11:573:232| Fundamentals of Environmental Geomatics

Rutgers, the State University of New Jersey
School of Environmental and Biological Sciences
Spring 2016

Meeting Place: Room 020, Loree Building
Meeting Times: Monday 5:35 p.m. – 6:55 p.m.
Wednesday 5:35 p.m. – 6:55 p.m.

Credits: 3

Instructor: Dave Smith
Office: Room 127, Environmental and Natural Resources Building
Email: dave.c.smith@rutgers.edu
Office Hours: Wednesday 12:30 p.m. - 2:30 p.m.

Course Website: *https://sakai.rutgers.edu* -- course site is listed as "FUND ENV GEOMATICS Sp17"

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

Course Learning Objectives

1. Become familiar with 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 the fundamental concepts, tools, and methods for computer-aided spatial data analysis and representation, and how they are applied.
3. Understand various methods for spatial data collection, management, and distribution.
4. Gain awareness of relevant institutions and developing trends in geomatics.

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 them.

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 the lab courses are required the BSLA Program, and for the *Environmental Geomatics*, *Landscape Planning*, and *Urban Forestry* options for *EP&D* majors, as well as for the *Environmental Geomatics Minor* program.

Textbook:

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

Assignments, Exams, and Quizzes

Homework: Homework will be assigned each week. These assignments will test students' ability to understand and apply the material presented in lectures.

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.

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

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

Grading:

Composition of final grade:	
Homework:	15%
Discussion Paper:	5%
Quizzes:	20%
Exam I:	30%
Exam II:	30%

Numerical ranges for letter grades:	
A	90-100%
B+	87-89%
B	80-86%
C+	77-79%
C	70-76%
D	60-69%
F	<60%

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 four unexcused absences will result in a step reduction in your final course grade.
Each additional four unexcused absences will result in a further step reduction in your final course 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	LECTURE TOPIC	HOMEWORK OR QUIZ
1	1. Introduction/Applications of Geomatics	
2	2. Spatial Understanding: Abstraction and Representation	
	3. Maps	HW 1: Map Analysis
3	4. Projections and Coordinate Systems	
	5. GIS	Quiz 1: Lectures 1-3
4	6. Data Models	
	7. Tables and Attribute Data	HW 2: SQL Queries
5	8. Vector Analysis: Selection and Classification	
	9. Vector Analysis: Dissolving and Buffering	Quiz2: Lectures 4-7
6	10. Vector Analysis: Overlay Analysis	
	11. Raster Analysis: Rater Algebra	HW 3: Vector Overlays/Raster Algebra
7	12. Raster Analysis: Terrain Analysis	
	13. Raster Analysis: Density and Interpolation	Quiz 3: Lectures 8-11
8	Review for Exam	
	EXAM	
9	**SPRING BREAK**	
10	14. Analyzing Distance and Movement	
	15. Finding Data	HW 4: Finding/Reading Metadata
11	16. Secondary Data Capture and Development	
	17. Surveying and GNSS	Quiz 4: Lectures 12-14
12	18. Remote Sensing	
	19. Data Management	HW 5: Data Management
13	20. Approaching Geomatics Research	
	21. Collaborative GIS: Geodesign, PPGIS, and VGI	Quiz 5: Lectures 15-19
14	22. Relevance, Uncertainty, and Critical Thinking in Geomatics	
	23. Some Emerging Trends in Geomatics	
15	24. TBD	
	Review for Exam	
16	**EXAM**	