EVST 205: Introduction to GIS for Environment and Society

Spring 2023
T-Th, 9:30 – 10:45am
Van Wickle Hall 120

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Course Description
Geographic Information Systems (GIS) is a rapidly growing field that is increasingly popular for a wide range of "spatial analyses" - understanding the relationships between phenomena and *where* they are occurring. Some of the uses for GIS include environmental modeling, urban and landuse planning, facilities management, social and demographic change analyses, economic development, site suitability analyses, marketing, and community development initiatives. This course will prepare you with the basic skills to *begin* approaching these applications - it will not make you an expert. In this course we will learn basic concepts and tools that you can use as building blocks to further explore the applications of GIS that are of interest to you outside of this classroom.

This course introduces the fundamental concepts of GIS through lectures and hands-on exercises using the popular software ESRI ArcGIS Desktop 10.8 specifically the ArcMap application. While students will gain a working knowledge of ArcGIS, the course will focus on fundamental concepts in GIS applicable to any GIS software, particularly analytical concepts that are foundational to spatial analysis. While there is now a proliferation of other GIS applications and software - both open source and online - ESRI's ArcGIS is, for better or worse, still the "industry standard." So, in order to best prepare you for continuing work in GIS, this is the software we will be working with the most. In addition to our course lab, you can access ArcMap remotely via Lafayette's Amazon AppStream by connecting to an Enhanced Graphics Lab.

Course Readings
I will post all readings, data, and other assignments to Moodle. Reading will be minimal - there will be a handful of required readings and I will post *optional* readings from a GIS textbook to Moodle.

Course Learning Objectives
- Gain an understanding of how GIS works
- Gain a critical understanding of how GIS is used in the world
- Familiarity with various data formats and how to work with them
- Familiarity with the ArcGIS 10 software package

- Ability to use GIS to perform spatial analysis, query data, and derive meaningful information
- Ability to use GIS for decision-making and site suitability analysis
- Ability to think critically about GIS uses and limitations

Course Format

With some exceptions, the course will follow a Tuesday lecture/discussion, Thursday lab schedule. Most of the time the lecture/discussion will be directly applicable to understanding what's happening "in the background" for the following lab, but these might occasionally diverge. Content and concepts from the lecture/discussion will be essential to fully completing the course assignments. This course is about more than just learning software - it's also about understanding the fundamental concepts behind *how* the software works. This means that, by the end of the term, you'll be able to explain and apply the GIS skills that you learn here in any setting and using any software. Arc is not the only GIS software out there, maybe not even the best, and so understanding these concepts will be essential to your success in the rest of the world if you happen to continue with this work.

The course schedule (see below) is *very* flexible and will depend on how well the class works together. Everyone moves at their own pace with GIS and it is difficult to predict how any one class will go. So, the most important thing I ask for is your patience - with myself, with yourself, with each other, and (most importantly) with the software.

I like to think of using GIS software as a puzzle. You'll learn a set of tools and, with each assignment, be asked to use those tools to solve a problem in GIS. You might sometimes get frustrated with the software, and sometimes even I might not be able to figure out what's wrong. Sometimes there is not one answer to the problem, just a variety of ways to solve it. Personally, I think this is what makes GIS so fun. But, of course, you're free to disagree!

Course Assessment

- Class Participation: 10%
- In-Class Labs: 30%
- Mastery Exercises: 35%
- Final Project: 25%

Class Participation: Lectures and labs build on each other throughout the semester. Learning GIS requires understanding, and building on, what was taught and learned in previous session. Because of this, *engagement with the material in the order it is assigned* is essential to doing well in this course. If you miss a lab session, it will be difficult to catch up. Participation will be graded by general course engagement (completing assignments fully and on time), class discussion and attendance, working with others in lab, and level of engagement on the final project.

In-Class Labs (Guided Lessons): Labs will focus on applied, guided lessons following on the material and concepts introduced during lectures and discussion. These are tutorial exercises

that guide students through a series of steps to both learn the GIS software and to demonstrate a variety of tools for GIS analysis. Labs also teach concepts essential for completion of the Mastery Exercises (see below). It is very possible to complete Lab assignments during class, but students are expected to complete them as homework if they cannot finish them during lab time. Important points:

- Labs are graded pass/fail and are due any time before the next assigned Lab.
- Students are allowed (and encouraged!) to work together on Labs.
- There will be 12-15 Lab assignments, depending on how quickly the course moves.

Mastery Exercises: In place of exams this course uses Mastery Exercises. These are designed to test your ability to use GIS tools for basic analysis and problem solving. They will build upon the concepts covered in lecture periods as well as the tools acquired through the in-class Labs. Each Mastery Exercise consists of a data set and a problem to be solved. The steps to solving the problem will not be given (as they are in Labs) and there is often no 100% "correct" way to arrive at the solution to the problem, even if there are correct answers to the questions.

- Mastery Exercises are strictly independent. **Treat these like exams.**
- There will be 4-5 Mastery Exercises, depending on how quickly the course moves.

Final Project: The final project will be in collaboration with the Nurture Nature Center in Easton, applying the skills learned during the semester to a real-world problem using real-world data. Details on the project are TBA and will depend on how quickly we move through the course.

Course Policies

Attendance: I obviously would prefer if everyone attended class regularly, but I understand that sometimes things come up that cannot be helped. If you have an emergency or if any of our class meetings conflict with your religious events or family and community commitments, please let me know (via email) as soon as possible. Keep in mind that attendance is necessary to gain the GIS skills needed to move on to the next lesson. So, **remember! - your absence will not only affect *you* but the *entire class*.**

Health and Safety: Masking is optional for this course, but please feel free to wear mask if you prefer.

Late Assignments: Late assignments will generally not be accepted unless a student has asked for and received an extension prior to the due date. I realize that sometimes things happen, and you won't be able to complete an assignment on time. **If this is the case, please communicate with me as soon as possible!** I will be much more understanding with advance notice. However, please don't abuse this offer. Repeated extension requests without prior communication will affect your grade. Also note that if you are not showing up for class or turning in assignments, I will not chase you down. The general policy for late assignments (i.e., if you are not

communicating) is to deduct 5% for each additional day late.

Inclusive Learning Environment: I ask that we all be respectful of each other in class. We all come from different backgrounds, have been shaped by different experiences, and have different learning and communication styles. Please keep this in mind when interacting in class. Discussion
and debate of ideas is the point of learning, but *personal* attacks are strictly off-limits. As we engage in discussion throughout the semester, **I hope that we can all practice radical empathy**.

Academic Integrity: Students are expected to adhere to Lafayette College's standards of academic integrity. Plagiarism, in any form, will result in a zero grade for the assignment. Repeated plagiarism will result in failure of the course.

Student Resources and Accommodations

If you require any specific learning accommodations for the course, please let me know in addition to visiting Lafayette Accessibility Services, where you can make a formal request. If you do not feel comfortable making a formal request, feel free to discuss your accommodation needs with me directly and I will do everything I can to make sure you're able to learn in the way that is most helpful to you.

- Disability Services
- Counseling Center
- Gender and Sexuality Resource Center
- Office of Intercultural Development
    - Harassment and discrimination reporting (sexual harassment, sexual assault, dating violence, domestic violence, stalking or other form of harassment or discrimination)

Course Outline and Schedule

As mentioned above, due to the nature of GIS, the course schedule is going to be very flexible. This is an *aspirational*schedule and will most certainly change as we move through the semester.

Dates	Tuesday	Thursday	Due Dates & Misc.
WEEK 1 1/24 - 1/26	Intro to Course	The Power of Maps	Thurs Reading: *Maps Blossom in the Springtime of the State*
WEEK 2 1/31 - 2/2	Longitude/Latitude and Data Types	Lab 1: Introduction to ArcGIS 10	Optional Reading: GIS Fundamentals Chp. 2
WEEK 3 2/7 - 2/9	Spatial Data Models	Lab 2: More ArcMap Skills	Optional: GIS Fundamentals Chp. 3
WEEK 4 2/14 - 2/16	Lat/Long review, Geodesy, Datums	Lab 3: Even More ArcMap Skills -	

		Symbology	
WEEK 5 2/21 - 2/23	Map Projections and Coordinate Systems	Open Lab	**Mastery 1 Due: Thurs, 2/23**
WEEK 6 2/28 - 3/2	Data Sources, Digitizing	Lab 4: Georeferencing and Digitizing	Optional: GIS Fundamentals Chp. 4 (pp.156-182)

WEEK 7 3/7 - 3/9	GPS and Data Collection	Lab TBD	Optional: GIS Fundamentals Chp. 5 (pp. 203-214)
WEEK 9 3/21 - 3/23	Attribute Data, Tables, and Joins	Lab 5: Query, Selection, and Tabular Join	Optional: GIS Fundamentals Chp. 8 (pp. 331-356)
WEEK 10 3/28 - 3/30	Vector Analysis - Spatial Selection, Classification, Joins	Lab 6: Summarize, Spatial Selection, and Join	Optional: GIS Fundamentals Chp. 9 (pp. 373-393) **Mastery 2 Due: Tues, 3/28**
WEEK 11 4/4 - 4/6	Vector Analysis - Distance/Proximity, Buffer, Overlay	Lab 7-8: Buffer & Overlay	Optional: GIS Fundamentals Chp. 9 (pp. 396-419) **Mastery 3 Due: Tues, 4/4**
WEEK 12 4/11 - 4/13	Network Analysis and Geocoding	Lab 9: Geocoding Lab 10: Network Analysis	Optional: GIS Fundamentals Chps. 6 (pp. 246-273) and 9 (pp. 420- 428) **Mastery 4 Due: Tues, 4/11**
WEEK 13 4/18 - 4/20	Remote Sensing & Cartographic Models	Lab 11: Environmental Impact Assessment in Raster	Optional: GIS Fundamentals Chp. 10 (pp. 443-459)
WEEK 14 4/25 - 4/27	Raster Analysis	Lab 12: Suitability Assessment in Raster	**Mastery 5 Due: Tues, 4/25**

WEEK 15 5/2 - 5/4	GeoWeb Applications and Critical GIS	Lab 13: Web-based Humanitarian Mapping	Reading: TBD
FINAL PROJECT DUE: TBD			