George Mason University

GGS 110: Introduction to Geoinformation Technologies

Fall Semester 2019 (August 26 – December 18)

Hours: We 10:30 PM – 1:10 PM
Location: EXPL 2103
Section/Credits: 001 / 3 credit hours
Teaching assistant: Franchesca Mireku
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Office hours: TR 1:30 – 3:00 PM
Website: https://mymason.gmu.edu

General Information

Classmate contact information:

Name	Email	Phone

Catalog description: This course introduces students to basic geoinformation technology concepts and applications. Students learn about and apply spatial data collection analytic tools and methods, including geographic information systems, and web-based map developments. Lectures examine social trends, ethical issues including privacy state of the art technological research and developments of geoinformation technologies in industry, government, education, and everyday life.

Course overview: Geoinformation technologies are becoming ubiquitous in our technologically connected world. This course is intended as a general introduction to a variety of geoinformation technologies, including geographic information systems (GIS), global positioning systems (GPS), and remote sensing (RS). Students will be introduced to the concepts of each of these larger fields and learn hands-on with labs that interact with geospatial data and software. By developing these skills, students will be able to take courses that delve into more specifics for each of these geospatial technologies, and also better understand how these technologies affect day-to-day life.

This course provides both theoretical and practical experience. Each meeting day are split between two closely related components; lectures and labs. In lectures, students will learn various geoinformation technologies and concepts in terms of theory and methods. In labs, students will apply these principles through hands-on experience with real world datasets. In general, lectures will be during the first portion of class and labs will be during the last portion. There are a few exceptions; please look at the course calendar at the end of this syllabus to see those differences.

Target audience: This course is intended for anyone interested in the multifaceted aspects of geoinformation technologies, which include geographic information systems, remote sensing, GPS, cartography, and web mapping. This is a survey course covering all these technologies and more. This can serve as a gateway to additional courses to build a deeper understanding of geoinformation science, such as GGS 308 (Field Mapping Techniques), GGS 310 (Digital Cartography), GGS 311 (Geographic Information Systems), GGS 354 (Data Analysis and Global Change Techniques), and GGS 379 (Remote Sensing). 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:

- Describe the fundamental concepts of geoinformation science and technology.
- Demonstrate proficiency in the basic functions of geospatial software and hardware.
- Demonstrate awareness of fundamental remote sensing and spatial analysis techniques.
- Understand how knowledge is visualized and disseminated to the public through basic proficiency in map creation and design principles, including thematic map display, employment of map projections and cartographic design.
- Demonstrate how to access different sources of data, demonstrate the process of creating data, and discuss the fundamental concepts of data quality.

Mason Impact: This course has been designated as a Mason Impact course. The structure of this course utilizes the goals of the Mason Impact program as noted in the program's mission statement. The mission statement of Mason Impact, as noted at https://uge.gmu.edu/mason-impact/, states that:

> Mason Impact prepares students to tackle significant global questions and challenges by investigating meaningful questions, engaging multiple perspectives, and creating new knowledge within the context of Undergraduate Research and Creative Activities, Civic Engagement, Entrepreneurship, and Global Activities.

Prerequisites: No prior coursework is required, but basic computer skills are a must.

Enrollment and repeat policy: This course follows the general Mason policy that an undergraduate course can be repeated for grade up to three times. Understand that each academic unit can have more restrictive limits on specific courses. Students that repeat the course must submit all newly completed work.

Course Materials

Required text: Shellito, Bradley A. 2018. Introduction to geospatial technologies. 4th ed. W. H. Freeman and Company, New York.
ISBN 13: 978-1-319-06045-9

The course textbook is available from various outlets in various forms. It is available through the bookstore or through your online provider of choice (Amazon, the publisher, etc). The publisher sells an e-book version through VitalSource (https://www.vitalsource.com/products/introduction-to-geospatial-technologies-bradley-a-shellito-v9781319060466) and other e-book providers. It is also available through the bookstore. The e-book version is the same as the hard copy, but there are various short-term purchase options that are less expensive. In addition, there may be other readings posted on Blackboard for you to complete.

In addition, you will make use of the book's student resource site (https://www.macmillanlearning.com/studentresources/college/collegebridgepage/shellito4e.html), as that will be where you access book lab data. There are also other resources provided at that link.

GGS computer lab: 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/).

Software, hardware, and data: During the semester we will make use of a variety of software. Some you may be able to use on your personal computer but others will be available in GGS computer labs, both in our classroom and in the student lab described above. Many of the files we will use are very large! You are encouraged to have a USB flash drive or portable hard drive in order to store and access files. 16 GB of storage or more is preferable. You may also use the drive to install some of programs we use. Cloud storage is another option, either to keep all your files or to use as a common backup.

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

Lab assignments (40%): Typically our course meetings will have a portion of time devoted to lab time. Labs are constructed to guide you through exploring specific concepts and tools in geospatial technologies. While each lab is different, for some you will utilize the lab portion of the textbook. A lab document will be posted on Blackboard that will provide questions or activities for assessment. Your answers should be entered into a document, which is submitted for assessment. You are expected to give thoughtful answers where necessary. Typically you will get one week to complete a lab. There will be nine (9) labs overall.

Midterm exams (12.5% each – 25% total): There will be two midterm exams in this course. Midterms will generally be composed of multiple choice questions, with some other options sometimes mixed in. Exams will cover topics from lectures only, but completing readings will help. You will not be expected to use the software from labs for exams, but again, completing labs will help with concepts. Each exam will be weighted equally (12.5% of the overall grade each). The midterm exams are not cumulative.

Final exam (20%): A cumulative final exam will be given during the assigned final exam period. This longer exam will have more concepts from topics that have not yet been examined, but will pull questions from the entirety of the semester. The final exam will still be composed of multiple choice questions, but will be supplemented with essays about core concepts discussed over the course of the semester.

Quizzes (15%): Quizzes that cover the chapter readings will be administered throughout the semester. These quizzes will need to be completed before class begins on the days marked on the syllabus (most Wednesdays during the semester), but you can of course complete them earlier. Quiz questions will be administered on Blackboard and will generally be composed of 5 multiple choice questions. You can take quizzes open book. There will be a 15 minute time limit on each quiz.

Grading Scale:

Grades	***Percentage Required***	***Grades***	***Percentage Required***	***Assignment***	***Percentage of Total Grade***
A+	96 to 100	**C+**	76 to 79.9	Labs (9)	**40%**
A	93 to 95.9	**C**	73 to 75.9	Midterms (2)	**25%**
A-	90 to 92.9	**C-**	70 to 72.9	Final exam	**20%**
B+	86 to 89.9	**D**	60 to 69.9	Quizzes (11)	**15%**
B	83 to 85.9	**F**	<60		
B-	80 to 82.9				

Note on attendance: 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: Due dates are explicitly stated. Assignments in this course (which are listed above as "labs") will be accepted past the ascribed due date all the way to the last regular class meeting of the semester (December 4th). Late penalties are assigned in a two-tiered system. Assignments turned in **within seven (7) days will result in a 25% deduction** for the assignment. Assignments **later that seven (7) days will result in a 50% deduction** for the assignment. 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 cannot complete the assignment on time, it can sometimes be better to turn in partially completed work than nothing at all.

Quizzes are due before most Wednesday classes begin and are based upon the assigned readings for that day. You may answer the questions as early as you like (generally they will be available a week in advance), but they are not accepted after the Wednesday class begins. **No late quizzes are accepted**. Should some extenuating circumstances arise, please discuss potential options with your professor.

If you are ill or physically indisposed and cannot complete an exam (midterm or final) during the allotted time, you must notify the instructor before class for you to have a chance to make up the

exam. **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.

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.

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.

GGS 110 Course Schedule

Dates	Lecture Topics	Coursework Due
Unit 1: Geoinformation technology and location		
Week 1 Aug 28	Course introduction / Intro to geoinformation tech	**Read** Chapter 1
Week 2 Sep 4	Datums, coordinate systems, and projections Lab 1 – Google Earth	**Read** Chapter 2 **Quiz 1:** Covers Ch. 2
Week 3 Sep 11	Global Positioning Systems (GPS) Lab 2 – GPS/Geocache	**Read** Chapter 4 **Quiz 2:** Covers Ch. 4 **Lab 1:** Google Earth
Unit 2: Geographic Information Systems		
Week 4 Sep 18	GIS: Data models / GIS: Attributes and data types	**Read** Chapter 5 **Quiz 3:** Covers Ch. 5 **Lab 2:** GPS/Geocache
Week 5 Sep 25	Spatial analysis Lab 3 – GIS	**Read** Chapter 6 **Quiz 4:** Covers Ch. 6
Week 6 Oct 2	Navigation Systems / **Midterm 1**	**Read** Chapter 8 **Lab 3:** GIS
Week 7 Oct 9	Georeferencing data Lab 4 – Georeferencing	**Read** Chapter 3 **Quiz 5:** Covers Ch. 3
Unit 3: Cartography and geovisualization		
Week 8 Oct 16	Cartography I / Cartography II	**Read** Chapter 7 **Quiz 6:** Covers Ch. 7 **Lab 4:** Georeferencing
Week 9 Oct 23	3D visualization Lab 5 – Thematic mapping	**Read** Chapter 14 **Quiz 7:** Covers Ch. 14
Week 10 Oct 30	Web mapping Lab 6 – Story Maps	**Read** Chapter 15 **Quiz 8:** Covers Ch. 15 **Lab 5:** Thematic mapping
Unit 4: Remote sensing		
Week 11 Nov 6	Remote sensing / **Midterm 2**	**Read** Chapter 10 **Lab 6:** Story Maps
Week 12 Nov 13	Remote sensing satellite systems Lab 7 – Remote sensing	**Read** Chapter 11 **Quiz 9:** Covers Ch. 11
Week 13 Nov 20	Aerial photography and photogrammetry Lab 8 – Image interpretation	**Read** Chapter 9 **Quiz 10:** Covers Ch. 9 **Lab 7:** Remote sensing
Week 14 Nov 27	*Thanksgiving break – no class*	
Week 15 Dec 4	Elevation Lab 9 – Digital terrain analysis	**Read** Chapter 13 **Quiz 11:** Covers Ch. 13 **Lab 8:** Image interpretation
Week 16 Dec 11	**Final Exam: Wed, Dec 11, 10:30 – 1:15 PM**	**Lab 9:** Digital terrain analysis

Note: The GGS 110 course schedule is tentative and is subject to revision by the instructor