consists of five short answer questions.

### Grading:

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|---|---|
| Attendance: | 10% |
| Discussion Paper: | 5% |
| Quizzes: | 25% |
| Exam I: | 30% |
| Exam II: | 30% |

### Attendance Policy:

Students are expected to attend all lectures for the full duration of the class period. Attendance will be taken at each class session. You will be expected to sign in with your *full signature*.

Absences may be excused in cases of illness, family emergency, or organized professional development events (*e.g.* conferences). In such cases, inform your instructor in writing within seven days of returning to campus. Make-up quizzes and exams will be offered only in the event of documented medical absence.

***More than five unexcused absences will result in 0 for your final attendance grade. Each additional five unexcused absences will result in a further step reduction in your overall final grade.***

### 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:**

| Week | Date | Lecture Topic |
|---|---|---|
| 1 | 1/20/2014 | Introduction/Applications of Geomatics |
| | 1/22/2014 | Spatial Understanding: Abstraction, Entities, and Relationships |
| 2 | 1/27/2014 | Projections and Coordinate Systems |
| | 1/29/2014 | Maps and Cartography |
| 3 | 2/3/2014 | GIS |
| | 2/5/2014 | Data Models and the Geodatabase |
| 4 | 2/10/2014 | Attribute Data and the Relational Database |
| | 2/12/2014 | Querying and Selection |
| 5 | 2/17/2014 | Vector Analysis I: Selection, Reclassification, Merging, and Proximity Analysis |
| | 2/19/2014 | Vector Analysis II: Overlays |
| 6 | 2/24/2014 | Raster Analysis I: Map Algebra, Raster Operations, and Raster Overlays |
| | 2/26/2014 | Raster Analysis II: Terrain Analysis and Interpolation |
| 7 | 3/3/2014 | Review for Exam I |
| | 3/5/2014 | **EXAM I** |
| 8 | 3/10/2014 | Other Analysis Techniques |
| | 3/12/2014 | Data Management and Documentation |
| 9 | 3/17/2014 | **Spring Break** |
| | 3/19/2014 | |
| 10 | 3/24/2014 | Finding Data |
| | 3/26/2014 | Generating and Editing Data |
| 11 | 3/31/2014 | Field Collection, Surveying, GNSS/GPS |
| | 4/2/2014 | Remote Sensing |
| 12 | 4/7/2014 | GIS Online |
| | 4/9/2014 | Guest Lecture: TBA |
| 13 | 4/14/2014 | Guest Lecture: Institutional GIS |
| | 4/16/2014 | Panel Discussion: GIS in the Real World |
| 14 | 4/21/2014 | Collaborative GIS: Geodesign, PPGIS, and VGI |
| | 4/23/2014 | Relevance, Uncertainty, and Crititcal Thinking in Geomatics |
| 15 | 4/28/2014 | Review for Exam II |
| | 4/30/2014 | **EXAM II** |