Mayville State University

GEOG 274, Introduction to Geospatial Techniques (19124)

Spring, 2024

3 Credit Hours

Course and Instructor Information

Instructor Name: Dr. Thomas Craig, Assistant Professor of Geography

Contact Information: Old Main 320, thomas.craig@mayvillestate.edu, 701-788-4809

Hours of Availability: 11:30 am - 12:30 pm M-F (Zoom), or by appointment

Meeting Times and Location: TR, 10:00-11:15 am, Old Main 310

How to address your instructor: Given my rank at MSU and my degree, I prefer to be called: "Dr. Craig"

Course Description

Students engage with a range of geospatial technologies to explore, analyze, and represent geographical phenomena and data through a series of field-based exercises. Students will learn about the types of societal problems that geographers and their tools are uniquely positioned to solve. Through guest speakers, readings, and discussions, they will learn about the knowledge and skills required to understand spatial data, both for geography-specific courses, as well as other disciplines that require these tools.

Purpose of the Course

This course is designed to acquaint you with the tools and technology needed to access, manipulate, and display geographic information. You will also learn how to think geographically to help you understand when to apply these tools. It is a combined introduction to geographic information systems (GIS), remote sensing (RS), global positioning systems (GPS), and cartography (the science and art of mapmaking). Additionally, we will discuss ethical issues regarding the use of geospatial technologies and current trends in the practical applications of these tools. Thus, the purpose of this course is to develop students': 1) understanding of and appreciation for the contribution of a geographic perspective to problem-solving, 2) understanding and appreciation of geographic technology's role in implementing the geographic perspective and problem-solving in a variety of disciplines, and 3) spatial thinking and reasoning skills.

Pre-/Co-requisites

GEOG 103

Course Objectives

To successfully complete this course, the learner will be expected to meet the following objectives, as aligned to Social Science Education Program Approval Standards through North Dakota's Education Standards and Practices Board (ND ESPB):

- *Describe* what geographic information is and why it is important to decision-making in a variety of disciplines.
- *Give* specific examples of how geographic information systems, global navigation satellite systems, remote sensing, and cartographic design are used together to address complex geographic problems.
- *Identify* various sources of geographic information and know how to obtain datasets from those sources.
- *Analyze* and *display* spatial information using simple GIS programs.
- *Propose* ways in which geospatial tools can be applied to problem-solving scenarios in a variety of disciplines.
- *Use* established cartographic principles to create a basic thematic map.
- *Describe* and give specific examples of ethical concerns regarding the use of geospatial technologies.
- *Describe* and give specific examples of the diverse applications of geospatial technologies.
- *Defend* viewing the world with a geographic perspective and how spatial thinking can improve problem-solving.

Standards Alignment (Social Science Education Program Approval Standards-ND ESPB):

- 15035.1 In the social studies composite major curriculum the program requires the study of a broad base of social studies including history (eighteen semester hours) and at least two of the following three core areas: political science and civics (twelve semester hours), economics (twelve semester hours), and geography (twelve semester hours). Additional electives to the social studies composite may include: sociology (six semester hours) or psychology (six semester hours) or anthropology (six semester hours) or global studies (six semester hours).

Required Materials and Technologies

Shellito, B. (2023). *Introduction to Geospatial Technologies, 6th Edition*. MacMillan Learning. (Digital version available)
IMPORTANT NOTE: This course will require **frequent** use of a personal laptop computer for weekly geospatial labs that utilize free software and/or websites. Please ensure that your computer meets all university technology requirements and that you come to class prepared to complete these in class.

Course Expectations

Instructor/Student Communication

Students are accountable for all academic communications sent to their Mayville State University e-mail address. Outside of class, I prefer to be contacted by email. I will do my best to respond in a timely manner (within the working day if received between 7am and 4 pm; evening and weekend communication may take longer).

Assignments and Assessments

Readings, Participation and Discussion (or Journals) – 7%

As this is a survey (and application-based) course, readings will be condensed. However, much of the material may be new exposure to technical, geospatial content and jargon. Therefore, some of this will be challenging, but I wish to push you a bit with the various topics we cover. I do not expect you to understand all of what we read, but I do expect you to read and pick up as much as possible. While I will provide some direct instruction and lecture throughout the term, most of this class will be discussions centered on these readings, along with the application of these concepts through labs (see Geospatial Lab Applications below). There is one required textbook for this course, *Introduction to Geospatial Technologies* (Shellito), which we will use as our foundational text.

The rough format for this class is to have one day per week dedicated to instruction and discussion and one day dedicated to lab application. Thus, assigned readings are scheduled for one of the days we meet each week, and these readings will form the basis of much of the conversation we have in class on that day. You will need to come prepared with readings completed and any notes/thoughts you have written down. Participating in – and not just attending – these classes is essential. For better or worse, you will be called on! **Participation in this class amounts to a possible 42 points**, based on 3 points a day for 14 discussions.

To be real, sometimes life happens, and you will not be able to attend class (e.g. emergency, pandemic, etc.). However, for those who may miss class days for some reason, there is a way to recoup points. To earn participation points if you miss class, you may complete a journal reflection. These journals are a chance for you to articulate your thoughts, concerns, review, and questions of the assigned readings (like what we will do in class). Each journal covers readings for a respective day in class. Each journal submission is worth the same amount of points as daily points (3 points). These make-up assignments should be turned in a timely manner – typically no more than one week – with extraordinary circumstances understandable. More information will be provided in class and on Blackboard. Please ask if you have concerns.

Quizzes – 23.5%

There will be **fourteen (14) quizzes** based on your readings from *Introduction to Geospatial Technologies*. Each quiz will cover a respective chapter (Quiz #1 covers Chapter 1, Quiz #2 covers Chapter 2, etc.). Each quiz consists of 10 multiple-choice and true/false questions, each worth 1 point, for a total of 10 points**. You may use your textbook**

during the quiz; however, you will only have fifteen minutes to complete the quiz. If you are not satisfied with your initial score, you have the option to take the quiz a second time, and the two scores will be averaged. Quizzes will be administered through the Blackboard course website in the respective "Quizzes" folder. Quizzes **must be completed by 11:59 pm** on their respective due dates (see Course Timeline/Schedule). **PLEASE**, do **NOT** wait until the last moments before the quiz closes to take it, as technology is often unpredictable. If you do not complete a quiz by the deadline, you may **NOT** make it up.

Geospatial Lab Applications (GLAs) – 30.5%

This course involves constant application of geospatial concepts and technologies. Indeed, you will be expected to complete about one GLA **PER WEEK**. **One day each week will be a dedicated lab day.** Within your textbook (*Introduction to Geospatial Technologies*), there are instructions for associated GLAs at the end of each chapter. To complete these GLAs, you will need to not only have access to the text, but also to a laptop computer (it may also be easier to if you have access to a physical mouse rather than a touchpad). All the software and/or online platforms used in the labs are available for free (more information will be given in class on how to access these). In most GLAs, there are a series of questions/prompts that you will answer as you complete the lab (several GLAs require you to submit a map instead). You will submit these responses on Blackboard in the "Geospatial Lab Applications" folder. Each GLA varies in their value, but in total there are 183 points available. While most GLAs will be completed in class, some may require you to complete after class (or in some instances you may not make it to class). **IMPORTANTLY**: **If you do not come to class on the day of a lab, or if you leave early on a lab day without completing your work, I will NOT answer questions outside of class** (unless you have an excused absence). Regardless, **you must submit your GLA responses by 11:59 pm of each lab day** (see Course Timeline/Schedule for respective due dates). More information will be provided in class and on Blackboard.

Drone Field Work – 10%

As you learn about various spatial techniques and technologies, and have opportunity to use some geospatial software, you will also use some hardware in the form of unmanned aerial vehicles (UAV), or drones. You will learn how to manually fly a small UAV, and how to use current UAV software (DroneDeploy) to create flight plans, conduct analysis, and complete a drone lab that includes a high-resolution map and 3D model. **In total, the various elements of the drone field work (e.g. flight training, DroneDeploy training, map, and model) will be worth 60 points and MUST be uploaded to Blackboard by 11:59 pm of the due date** (see Course Timeline/Schedule). More information will be provided in class and on Blackboard.

StoryMap Project – 12.5%

As a culminating artifact demonstrating various skills you develop over the course of the semester, you will create a StoryMap project using ArcGIS Online. A StoryMap is exactly that, a story that unfolds around a map (or several maps), utilizing text and multimedia to present interactive narratives that engage users and provide instantly accessible geographic context to your project. More specifically, you will create a virtual tour using the StoryMap program. You will be able to select a location of interest to you and include your own photographs and/or videos. Most of this work will take place outside of class, though you may have time in class to work on this during lab days, as some labs will not take up the entire time. In addition to submitting your StoryMap for evaluation, you will also give a brief presentation to the class during Finals Week showcasing your work. **In total, the various elements of this project (e.g. benchmarks, presentation, StoryMap) will be worth 75 points and MUST be uploaded to Blackboard by 11:59 pm of the due date** (see Course Timeline/Schedule). More information will be provided in class and on Blackboard.

Formal Assessments – 16.5%

You will complete two formal assessments. Each assessment will be in the form of a take-home written exam that will be typed and submitted through Blackboard. **Each exam will be worth 50 points (100 points total).** Each assessment will only cover respective material (i.e. not comprehensive). The format will include 2 questions, each worth 25 points, that will expect you to show not only your knowledge and comprehension of material, but also your application and analysis to given situations. You will have two weeks to complete each assessment on Blackboard:

Assessment #1 – Begins Friday, March 1st at 5:00 pm; due Friday, March 15th at 5:00 pm.
Assessment #2 – Begins Monday, April 22nd at 5:00 pm; due Monday, May 6th at 5:00 pm.

You will be able to use materials on your exam and be expected to use MLA citations when and where necessary. Again, you will need to do more than just regurgitate from our readings and show higher-ordered thinking in your responses. More information will be provided in class and on Blackboard.

Method of Evaluation/Grading

Grading Policies

I will do my best to turn around work completed in this course in a timely manner (optimally within a week of a respective deadline, but no more than two weeks). Moreover, I will attempt to leave helpful comments when and where necessary. Most evaluation is based on a rubric, which will be available for you to review.

To maintain timely feedback, **no late submissions will be accepted** (although understanding extraordinary circumstances). **All deadlines will be by the end of their respective due dates (i.e. 11:59 pm CST).**

Attendance/Participation Policies

To successfully complete this course, your attendance and active participation is required. Participation in classroom discussions or activities will result in stronger connections to theory and practice, adding to the quality of your learning experience.

AI Text-Generating Software Use

While you may use AI programs to help generate ideas and brainstorm, you should note that the material generated by these programs may be inaccurate, incomplete, or otherwise problematic. Beware that use may also stifle your own independent thinking and creativity. **You may not submit any work generated by an AI program as your own. Any text-generating software (such as ChatGPT, iA Writer, Marmot or Botowski) is not permitted, and it will be treated as plagiarism (i.e., zero on the assignment, reported to Academic Affairs, etc.).**

Grading Scale

The overall course evaluation is based on 600 total points, with the following grading scale: A (100-90%), B (89-80%), C (79-70%), D (69-60%), F (<60%) (percentages are rounded).

Breakdown of Grades

Assignments/Assessments	Total # of Assignments	Points Possible for each	Total Possible Points (% of Grade)
Participation/Discussion (or Journals)	15	3	45 (7.5%)
Quizzes	14	10	140 (23.5%)
Geospatial Lab Applications	14	Varies	180 (30%)
Drone Field Work	-	60	60 (10%)
StoryMap Project		75	75 (12.5%)
Assessments	2	50	100 (16.5%)
Total Points Possible	-	-	600 (100%)

Tips for Success

Faculty often take for granted the rules of the game for academic success. By virtue of our faculty status, we successfully navigated the university setting for years. But it was not always that way. I remember feeling like a fish out of water throughout my undergraduate years. I did not understand what "office hours" were, so I rarely went to them. I also did not write to my professors with questions that I was too afraid to ask in class. Indeed, I knew little if nothing about what resources existed on my campus, and I often wondered how other students found out about things like scholarship opportunities, internships, study abroad, and so on. So here are just a few items to consider regardless of whether you are embarking on your first or final semester as an undergraduate:

- If you have a question about course content, ask it! I am an expert in my field of study, and I want to share my expertise with you.
- If you have a question that is not about the course, and feel comfortable enough, ask that too! If I do not know the answer, I can likely point you to someone on our campus who does.
- The library and its staff are the single greatest resource we have on campus. The library is a living bibliography of the entirety of human knowledge and condition. Whatever topic you find interesting (regardless if you find it

in this course!), the library staff can help you find relevant information. You just need to ask them.

- Get to know the Writing Center! Writing successfully at the college-level is something you likely do not yet know how to do well. It is a process. The Writing Center and its staff can help demystify your assignments and help you to write more clearly and effectively. Again, you need only ask them.

Enrollment Verification

The U.S. Department of Education requires instructors to conduct an activity which will validate student enrollment in this course. Class attendance will be used to verify enrollment in on-campus courses. If you do not attend, your enrollment in this course will be at risk.

Important Student Information

Navigate to Blackboard > My MaSU tab > Student Resources tab to find a document entitled, "Important Student Important Information," which includes information about:

- ✓ Land Acknowledgement Statement
- ✓ Academic Grievance Concerns and Instructor English Proficiency
- ✓ NetTutor - Online Tutoring Program
- ✓ Starfish - Student Success System
- ✓ Students with Documented Disabilities
- ✓ Student Learning Outcomes / Essential Learning Outcomes
- ✓ Academic Honesty
- ✓ Emergency Notification
- ✓ Continuity of Academic Instruction for a Pandemic or Emergency
- ✓ Family Educational Rights and Privacy Act of 1974 (FERPA)
- ✓ Diversity Statement (Title IX)

Course Timeline/Schedule

GLA = Geospatial Lab Application

Week	Date	Topic	Readings/Labs	Due
1	9-Jan	Introduction: It's a Geospatial World Out There	Syllabus; Shellito Ch. 1	Quiz #1
	11-Jan	GLA: Introduction to Geospatial Concepts and Google Earth Pro	Lab 1.1	Lab #1
2	16-Jan	Where in the Geospatial World Are You?	Shellito Ch. 2	Quiz #2
	18-Jan	GLA: Coordinates and Position Measurements	Lab 2.1	Lab #2
3	23-Jan	Getting Your Data to Match the Map	Shellito Ch. 3	Quiz #3
	25-Jan	GLA: Georeferencing an Image	Lab 3.1	Lab #3
4	30-Jan	Finding Your Location with the Global Positioning System (GPS)	Shellito Ch. 4	Quiz #4
	1-Feb	GLA: GNSS Applications	Lab 4.1	Lab #4
5	6-Feb	Working with Digital Geospatial Data and Geographic Information Systems (GIS)	Shellito Ch. 5	Quiz #5
	8-Feb	GLA: GIS Introduction: QGIS Version	Lab 5.1	Lab #5
6	13-Feb	Using GIS for Spatial Analysis	Shellito Ch. 6	Quiz #6
	15-Feb	GLA: GIS Spatial Analysis: QGIS Version	Lab 6.1	Lab #6
7	20-Feb	Using GIS to Make a Map	Shellito Ch. 7	Quiz #7
	22-Feb	GLA: GIS Layouts: QGIS Version	Lab 7.1	Lab #7
8	27-Feb	Getting There More Quickly with Geospatial Technology	Shellito Ch. 8	Quiz #8
	29-Feb	GLA: Geocoding and Shortest Path Analysis	Lab 8.1	Lab #8
9	12-Mar	Remotely Sensed Images from Above	Shellito Ch. 9	Quiz #9
	14-Mar	GLA: Visual Imagery Interpretation	Lab 9.1	Lab #9
10	19-Mar	How Remote Sensing Works	Shellito Ch. 10	Quiz #10
	21-Mar	GLA: Remotely Sensed Imagery and Color Composites	Lab 10.1	Lab #10
11	26-Mar	Images from Space	Shellito Ch. 11	Quiz #11
	28-Mar	GLA: Landsat 8 Imagery	Lab 11.1	Lab #11
12	2-Apr	Studying Earth's Climate and Environment from Space	Shellito Ch. 12	Quiz #12
	4-Apr	GLA: Earth-Observing Missions Imagery	Lab 12.1	Lab #12

13	9-Apr	Digital Landscaping	Shellito Ch. 13	Quiz #13
	11-Apr	GLA: Digital Terrain Analysis	Lab 13.1	Lab #13
14	16-Apr	See the World in 3D	Shellito Ch. 14	Quiz #14
	18-Apr	GLA: 3D Modeling and Visualization	Lab 14.1	Lab #14
15	23-Apr	Drone Flying 101		
	25-Apr	Learning DroneDeploy Software		
16	30-Apr	StoryMap and Drone Lab Workday		
	2-May	StoryMap Presentations		Drone Lab StoryMap
17	6-May	Assessment #2 Due	No Class	Assessment #2

Appendix

Other Required Items, if Applicable:

Continuity of Academic Instruction for a Pandemic or Emergency

The health and safety of our students, staff, and faculty is our top priority. Mayville State University is committed to continuing face-to-face instruction for on campus courses each semester while minimizing exposure risk and promote health and safety for students, faculty, and staff.

If there is a significant health or safety event that necessitates a change in course format, plans for remote options for this course include transitioning into an asynchronous, online model of instruction. This will include some modification (for example, recorded lectures), but much of the structure and assessment of this course will remain intact.

Division-Specific Items

Program Student Learning Outcomes (SLOs) Addressed in This Course

The Academic Program Student Learning Outcomes document can be found in your course shell. It contains all learning outcomes pertaining to Essential Studies courses and all majors and minors. The document has an index, so you can quickly find the degree you are pursuing. No SLO is currently being assessed with this course.

Late Arrivals

The grading system for students adding this course after the first day of instruction will be modified. The student will be graded only on the activities that transpired while the student is enrolled. Students will not be penalized for missed assignments, but the student is still responsible for learning the course material that was covered during their initial absence.