

## GGS 110: Introduction to Geoinformation Technologies

Spring Semester 2021 (January 25 – May 10)

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**Course:** GGS 110 (f2f)- unless otherwise stated

**Website:** <https://mymason.gmu.edu>

**Credits:** 3 credit hours

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**Learning Assistant:** Taye Folk

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**Class Meets:** Wednesday (10:30 am -1:10 pm)

**Location:** Exploratory Hall 2310

**Instructor:** Maction Komwa

**Email:** [mkomwa@gmu.edu](mailto:mkomwa@gmu.edu)

**Instructor office:** EXPL 2414

**Office hours:** Virtual Office hours (M|F  
1:30 pm – 2:30 pm or by appointment)

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### General Information

**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), remote sensing (RS), and geovisualization. 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. The theoretical component consists of lectures, and the practical experience is through self-paced geoinformation labs. In lectures, students will learn various geoinformation technologies and concepts in terms of theory and methods. Demonstrations of concepts using geospatial software will be provided. In labs, students will apply these principles through hands-on experience with real world datasets, generally with an introduction by the professor. Both lecture and lab will occur asynchronously in video recordings. Each week lectures will be offered as a set of videos broken into shorter sections, while labs will be one video that provides an overview of the assigned lab. See the schedule at the end of the syllabus for a specific schedule.

**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. GGS 110 serves as a gateway to upper level courses to build a deeper understanding of geoinformation science. GGS 110 is required for anyone majoring in geography and geoinformation science (both BS and BA GEOG degrees), as well as for the GIS minor. 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. 2020. Introduction to geospatial technologies. 5<sup>th</sup> ed. W. H. Freeman and Company, New York.  
ISBN 13:978-131-92495-19

The course textbook is available from various outlets in various forms. It is available through the Mason bookstore or through your online provider of choice. The publisher sells an e-book version through VitalSource (<https://www.vitalsource.com/products/introduction-to-geospatial-technologies-bradley-a-shellito-v9781319315184>) and other e-book providers. 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.

Students will make use of the book's student resource site (<https://store.macmillanlearning.com/us>), as that will be where you access book lab data. There are also other resources provided at that link.

**GGIS computer lab and virtual computing:** The GGIS has computer lab in EXPL 2102, which during normal times it's open 24 hours. Unfortunately, due to COVID-19, the lab is not accessible to our students registered for the course. In absence of physical computer lab, Mason provides access to Mason Labs virtual computing through your web browser. In order to access it, you will need to install both a Mason VPN (<https://its.gmu.edu/service/virtual-private-network-vpn/>) and the Citrix Workspace app (<https://www.citrix.com/downloads/workspace-app/>). After logging into the VPN, you can then access <https://mymasonapps.gmu.edu/> using your Mason directory ID. Once inside,

you will be able to access Mason Labs and have a virtual connection to a Mason lab computer with some specialized software. You can connect to the Microsoft One Drive cloud storage that each Mason student has or connect to local storage drives.

**Software, hardware, and data:** During the semester we will make use of a variety of software. All *should* be accessible for use on your personal computer, and will be available through Mason Virtual Computing Lab (explained 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.

### Daily Health Checks

- Complete your daily [Mason COVID Health Check](#) online health survey before coming to campus or leaving your residence hall;
- This tool will produce a green, yellow, or red status that each individual should be prepared to display to confirm their fitness to be on campus. The color codes mean:
  - **Green** – Cleared to enter campus and classrooms. No report of symptoms or known exposure to someone with COVID-19 symptoms.
  - **Yellow** – NOT cleared to enter campus or classrooms due to either exhibiting symptoms, awaiting a COVID test result, or reporting exposure to someone who has. Until you are cleared to enter campus, please quarantine at home and stay away from campus.
  - **Red** – NOT cleared to enter campus, with emergency symptoms requiring immediate medical attention. Seek immediate medical attention and stay away from campus until cleared to return to campus.
- Quarantine at home if your health survey produces a yellow or red condition.
- Be prepared to show your daily green health status upon entering any classroom; and
- Practice all enhanced hygiene practices, including wearing a face covering that covers the nose and mouth, washing hands, maintaining at least **six feet** of physical distance, and staying away from campus and getting tested if you feel any symptoms consistent with COVID-19.

### Grading

**Lab assignments (35%):** Each lecture topic is connected to a hands-on geoinformation lab assignment. Labs are constructed to guide you through exploring specific concepts and tools in geoinformation 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. Labs are due the week following their introduction. There will be thirteen (13) labs overall, with the lowest score dropped.

**Midterm exams (15% each – 30% 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 and readings. 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 (15% of the overall grade). The midterm exams are not cumulative.

**Final exam (20%):** A cumulative final exam will be given during the final exam period. This longer exam will have more concepts from topics that have not yet been examined (the last third of the course) 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 (10%):** For each section of lectures, five questions multiple-choice quiz will be administered virtually. The questions will be based on topics covered during that section of lecture. Each weekly lecture will have 10 points of quizzes, and the lowest lecture quiz total will be dropped from the grade calculation. The set of quiz responses for weekly lectures need to be completed by the end of Friday of each week.

**Discussions (5%):** There will be five virtual class discussions in this course. Most discussions will require two parts: posting (5 points) and commenting (5 points). Topics will be provided for each discussion. Topics will generally revolve around finding/using online resources. Grading rubric for the discussion can be accessed through the Blackboard in the Rubric Folder.

#### 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	Labs (13)	35%
A	93 to 95.9	C	73 to 75.9	Midterms (2)	30%
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)	10%
B	83 to 85.9	F	<60	Discussions (5)	5%
B-	80 to 82.9				

**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 until April 28<sup>th</sup>. No work will be accepted past that date. 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 than seven (7) days will result in a 50% deduction** for the assignment. 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.

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. No late quizzes are accepted.** 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.**

While collaboration and group learning is encouraged in this course, 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; [titleix@gmu.edu](mailto:titleix@gmu.edu)).*

**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. As an asynchronous online course, in general these cancellations should not delay our course. However, there may be times in which university-wide closures or delays will affect Blackboard availability or the ability to submit coursework. In these situations, your professor will make an announcement via Blackboard and/or email. 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 is in some way interrupted, 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; often you will find the proper solution by giving yourself an hour or two to problem solve! Please make use of the office hours listed at the top of this document. Generally, issues can be clarified quickly in person or in a live online chat.



**GGG 110 Course Schedule**

Week	Lecture/Lab Topic	Coursework
<b>Unit 1: Geoinformation technology and location</b>		
Week 1: Jan 27	Intro to geoinformation technologies	<b>Read</b> Chapter 1 <b>Self-Introduction (No grade)</b> - Due Sunday, 11:59 pm <b>Practice Quiz 0 (No grade)</b> - Due Sunday, 11:59 pm
Week 2: Feb 3	Datums, coordinate systems, and projections Lab 1 – Google Earth	<b>Read</b> Chapter 2 <b>Quiz 1:</b> - Due Friday, 11:59 pm <b>Lab 1:</b> - Due Sunday, 11:59 pm <b>Discussion 1:</b> - Initial Post due Wednesday - Comments due Sunday
Week 3: Feb 10	Global Positioning Systems (GPS) Lab 2 – GPS/Geocache	<b>Read</b> Chapter 4 <b>Quiz 2:</b> - Due Friday, 11:59 pm <b>Lab 2:</b> - Due Sunday, 11:59 pm
<b>Unit 2: Geographic Information Systems</b>		
Week 4: Feb 17	GIS and digital data Lab 3 – Exploring GIS data	<b>Read</b> Chapter 5 <b>Quiz 3:</b> Due Friday, 11:59 pm <b>Lab 3:</b> - Due Sunday, 11:59 pm <b>Discussion 2:</b> - Initial Post due Wednesday - Comments due Sunday
Week 5: Feb 24	Spatial analysis Lab 4 – Analytical concepts in GIS	<b>Read</b> Chapter 6 <b>Quiz 4:</b> - Due Friday, 11:59 pm <b>Lab 4:</b> - Due Sunday, 11:59 pm
Week 6: March 3	Navigation systems Lab 5 – Networks and geocoding	<b>Midterm 1 exam:</b> - Due Friday, 3/5 - 11:59 pm <b>Read</b> Chapter 8 <b>Lab 5:</b> - Due Sunday, 11:59 pm

Week	Lecture/Lab Topic	Coursework
Week 7: March 10	Georeferencing data Lab 6 – Georeferencing	<b>Read</b> Chapter 3 <b>Quiz 5:</b> - Due Friday, 11:59 pm <b>Lab 6:</b> - Due Sunday, 11:59 pm <b>Discussion 3:</b> - Initial Post due Wednesday - Comments due Sunday
<b>Unit 3: Cartography and geovisualization</b>		
Week 8: March 17	Cartography and maps Lab 7 – Thematic mapping	<b>Read</b> Chapter 7 <b>Quiz 6:</b> - Due Friday, 11:59 pm <b>Lab 7:</b> - Due Sunday, 11:59 pm
Week 9: March 24	3D visualization Lab 8 – Modeling in 3D	<b>Read</b> Chapter 14 <b>Quiz 7:</b> - Due Friday, 11:59 pm <b>Lab 8:</b> - Due Sunday, 11:59 pm
Week 10: March 31	Web mapping and geoinformation professionals Lab 9 – Story Maps	<b>Read</b> Chapter 15 <b>Quiz 8:</b> - Due Friday, 11:59 pm <b>Lab 9:</b> - Due Sunday, 11:59 pm <b>Discussion 4:</b> - Initial Post due Wednesday - Comments due Sunday
<b>Unit 4: Remote sensing</b>		
Week 11: April 7	Aerial photography and photogrammetry Lab 10 – Image interpretation	<b>Midterm 2 exam:</b> - Due April 8-9 <b>Read</b> Chapter 9 <b>Lab 10:</b> - Due Sunday, 11:59 pm
Week 12: April 14	Remote sensing Lab 11 – Color composites	<b>Read</b> Chapter 10 <b>Quiz 9:</b> - Due Friday, 11:59 pm <b>Lab 11:</b> - Due Sunday, 11:59 pm



Week	Lecture/Lab Topic	Coursework
Week 13: April 21	Remote sensing satellite systems Lab 12 – Analyzing remotely sensed imagery	<b>Read</b> Chapter 11 <b>Quiz 10:</b> - Due Friday, 11:59 pm <b>Lab 12:</b> - Due Sunday, 11:59 pm <b>Discussion 5:</b> - Initial Post due Wednesday - Comments due Sunday
Week 14: April 28	Elevation and terrain Lab 13 – Digital terrain analysis	<b>Read</b> Chapter 13 <b>Quiz 11:</b> - Due Friday, 11:59 pm <b>Lab 13:</b> - Due Sunday, 11:59 pm
Finals Week	Final exam	<b>Final exam:</b> - May 5 (10:30 am – 1:15 pm)

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

Although assignments are due on different specific day(s) of the week, due time on those days remain the same - thus, **11:59 pm**.