

Hours: MoWe 10:30 AM – 11:45 AM**Location:** EXPL 2312**Website:** <https://mymason.gmu.edu>**Section/Credits:** 004 / 3 credit hours**Instructor:** Nathan Burtch**Email:** nburtch@gmu.edu**Instructor office:** EXPL 2413**Office hours:** TBA

General Information

Classmate contact information:

Name	Email	Phone

Catalog description: Fundamental concepts and theories for appropriate use of geographic information systems (GIS). Discusses basic GIS functionality and applications in various fields.

Course overview: Geographic Information Systems (GIS) are computerized systems designed for the storage, retrieval and analysis of geographically referenced data. GIS uses advanced analytical tools to explore at a scientific level the spatial relationships, patterns, and processes of cultural, biological, demographic, economic, geographic, and physical phenomena. This is done through modeling the infinite complexity of the Earth to finite computer systems. By the end of the course, students will have sufficient background to identify spatial characteristics of diverse application areas enabling them to integrate spatial thinking and GIS analysis into their academic research and careers.

This course consists of two closely related components: lectures and labs. In lectures, students will learn GIS history, theory, and methods. In labs, students will apply these principles in ‘hands-on’ experience with real world datasets, using the software package ArcGIS. In general, lectures will occur on Mondays and labs on Wednesdays. At times, lab days will begin by finishing the lecture from the previous Monday. Please see the schedule at the end of the syllabus for specifics or exceptions. Generally, labs are constructed so that students can work at their own pace, with access to the professor for questions.

Target audience: This course is intended for anyone who wants to learn the fundamentals of GIS and develop basic geospatial data manipulation skills. This course can serve either as a termination for a more general program or as a gateway to additional courses to build a deeper understanding of GIS and geoinformation sciences, such as GGS 310 (Digital Cartography), GGS 411 (Advanced Digital Cartography), GGS 462 (Web Mapping), and GGS 463 (Applied GIS). GGS majors, non-GGS majors, and undeclared majors are all welcome to take this course.

Applicable learning outcomes: Successful completion of this course will enable students to:

1. Define key concepts and principles related to the fundamental scientific theories and techniques of GIS.

2. Demonstrate basic skills of data creation, management, and analysis using commercial GIS software.
3. Develop basic independent research in spatial analysis by acquiring and processing GIS data.
4. Effectively communicate by coupling analysis with visual outputs in the form of maps and other graphics produced with GIS, designed according to best professional cartographic practices and aesthetic principles.

Scholarly Inquiry: This course has been designated as a Scholarly Inquiry course. This mid-level *Students as Scholars* course is designed so that students learn content and skills to articulate a scholarly question; engage in the key elements of the scholarly process; and situate the concepts, practices, or results of scholarship within a broader context. In particular, students will:

1. Articulate and refine a research question
2. Follow ethical principles in research
3. Choose the appropriate process, approach, or methodology for scholarly inquiry
4. Situate the scholarly inquiry within a broader context.

To learn more about Students as Scholars, visit oscar.gmu.edu.

Prerequisites: No prior coursework is required, but basic computer skills are a must. Some students may find GGS 110 (Introduction to Geoinformation Technologies) useful.

Enrollment and repeat policy: While the general Mason policy is that a course can be repeated up to three times, understand that each academic unit can have more restrictive limits. Students that repeat the course may not repeat the same course project and must submit all newly completed work.

Course Materials

Required texts:

Textbook: Bolstad, Paul (2016). *GIS fundamentals: A first text on geographic information systems*. 5th ed. Eider Press, White Bear Lake, MN. ISBN: 9781506695877.

The 5th edition is the newest edition of this text. This text has been chosen because it is affordable and comprehensive. You may also purchase older editions of the text; there will be some differences but overall covers the same topics. The 5th edition can be purchased as either a physical book or an eBook. The text is available in the campus bookstore. Go to http://www.xanadu.com/higher-education/educators/custom-books-catalog/gis_fund_5e/ to purchase the text from the publisher directly. You can also find copies available on Amazon for purchase, and probably at other online retailers.

Lab manual: Law and Collins (2018). *Getting to know ArcGIS Desktop*. 5th ed. ESRI Press. ISBN: 9781589485105.

DO NOT get any older editions of the lab manual; it may not have instructions that are fully compatible with our labs and assignments. This text is available in the campus bookstore. You can purchase the lab manual from a variety of online retailers. If you purchase a new copy, you will

receive a code for an evaluation copy of our course software, ArcGIS. Chances are used books will not have a valid code. If you are buying an eBook, Esri provides information on how to get an evaluation software copy and sample data. This information is at <https://esripress.esri.com/display/index.cfm?fuseaction=display&moduleID=0&websiteID=286>.

Software, hardware, and data: We will use Esri ArcGIS for lab work this semester. You are able to download a 180-day trial when a new Law and Collins lab manual is purchased. **This software is NOT compatible with the Macintosh operating system (on Apple computers). You must have Microsoft Windows installed.** For Mac users, you can install Windows concurrently with your existing operating system. See here: <http://support.apple.com/kb/HT1461>.

For labs, you MUST have a **data storage device that can hold all of the data** necessary for labs, along with your own lab documents and project. Many of the files we will use are very large! If you intend to only use your personal computer for labs, this can be the internal hard drive. If you plan on using multiple computers (ie: desktop and laptop, home and GGS labs, etc.), you **must** put all lab data on a portable storage device, such as a USB stick or external hard drive. Again, make sure it is large enough to hold all the GIS data. 16 GB of storage or more is preferable. Cloud storage is another option, either to keep all your files or to use as a common backup.

The lab in EXPL 2102 is open 24 hours for you to use. Registration in a GGS class should automatically grant you access. Please contact ggsit@gmu.edu to report issues. You can also make use of the GMU Virtual Computing Lab (<https://www.vcl.gmu.edu/>).

Online materials and email: This course will make extensive use of Blackboard at Mason. Course materials such as assignments will be available only in electronic version on Blackboard. Also, students will be expected to submit assignments online through Blackboard. **Only Word document (.docx or .doc) or Adobe PDF (.pdf) file formats will be accepted**, with some exceptions. Grades will be posted on Blackboard as well. Make sure you are familiar and comfortable with the Blackboard interface.

Students are required to have a MasonLive/Email account, which will allow you access to Blackboard and lab computers. Please use this university email account when contacting the professor regarding this class.

Grading

Assignments/labs (40%): Typically our Wednesday classes will be devoted to lab time. After completing the lab you will have a homework assignment which is due in one week before class begins at 10:30 AM. Labs utilize the lab manual to give guided practice to GIS concepts; these are not handed in. An assignment is given to assess your knowledge of GIS concepts. Please view the calendar at the end of the syllabus to see the schedule of assignments. Assignments will be posted and submitted to Blackboard, with students answers submitted as one or more documents. There will be 9 Assignments/Labs which will count for 40% of your final grade.

Midterm exams (10% each – 20% total): There will be two midterm exams during the semester. These exams will generally be multiple choice and fill-in-the-blank, with some short answer/essays. Exams will cover topics from lectures and labs only, but completing readings will help. You will not

be expected to use GIS software from labs for exams. The midterms are not cumulative.

Final exam (20%): A cumulative final exam will be given during the assigned final exam period. This longer exam, like the midterms, will have a mix of multiple choice, fill-in-the-blank, and short answer/essays, with potentially longer essays. There will likely be more short answer/essays, in which students will write short descriptions, solve problems, make calculations, or perform other assessments of GIS knowledge. Unlike the midterms, the final exam is cumulative with a bit more weight on topics that have not yet been examined.

Project (20%): GGS 311 is designated as a Scholarly Inquiry course. Each student is expected to complete a short research project, using GIS methods learned in the course to a topic of the student's choosing. Students will submit a written report, containing a research question, methodology, discussion of results, and visual outputs such as a map. More details will be discussed during the semester.

Grading Scale:

<i>Grades</i>	<i>Percentage Required</i>	<i>Grades</i>	<i>Percentage Required</i>	<i>Assignment</i>	<i>Percentage of Total Grade</i>
A+	96 to 100	C+	76 to 79.9	Assignments (9)	40%
A	93 to 95.9	C	73 to 75.9	Midterms	20%
A-	90 to 92.9	C-	70 to 72.9	Final	20%
B+	86 to 89.9	D	60 to 69.9	Project	20%
B	83 to 85.9	F	<60		
B-	80 to 82.9				

Note on attendance: As you can see in the grading section, there is no specific value assigned to attendance or participation. That said, **regular attendance is an expectation.** Those that make a habit of missing class tend to do worse in this course than those that do attend. It is in your best interest to come to class and participate as attendance will lead to a better understanding of course concepts. Students are responsible for any announcement given by the instructor during class regardless of their personal attendance.

Students that must miss classes because of religious observances or participation in University activities should provide documentation to the professor within the first two weeks of the course. Reasonable accommodations will be provided for work missed on those days. It is expected that if a student is to have one of these excused absences on a day in which an assignment is due that the student submit the assignment early.

Make-up and late assignment policies: Assignment due dates are explicitly stated. Assignments will be accepted up to 7 days after the due date. **Each day late for the assignment will result in a 10% deduction for the assignment.** In other words, an assignment handed in one day late can earn a maximum of 90%. This penalty begins 1 minute after the due date! Technical excuses ("computer system error", "didn't submit correctly on Blackboard", etc.) will not be accepted as reasons for late work. You are expected to start the work early. **Never underestimate the time you will spend on the assignments.**

If you are ill or physically indisposed and cannot submit your assignment on time, you must notify

the instructor before class for you to have a chance to make up the assignment. Make-up exams will be given only for University approved excused absences. This policy may seem strict, but it is in your best interest to turn in everything on time to avoid falling irrecoverably behind. Please contact the instructor if you are struggling and you will receive aid as best as the instructor can provide. Also, if you cannot complete the assignment on time, it is better to turn in partially completed work than nothing at all.

Administrative

Academic integrity: *The following statement is adapted from the Stearns Center for Teaching and Learning.* No grade is important enough to justify academic misconduct. The integrity of the University community is affected by the individual choices made by each of us. Mason has an Honor Code, which you can read fully at the Office for Academic Integrity (<https://oai.gmu.edu/mason-honor-code/>). The Honor Code Pledge reads as follows:

To promote a stronger sense of mutual responsibility, respect, trust, and fairness among all members of the George Mason University Community and with the desire for greater academic and personal achievement, we, the student members of the university community, have set for this Honor Code: Student Members of the George Mason University community pledge not to cheat, plagiarize, steal, or lie in matters related to academic work.

The Mason Honor Code defines cheating, plagiarism, stealing, and lying. It is expected that you understand these definitions. If you have any doubts about what constitutes cheating, plagiarism, stealing, or lying in the academic context, please see your professor. **Acts of academic dishonesty in this course may be penalized with failure of either the work in question or the entire course.**

In this course, it is expected that students may work together and help each other collaboratively on labs, assignments, and studying. However, each student **absolutely must** turn in their own work, from their own computer, and any discussion must be theirs alone, and not attributable to another person or group, *except where noted* (for example, quoting authors as a small portion of your scholarly work). This also applies to online sources; you cannot copy the words of anyone else for any graded part of this course. It is not enough to exchange a few synonyms within a sentence! You must write, summarize, and analyze with your own words and ideas. **Students must list everyone they collaborated with on each lab, if applicable.**

Disability statement: This course is in compliance with Mason policies for students with disabilities. Students with disabilities are encouraged to register with Disability Services (DS). DS can be contacted by phone at (703) 993-2474, or in person at SUB I Suite 2500, or online by the link at the end of this section. Students who suspect that they have a disability, temporary or permanent, but do not have documentation are encouraged to contact DS for advice on how to obtain appropriate evaluation. A memo from DS authorizing your accommodation is needed before any accommodation can be made. The memo should be furnished to the professor preferably within the first two weeks of class or as soon as an accommodation is made. Please visit <https://ds.gmu.edu/> for more information.

Mason diversity statement: *From <https://stearnscenter.gmu.edu/professional-development/mason-diversity-statement>*

George Mason University promotes a living and learning environment for outstanding growth and productivity among its students, faculty and staff. Through its curriculum, programs, policies, procedures, services and resources, Mason strives to maintain a quality environment for work, study and personal growth.

An emphasis upon diversity and inclusion throughout the campus community is essential to achieve these goals. Diversity is broadly defined to include such characteristics as, but not limited to, race, ethnicity, gender, religion, age, disability, and sexual orientation. Diversity also entails different viewpoints, philosophies, and perspectives. Attention to these aspects of diversity will help promote a culture of inclusion and belonging, and an environment where diverse opinions, backgrounds and practices have the opportunity to be voiced, heard and respected.

The reflection of Mason's commitment to diversity and inclusion goes beyond policies and procedures to focus on behavior at the individual, group and organizational level. The implementation of this commitment to diversity and inclusion is found in all settings, including individual work units and groups, student organizations and groups, and classroom settings; it is also found with the delivery of services and activities, including, but not limited to, curriculum, teaching, events, advising, research, service, and community outreach.

Acknowledging that the attainment of diversity and inclusion are dynamic and continuous processes, and that the larger societal setting has an evolving socio-cultural understanding of diversity and inclusion, Mason seeks to continuously improve its environment. To this end, the University promotes continuous monitoring and self-assessment regarding diversity. The aim is to incorporate diversity and inclusion within the philosophies and actions of the individual, group and organization, and to make improvements as needed.

Mason policy on sexual harassment, sexual misconduct, and interpersonal violence: As a faculty member and designated "Responsible Employee," I am required to report all disclosures of sexual assault, interpersonal violence, and stalking to Mason's [Title IX Coordinator](#) per [university policy 1412](#). If you wish to speak with someone confidentially, please contact the [Student Support and Advocacy Center](#) (703-380-1434), [Counseling and Psychological Services](#) (703-993-2380), [Student Health Services](#), or [Mason's Title IX Coordinator](#) (703-993-8730; cde@gmu.edu).

Use of electronic devices: Your professor encourages the use of devices that both aid your learning ability and do not distract from the learning of others. With the exception of mobile phones and audio/video recorders, you are free to use any electronic device that fulfills both of those conditions. All electronic devices should be muted or silenced. Please be respectful of the class and avoid use of social media during class which can distract both you and your classmates. You are expected to adhere to Mason's student code of conduct; disruptive behavior will result in classroom removal. Audio/video recording requires the consent of the professor.

University-wide closures and class cancellations/delays: There may be times during the semester in which George Mason University announces university-wide closures or delays. Should inclement weather or another emergency force Mason to close, causing our class to cancel meeting times, we will not meet. Check the Mason website and our own Blackboard site for updates. Other cancellations or delays to class will be announced via Blackboard by your professor. In the event that this course has missed meeting times, the course schedule, assignment deadlines, and other course alterations will be decided upon and announced via Blackboard and email by the professor. You are expected to stay abreast of any changes.

Instructor availability: Please do not hesitate to contact your instructor if you have questions about course topics or assignments. Your instructor will do his best to answer all weekday emails within 24 hours, and weekend emails within 48 hours. Should you not receive a response within that time frame, you may send a gentle reminder via email. Do try to avoid last-minute emails, as your instructor may not have email accessible immediately before deadlines. It is generally a good practice to avoid sending an email at the first sign of trouble with an assignment; many times you will find the proper solution by giving yourself an hour or two to problem solve!

Please also make use of the office hours listed at the top of this document. Generally, issues can be clarified quickly in person.

GEOG 311 Course Schedule

Under readings, B is for the Bolstad text and LC for Law & Collins. B 1 means Bolstad, Chapter 1. Readings for lectures should be completed before the course meets. Readings for labs are the chapters you will independently work on during lab time and do not need to be reviewed before the course meets.

Dates		Lecture Topics	Reading	Due
Week 1	Aug 27	Course overview and GIS in action	B 1	
	Aug 29	ArcGIS and file types	LC 1, 2	
Week 2	Sep 3	<i>No class – Labor Day</i>		
	Sep 5	Spatial data representation	B 2	
Week 3	Sep 10	Attribute data representation	B 2	
	Sep 12	Lab 1: Exploring spatial data	LC 3, 4	
Week 4	Sep 17	Mapping and cartography I	B 4	
	Sep 19	Lab 2: Beginning cartography	LC 7, 10	Lab 1
Week 5	Sep 24	Mapping and cartography II		
	Sep 26	Lab 3: Thematic mapping	LC 8, 9	Lab 2
Week 6	Oct 1	Geodesy and datums	B 3	
	Oct 3	Midterm 1		Lab 3
Week 7	Oct 9	TUESDAY CLASS: Map projections	B 3	
	Oct 10	Lab 4: Projections	LC 6	
Week 8	Oct 15	Digitizing and coordinate transformation	B 4	
	Oct 17	Lab 5: Digitizing and editing data	LC 11, 12, 13	Lab 4
Week 9	Oct 22	Digital data and tables	B 7, 8	
	Oct 24	Lab 6: Joining tables	LC 15, 16, 17	Lab 5
Week 10	Oct 29	Vector spatial analysis	B 9	
	Oct 31	Lab 7: Geoprocessing	LC 18, 19	Lab 6
Week 11	Nov 5	Data standards and data quality	B 14	
	Nov 7	Midterm 2		Lab 7
Week 12	Nov 12	Raster spatial analysis	B 10, 13	
	Nov 14	Lab 8: Analyzing rasters	LC 20	
Week 13	Nov 19	Spatial estimation and terrain	B 11, 12	
	Nov 21	<i>No class – Thanksgiving Break</i>		
Week 14	Nov 26	Networks and geocoding	B 9	
	Nov 28	Lab 9: Geocoding	LC 14	Lab 8
Week 15	Dec 3	Work on course project		
	Dec 5	Work on course project		Lab 9
Week 16	Dec 10	<i>No class – Reading day</i>		Project
	Dec 12	Final Exam: Wed, Dec 12, 10:30 – 1:15 PM		

Note: The GEOG 311 course schedule is tentative and is subject to revision by the instructor