
Class meeting: MW 12:30 PM – 1:20 PM
Class location: Online via Zoom
Sect/Credits: DL1 / 3 credit hours
Teaching assistant: TBA
TA email: TBA@gmu.edu

Instructor: Nathan Burtch
Email: nburtch@gmu.edu
Instructor office: EXPL 2413 / Zoom
Office hours: T 10 – 11:00 AM via Zoom
W 10 – 11:00 AM in person

General Information

Classmate contact information:

Name	Email	Phone

Catalog description: Focused on the creation and application of maps, with an emphasis on thematic mapping. Includes fundamental mapping principles (projection, scale, generalization, symbolization), spatial data selection and acquisition, and effective design choices for geospatial communication, utilizing mapping software and digital outputs. Additionally considers cartographic research and the usage of spatial data analysis in research contexts.

Course overview: This course focuses on the science and art of creating maps. As a visual form of communication, it is important that geographers learn how to make “good” maps that are informative, creative, easy to understand, and aesthetically pleasing. By the end of the course, students will be able to both recognize good map design and also apply technical skills to create effective maps and graphics.

This course consists of two closely related components: lectures and labs. In lectures, students will learn cartographic theory and conventions. In labs, students will apply these principles of cartography, along with modern computer-based techniques, in ‘hands-on’ experience with ArcGIS Pro and other software packages to create maps and graphics. Lectures will occur during live online sessions, while labs will occur asynchronously in video recordings. Not every week will have a dedicated lab. See the schedule at the end of the syllabus for a specific schedule.

Online course: GGS 551 is presented as a hybrid online course. This means that there is both a synchronous and an asynchronous aspect to this course. The synchronous portion of the course is composed of specifically-timed weekly gatherings; just like with an on-campus course, but with meetings through web-conferencing software. The asynchronous portion of the course is composed of additional course work that students complete during their own time. In general, the asynchronous portion of class will involve the ‘lab’ components of the course (hands-on cartographic work), often including a prerecorded lab intro video. This resembles the usual in-person version of this class, in which most weeks have time dedicated for lab introductions and in-class time to work on cartography. There may be other asynchronous components (other videos, quizzes, or other assessed work).

Target audience: This course is co-listed at the 300/500 level; it is therefore intended for both undergraduate and graduate students interested in the topic and practice of cartography. This course is required for students enrolled in the Geographic and Cartographic Sciences MS, and is a potential elective in the Earth Systems and Geoinformation Sciences PhD, Earth Systems Science (GGS) MS and the Geographic Information Science Graduate Certificate. This course is appropriate for any student that wants to develop cartographic skills, enhance graphic design ability, and spatial thinking.

Applicable learning outcomes: Upon completion of this course, students should be able to:

- Analyze the qualities of scale, projections, generalization, classification, symbolization, and other basics of cartography in maps
- Analyze maps for balanced and ethical graphic design
- Apply considerations of how different media (paper, digital, animation) affect map clarity
- Analytically critique maps
- Apply proper techniques and data to various thematic maps
- Be proficient in cartographic tools of ArcGIS Pro and other software

Course prerequisites: No prior coursework is required, but it is strongly suggested that students have basic computer skills and at least passing familiarity with GIS.

Enrollment and repeat policy: This course may only be repeated under special circumstances. Students enrolling in this course again must submit all newly completed work.

Course Materials

Required text: Tyner, J. A. 2010. *Principles of map design*. New York: Guilford Press.
ISBN 13: 978-1-462-51712-1

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 their website (<https://www.guilford.com/books/Principles-of-Map-Design/Judith-Tyner/9781462517121>) and VitalSource (<https://www.vitalsource.com/products/principles-of-map-design-tyner-judith-a-v9781609180317>). Presumably, other e-book providers also sell the text. In addition, there may be other readings posted on Blackboard for you to complete.

The Tyner text is available freely online through the GMU library. **However, access is limited so that only one student at a time can have online access.** You will need to use your Mason email account to log in for access. Below is a link to the book. Click the link (you may want to bookmark it) to bring up the library page. There is a section with the header “View Online”; click the link to “view full text” to access the book.

To access the Tyner text, use the following link: https://wrlc-gm.primo.exlibrisgroup.com/discovery/fulldisplay?docid=alma9935194163404105&context=L&vid=01WRLC_GML:01WRLC_GML&lang=en&search_scope=MyInst and CI&adaptor=Local%20Search%20Engine&tab=Everything&query=any,contains,tyner%20map%20design&offset=0

GG5 computer lab and virtual computing: The lab in EXPL 2102 is open 24 hours for you to use. Registration in a GG5 class should automatically grant you access. Please contact ggsit@gmu.edu to report issues.

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/products/receiver.html>). 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: The main software used for this class is ArcGIS; in particular, we will be using ArcGIS Pro. We may also utilize other software in the context of this course, including Adobe products. Students are able to download an evaluation copy of ArcGIS for their own computer (Windows only) through a GMU Enterprise account. Instructions will be available on Blackboard.

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. 64 GB of storage or more is preferable. You may also use the drive to install some of the programs we use. Cloud storage is another option, either to keep all your files or to use as a common backup.

You will create video presentations in this class. You will need a microphone or headset to complete this assignment. Many computers, especially laptops, have built-in microphones that should be sufficient, but you should test your hardware early.

It is recommended that students have the technological bandwidth to stream data; students should have regular, reliable access to a computer with an updated operating system and a stable broadband Internet connection (consistent 1.5 Mbps or higher download and upload speed; you can use <https://www.speedtest.net/> to check the speed of your connection).

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; your professor will not respond to messages sent from a non-Mason email address. Students may also contact the professor through Microsoft Teams, although students should not expect instant responses from these direct chats; in other words, Teams is not a 24/7 direct support line for the class.

Grading

Lab assignments (25%): Most weeks there will be a laboratory exercise. Labs are designed to apply the cartographic theories discussed in class in a hands-on environment. Each lab has a graded deliverable, typically in the form of a map. Labs will be due on Thursday of the following week (by 11:59 PM). Labs will be submitted online through Blackboard, with potentially items due in hard copy. There will be eight (8) labs overall.

Midterm exam (10%): There will be one midterm exam for this course. The midterm will be a mix of multiple choice, fill-in-the-blank, short answer, and long answer questions covering topics from lecture and readings.

Final exam (15%): The final will be the same format as the midterm but will cover all material learned during the course. Though cumulative, the majority of the exam will cover material since the midterm exam.

Projects (25%): Each student will complete two cartographic projects to make original map products. High quality work is expected. The first project will be mid semester, three-weeks in length, and involve the creation of a general reference map. The second will be more of a final course project and be a thematic map of a topic of student's choosing. More specific information on the course projects will be provided during the semester.

Map critiques (5%): On days in which labs are due, a set of students will post their maps on the Blackboard discussion board along with a brief written summary of their map. Another set of students will write a paragraph constructive critique of each map. Each student will twice post maps (each time worth 10 points), and twice post critiques (each time worth 20 points).

Participation (5%): From time to time, opportunities to gain participation points will be offered. Most of the time these will be during in-person class sessions, and may be discussions, quizzes, short reaction papers, and group work, among other activities.

Graduate research (15% G): To get graduate credit for this course, graduate students will be required to complete an additional graduate research component. Graduate students will create a multimedia research project involving cartography. More details will be provided on Blackboard during the semester.

Graduate grading scale:

<i>Grades</i>	<i>Percentage Required</i>		<i>Assignment</i>	<i>Total Grade %</i>			
A+	96 to 100	B	83 to 85.9	Labs (8)	25%	Midterm	10%
A	93 to 95.9	B-	80 to 82.9	Projects	25%	Final	15%
A-	90 to 92.9	C	70 to 79.9	Map critiques	5%	Grad Proj.	15%
B+	86 to 89.9	F	<70	Participation	5%		

Graduate student expectations: In order to earn graduate credit, students enrolled in GGS 551 have additional expectations. Graduate students are expected to develop deeper knowledge of the topics presented in class and synthesize with higher-level cartographic products and writing. In other

words, expectations for the work produced in GGS 551 are commensurate with expectations of a 500-level course. Details on differential grading of graduate students on the above graded items will be provided on Blackboard.

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 has one of these excused absences on a day in which an assignment is due that the student submits the assignment early.

Make-up and late assignment policies: Due dates are explicitly stated. All assessed/graded items in this course (listed above) will be accepted past the ascribed due date until **December 5th**. Late penalties are assigned in a two-tiered system. Items turned in **within seven (7) days will result in a 10% deduction** for the item. Items **later than seven (7) days will result in a 30% deduction** for the item. 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 may be better to turn in partially completed work than nothing at all.

If you are ill or physically indisposed and cannot submit work on time, you must notify the instructor beforehand for you to have a chance to make up the work without late penalty. **Special dispensation is available for students with difficulties due to COVID-19 illness or quarantine;** please contact the instructor to make any special accommodations in this regard.

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.

Incomplete policy: Students may request an incomplete for this course if they (a) currently have a passing grade based on submitted coursework; (b) will have completed at least 50% of coursework materials; (c) cannot complete scheduled coursework for a cause beyond reasonable control; and (d) submit an Incomplete Grade Contract with the professor. In general, students have until the 9th week of the following full semester to complete their work (unless it is the student's final semester). Keep in mind that if the incomplete grade is not updated by the deadline, it defaults to a grade of F. All incomplete work will be assigned late penalties as outlined in this syllabus.

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.

Course materials and student privacy: All course materials posted to Blackboard or other course sites 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 or all of our synchronous meetings in this class may be recorded to provide necessary information for students in this class. Recordings will be stored on Blackboard and will only be accessible to students taking this course during this semester. **Sharing of instructor-created materials** (lectures, notes, videos, assignments, exams, etc.) to others not currently enrolled in this specific section of this class, **including to public or private online “study” sites, is considered a violation of Mason’s Honor Code.**

Disability statement: This course complies 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 (faculty contact sheet) from DS authorizing your accommodation is needed before any accommodation can be made. The faculty contact sheet 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.

Diversity, non-discrimination, and anti-racism: Mason President Gregory Washington has created the President’s Task Force on Anti-Racism and Inclusive Excellence. Through a broad

focus, the task force will help Mason become “a local, regional, and national beacon for the advancement of anti-racism, reconciliation, and healing.” For President Washington’s full statement, visit <https://www2.gmu.edu/news/587381>. Members of this classroom community must uphold Mason’s core values of diversity and inclusion, and help maintain a learning environment of respect across identity, status, origin, and ability. Being inclusive and anti-racist is an active, conscious practice involving self-reflection.

Mason’s non-discrimination policy can be read at <https://universitypolicy.gmu.edu/policies/non-discrimination-policy/>. Please utilize the office of Compliance, Diversity, and Ethics (<https://diversity.gmu.edu/>) for training, resources, and to submit grievances. The following is a short portion of the Mason Diversity Statement; visit <https://stearnscenter.gmu.edu/knowledge-center/general-teaching-resources/mason-diversity-statement/> to read the full 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.

Gender identity, pronoun use, and proper address: Students are welcome to share their chosen name and gender pronouns with the instructor and discuss how the instructor can best address you in class and via email. As well, students should be aware that they can use Mason-provided tools to update their chosen name and pronouns; these changes will appear in Blackboard class sites among other places. See <https://registrar.gmu.edu/updates-chosen-name-pronouns/> for more information. Your instructor uses *he/him/his* pronouns. When addressing your instructor in writing or verbally, please use “Dr. Burtch” or “Prof. Burtch.” The surname ‘Burtch’ is pronounced the same as ‘birch.’

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.

Sexual harassment, sexual misconduct, and interpersonal violence: *The following statement is adapted from the Stearns Center for Teaching and Learning. As a faculty member and designated “Responsible Employee,” I am required to report all disclosures of sexual assault, interpersonal violence, stalking, sexual exploitation, and retaliation to Mason’s Title IX Coordinator per [university policy 1412](#). If you wish to speak with someone confidentially, please contact one of Mason’s confidential resources, such as the [Student](#)*

[Support and Advocacy Center](#) at 703-380-1434, [Counseling and Psychological Services](#) at 703-993-2380, [Student Health Services](#), or [Mason's Title IX Coordinator](#) at 703-993-8730 or via email at 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. 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.

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. Except for 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.

GG5 551 course schedule

Week	Lecture/Lab Topic	Coursework
Unit 1: Mapping basics		
Week 1 Aug 21 Aug 23	Introduction to cartographic design Mapping data Digital spatial data	Read Chapter 1, Anthamatten Ch 10, 11
Week 2 Aug 28 Aug 30	Cartographic design Map critique	Read Chapters 2, 12
Week 3 Sep 4 Sep 6	<i>Labor Day – No class Monday 9-4</i> Symbolization Lab 1: Cartographic design basics	Read Chapter 7
Week 4 Sep 11 Sep 13	Projections and coordinate systems Lab 2: Projections	Read Chapter 6, Appendix A Lab 1: - Due Thursday, 9-14 Map critique 1: - Comment Monday, 9-18
Unit 2: Symbolization of maps		
Week 5 Sep 18 Sep 20	Color Lab 3: Color	Read Chapter 4 Lab 2: - Due Thursday, 9-21 Map critique 2: - Comment Monday, 9-25
Week 6 Sep 25 Sep 27	Typography Lab 4: Typography	Read Chapter 3 Lab 3: - Due Thursday, 9-28 Map critique 3: - Comment Monday, 10-2
Week 7 Oct 2 Oct 4	Topic catchup day Midterm exam (Oct 4) Project 1: General reference map	Lab 4: - Due Thursday, 10-5 Map critique 4: - Comment Monday, 10-10 Graduate project proposal: - Due Friday, 10-6
Week 8 Oct 10 Oct 11	<i>No class Monday; meet Tuesday instead *</i> Scale and generalization Project 1 work	Read Chapter 5 Project 2 proposal: - Due Friday, 10-13
Week 9 Oct 16 Oct 18	Terrain visualization Project 1 work	Read Slocum Ch. 20

Week	Lecture/Lab Topic	Coursework
Unit 3: Thematic mapping and map use		
Week 10 Oct 23 Oct 25	Thematic mapping 1: Classification, statistics, and choropleth maps Lab 5: Choropleth maps	Read Chapter 8, Campbell Ch. 11, Lambert & Zanin Ch. 2 Project 1 final map: - Due Friday, 10-27
Week 11 Oct 30 Nov 1	Thematic mapping 2: Isarithmic, proportional/graduated symbols, and dot/dot density mapping Lab 6: Dot density and graduated symbol maps	Read TBA Lab 5: - Due Thursday, 11-2 Map critique 5: - Comment Monday, 11-6
Week 12 Nov 6 Nov 8	Thematic mapping 3: Dasymetric, cartograms, flow, and bivariate/multivariate mapping Lab 7: Dasymetric mapping	Read Chapters 9, 10 Lab 6: - Due Thursday, 11-9 Map critique 6: - Comment Monday, 11-13
Week 13 Nov 13 Nov 15	Cartographic history Map use and map users Lab 8: Cartograms and flow mapping	Read Kraak & Ormeling Ch. 11, Tyner Ch. 32 Lab 7: - Due Thursday, 11-16 Map critique 7: - Comment Monday, 11-20
Unit 4: The final project		
Week 14 Nov 20 Nov 22	Work on final project <i>Thanksgiving Break – No class Wednesday</i>	
Week 15 Nov 27 Nov 29	Work on final project	Lab 8: - Due Thursday, 11-30 Map critique 8: - Comment Monday, 12-4 Project 2 check in meeting
Finals Week	Final exam (take home, due Dec 11) Final project presentations (Monday, December 11, 10:30 AM – 1:15 PM)	Project 2 presentation, peer assessments, map, and report: - Due Monday, 12-11 Graduate project paper and audio: - Due Friday, 12-8

Note: The GGS 551 course schedule is tentative and is subject to revision by the instructor