Geography 225 - Introduction to Geographic Information Systems (FA 2024)

Faculty: Kelsey McDonald

Lecture: Carnegie 107
MWF 9:40 am - 10:40 am

Office: Carnegie 103 Annex
(next to Prof. Carter's office)

Email: kmcdonal@macalester.edu

Drop-In Hours: Mon 1:15-2:15 pm
Wed 10:45-11:45 am
Or, email me for an appointment.

Lab Instructor: Ashley Nepp

Lab: Carnegie 108
Wed 12:00 pm - 1:30 pm
Thurs 9:40 am - 11:10 am

Office: Carnegie 110
Office Phone: 651.696.6906

Email: anepp@macalester.edu

Drop-In Hours: Please drop in anytime my door is open! Use my google calendar booking page or email me if you would like to arrange a specific appointment or meeting time.

COURSE DESCRIPTION AND OBJECTIVES

The ability to create, visualize, and analyze spatial data is an increasingly important skill for assessing and understanding our rapidly changing global, regional, and local communities. Maps are the primary medium through which we communicate our knowledge of the spatial world, but are, by design, generalizations of more complex spatial data. In the first part of this course we will explore the principles of map production and geographic concepts that provide a foundation for spatial data analysis. During the second half of the course we will shift our focus to Geographic Information Systems and the development, display, and analysis of spatial data in a digital environment. We will approach each topic conceptually through our lecture sessions and then apply these principles during lab sessions. By the end of this course you should:

- Understand maps and their projections, scale, resolution and accuracy
- Be a more critical map user
- Acquire a basic GIS vocabulary
- Become familiar with the most used features of ArcGIS software
- Learn to solve common geographic problems using a GIS
- Be able to carry-out a GIS project from problem conceptualization to final analyses and interpretation

COURSE READINGS

Required Texts

- Monmonier, Mark. 2018. *How to Lie with Maps, 3rd Edition.* Chicago: University of Chicago Press

Additional Reading

- *See attached reading list*

COURSE RESOURCES, REQUIREMENTS & GRADING

Resources: For each class meeting, the lecture slides and assignments will be made available on Moodle immediately following our lecture time. Other resources such as additional readings, web and news links can be found here as well. Please use this site as a resource for studying and exploring varied and interesting dimensions of GIS.

Lecture Exercises and Final Project – Over the course of the semester we will have a series of applied exercises. These exercises will help you utilize the concepts that we are discussing in class in a more hands-on manner. Exercises are designed to allow you to experiment with different techniques and will be discussed during the class period in which it is due. With the exception of the Overlay Lecture Exercise (10 points), these are graded on a "Check" / "No Check" basis meaning that you get credit for turning them in completed and on time (10 points) and no credit if you don't turn them in completed and on time (0 points).

Towards the end of the semester, you will complete a final project. In brief, the project consists of five major components: a project proposal, GIS analysis, a story map, technical paper, and an oral presentation. Details will be forthcoming.

Exams will consist of short answer, essay, and applied problem-solving questions. There are two exams; each exam is 100 points and will cover lecture and lab material.

Final Portfolio. As a culminating experience for your Introduction to GIS, you have a Final Portfolio. Details for this will be announced towards the end of the semester. This assignment is designed to help you reflect on your new GIS skills, your competencies, and your professional qualifications.

Incompletes – Incompletes will be given according to Macalester policy. That means it will be given only to students "who have encountered difficulties beyond their control that have hindered their academic progress."

Make-up and Late Assignments

- **Exams** – Students are expected to take exams at the scheduled time. If extreme circumstances make it impossible to take an exam at the scheduled time, please notify us as far in advance as possible or as soon as possible after an unanticipated emergency.
- **Lecture assignments** – Late assignments will be accepted for partial credit only.
- **Lab assignments** – Late lab assignments are accepted up until the hard deadlines specified in the course schedule. Late lab assignments will not receive a grade or feedback until the end of term.

Feeling Ill? Need to miss class?

- Ashley and I are here to help you learn. If you're not feeling well, please send us an email and we will work with you to figure out how to keep up with the class. It is very important that we all stay healthy and we trust that if you're not feeling well, it's best to rest and communicate with us as soon as possible.

CLASSROOM POLICIES

Courtesy – The first and most important classroom policy is to *be courteous*! This includes:

- If you arrive late or need to leave early, do so with a minimum of disruption.
- Please turn-off all cell phones, etc. during class.
- Be polite when others are speaking, there is enough time to discuss all perspectives.

Course Information – A fair amount of course information will be disseminated via Moodle and email. Please be sure to check your Macalester email account and the course Moodle page regularly.

Lab Hours – Lab time will be used to demonstrate cartographic and GIS applications using ESRI's ArcGIS Pro software as well as allow you time to begin your weekly assignment. You will be expected to complete the lab assignments on your own time outside of class.

Card access hours are: **Monday-Sunday: 7 am - 11 pm.** *Please do not work in the lab past 11 pm.*

Lab Assistants: The Carnegie 108 lab is staffed by our student employee Lab Assistants. They can assist you with most lab assignment questions and basic troubleshooting; they have all taken Intro GIS and are reviewing the labs a week ahead of you. You are encouraged to work in GIS Lab so that the lab assistants can help you complete your assignment in a timely and efficient manner. The lab schedule will be posted on the course Moodle page and outside the door of the lab.

Lab Expectations – While working in the computer lab, please abide by the following:

- Do not eat food in the lab; beverages must be in containers with a lid and placed away from computers.

- Work on the C: drive and save all files to your personal workspace (C:/geog225/username); always backup your work to Google drive.
- Print only color maps on the printer. No written assignments (these can be printed in the library). Please do not ask the Lab Assistants to print anything other than maps on the lab printer.
- Obtain permission from Ashley before downloading programs to the computers.
- This is a shared workspace designated for GIS students and classes; please be a courteous and respectful member of this community. There are many students who need time in this lab so please keep your use of unrelated websites and programs to a minimum. Please use headphones when playing videos and music. Lastly, please be courteous and respectful to our Lab Assistant student employees. If you have an issue with one of our lab assistants, please talk to Ashley Nepp directly.
- Do not work in the lab past 11 pm. If this expectation is violated, card access privileges will be revoked.

Drop-In Hours – Drop-in hours provide a great opportunity to discuss questions, issues, or concerns about the class or to just talk about GIS. Feel free to stop by during office hours or schedule a different time to meet, if your schedule conflicts with the posted office hours.

Attendance – Attendance plays an essential role in learning; you are warmly invited, encouraged, and expected to attend all class meetings. Attendance will be important not only for your learning, but also for our ability to build a community together and maintain a sense of connection and commitment to one another and foster understanding across a range of perspectives. Your presence in class matters.

We recognize that there are unavoidable circumstances that sometimes make it impossible for you to attend class. Although we hope it isn't the case, those unavoidable circumstances may be more common during this time. If you will not be in class for any reason, it is your responsibility to inform us in advance via email (please include both instructors on the email). It is also your responsibility to make up work you missed in your absence. If you have accommodations, please discuss these with us early in the course to work out a plan that aligns with maintaining course expectations and learning goals.

As instructors, we usually take attendance simply to keep track of who is regularly attending. Our experience is that students who attend regularly are better equipped to successfully wed the conceptual and theoretical components of GIS with the applied technical requirements.

The lab section of this course also meets regularly. Most of the material covered during the lab period is not easily made up if you are absent. If you miss a lab period you are required to meet with Ashley within a week of the absence. If you are absent from lecture or lab for any reason, please realize that it is your responsibility to obtain the information you missed.

Participation* - Participation is distinct from attendance and is also an essential part of this course. In-class discussions, online discussion forums, responses to brief ungraded writing assignments, etc. will be factored into your participation grade. Engaging with the other individuals in class — including by helping to create an environment where all of us can learn and think well about one another — will also be factored into participation.

It is important to remember that we all have different styles of expression. If you have not been able to participate in a class discussion for any reason but want to demonstrate your active engagement, please send us an email after class with a comment or an idea you had that you would have liked to share, but were not able to during class.

This is an interactive course. Our days will be mostly oriented around in-class exercises and discussions. In this class we define participation as attending class regularly and on-time, asking questions, contributing to discussions, being prepared (this means doing the readings and exercises before coming to class) and generally being intellectually engaged in the material.

3 Questions: Asking questions following in-class presentations or guest lectures is an acquired skill. Such skills only improve with practice. 3 Questions challenges you to think about the questions you have about a presentation in this classroom. Questions can come in a variety of forms, for example, asking for clarification, or more information. Think critically, ask questions.

Students with any concerns, questions, or need for consideration for flexibility should connect with us as soon as possible to determine an appropriate plan.

*FOR SPECIFIC EXPECTATIONS SEE "WHAT IS PARTICIPATION?" Slide in Moodle.

Academic Integrity – Cheating and plagiarism are unacceptable and dishonest. In this class you are expected to complete and turn in your own work and to follow established academic practices regarding proper use and citation of materials and ideas that are not your own. Engaging in cheating or plagiarism will result in a failing grade in this class. More information is available about Macalester's academic integrity policy in the Student Handbook (www.macalester.edu/academicprograms/academicpolicies/academicintegrity/).

Health and Well-Being
Here at Macalester, you are encouraged to make your well-being a priority throughout this semester and your career here. Investing time into taking care of yourself will help you engage more fully in your academic experience. Remember that beyond being a student, you are a human being carrying your own experiences, thoughts, emotions, and identities with you. It is important to acknowledge any stressors you may be facing, which can be mental, emotional, physical, financial, etc., and how they can have an academic impact. I encourage you to remember that sleeping, moving your body, and connecting with others can be strategies to help you be resilient at Macalester. If you are having difficulties maintaining your well-being, please reach out to us or to the many resources available to you at Macalester.

Please adhere to the Mac Stays Safer Community Commitment, which outlines practices to maintain your own health and that of others around you.

Supporting Student Learning
In some circumstances, course design may pose barriers to a student's ability to access or demonstrate mastery of course content. If you are encountering barriers to your learning that we can mitigate, please bring them to our attention. Reasonable accommodations are available for students with documented disabilities. Contact the Disability Services office by emailing disabilityresources@macalester.edu, or calling 651-696-6874 to schedule an appointment to discuss your individual needs. It is important to meet as early in the semester as possible; this will ensure that your accommodations can be implemented early on.

855 point grading scale
200 = Exams (2; 100 pts each)
100 = Final Portfolio
175 = Final Project
210 = Lab Assignments (7; 30 pts each)
70 = Lecture exercises (7; 10 pts each)
100 = Participation and attendance (Lecture & Lab combined)

A = 94+	A- = 90.0 – 93.9%	
B+ = 87.0% - 89.9%;	B = 83.0 – 86.9%;	B- = 80.0 - 82.9%
C+ = 77.0% - 79.9%;	C = 73.0 – 76.9%;	C- = 70.0 – 72.9%
D+ = 67.0% - 69.9%;	D = 63.0 – 66.9%;	D- = 60.0 – 62.9%

General Schedule: Dates are approximate – we will adjust as needed.

THEME	DATE	LECTURE TOPIC	READINGS	LECTURE ASSIGNMENT DUE DATES	LAB ASSIGNMENT
1	Sep 2	**No Class (Labor Day)**			NO LAB THIS WEEK
	Sep 4	Course Overview and Lab Intro			
	Sep 6	What is GIS? Types of GIS Problems	Cohen 2011 Scheid Vineyards 2013 Choose 1 article from "ArcNews Summer 2022" (link in Moodle)		
2	Sep 9	Data Visualization (Ashley)	Few 2009 Krygier & Wood Ch 9		**LAB 1: ArcGIS Quick-Start Guide** LAB DUE (30 pts): By your lab period next week. Wed Lab: Sept 18 Thurs Lab: Sept 19
	Sep 11	Map Types I	Monmonier Ch 6-7 (Ch 10 for Topo maps, optional)		
	Sep 13 **Ashley Away**	Map Types II	Monmonier Ch 8-9		
3	Sep 16	Map Types III The Easiest Way to Lie with Maps: Data Classification *Assign Lect. Ex. 1: Data Classification*	Monmonier Ch 11		**LAB 2: Data Symbolization & Layout** LAB DUE (30 pts): By your lab period next week Wed Lab: Sept 25 Thurs Lab: Sept 26
	Sep 18	Map Design I: Map Elements & Composition (Ashley) **Please bring a map to class*	Brewer Ch 1 & Ch 3; Buckley 2012; Buckley & Field 2011		
	Sep 20	Map Design II: Labeling, Typography & Placement (Ashley) **Please bring a map to class*	Brewer Ch 6	Lecture Exercise 1 due to Moodle by midnight	
4	Sep 23	Coordinate Systems & Projections *Assign Lect. Ex. 2: Exploring scale and projections*	Monmonier Ch 2, pages 5-19 Tyner Ch 6		**LAB 3 Spain Map:** **Map Design & Labeling** DRAFT MAP DUE (10 pts): Have your draft printed and ready for peer review before you come to lab next week. *Draft map will be assigned a grade based on completeness: Full draft, Partial draft, Just started/not started*
	Sep 25	Coordinate Systems & Projections, cont.		Lecture Exercise 2 due to Moodle by Thursday midnight	
	Sep 27	In class *Lect. Ex. 3: Designing for Map Purpose (US Poverty map)*			

5	Sep 30	Poverty map presentations & catch up		Post Final Poverty Maps (Lect. Ex. 3) to Moodle **before** class	**LAB 3 Spain Map: Peer Review + Map Revision** FINAL MAP DUE (20 pts): By your lab period next week Wed Lab: Oct 9 Thurs Lab: Oct 10
	Oct 2	Review Session			
	Oct 3	**THURSDAY: ALL LECTURE EXERCISES (1-3) FINAL DUE DATE AT MIDNIGHT OCT 3 TO MOODLE**	**NO LATE ASSIGNMENTS ACCEPTED**		
	Oct 4	**EXAM 1**			
6	Oct 7	GIS: Spatial Problem Solving *Assign Lect. Ex. 4: GIS Data Source Presentations*	Smith 2007; Murphy 2008		**LAB 4 Part I: Importing Data: Geocoding** LAB DUE (15 pts): **Wednesday, Oct 16th**
	Oct 9	Representing Data in GIS: The Vector & Raster Models IN CLASS: QUIZ (Based on recorded lecture) Vector / Raster Exercise	**BEFORE CLASS :** LISTEN TO RECORDED PPT LECTURE « VECTOR – RASTER »		
	Oct 11	Raster Data mini-lab (in class lab work)	Watters 2016; Nicholson 2012	**LABS 1-3 FINAL DUE DATE: AT 10 PM SUN OCT 13**	
7 **Ashley @ NACIS 10/15 - 10/18**	Oct 14	Alternative Data Representations: Discussion			NO LAB THIS WEEK
	Oct 16	GPS 1 – Lecture - REVIEW VOICETHREAD BEFORE CLASS GPS 2 – Data Collection ***Dress for the weather – we will be outside***	Harringa 2007; Hill 2008 ***Dress for the weather – we will be outside***		
	Oct 18	**FALL BREAK - NO CLASS** *The GIS Lab is not staffed from Thursday Oct. 17th through Sunday Oct. 20th (Card Access Only)*			
8	Oct 21	CENSUS DATA QUIZ (Based on PPT) *Lect. Ex. 5: Using ACS data - in class* *Discuss Lecture exercise 5 in class*	BEFORE CLASS: REVIEW CENSUS PPT READ: "GeoSpatial Access Underpins Every Aspect of 2020 Census" (Link in Moodle)		**LAB 4 Part II: Importing Data: Attribute Joins & Census Data** LAB DUE (15 pts): By your lab period next week Wed Lab: Oct 30 Thurs Lab: Oct 31
	Oct 23	Work day for data presentation groups		Lecture Exercise 5 due to Moodle by midnight	
	Oct 25	Lecture Ex 4 Due: Data Presentations ***Upload PPT to Moodle before class		Post Lecture Ex 4 to Moodle before class	

9	Oct 28	Geoprocessing Techniques *Assign Lect. Ex. 6: Overlay Analysis*	Urban Planning & GIS Opioids and GIS (See links in Moodle)		**LAB 5: Geoprocessing: Site Suitability Analysis** LAB DUE (30 pts): By your lab period next week Wed Lab: Nov 6 Thurs Lab: Nov 7
	Oct 30	Final Project Strategies and Planning: A Discussion Final Portfolio Assigned			
	Nov 1	Project Proposal work day		Lecture Exercise 6 due to Moodle by midnight	
10	Nov 4	Set up final project AGOL groups Project Work - *Data Collection*		Project Proposal Due by 9am to Moodle	**LAB 6: Data Creation: GPS & Digitizing** LAB DUE (30 pts): By your lab period next week Wed Lab: Nov 13 Thurs Lab: Nov 14 *(Most people finish during this lab period)*
	Nov 6	Review Session Project Work - *Data Collection*			
	Nov 7	**THURSDAY: ALL LECTURE EXERCISES (4-6) FINAL DUE DATE AT MIDNIGHT NOV 7 TO MOODLE**	**NO LATE ASSIGNMENTS ACCEPTED**		
	Nov 8	**EXAM 2**			
11	Nov 11	Project Work - *Data Collection, start maps + analysis*			**LAB 7: How to Create a Story Map** LAB DUE (30 pts): **9:30 am (before class)** **Monday, Nov 18th** *** No late submissions accepted ***
	Nov 13	Project Work - *Maps + Analysis*			
	Nov 15	Project Work - *Maps + Analysis*			
12	Nov 18	Project Work - *Maps + Analysis*	Please Read: ***One of these:*** How to Make an Awful StoryMap Nine steps to great storytelling	**LAB 7 DUE BEFORE CLASS (9:30 AM)** *** No late submissions accepted ***	**Peer Review of Final Project Maps** ***In-lab:*** *You will be peer-reviewing your final project maps. Please have final drafts of your final project maps printed and ready to critique.*
	Nov 20	Project Work - *Write paper + Create Story Map*			
	Nov 22	Project Work - *Write paper + Create Story Map*		**LABS 4-6 FINAL DUE DATE: AT 10 PM SUN NOV 24**	
13	Nov 25	Project Work - *Work on presentation, practice and polish story map*			NO LAB THIS WEEK
	Nov 27	**THANKSGIVING BREAK - NO CLASS** *The GIS Lab is not staffed from Wed. Nov. 27th through Sunday Dec. 1st (Card Access Only)*			
	Nov 29				

14	Dec 2	Final Project Presentations			**Portfolio: Map Revisions** Additional GIS Resources + Opportunities Advanced Courses
	Dec 4	Final Project Presentations			
	Dec 6	Final Project Presentations		ALL groups Upload Final Project StoryMap Links and Final Papers to Moodle by **Friday @ 9am**	
15	Dec 9	Course Evaluation, Group Evaluation & Story Map Competition with prizes (attendance required for credit)			NO LAB THIS WEEK
	Dec 11	REQUIRED PORTFOLIO WORK DAY IN LECTURE (MEET IN LAB)			
FINAL EXAM		**FINAL PORTFOLIOS ARE DUE TO MOODLE BY NOON ON SATURDAY, DECEMBER 14th - <u>NO LATE PORTFOLIOS WILL BE ACCEPTED</u>**			