16:550:545 | INTRODUCTION TO GEOMATICS

Rutgers, the State University of New Jersey
School of Environmental and Biological Sciences
SPRING 2024 – 3 Credits

Meeting Place: Room 129, Blake Hall
Meeting Times: Tuesday, 12:10 PM – 1:30 PM
Friday, 12:10 PM – 1:30 PM
Instructor: Dave Smith
Office: Blake Hall, Room 224
Email: dave.c.smith@rutgers.edu
Office Hours: By Arrangement
Course Website: CANVAS – "INTRO TO GEOMATICS SP24"
Prerequisites: There are no formal prerequisites for this course. However, students are expected to have basic computer skills.
Textbook: There is no required text for this course. Required readings will be provided.

This course fulfills the geomatics requirement for the Master 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 mapping and spatial analysis, and how they are applied.
3. Perform basic functions and apply tools for visualizing, manipulating, analyzing, and generating spatial with ArcGIS Pro.
4. Apply these tools together to perform complex spatial analysis of real-world environmental phenomena.

Course Description:

Geomatics is all about understanding what is happening where. With location-based technologies including Geographic Information Systems (GIS), aerial and satellite imagery, and Global Navigation Satellite Systems (*e.g.,* GPS), users of geomatics seek to answer spatial questions ranging from "how do I get to the nearest garden center?" to "how does a novel coronavirus spread across the world to become a global pandemic?". 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.

Access to Computing Resources:

Some work outside of class will generally be necessary. ArcGIS Pro is available for download through the university's software portal (https://software.rutgers.edu/info/login/). However, be aware that ***ArcGIS is available for Windows only***. Mac users will need to use either the physical computer lab or the Rutgers Virtual Computer Lab system (https://it.rutgers.edu/virtual-computer-labs/) for work outside of class.

All necessary data will be available directly through the cloud using Box using the Box Drive app. You should be able to switch seamlessly between computers without needed to upload, download, or sync data. You can download the Box Drive app here: https://www.box.com/resources/downloads

Assignments and Grading:

Composition of Final Grade:

Lab Exercises:	60%
Term Project:	30%
Participation:	10%
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%		

Lab Exercises:

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.

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 project will be a formal written report.

Attendance Policy:

Students are expected to attend all class sessions. This is particularly important for this course, as the material we cover is cumulative. To that end, and in keeping with the policy of the Department of Landscape Architecture, ***more than two unexcused absences will result in a 10% reduction in your final grade for the course. Each additional two unexcused absences will result in a further 10% reduction in your final grade for the course.***

Absences may be excused in cases of illness, family emergency, or organized professional development events (*e.g.,* conferences). Where possible, let your instructor know in advance of your absence so that we can arrange to cover any material you miss. If advance notice is not possible, inform your instructor in writing within seven days of returning to campus.

Any material missed during an unexcused absence will be the responsibility of the student.

Late Submission Policy:

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

Participation Policy:

- While students are encouraged to ask questions during class and office hours, you are expected show a concerted effort to follow and understand the written instructions.
- Students are expected to show respect for classmates and their instructor. Deliberately distracting, offensive, or confrontational behavior will not be tolerated.
- Failure to fulfill these expectations will result in a reduced participation grade. Persistent acts of disrespect toward other students or instructors will result in more serious discipline.

Academic Integrity Policy:

While students are encouraged 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 of 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/

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.

Course Schedule:

TUES	CLASS MATERIAL	FRI	CLASS MATERIAL
Jan. 16	Intro to Geomatics and GIS (Lecture)	Jan. 19	Intro to ArcGIS Pro (Lab)
Jan. 22	Maps: Structure and Function (Lecture)	Jan. 26	Mapping Categorical Data (Lab)
Jan. 30	NO CLASS	Feb. 2	Mapping Statistical Data (Lab)
Feb. 6	Coordinates, Projections, and Scale (Lecture)	Feb. 9	Basic Map Design Concepts (Lab)
Feb. 13	GIS Data (Lecture)	Feb. 16	Understanding GIS Data (Lab)
Feb. 20	Spatial Analysis (Lecture)	Feb. 23	Spatial Analysis Concepts (Lab)
Feb. 27	Tables and Attribute Data (Lecture)	Mar. 1	Working with Tables and Attribute Data (Lab)
Mar. 5	Tools for Vector Data (Lecture)	Mar. 8	Analysis of Vector Data (Lab)
Mar. 12	**SPRING BREAK**	**Mar. 15**	**SPRING BREAK**
Mar. 19	Tools for Raster Data (Lecture)	Mar. 22	Analysis of Raster Data (Lab)
Mar. 26	Terrain Representation and Analysis (Lecture)	Mar. 29	Terrain Representation and Analysis (Lab)
Apr. 2	Data Gathering and Management (Lecture) ***Project: Preliminary Proposal Due***	Apr. 5	Data Gathering I (Lab)
Apr. 9	Data Gathering II (Lab) ***Project: Proposal Due***	Apr. 12	Data Gathering III (Lab)
Apr. 16	Critical Thinking (Lecture)	Apr. 19	Work Session
Apr. 23	Work Session	Apr. 26	Work Session ***Project: Draft Report Due***
May 8	***Project: Final Report Due***		