GEOG 2680 Introduction to GIS & Mapping Sciences

Fall Semester 2020-21

Lecture: M/W/F 11:50 am – 12:45 pm
Labs: W 2:00 pm – 3:50 pm OR 4:10 pm – 6:00 pm

Name	Contact	Office Hours
Dr. Gaurav Sinha *(Instructor)*	Office: Clippinger, 105A Email: sinhag@ohio.edu Phone: 740.593.0304 Web: https://people.ohio.edu/sinhag	Lecture Zoom Link M/W 2:00 pm – 4:00 pm *AND By Appointment*
Frederick Adu Agyekum *(Teaching Assistant)*	Office: Clippinger, 102 Email: fa402519@ohio.edu	Lab Zoom Link W 2:00 pm – 3:50 pm *AND By Appointment*
Grant McGregor *(Teaching Assistant)*	Office: Clippinger, 102 Email: gm110919@ohio.edu	Lab Zoom Link W 4:10 pm – 6:00 pm *AND By Appointment*

Course overview

Maps have been around for thousands of years to orient people about local and global geography. Today, maps are produced using a combination of geospatial and graphic design software. The process of mapping the world is now heavily reliant on geographic information systems (GISs) and related geospatial technologies such as Global Positioning System (GPS) and satellite and aerial remote sensing. GIS theory and software serves as the lynchpin technology for processing, managing, analyzing and visualizing digital geographic information collected from a variety of geospatial technologies. These geospatial technologies and the geographic information they help generate have permeated every aspect of our personal and professional lives, whether we realize it or not.

The course will help students learn about fundamentals of maps and mapping science, and how to use geospatial technologies to make maps and conduct basic spatial analysis required in everyday life, professional and scientific contexts. The course is also designed to reflect fast-moving trends in mapping science and geospatial technologies. Students will learn about maps, mapping principles, geographic data collection using GPS units, computer mapping, and basic spatial analysis. Applied lab exercises with geospatial software such as Google Earth Pro, ArcGIS Pro and Microsoft Excel spreadsheet software will help students become intimately familiar with a broad range of computational tools needed to create maps and engage in computer-based spatial analysis.

The course serves as a pre-requisite for all upper level courses in GIS, cartography and remote sensing offered by the Department of Geography. It is also a general education course (2AS) and meets the Tier II Applied Science and Mathematics (2AS) requirement for undergraduate education at Ohio University.

Learning Objectives

- Understand how maps are fundamental and why we need different kinds of maps for visually communicating information about geographic location and geographic patterns.
- Learn how to use topographic maps and learn basic map measurement concepts: interpretation of azimuths and bearings from a magnetic compass; calculation of distances, slopes, elevations, and coordinates on a U.S. Geological Survey map.
- Understand the basic principles of cartography including scale, generalization, map design, and thematic mapping.
- Understanding fundamental geodetic concepts such as datums, map projections, and coordinate systems and apply such knowledge while using GPS units and mapping with Geographic Information System (GIS) software.
- Understand the difference between traditional non-interactive maps and digital interactive mapping systems such as geobrowsers and the more advanced GIS software.
- Learn to calculate Euclidean and globe-based distances/lengths, areas, volumes, and location coordinates of geographic features using analog map tools, digital spreadsheet calculators, and online geospatial tools.
- Understand basic principles of geographic data modeling and database management crucial for GIS based data management, mapping and geospatial analysis.
- Learn to collect spatial data with GPS units and from online geobrowsers and how to import and map such data using ArcGIS, Google Earth and other geospatial tools.
- Learn how to create, edit, and store digital spatial data using ArcGIS software tools.
- Learn how to query, visualize, and process geographic data for basic mapping and geospatial analysis tasks using ArcGIS software tools.

Reading Material

There is no prescribed textbook for this class. Lecture slides will be provided along with supplemental reading material and videos to clarify concepts discussed in class.

Course Prerequisites

Basic understanding of computers and school level mathematics.

Grading (4 credits)

The lecture/reading assignments and lab exercises will define the scope of quizzes and exams. Assignment deadlines must be met to earn the best possible grade. If any assignment is late by more than 3 days (an automatic grace period), the following rule MAY be imposed: *"A late assignment will be graded but may not earn the student more than 80% of the maximum score possible for that assignment"*. The following is the grading strategy and schedule that will be used to determine the final grade for each student.

Quizzes	10%
Lab Exercises/Homework	60%
Mid-Term Exam *(Wed, Oct 7, Lab time)*	15%
Final Exam *(Wed, Dec 9, 10:10 a.m.)*	15%

Grading Criteria

Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
% Range	100-94	93-90	89-87	86-84	83-80	79-77	76-74	73-70	69-67	66-64	63-60	≤59

Class Technology Instructions

The course will utilize Microsoft OneDrive for sharing all class material. Blackboard will be used for online quizzes, lab submissions, and grading. All communications will be done through official Ohio University emails. For all topics, review lecture slides and a set of readings will be made available. Students will also need access to a computer able to run the Windows operating system to install ArcGIS Pro software. This software system does not work on other operating systems, unfortunately. If the Geography departmental lab in Clippinger 105 is not available, for Apple Mac users, there are two options: i) find another personal Windows computer to work or ii) use Ohio University's Virtual Desktop solution to remotely use Windows on a university server (ArcGIS Pro is installed in this virtual environment).

Student Responsibility

Students are ultimately responsible for their own learning. Instructors and teaching assistants can only facilitate learning. We will help you as much as we can, but learning the material is ultimately up to the student. This includes reading all material without fail on time, completing the assignments on time. and participating in class and contacting the instructor without hesitation to resolve personal and academic difficulties. This course, especially due to the detailed lab exercises, is quite time intensive. Students must allocate sufficient time EVERYDAY to work on readings, quizzes and lab exercises

Academic Integrity and Misconduct

Please help maintain an academic environment of mutual respect and fair treatment. Academic misconduct will not be tolerated and will be dealt with procedurally in accordance with the Ohio University Student Code of Conduct policies. Students should read the code and be careful to abide by the code. Specifically, for this class, it should be noted that although collaborative learning and working on assignments is encouraged, students must write up their assignments individually. Plagiarism from your current or former students will not be tolerated and reported to proper authorities. Additionally, depending on the perceived severity of the violation, the instructor's response may range from imposing grade penalty to assigning an automatic failure grade. Students may appeal academic sanctions through the grade appeal process. Note that University Judiciaries may impose additional sanctions.

Institutional Equality

In compliance with the Americans with Disabilities Act (ADA), all students who have a document disability are entitled to "reasonable academic accommodations." Any student who suspects s/he may need an accommodation based on the impact of a disability should contact the class instructor privately to discuss the student's specific needs and provide written documentation from the Office of Student Accessibility Services. If the student is not yet registered as a student with a disability, s/he should contact the Office of Student Accessibility Services.

APPENDIX: Tentative List of Modules, Quizzes and Lab Exercises

Week	*Module*	*Quiz*	*Lab*
1-2	**Introduction to Maps & Mapping**	Maps and Mapping	Lab 1: Theoretical Introduction to Maps & Mapping Lab 2: Exploring Online Mapping
3-5	**Thematic Mapping**	Thematic Mapping	Lab 3: Thematic Mapping
6-7	**Introduction to GIS & Geospatial Technologies**	GIS & Geospatial Technologies	Lab 4: Introduction to Desktop GIS
8-9	**Geospatial Positioning Theory**	Coordinate System Basics	Lab 5: Exploring Geospatial Coordinate Systems
EXAM 1			
10-11	**Theory of GIS Data Modeling**	Vector Data Modeling Raster Data Modeling Data Quality	Lab 6: Exploring Vector and Raster Geospatial Datasets Storage Formats
12	**Geospatial Measurement Concepts**	Geospatial Measurements	Lab 7: Geospatial Measurements
13-14	**Spatial Data Analysis**	Spatial Analysis	Lab 8: Vector Data Analysis Lab 9: Raster Data Analysis
FINAL EXAM			