GGS 311: Introduction to Geographic Information Systems (3 credits)
**Syllabus is subject to change

Fall 2024

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Course type: In Person
In Person Meeting hours: Tuesdays/Thursdays 3:00-4:15pm EXPL 2310
Office hours: Tuesdays/Thursdays 2-3pm in EXPL 2405
Course website: Blackboard

Course Description

Geographic information systems (GIS) are computer systems that are used to help us make sense of spatial data. Specifically, a GIS is used to transform unorganized spatial data to meaningful spatial information that can be used to answer the questions "where is what?", "so what?", and "why?". These are important questions for delivery services, social scientists, urban planners, meteorologists, forensic scientists, foresters, policy makers and many more. Spatial data has always been "big", but it is now collected at a greater volume, velocity, and variety at larger spatial extents and in real time. Thus, geotechnology has been identified as one of the three mega-technologies of the 21st century. It is no surprise that the demand is high for trained GIScientists. This course introduces theoretical concepts in Geographic Information Systems (GIS) and science (GIScience) and equips students with introductory technical experience in spatial analysis using a GIS, building a foundation for future studies in GIS. In the lectures, students will learn the differences between GIScience and GIS, principals of GIS, geographic data modelling and collection, cartography and map production, georeferencing and projections, and spatial analysis. In the labs, students will learn the foundational technical skills required for cartography and map production, spatial data queries, and spatial analysis to solve geographic problems.

Blackboard Login Instructions

Access to [MyMason](#) and GMU email are required to participate successfully in this course. Please make sure to update your computer and prepare yourself to begin using the online format BEFORE the first day of class. Check [the IT Support Center](#) website. Navigate to [the Student Support page](#) for help and information about Blackboard. In the menu bar to the left you will find all the tools

you need to become familiar with for this course. Take time to learn each. Make sure you run a system check a few days before class. Become familiar with the attributes of Blackboard and online learning.

Required Textbooks
The following texts are REQUIRED:

Bolstad, P. & Manson, S. (2022). GIS Fundamentals: A First Text on Geographic Information Systems, 7th Ed. John Wiley & Sons.

A print copy is available at the GMU library. A digital copy of the text is available at https://www.gisfundamentals.org/order (lifetime copy for $24, rental for $18).

Course Learning Outcomes
Upon completion of this course, students will be able to:
1. Describe the difference between a GIS and GIScience.
2. Communicate the meaning of geographic representation and its limitations.
3. Use basic cartographic principles to identify the strengths and weaknesses of a map.
4. Explain the differences between the vector and raster data model.
5. Demonstrate proficiency in use of a GIS to perform basic spatial analysis.

Technology Requirements

Software: Many courses use Blackboard as the learning management system. You will need a browser and operating system that are listed compatible or certified with the Blackboard version available on the myMason Portal. See supported browsers and operating systems. Log in to myMason to access your registered courses. Some courses may use other learning management systems. Check the syllabus or contact the instructor for details. Online courses typically use Acrobat Reader, Flash, Java, and Windows Media Player, QuickTime and/or Real Media Player. Your computer should be capable of running current versions of those applications. Also, make sure your computer is protected from viruses by downloading the latest version of Symantec Endpoint Protection/Anti-Virus software for free here.

Students owning Macs or Linux should be aware that some courses may use software that only runs on Windows. You can set up a Mac computer with Boot Camp or virtualization software so Windows will also run on it. Watch this video about using Windows on a Mac. Computers running Linux can also be configured with virtualization software or configured to dual boot with Windows.

Note: If you are using an employer-provided computer or corporate office for class attendance, please verify with your systems administrators that you will be able to install the necessary applications and that system or corporate firewalls do not block access to any sites or media types.

Course-specific Hardware/Software
This course uses ArcGIS Pro, which you will have access to through the on-campus computer labs. You can find a tutorial and associated installation instructions for Windows PC users on the course website on Blackboard.

ArcGIS Pro is limited to running on Windows OS, meaning that if you wish to have the software on your personal computer and you have a Mac, you will instead download and install Citrix Virtual Labs. The virtual laboratory will have ArcGIS Pro installed, but requires some set up on your part. You can find a tutorial and associated installation instructions for Mac users on the course website on Blackboard.

Hardware or software required for your course or program may be available for purchase at Patriot Computers (the University's computer store that offers educational discounts and special deals).

Course Schedule **Full details can be found on Blackboard and is subject to change

WEEK	IN PERSON MEETINGS	TOPICS	TEST	LAB EXERCISES	READING
1	Aug 27, 29	Introduction to GIS and GISc		L1 Intro to ArcGIS Pro Due Sept 9 @11:59pm	Chapter 1 Wright et al.
2	Sept 3, 5	Data Models		L1 continue	Chapter 2
3	Sept 10, 12	Geodesy and Projections		L2 Projections Due Sept 16 @11:59pm	Chapter 3
4	Sept 17, 19	Cartography		L3 Digitizing Due Sept 23 @11:59pm	Chapter 4 Monmonier et al.
5	Sept 24, 26	Data Collection		L4 GPS Due Sept 30 @11:59pm	Chapter 5 & 6
6	Oct 1, 3	Digital Data	**Test 1 Oct 3**	L5 Digital Data Due Oct 7 @11:59pm	Chapter 7

WEEK	IN PERSON MEETINGS	TOPICS	TEST	LAB EXERCISES	READING
7	Oct 8, 10	Databases		L6 Tables Due Oct 14 @11:59pm	Chapter 8
8	Oct 15, 17	Spatial Analysis		L7 Advanced Tables Due Oct 21 @11:59pm	Chapter 9
9	Oct 22, 24	Vector Spatial Analysis		L8 Buffer and Overlay Due Oct 28 @11:59pm	Chapter 9
10	Oct 29, 31	Raster Spatial Analysis and Terrain Analysis		L9 Raster Analysis Due Nov 4 @11:59pm	Chapter 10
11	Nov 5, 7	Spatial Modeling		L10 Spatial Modeling Due Nov 11 @11:59pm	Chapter 11
12	Nov 12, 14	Interpolation		L11 Interpolation Due Nov 18 @11:59pm	Chapter 12
13	Nov 19, 21	Standards, Error, and Uncertainty/Project Work	**Test 2 Nov 21**	L12 Mini Project Due Dec 9 @11:59pm	Chapter 13, 14
Nov 26, 28: Thanksgiving Recess					
14	Dec 3, 5	Project Work			

Assignments Description

DELIVERABLE	% OF FINAL GRADE
Labs	**50**
Tests	**40**
Participation	**10**

Exercises. Throughout the course of the semester, you will be required to independently complete weekly lab exercises. It should be noted that each exercise requires a significant amount of time to complete. Take care in giving yourself enough time to complete them. Answers for each exercise are to be submitted to Blackboard.

Tests. The tests are intended to test your understanding of the theoretical material. Tests will cover the lecture material and the readings. You will not be asked to perform any technical exercises in ArcGIS Pro. Tests will consist of multiple choice and short answer.

There is no final exam in this course.

Participation. Each week, you will have an opportunity to engage in active learning activities (ALA)**.** This will be accounted for by your attendance each week (both Tuesdays and Thursdays).

Course Policies

Late Assignments:

One Extension Policy: Any student may propose a reasonable deadline extension for any course deliverable, subject to my approval, once during the semester. Students must justify in writing why they need this extension and provide a plan for how they will complete the work.

One Revision Policy: Any student may revise and resubmit one major deliverable within two weeks, after it is graded, either for a new grade or for up to a 15% increase on their prior grade provided the revisions are significant (not just error corrections).

Late Assignment Deduction Policy: Any late deliverable will earn a flat 10% grade deduction as long as the deliverable is completed within 7 days of the deadline, followed by 10% per day.

Instructor-Student Communication: I will respond to your emails within 24 business hours. If I will be away from email for more than one day, I will post an announcement in the Blackboard course folder. Before sending an email, please check the following (available on your Blackboard course menu) unless the email is of a personal nature:

1. Syllabus
2. Ask the Instructor Blackboard Discussion
3. On-demand Blackboard videos on how to use Blackboard features, and Technical Requirements.

Feel free to respond to other students in the Ask Professor forum if you know the answer.

Campus Closure: If the campus closes or class is canceled due to weather or other concern, students should check Blackboard for announcements.

Technology. You will need a reliable computer and internet access to view course materials in Blackboard.

Grading Scale

GRADE	PERCENTAGE
A+	> 99
A	93 – 98.9
A-	90 – 92.9
B+	87 – 89.9
B	83 – 86.9
B-	79 – 82.9
C+	77 – 78.9
C	73 – 76.9
C-	70 – 72.9
D	60 – 69.9
F	0 – 59.9

University Policies and Resources

a. Academic Integrity: Mason is an Honor Code university; please see the Office for Academic Integrity for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously, and violations are treated gravely. What does academic integrity mean in this course? Essentially this: when you are responsible for a task, you will perform that task. When you rely on someone else's work in an aspect of the performance of that task, you will give full credit in the proper, accepted form. Another aspect of academic integrity is the free play of ideas. Vigorous discussion and debate are encouraged in this course, with the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives, and traditions. When in doubt (of any kind) please ask for guidance and clarification.

b. Course materials and student privacy: All course materials posted to Blackboard or other course site are private; by federal law, any materials that identify specific students (via their name, voice, or image) must not be shared with anyone not enrolled in this class. Video recordings of class meetings that include audio or visual information from other students are private and must not be shared. Live Video Conference Meetings (e.g. Collaborate or Zoom) that include audio or visual information from other students must be viewed privately and not shared with others in your household. Some/All of our synchronous meetings in this class will be recorded to provide necessary information for students in this class. Recordings will be stored on Blackboard [or other secure site] and will only be accessible to students taking this course during this semester.

c. <u>Names and pronouns</u>: If you wish, please share your name and gender pronouns with me and indicate how best to address you in class and via email. I use "she/her" for myself, and you may address me as "Taylor" or "Dr. Anderson" in email and verbally.

d. <u>Computing</u>: Students must follow the university policy for [Responsible Use of Computing](#)

e. <u>Communication</u>: Students are responsible for the content of university communications sent to their George Mason University email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students solely through their Mason email account. Students must use their Mason email account to receive important University information, including communications related to this class. I will not respond to messages sent from or send messages to a non-Mason email address.

f. <u>Devices</u>: Students must follow the university policy stating that all sound emitting devices shall be turned off during class unless otherwise authorized by the instructor.

g. <u>Student services</u>: The University provides range of services to help you succeed academically and you should make use of these if you think they could benefit you. I also invite you to speak to me (the earlier the better).

    a. [The George Mason University Counseling and Psychological Services (CAPS)](#) staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops and outreach programs) to enhance students' personal experience and academic performance.   Counseling Center: Student Union I, Room 364, 703-993-2380.

    b. Students with disabilities who seek accommodations in a course must be registered with the [George Mason University Office of Disability Services (ODS)](#) and inform their instructor, in writing, at the beginning of the semester. All academic accommodations must be arranged through that office. Please note that accommodations <u>MUST BE MADE BEFORE</u> assignments or exams are due. I cannot adjust your grade after the fact.

    c. [The George Mason University Writing Center](#) staff provides a variety of resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing. University Writing Center: Robinson Hall Room A114, 703-993-1200. The writing center includes assistance for students for whom English is a second language.

h. [<u>Diversity</u>](#): This course seeks to create a learning environment that fosters respect for people across identities. We welcome and value individuals and their differences, including gender expression and identity, race, economic status, sex, sexuality, ethnicity, national origin, first language, religion, age and ability. We encourage all members of the learning environment to engage with the material personally, but to also be open to exploring and learning from experiences different than their own.

i. <u>Use of generative AI</u>: Any student use of Generative-AI tools should follow the fundamental principles of the Honor Code. For more information, please see recommendations on our [Generative AI Support](#) page.

j. <u>Sexual Harassment</u>: As a faculty member, I am designated as a "Non-Confidential Employee," and must report all disclosures of sexual assault, sexual harassment, interpersonal violence, stalking, sexual exploitation, complicity, and retaliation to Mason's Title IX Coordinator per University Policy 1202. If you wish to speak with someone confidentially, please contact one of Mason's confidential resources, such as Student Support and Advocacy Center (SSAC) at 703-993-3686 or Counseling

and Psychological Services (CAPS) at 703-993-2380. You may also seek assistance or support measures from Mason's Title IX Coordinator by calling 703-993-8730, or emailing titleix@gmu.edu.