ENR 3700: Introduction to Spatial Information for Environment and Natural Resources

Autumn 2025

Course Information

Course times and location:

- **Lecture:** Online on Carmen
- **Labs:** Kottman Hall 114 (30833 M 9-12), (30845 T 2-5), (31943 W 11:30-2:30), (32350 W 8-11), (32351 Th 2-5)
- **Credit hours:** 3
- **Mode of delivery:** Hybrid: Lecture online, Labs in person.

Instructors

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Name: Kaiguang Zhao
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Instructional Aide

Name: Audrey Heiser
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Office Location: Kottman Hall 473A
Office Hours: Tuesday 9-11 a.m.; Friday 1-3 p.m.

Course Prerequisites/Co-Requisites/ Exclusions

No prerequisites. Not open to students who have credit for ENR 3750

Course Description

This course is an introduction to methods of collecting and utilizing spatial information for environmental and natural resources management. It presents the basic concepts and vocabulary of spatial information systems and geospatial technologies, particularly in the context of environmental management. We will examine Geographic Information Systems (GIS), Remote Sensing (RS), and aerial imagery, Global Positioning Systems (GPS) for spatial location and spatial modeling and will survey methods for assessment of temporal change in natural and managed ecosystems. You will learn how to access and use a variety of spatial data, including map data, digital aerial photography, digital elevation models (DEMs), and high-resolution satellite imagery, in conjunction with GIS, RS, and GPS to solve environmental problems.

The central goal is to introduce you to the capabilities of GIS software (such as Google Earth, ArcGIS, and QGIS), as they are used in many jobs (both private and public) in natural resources management. Traditional paper-based maps and aerial photos will be briefly introduced, but the emphasis is on computer-based interpretation, measurement, processing, and analysis of digital data such as digital maps, digital vertical imagery and DEM. We will cover basic geographic and cartographic principles such as coordinate systems, spatial data models, resolution, distortion, and map scale. We will learn techniques to capture and analyze various formats of information for use in modern GIS software. We will briefly introduce you to the wide range of problems in natural and environmental resources where spatial data are useful, including agriculture, forestry, wildlife, wetlands and aquatic systems, and urban development.

You will learn and practice the basic skills needed to use air photos, multi-band satellite imagery, and digital elevation models within GIS software, as well as how to access public sources of information for use in this class and in future work. You will learn how to identify natural and anthropogenic features in aerial imagery, how to make basic measurements, and how to create professional quality maps for presentations and reports using GIS software.

Course Learning Goals and Outcomes

Students will gain an understanding of the principles, theories, and methods used in Geographic Information Systems (GIS), Remote Sensing (RS), and Global Positioning Systems (GPS). Students will be introduced to the criteria for and practice of spatial data acquisition, organization and applications (including GIS, RS, and GPS), the implications of readily available spatial information and the potential of science and technology to address problems of the contemporary world.

By the end of this course, you should be able to:

1. Connect geospatial concepts learned in class to real-world environmental problems
2. Communicate the applicability of GIS and spatial analysis to your field of study
3. Analyze geospatial data – either your own data or from existing geospatial data sources
4. Create professional quality maps and other project deliverables for presentations and reports following accepted cartographic principles

How This Course Works

Mode of delivery: Hybrid. The lecture portion is delivered online asynchronously. There are no required meeting times for lectures. All content is available online in Carmen.

Labs are in-person and meet once a week; day and time based on your section.

Pace of online activities: This course is divided into **weekly modules** that are released one week ahead of time. Students are expected to keep pace with weekly deadlines but may schedule their efforts freely within that time frame.

Credit hours and work expectations: This is a [3] credit-hour course. According to Ohio State bylaws on instruction (go.osu.edu/credithours), students should expect around [3] hours per week of time spent on direct instruction (instructor content and Carmen activities, for example) in addition to [6] hours of homework (reading and assignment preparation, for example) to receive a grade of [C] average.

Attendance and participation requirements: Research shows regular participation is one of the highest predictors of success. With that in mind, I have the following expectations for everyone's participation:

- **Participating in online activities for attendance**: **at least once per week**
  You are expected to log in to the course in Carmen every week. During most weeks you will probably log in many times. If you have a situation that might cause you to miss an entire week of class, discuss it with me *as soon as possible.* In the case of emergency or illness, contact the instructor as soon as possible to discuss possible accommodations at the discretion of the instructor and with appropriate documentation.
- **Zoom meetings and office hours**: **optional**
  All live, scheduled events for the course, including my office hours, are optional. I will post recordings of synchronous sessions for those who cannot attend.
- **Participating in discussion forums**: **two or more times per week**
  As part of your participation, each week you can expect to post at least twice as part of our substantive class discussion on the week's topics.

Course Materials, Fees and Technologies

Required Materials and/or Technologies

- **Textbooks:** There are no required textbooks to purchase for this course. Required readings will be posted to the Carmen course page.

Recommended/Optional Materials and/or Technologies

Other helpful resources are:

- **Introduction to Geospatial Technologies**, Bradley A. Shellito, Macmillan Learning, Fifth Edition.
- **GIS Fundamentals: A First Text on Geographic Information Systems**, Paul Bolstad, XanEdu, Sixth Edition.
- **Introduction to Remote Sensing,** James B. Campbell, Randolph H. Wynne, Valerie A. Thomas, Guilford Press, Sixth Edition.
- **Telling Stories with Maps: Lessons from a lifetime of creating place-based narratives,** Allen Carroll, ESRI Press, 1st Edition.

Required Equipment

- **Computer:** Most of your work can be completed using lab computers, but if you prefer to work on your own computer, you'll need a current PC running Windows 10 or 11 with high-speed internet connection.
- Specifications can be found using this link. **ArcGIS Pro does not work on Apple computers unless you can set up a dual operating system (only recommended for advanced users).**
- **Webcam:** built-in or external webcam, fully installed and tested
- **Microphone:** built-in laptop or tablet mic or external microphone
- **Other:** a mobile device (smartphone or tablet) to use for BuckeyePass authentication

If you do not have access to the technology you need to succeed in this class, review options for technology and internet access (go.osu.edu/student-tech-access).

Required Software

- **Microsoft Office 365:** All Ohio State students are now eligible for free Microsoft Office 365. Visit the installing Office 365 (go.osu.edu/office365help) help article for full instructions– All Ohio State students are eligible for Microsoft Office 365 through OTDI.

- Adobe Express - https://it.osu.edu/adobe
- ArcGIS Pro - https://guides.osu.edu/esri/arcgis-pro - this guide will help you through the process of downloading ArcGIS Pro and installing it. **This can be a challenging process. Please reach out if you are struggling!**
- QGIS – this is a free software that is a widely used alternative to ArcGIS when budget is an issue. Many processes are the same, but there is a steeper learning curve and the user interface is less intuitive. You can download it here: https://qgis.org/download/

CarmenCanvas Access

You will need to use BuckeyePass (buckeyepass.osu.edu) multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you do each of the following:

- Register multiple devices in case something happens to your primary device. Information can be found at BuckeyePass (buckeyepass.osu.edu).
- Users will only receive one SMS passcode at a time. Using the "Trust Browser" feature on a user's first authentication log in of the day will allow the user to bypass the need for another passcode for 24 hours.
- Install the Duo Mobile application on all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service.

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357 (HELP) and IT support staff will work out a solution with you.

Technology Skills Needed for This Course

- Navigating CarmenCanvas (go.osu.edu/canvasstudent)
- CarmenZoom virtual meetings (go.osu.edu/zoom-meetings)
- Recording a slide presentation with audio narration and recording, editing and uploading video (go.osu.edu/video-assignment-guide)
- Ability to ask a scientific question and determine what data is needed to craft an answer
- Having a consistent, thoughtful, and intentional computer file structure is crucial. Have a plan for where you will save your files so you can access them later.

Technology Support

For help with your password, university email, CarmenCanvas, or any other technology issues, questions or requests, contact the IT Service Desk, which offers 24-hour support, seven days a week.

- **Self Service and Chat**: go.osu.edu/it, **Phone:** 614-688-4357 (HELP)
- **Email:** servicedesk@osu.edu

Grading and Faculty Response

How Your Grade is Calculated

Your final grade is based on four categories:

Weekly Labs	Quizzes/Exam	Final Project	Participation
50%	20%	20%	10%

Following are the point values for each assignment:

Assignment	Points
Lab 1 – Google Earth	10
Lab 2 – Intro to ArcGIS Pro	50
Lab 3 – Accessing Data	50
Lab 4 – Habitat Suitability	100
Lab 5 - Georeferencing	50
Lab 6 - GPS	50
Lab 7 – GPS & GIS Integration	50
Lab 8 – Multispectral Imaging	50
Lab 9 – Intro to QGIS	90
Quizzes	100
Final Exam	100
Final Project	200
Participation	100
TOTAL	1,000

Grade	Percent	Points
A	93-100	930-1000
A-	90-92	900-929
B+	87-89	870-899
B	83-86	830-869
B-	80-82	800-829
C+	77-79	770-799
C	73-76	730-769
C-	70-72	700-729
D+	67-69	670-699
D	60-66	600-669
E	Less than 60	599 points or less

See Course Schedule for due dates.

Course Policies: Late Assignments/Grading Policies

Late Policy: Please refer to Carmen for due dates. Due dates are set to help you stay on pace and to allow timely feedback that will help you complete subsequent assignments. Late work for quizzes, discussions, and participation will not be accepted for a grade.

Attendance: Attendance in lab sessions is crucial to your success in this course. It is much easier to work together to overcome technical challenges when we can work on the same software together. However, each person has different levels of expertise and need. While not required, attendance is encouraged and will positively impact not only your participation grade for the course but also your lab grades. A record of attendance will be taken at each lab session.

Submitting Lab Assignments: Lab assignments should be submitted on Carmen. A description and rubric should be available for each lab. You should expect to receive a grade for each lab within one week of the due date. **Late assignments submitted will receive a deduction of 10% per day the assignments are late up to three days past the deadline. After three days, no late work will be accepted.**

Final Project: The final project for this course is an independent project in which you will (1) propose a GIS analysis related to your field of research (2) run analyses in ArcGIS Pro, and (3) create a high-quality map suitable for print or web display. More information about this project will be communicated as the semester progresses. **Unless you communicate a need for an extension with us before the deadline, no late final projects will be accepted for a grade. Extensions may be granted up to one week after the initial deadline (with the final grade reduced by 10% in total), but you should not plan on this extension being granted. Imagine that we are your client and have given you a serious deadline for this project.**

Final Exam: You are required to take the final exam on the scheduled day and time (see schedule below). If you do not take the exam, you will receive 0 points for the exam. If this time does not work for you, you must work with us before the scheduled time to create an alternate plan

Grading and feedback: For assignments submitted before the due date, we will try to provide feedback and grades within seven days. Assignments submitted after the due date may have reduced feedback and grades may take longer to be posted.

Use of AI: Given that the learning goals of this class center on your ability to effectively use technology to answer environmental questions, students are welcome to explore innovative tools and technologies for geospatial and GIS research, including generative artificial intelligence (GenAI). Students are permitted to use GenAI tools in the refining and troubleshooting phases of lab projects **but are discouraged from using them in the creative or early phases of answering a research question**. Your quizzes and the final exam should be your own original work. While GenAI can be a valuable tool, academic integrity remains paramount. You are responsible for developing and articulating your own ideas, so addressing how GenAI contributed to those ideas (as you would for any sources you use) is centrally

important to your learning. Attribute GenAI-generated content with proper citations and avoid plagiarism. Additionally, **consider the accuracy of information incorporated in your assignment and the ethical implications of using GenAI in educational contexts**. You are responsible for ensuring that the information you submit based on a GenAI query does not contain misinformation, unethical content, or violate intellectual property laws.
If I suspect that you have used GenAI on an assignment for which it is prohibited, I will ask you to explain your process for completing the assignment in question. Submission of GenAI-generated content as your own original work is considered a violation of Ohio State's Academic Integrity policy and Code of Student Conduct because the work is not your own. The unauthorized use of GenAI tools will result in referral to the Committee on Academic Misconduct.

Course Policies: Communication Guidelines

Preferred means of communication:

- My preferred method of communication for questions is **email. Make sure to send an email to all three of us for fastest response. For labs, you are encouraged to submit to the lab specific Q&A discussion.**
- My class-wide communications will be sent through the Announcements tool in Carmen Canvas. Please check your notification preferences (go.osu.edu/canvas-notifications) to be sure you receive these messages.

Communications: We will post class updates, extra credit opportunities, and/or additional materials as announcements on Carmen and/or to your OSU email. Please check Carmen and read your email regularly (at least 2-3 times per week) because you are responsible for this information, just as you are responsible for information in class. If you email us with a question, we will respond to you within **24 hours**. If your question is pressing, make sure to look through course information (***particularly this syllabus, assignment descriptions, and Carmen Q&A discussions***) for the answer. If you email us a question that can be answered on basic course documents, we may simply wait to discuss this with you in the next class period.

Classroom Civility: We want to build a classroom climate that is comfortable for everyone. It is especially important that we (1) display respect for all members of the classroom, including the instructors and students; (2) pay attention to and participate in all class sessions and activities; (3) avoid unnecessary disruption during class time (e.g., having loud private conversations, making/receiving cell phone calls, text messaging, etc.); and (4) avoid racist, sexist, homophobic, or other negative language that may unnecessarily exclude members of our campus and classroom. This is not an exhaustive list of behaviors; rather, they represent the minimal standards that help make the classroom a productive learning environment for all concerned.

Punctuality: Class begins on time every day to guarantee that all scheduled discussions and activities are completed, particularly on days when your fellow students are speaking or presenting. You are expected to be punctual. If you are late for class, do not enter the classroom while another student is speaking or presenting. Please wait outside until there is a break between speeches or presentations.

Challenging a Grade: We are always willing to discuss your grades with you but will not do so during class time. To challenge a grade, you should meet with Jon or Kai during office hours or make an appointment *within one week* of the assignment being returned to you. When we meet, you must present a clear case as to why the received grade is not an accurate representation of your work. Please note that a challenge may result in grades being raised or lowered.

Ohio State's Academic Integrity Policy

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's Code of Student Conduct, and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the University's Code of Student Conduct and this syllabus may constitute Academic Misconduct.

The Ohio State University's Code of Student Conduct (Section 3335-23-04) defines academic misconduct as: Any activity that tends to compromise the academic integrity of the University or subvert the educational process. Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the University's Code of Student Conduct is never considered an excuse for academic misconduct, so I recommend that you review the Code of Student Conduct and, specifically, the sections dealing with academic misconduct.

If I suspect that a student has committed academic misconduct in this course, I am obligated by University Rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the University's Code of Student Conduct (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the University.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact the instructor for this course.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- Committee on Academic Misconduct (go.osu.edu/coam)
- Ten Suggestions for Preserving Academic Integrity (go.osu.edu/ten-suggestions)

- Eight Cardinal Rules of Academic Integrity (go.osu.edu/cardinal-rules)

Copyright for Instructional Materials

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Creating an Environment Free from Harassment, Discrimination, and Sexual Misconduct

The Ohio State University is committed to building and maintaining a community to reflect diversity and to improve opportunities for all. All Buckeyes have the right to be free from harassment, discrimination, and sexual misconduct. Ohio State does not discriminate on the basis of age, ancestry, color, disability, ethnicity, gender, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, pregnancy (childbirth, false pregnancy, termination of pregnancy, or recovery therefrom), race, religion, sex, sexual orientation, or protected veteran status, or any other bases under the law, in its activities, academic programs, admission, and employment. Members of the university community also have the right to be free from all forms of sexual misconduct: sexual harassment, sexual assault, relationship violence, stalking, and sexual exploitation.
To report harassment, discrimination, sexual misconduct, or retaliation and/or seek confidential and non-confidential resources and supportive measures, contact the Office of Institutional Equity:

Online reporting form at **equity.osu.edu**,
Call 614-247-5838 or TTY 614-688-8605,
Or Email **equity@osu.edu**

The university is committed to stopping sexual misconduct, preventing its recurrence, eliminating any hostile environment, and remedying its discriminatory effects. All university employees have reporting responsibilities to the Office of Institutional Equity to ensure the university can take appropriate action:

- All university employees, except those exempted by legal privilege of confidentiality or expressly identified as a confidential reporter, have an obligation to report incidents of sexual assault immediately.
- The following employees have an obligation to report all other forms of sexual misconduct as soon as practicable but at most within five workdays of becoming aware of such information: 1. Any human resource professional (HRP); 2. Anyone who supervises faculty, staff, students, or volunteers; 3. Chair/director; and 4. Faculty member.

Diversity

The Ohio State University affirms the importance and value of diversity of people and ideas. We believe in creating equitable research opportunities for all students and to providing programs and curricula that allow our students to understand critical societal challenges from diverse perspectives and aspire to use research to promote sustainable solutions for all. We are committed to maintaining an inclusive community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among all members; and encourages each individual to strive to reach their own potential. The Ohio State University does not discriminate on the basis of age, ancestry, color, disability, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, race, religion, sex, gender, sexual orientation, pregnancy, protected veteran status, or any other bases under the law, in its activities, academic programs, admission, and employment.

To learn more about diversity, equity, and inclusion and for opportunities to get involved, please visit:

https://odi.osu.edu/
https://odi.osu.edu/resources/student-resources
https://cbsc.osu.edu

In addition, this course adheres to **The Principles of Community** adopted by the College of Food, Agricultural, and Environmental Sciences. These principles can be found at cfaesdei.osu.edu/about-us/cfaes-principles-community. For additional information on Diversity, Equity, and Inclusion in CFAES, contact the CFAES Office for Diversity, Equity, and Inclusion (cfaesdei.osu.edu). If you have been a victim of or a witness to harassment or discrimination or a bias incident, you can report it online and anonymously (if you choose) at equity.osu.edu.

Your Mental Health

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing.

If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling 614-292-5766. CCS is located on the 4th floor of the Younkin Success Center and 10th floor of Lincoln Tower. You can reach an on-call counselor when CCS is closed at 614-292-5766 and 24-hour emergency help is also available through the 24/7 by dialing 988 to reach the **Suicide and Crisis Lifeline**.

For students in the College of Food, Agricultural, and Environmental Sciences, David Wirt, wirt.9@osu.edu, is the CFAES embedded mental health counselor on the Columbus campus. To contact David, please call 614-292-5766. Students should mention their affiliation with CFAES if interested in speaking directly with David.

Religious Accommodations

Ohio State has had a longstanding practice of making reasonable academic accommodations for students' religious beliefs and practices in accordance with applicable law. In 2023, Ohio State updated its practice to align with new state legislation. Under this new provision, students must be in early communication with their instructors regarding any known accommodation requests for religious beliefs and practices, providing notice of specific dates for which they request alternative accommodations within 14 days after the first instructional day of the course. Instructors in turn shall not question the sincerity of a student's religious or spiritual belief system in reviewing such requests and shall keep requests for accommodations confidential. With sufficient notice, instructors will provide students with reasonable alternative accommodations with regard to examinations and other academic requirements with respect to students' sincerely held religious beliefs and practices by allowing up to three absences each semester for the student to attend or participate in religious activities. Examples of religious accommodations can include, but are not limited to, rescheduling an exam, altering the time of a student's presentation, allowing make-up assignments to substitute for missed class work, or flexibility in due dates or research responsibilities. If concerns arise about a requested accommodation, instructors are to consult their tenure initiating unit head for assistance.

A student's request for time off shall be provided if the student's sincerely held religious belief or practice severely affects the student's ability to take an exam or meet an academic requirement and the student has notified their instructor, in writing during the first 14 days after the course begins, of the date of each absence. Although students are required to provide notice within the first 14 days after a course begins, instructors are strongly encouraged to work with the student to provide a reasonable accommodation if a request is made outside the notice period. A student may not be penalized for an absence approved under this policy.

If students have questions or disputes related to academic accommodations, they should contact their course instructor, and then their department or college office. For questions or to report discrimination or harassment based on religion, individuals should contact the **Office of Institutional Equity**.

Policy: **Religious Holidays, Holy Days and Observances**

Weather or other short-term closing

Although Ohio State strives to remain open to ensure continuity of services to students and the public, extreme conditions can warrant the usage of the university's **Weather or Other Short-Term Closing Policy**. Please **visit this webpage** to learn more about preparing for potential closings and planning ahead for winter weather.

ACCESSIBILITY ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

Requesting Accommodations

The university strives to maintain a healthy and accessible environment to support student learning in and out of the classroom. If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion.

If you are ill and need to miss class, including if you are staying home and away from others while experiencing symptoms of a viral infection or fever, please let me know immediately. In cases where illness interacts with an underlying medical condition, please consult with Student Life Disability Services to request reasonable accommodations. You can connect with them at slds@osu.edu; 614-292-3307; or slds.osu.edu.If you are ill and need to miss class, including if you are staying home and away from others while experiencing symptoms of a viral infection or fever, please let me know immediately. In cases where illness interacts with an underlying medical condition, please consult with Student Life Disability Services

to request reasonable accommodations. You can connect with them at slds@osu.edu; 614-292-3307; or slds.osu.edu.

Disability Services Contact Information

- Phone: 614-292-3307
- Website: slds.osu.edu
- Email: slds@osu.edu
- In person: Baker Hall 098, 113 W. 12th Avenue

Accessibility of Course Technology

This online course requires use of CarmenCanvas (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations as early as possible.

- CarmenCanvas accessibility (go.osu.edu/canvas-accessibility)
- Streaming audio and video
- CarmenZoom accessibility (go.osu.edu/zoom-accessibility)
- ArcGIS Pro accessibility information (https://pro.arcgis.com/en/pro-app/latest/get-started/overview-of-accessibility.htm)

Course Schedule

Refer to the Carmen Canvas course for up-to-date due dates.

TENTATIVE DAILY SCHEDULE

Week	Date	LAB DAY – FOLLOW ONLY YOUR ASSIGNED SECTION	Lecture/ Reading(s) Due	Assignment(s) Due* Date approximate – all labs will have different due dates
Week 1	M 8/25	-		
	T 8/26	No lab – work on Carmen activities	Syllabus Lecture (1.1)	
	W 8/27	No lab – work on Carmen activities	Intro to Environmental GIS Lectures (1.2)	Discussion 1.1 Initial Post Due
	Th 8/28	Lab – Day 1	Reading - On Carmen	
	F 8/29	-		Discussion 1.1 Discussion Responses Due
Week 2	M 9/1	LABOR DAY (NO CLASS)		
	T 9/2	No lab – work on Carmen activities	Reading – On Carmen GIS Basics & Raster vs. Vector Data Lecture Series	
	W 9/3	Lab – Day 1		
	Th 9/4	Lab – Day 2		
	F 9/5			
Week 3	M 9/8	Lab – Day 1	Reading – On Carmen Intro to ArcGIS Pro Lecture Series	
	T 9/9	Lab – Day 1		
	W 9/10	Lab – Day 2		
	Th 9/11	Lab – Day 3		
	F 9/12			Lab 1 – Google Earth Due*
Week 4	M 9/15	Lab – Day 2	Accessing Data Lecture Series	
Week	**Date**	**Topic and Activity***	**Reading(s) Due****	**Assignment(s) Due**
	T 9/16	Lab – Day 2		

	W 9/17	Lab – Day 3		
	Th 9/18	Lab – Day 4		
	F 9/19			Lab 2 Intro to ArcGIS Pro Due
Week 5	M 9/22	Lab – Day 3	Reading – On Carmen Coordinate Systems, Projection Systems, Suitability Analysis Lectures	
	T 9/23	Lab – Day 3		
	W 9/24	Lab – Day 4		
	Th 9/25	Lab – Day 5		
	F 9/26			Lab 3 Accessing Data Due
Week 6	M 9/29	Lab – Day 4	Reading – On Carmen Georeferencing Lecture Series	
	T 9/30	Lab – Day 4		
	W 10/1	Lab – Day 5		
	Th 10/2	Lab – Day 6		
	F 10/3			Lab 4 Habitat Suitability Due
Week 7	M 10/6	Lab – Day 5	Reading – On Carmen GPS Lecture Series	
	T 10/7	Lab – Day 5		
	W 10/8	Lab – Day 6		
	Th 10/9	Lab – Day 7		
	F 10/10			Lab 5 Georeferencing Due
Week 8	M 10/13	Lab – Day 6	Reading – On Carmen Intro to Remote Sensing Lecture Series	
	T 10/14	Lab – Day 6		
	W 10/15	Lab – Day 7		Lab 6 GPS Due
	Th 10/16	FALL BREAK (NO CLASS)		
	F 10/17	FALL BREAK (NO CLASS)		

Week 9	M 10/20	Lab – Day 7	Reading – On Carmen Satellite & Drone Lecture Series; Multispectral Lecture Series	
	T 10/21	Lab – Day 7		
	W 10/22	Lab – Day 8		
	Th 10/23	Lab – Day 8		
	F 10/24	Exam		Lab 7 GPS & GIS Due
Week 10	M 10/27	Lab – Day 8	Reading – On Carmen Photo interpretation lecture series; classification lecture series	
	T 10/28	Lab – Day 8		Final Project Proposal Due
	W 10/29	Lab – Day 9		
	Th 10/30	Lab – Day 9		
	F 10/31			Lab 8 Multispectral Imaging Due
Week 11	M 11/3	No lab – work on Carmen activities	Reading – Lidar Lecture Series; QGIS Lecture Series	
	T 11/4	Lab – Day 9		
	W 11/5	Lab – Day 10		
	Th 11/6	Lab – Day 10		
	F 11/7			Lab 9 Intro to QGIS Due
Week 12	M 11/10	Lab – Day 9	Reading - On Carmen	
	T 11/11	VETERAN'S DAY (NO CLASS)		
	W 11/12	Lab – Day 11	Cartography Lecture Series	
	Th 11/13	Lab – Day 11		
	F 11/14			

Week 13	M 11/17	Lab – Day 10	Geovisualization Lecture Series	
	T 11/18	Lab – Day 10		
	W 11/19	Lab – Day 12		
	Th 11/20	Lab – Day 12		
	F 11/21			Final Project Draft Due
Week 14	M 11/24	Lab – Day 11	Reading – Example Presentation Lecture Series	
	T 11/25	Lab – Day 11		
	W 11/26	THANKSGIVING BREAK		
	Th 11/27	(NO CLASS)		
	F 11/28	(NO CLASS)		
Week 15	M 12/1	Lab – Day 12	Reading – Example Presentations Lecture Series	
	T 12/2	Lab – Day 12		
	W 12/3	Lab – Day 13		
	Th 12/4	Lab – Day 13		
	F 12/5			
Week 16	M 12/8	Lab – Day 13		
	T 12/9	Lab – Day 13		
	W 12/10	No lab – work on Final Project		Final Project Due
	Th 12/11	END OF SEMESTER		
FINALS	W 12/17	Exam on Carmen – open for 24hrs		Final Exam