EES 201: Introduction to Geographic Information Systems (GIS)
Spring 2021

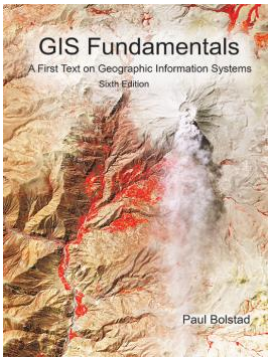
"Everything is somewhere, and that somewhere matters."
- Stacey Maples, GIS Specialist, Yale University

Instructor: Mike Winiski (mike.winiski@furman.edu, office: 864.294.2451, cell: 864.354.6843).
TAs: Catherine Lippert (catherine.lippert2@furman.edu, office: 864.294.2168, cell: 803.354.2629) and Sam Hayes (sam.hayes4@furman.edu, office: 864.294.2392, cell: 843.693.2807).
Office: 112A – Shi Institute for Sustainable Communities
Student Drop-In Hours: Please email me, Catherine, or Sam to set up an appointment.

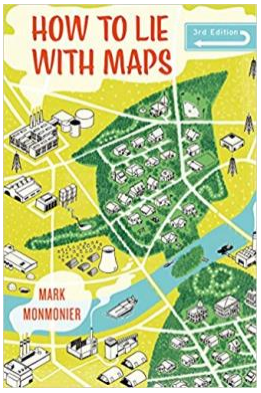
Meeting Times and Location

Class: Tue/Thurs 1:15 P.M. – 2:30 P.M. – Online
Lab: Tue 3:00 P.M. – 5:50 P.M. - Online
Final Exam: 5/1 (12:00 P.M. – 2:30 P.M.) - **Yes. That's a Saturday.**

Required Books



Bolstad, P. (2019). GIS Fundamentals: A First Text on Geographic Information Systems (6th ed.).



Monmonier, M. (2018). How to Lie with Maps (3rd ed.). University of Chicago Press.

Incredibly Useful Resources

- Online GIS Textbook (https://www.e-education.psu.edu/natureofgeoinfo/) - This is a free, online introductory GIS textbook made available through Penn State University's Open Educational Resource Initiative. The website is a fantastic resource and covers many of the concepts we'll be exploring in class. I strongly suggest that you use this as one of your "go-to" study resources.
- Online Help Documentation (https://desktop.arcgis.com/en/arcmap/ and https://pro.arcgis.com/en/pro-app/help/main/welcome-to-the-arcgis-pro-app-help.htm).This will take you to the help documentation for ArcGIS Desktop and ArcGIS Pro. Learning to use this documentation is critical to learning GIS, especially for labs and your project.
- Census Book – The library has 2 copies of a great book, *Urban Policy and the Census* by Heather MacDonald. The US Census has gotten complicated with recent changes, and this book is a concise and well-written resource you should add to your list of study resources—especially if your project involves using US demographic data.

Big Ideas

Over the years, I've come to realize that while learning GIS is complicated (and challenging), the course boils down to a handful of major goals:

- Determine what's the purpose of this map? We'll make lots of maps this semester. Social and environmental justice will be the focus of many of our labs and projects. We'll explore the power and limitations of a geographic perspective to explore

these issues.

- Communicate information with maps and visual representations / Evaluate maps and visual representations. What stories do they tell? What are the limitations of the representations?
- Describe the role of models in GIS and the advantages and disadvantages of different representations;
- Analyze spatial data to help you investigate a question, as well as propose and take action. Select the appropriate tools for the job;
- Find and prepare data for spatial analysis and understand different collection and storage options and formats;
- Manage an academic project and build a foundation for future problem solving and self-directed learning in a variety of disciplines and settings. Learn to learn GIS.

Mindset

You are not expected to have prior knowledge of GIS; however, curiosity, a desire to learn, and willingness to troubleshoot are essential**. Your input and participation are critical to making this a great learning experience.** While GIS software is mature, programs still crash and frustrating errors are common. We're asking the computer to do a lot of processing! Persistence and a thoughtful approach can be tremendously helpful in overcoming inevitable hurdles and setbacks in this class. The model on the last page of the syllabus, by psychologist Carol Dweck, illustrates the range of approaches that people can take when faced with 'challenges' (I like 'learning opportunities' better). While we all show signs of a fixed or growth approach in a given situation, I think you'll find the class much more enjoyable--and your learning much deeper--if you approach the class with a growth mindset. BTW, I think this model has been misused. Let's talk about that in class! Spatial analysis is hard work (especially when we are working remotely), but using the tools to better understand a given problem can be incredibly rewarding.

Class Website

http://courses.furman.edu/ - The purpose of the syllabus is to show overall course flow and major milestones. See Moodle for specific readings, assignment guidelines, and due dates.

Schedule

This schedule lists major activities and is subject to modification based on class interest, need, project developments, and yes . . . Covid. Check Moodle (our course website) for the latest information on course assignments and activities. **The schedule is likely to be modified, and Moodle is the definitive source for assignments and due dates.**

Exams

Project Milestones (Exact Due Dates Provided on Moodle)

Wk	Class Dates	Topics	Lab
1	1/19, 1/21	Evaluating Visualizations and Maps / New Orleans Case Study. Get to know each other.	1/19: Evaluating Visualizations and Maps Lab
2	1/26, 1/28	Thematic Mapping and Cartography / US Census / New Orleans Case Study Thinking About Projects **Project Reflection #1**	1/26: New Orleans Case Study Lab (ArcGIS Online)

3	2/2, 2/4	Types of Maps / Symbology / Tableau (Visualization Software) Refine Thinking About Projects **Project Reflection #2**	2/2: Intro to QGIS (Free and Open Source Software)
4	2/9, 2/11	Coordinate Systems and Projections / (ESRI Projection Activity) **Researching What Others Have Done**	2/9: Making Choropleth Maps
5	2/16, 2/18 (Student Holiday – no class)	Spatial Analysis / Data Models and Formats	2/16: Food Insecurity in Greenville, SC
6	2/23, 2/25	Spatial Analysis – Queries, Overlays, Editing **Annotated Bibliography**	2/25**:** Crime in Greenville, SC
7	3/2, 3/4	Modifiable Areal Unit Problem (MAUP):	3/2: Pandemic and Public Health Mapping
8	3/9, 3/11	**Formal Project Proposal (With Data Plan)**	3/9: Elections and Gerrymandering
9	3/16, 3/18	Raster Spatial Analysis / Map Algebra / Viewshed Analysis	3/16: Viewshed Lab – Cell Tower Coverage
10	3/23, 3/25	Water and GIS	3/23: Watersheds and Access to Water
11	3/30, 4/1	GPS. How Does a Roomba Work?	3/30: Geocache Field Trip to Paris Mountain (Covid permitting)
12	4/6, 4/8	Project Work **Introduction and Methods Section**	4/6: Project Work
13	4/13 (Furman Engaged – No Class or Lab), 4/15	Alternatives to Previously Used Software / R and Web-Mapping **Results Section**	4/13: No lab – Furman Engaged
14	4/20, 4/22	Project Work	4/20: Project Work
15	4/27 (LDOC)	Project Sharing	4/27: Final Project Presentations

Grading Categories

Final Project (30%)

Each student is required to conduct a semester project that emphasizes the application of GIS to a real-world problem. **I strongly encourage you to select a topic that aligns with your interests.** You'll be spending a great deal of time investigating your question. If there's a topic in another class (perhaps your major or concentration) that has piqued your interest, let's explore how we *might* turn this into your project. Instructor approval is required for student-defined research questions. Students can also choose from a list provided by the instructor. Traditionally, the output of the semester project is a poster that is presented in class as well as a special poster session in Kohrt Commons held during our last lab session**.** Due to the pandemic, our final projects will be shared through StoryMaps. StoryMaps is a web-based GIS platform, and it has many advantages over static posters. StoryMaps are interactive, allow your reader to explore the data, and provide more flexible ways to incorporate videos and images. In addition, the platform forces you to turn your project into a compelling story. This is a skill that will be important well beyond this course.

The project proposal should include the following components: 1) a statement of the problem or objectives 2) why the topic is important and relevant 3) previous research on the topic (with references cited) 4) how you will use GIS to address the problem 5) data sets you will need 6) methods that you will use and 7) desired goals and outcomes. The project proposal is a statement of intent about what you will do with GIS. You are not expected to develop your own methods and/or gather your own data (but you may find the latter necessary); however, your StoryMap should provide the necessary details so readers know where your data come from and what kinds of processes you have performed on the data to get the results you are sharing. **You must go beyond simply mapping information by conducting spatial analysis** that looks at the data in a new way. Examples of previous projects will be provided.

Concept Checks (10%)

All right. Let's call it what it really is: A quiz. It's easy to fall into the trap of using GIS to perform spatial functions without truly understanding what's happening under the hood. Without this knowledge, you can end up drawing the wrong conclusions or be thwarted when inevitable troubles arise. These checks, which occur, approximately every-other week, are a low stakes way to evaluate this essential conceptual knowledge, which is crucial to utilizing GIS effectively, as well as your ability to apply this knowledge in a lab setting. Make sure you do the reading, and pace yourself. These quizzes will be taken online. You can take each quiz up to three times. The final score will be the one that is recorded. You will NOT be allowed to confer or collaborate with classmates for this activity.

Labs (40%)

A diligent approach to lab exercises is essential. This is a chance to apply what you're learning to real-world questions and practice. The exercises are similar to drills in sports. Sometimes they can be tedious and challenging, but **there's no better way to learn GIS than by doing GIS**. Lab exercises don't need to be perfect to be considered complete, but thoughtfully addressing each aspect of the lab (answering questions, creating maps, and performing calculations) is required. This portion of your grade measures your attention to practice, diligence, and timeliness.

Lab exercises are due at the beginning of Tuesday class (a week from when the lab was held). Your lab report must be typed (usually in BOX), follow a standard format given with the lab instructions, and answer the lab questions with appropriately constructed tables and figures (mostly maps) as needed. Concise reports are best. Laboratory exercises need to reflect an individual's own effort, unless otherwise specified. While collaboration in class is encouraged, you must write up your answers individually, unless otherwise noted.

There are big upsides to staying on top of labs. You'll develop the skills you need for your project and exams, and the practice helps you understand the underlying GIS concepts. The grading scale in this category is designed to encourage timeliness and attention to detail.

100 – All labs are complete and on time**. If your work falls in this category, you'll get 6-point bonus on one of your concept checks and you can drop your lowest homework / class activity grade.**

95 – All labs are complete; one is turned in late (within a week of the deadline).

85 – All labs are complete; two are turned in late (within a week of the deadline).

75 – All labs are complete; three are turned in late (within a week of the deadline).

50 – One incomplete lab OR four are turned in late (within a week of the deadline).

0 – Two or more incomplete labs OR more than four late labs.

Labs turned in after the last class meeting of the semester will not be considered.

It's better to turn in a lab late than not complete the lab. You may be tempted to let labs slide, but don't! The impact on your project, exams, and your ability to receive feedback will be negatively impacted. Late labs will not receive feedback. **If you don't want a lab marked for completion (you plan to turn it in late), you must email the instructor before the lab due date.**

Class Activities (10%)

This category includes group activities, your participation in online breakout groups, online journals, write-to-learn activities, and peer evaluation of your contributions to the group. Items in this category will be averaged based on total points.

All assignments in this category, unless otherwise noted, must be submitted to the instructor at the beginning of class on the assignment due date. Half credit will be given for assignments turned in up to three days after the deadline. Missing assignments or those turned in three or more days after the due date, will receive a zero. This may seem harsh, but in many cases, your assignment input will serve as the basis for class discussion. We need your timely participation to make the most of class time and so we can learn from each other. This privilege does not apply to major grades such as the final project or labs. No assignment may be submitted after the last day of class.

Final Exam (10%)

The final will consist of a written and hands-on portion.

Grading Scale

A (> 93)	B (83 – 87)	C (73 – 77)	D (63 – 67)
A- (90 – 93)	B- (80 – 83)	C- (70 –73)	D- (60 – 63)
B+ (87 – 90)	C+ (77 – 80)	D+ (67 – 70)	F (< 60)

Additional Requirements / Notes

You are expected to complete course readings before you get to class. Many activities will require you to apply information from

course readings, and your classmates are counting on you to be prepared.

Computer Information and Software:

This is a unique semester, but Catherine, Sam, and I have done a lot of work to ensure that you can complete this class successfully from a remote location. Here are some of the tools that we'll use.

- ArcGISOnline / StoryMaps – You can access these tools through a standard browser. I recommend Chrome and Firefox. I'm amazed at how much mapping power is now available through a web interface.
- QGIS – This is a free and open-source program that runs on Macs, PCs (Windows), and even Linux. This will be our go-to, desktop application. By "desktop," I mean, runs on your computer, not the web.
- ArcGISPro – This is a super-powerful application, but it's only available on a desktop or laptop running Windows. Don't worry if you have a Mac, we have set up a solution for you to remote into Windows computers in the GIS lab.

Storage: I once had a student turn pale in class as he exclaimed, "Oh, S*&t, I just deleted my project." I asked,"You've been saving your project on the network share, right?" He replied, "Yeah. Of course." It took us about a minute to recover his project. Thank goodness he was saving stuff in the right place. We'll talk about this incessantly, but you want to save your work in a location that is backed up. This is either in Box (if you aren't remoting in) or the network share. Knowing where you are storing your lab, project, and related materials is a critical skill. We'll talk about this a lot. If you're ever unclear about where you just saved something, talk to Mike, Catherine, or Sam.

General Course Policies

Policies are hard during Covid. I don't want to be too prescriptive. For example, I (and your classmates) want to see you on Zoom, but I also want to make it okay for you to turn off your video at times. I do this in meetings all the time—sometimes to do push-ups to wake myself up, blow my nose, or run downstairs for a cup of coffee. How about this?

1. If "video-on" time becomes an issue. I'll let you know. One thing that has reduced Zoom fatigue for me is to turn off self-view. It's hard for me to look at myself for 75 minutes. It also helps if you provide a picture of you (or anything that is important and relevant to you) when your video is off.

2. Be aware of what's in your background. I realize that not everyone has the software to use a virtual background. Just know that we see what's behind you, and anything that could make a fellow learner feel excluded, intimidated, distracted, or uneasy should be at least off-screen, or reconsidered altogether.

3. Attendance at all course instructional sessions is required. Of course, stuff happens. Please talk with Mike if you anticipate any absence. More than 3 unexcused absences will result in a reduction of course final grade by half a letter grade. Three late arrivals equal one unexcused absence. University policy is in effect for additional absences. See the online course catalog for details.

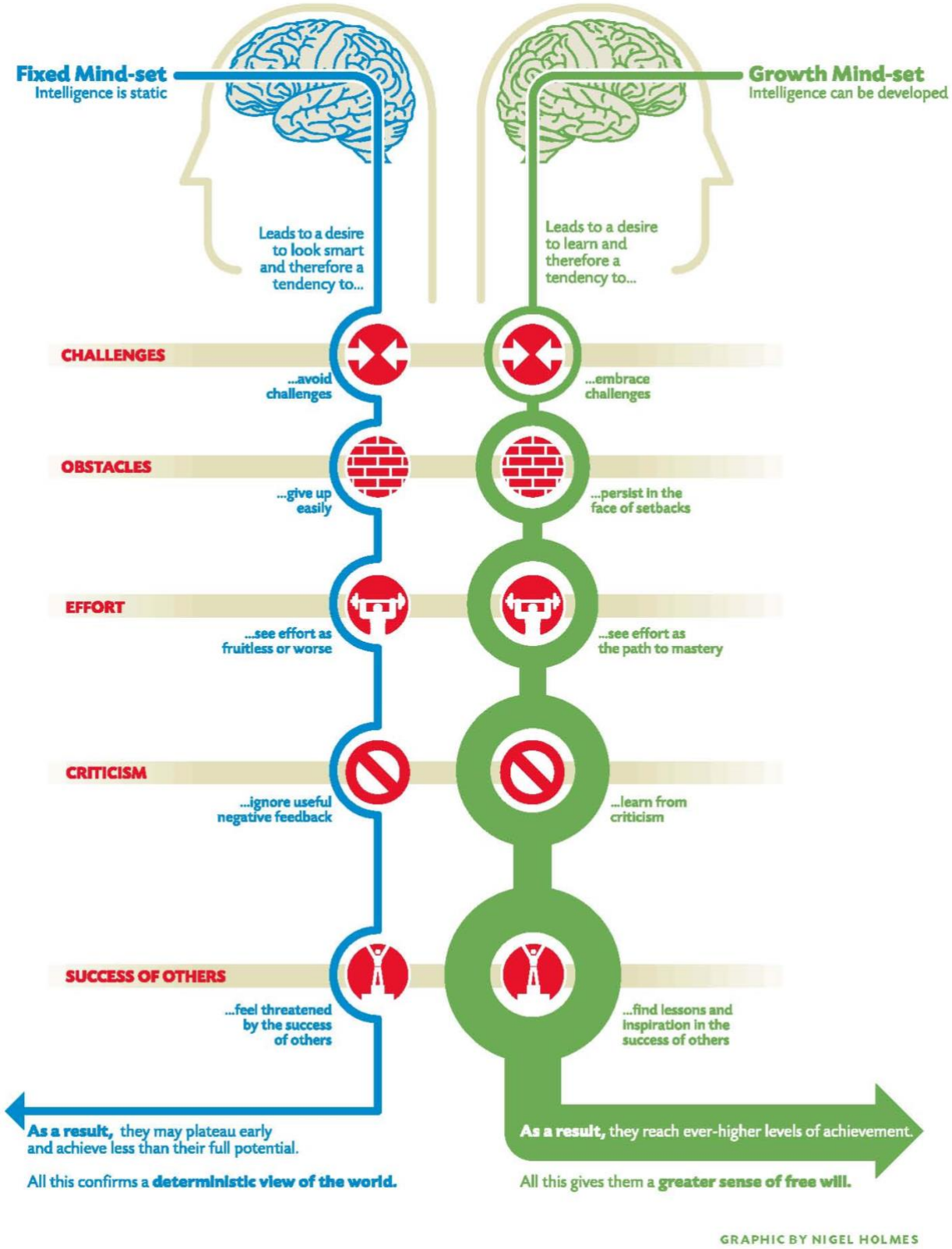
4. Outside of scheduled class and lab, Catherine, Sam, and I encourage you to contact us with questions. Email us for an appointment. Don't forget that your classmates are also a valuable resource when you hit trouble spots. If you're stuck or have questions, I'll bet top dollar, you aren't the only one with that question. Please follow professional email etiquette (proper salutation, a subject line that indicates the purpose of the email, complete sentences, detailed descriptions, etc.). Your questions require context, or your classmates and I don't know enough about the situation to help. I've found that over 50% of the time that I compose a question to an online technical forum, by the time I've finished describing the situation, I've discovered the problem. Articulating the problem often helps you discover the solution.

5. If you have a question about lab, post your question on the class Moodle forum. Others are likely to have similar questions or can help, and everyone will be able to see the solution. Teaching someone else is the best way to learn. You'll discover the holes in your own understanding in the process. You are expected to maintain an e-mail address on the Furman University email system. You will be expected to check your e-mail daily. You are responsible for all material, assignments, and announcements sent to you by e-mail.

6. In an online environment, multi-tasking is an enticing siren call. Don't do it. Research clearly shows it doesn't work.

When I'm tempted to read an article while the game is on, I tell myself, "If you do two or more things at once, you aren't doing any task well. Watch the game. **Then**, read the paper."

7. Integrity: Honesty, respect, and personal responsibility are principles that guide academic life at Furman, in and out of the classroom. Academic misconduct in any form (plagiarism, cheating, inappropriate collaboration, and other efforts to gain an unfair academic advantage) threatens the values of the campus community. Consequences can include failure in the course, and/or suspension or dismissal from the university. Plagiarism is the presentation of someone else's ideas or language as your own. Cheating is giving or receiving unauthorized assistance on any graded assignment**. If you don't feel that you have a clear understanding of the requirements for an assignment, please ask me.** Be familiar with the information available at http://www2.furman.edu/academics/academics/academic-resources/Pages/Academic-Integrity.aspx . As part of our effort to protect academic integrity at Furman, the University now subscribes to Turnitin.com, an online plagiarism detection service. This service may be used in our class, and all materials submitted to Turnitin will be stored on the service's restricted access database for the sole purpose of detecting possible plagiarism of such documents. For more information about Turnitin, refer to http://www.turnitin.com. Grades and performance evaluations will always remain strictly confidential.



http://johnnyholland.org/2008/10/fixed-vs-growth-mindsets/