
ESC/GEO 485/585: Geographic Information System and Science-III

Department of Geography & Earth Science
University of Wisconsin-La Crosse
Spring 2021

Instructor:	Gargi Chaudhuri, PhD	Class Location:	Cowley Hall 245
Email:	gchaudhuri@uwlax.edu	Lecture Day/Time:	Mon/Wed-12:05-1:005PM
Office Hours:	Mon/Wed-2:30-4PM	Lab Location:	Cowley Hall 245
Office Location:	Zoom	Lab Day/Time:	Mon/Wed-1:05-2:05AM
Office Phone:	608-785-8338	Credit Hours:	3

COURSE DESCRIPTION

The purpose of this course is to introduce students to advanced concepts and techniques associated with Geographic Information Science and System. A Geographic Information System can be defined as any computer-based, software-hardware platform capable of capturing, storing, displaying, manipulating, and analyzing any set of geo- referenced data. Since students for this course have already taken ESC/GEO 405 it is assumed that the students have familiarity with lengths and breadths of ArcGIS Pro, spatial data, and basic spatial analytical techniques. Along with that it is assumed that students have basic computer skills, which will not be taught in the class. Once a new technique is taught in class, students will be expected to retain knowledge of steps. Step by step instructions for tasks that have already been covered will not be provided every time. Keeping a journal for the lab portion of this course will prove useful in this course and in future courses

COURSE GOALS

This course is designed to advance student's knowledge in the rapidly developing field of Geographic Information System and Science. This course has two goals:

- 1. To provide students with a deeper understanding of the concepts of GI Science, spatial reasoning and analysis.
- 2. To offer students hands-on experience of using some advanced GIS tools in ArcGIS and other open-source software and employing these techniques and knowledge in self-designed GIS projects.

EXPECTED LEARNING OUTCOMES

Students will learn spatial reasoning and thinking.

- 1. Understand concepts of spatial database.
- 2. Collect and input spatial data using a variety of different methods.
- 3. Query and manipulate GIS data using geodatabase techniques.
- 4. Design geoprocessing models to solve application problems.
- 5. Understand some advanced topics in spatial analysis.
- 6. Plan and execute a GIS project to address and solve particular problems.

EXPECTATIONS FROM THE STUDENT

- 1. Students must do their reading assignment for the upcoming lecture before the class.
- 2. Listen to lectures carefully and take notes over written materials.
- 3. Students will push themselves to explore more on topics taught in class.
- 4. Go through your lectures and tally your notes after class every day.
- 5. Attend lectures and labs regularly. Submit completed labs within due dates.
- 6. Class participation. Ask questions and discuss topics within the lecture session.

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- 7. No use of phone in class.

PREREQUISITES

ESC/GEO 405 and STAT 145. It will be assumed that students will know the following: Desktop computers and Windows operating system; Web Browsing, MS Excel, MS Word, MS Powerpoint, Save a file to a given drive, create, name and rename files and folders, drag and drop files, send an email attachment, know/how of Canvas, know how/when to log-off/ shutdown, find a file or folder, know when it is appropriate to use 'Save as' instead of 'Save', download files from the web to a given folder, move files between drives, Zip/Unzip a file, use the start menu to locate and start a software, copy, paste and delete files, Select & print to a printer from Windows application, make a new folder in an existing folder, place an image in Microsoft Word/PowerPoint, and use "Help" from within a Windows application.

TEXTBOOK & READINGS: *Paul A. Longley, Michael F. Goodchild, David J. Maguire, and David W. Rhind (2011) Geographic Information Systems and Science. Third Edition. New York: Wiley.* Additional readings will be posted on Canvas course site. You are responsible for completing all the readings as listed on the course schedule and assigned in class. Readings are due on the date they are listed in the syllabus and will be discussed in class on the day they are due. There will also be information that is only presented in class and therefore if you miss class you must obtain the notes from someone else in the course.

EXPECTATIONS FROM THE STUDENT

To be successful in this course, a student must

- Read assigned readings and go through the lecture materials regularly
- Listen to lectures carefully and take notes over written materials.
- Attend class regularly.
- Submit completed assignments, exams, homeworks, final projects and any other class activity within due dates.
- Ask questions and discuss topics within the lecture session. Clarify issues within class itself while the topic is being taught.

ASSIGNMENTS

- **Lab Assignments:** You need to complete all lab assignments and submit in required format by its due date to be considered for full grades in each assignment. If you fail the lab assignments, you will fail the course. You will have enough time to complete each assignment within assigned lab time with help from me and/or lab assistant. If you choose not to complete your work within lab time, it's your responsibility to finish on time by yourself.
- **Homeworks:** There will be few homeworks that you will be provided based on some lecture materials. Homeworks are meant to be done on your own and submit it by the due date.
- **Review presentations:** Students will be assigned reading materials from the text book or scientific articles to critically evaluate and present in class.
- **Exams:** There will be **three exams on the dates listed in the syllabus** and are designed to assess your comprehension of the presented materials. Two exams will be based on lecture materials and readings and will be named as Mid-term and Final exams. One exam will be based on hands-on problem solving called Lab Exam. Make-up exams will be given **ONLY** during exceptional circumstances, such as illness or university-approved event, and proof will be required. In cases where you have a scheduling conflict with a university-approved event, it is **YOUR** responsibility to notify the instructor at least two weeks before the exam. In the case of emergencies, it is **YOUR** responsibility to notify the instructor that you will be unable to attend, preferably before the exam or within 24 hours after the exam.

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- ***Final Project:*** More information about the final project can be found in Final Project module in canvas. In the final project, students propose a real world case study that they would like to explore. The student will pose some objectives or research questions that they will address by using geospatial data and analytical techniques learned in this course. The whole process of final projects takes last few weeks, and students are guided by few milestones which help them accomplish their task on time. **The final project submission items are not eligible for late submission.** If you fail to turn in any of the items by the due date then you will not receive any points for that item.
 - ***For graduate students and Writing Emphasis:*** In addition to the items above, graduate students and undergraduate students with writing emphasis are required to write an academic paper and scientific report, respectively based on their final project. Graduate students are strongly suggested to focus their final project topic within the context of their thesis work.

LATE SUBMISSION POLICY

Late submission of any assignment is strongly discouraged. However, turning a lab late is encouraged over not doing it at all. Late submissions will be accepted until the *last day of classes*. **One week late submission will lose 25%** of their value and **more than one week late submission will lose 50%** of their value if more than one week late. In case of sickness or emergency, appropriate proof should be provided during late submission otherwise points would be deducted.

ATTENDANCE

Due to COVID-19 and hybrid nature of the class, the scheme to assess attendance may change. Currently, the short lecture quizzes will serve as lecture attendance and lab attendance will be taken in class.

COVID-19 Health Statement

Students with COVID-19 symptoms or reason to believe they were in contact with COVID-19 should call and consult with a health professional, such as the UWL Student Health Center (608-785-8558). Students who are ill or engaging in self-quarantine at the direction of a health professional should not attend class. Students in this situation will not be required to provide formal documentation and will not be penalized for absences. However, students should:

- notify instructors in advance of the absence and provide the instructor with an idea of how long the absence may last, if possible.
- keep up with classwork, if able.
- submit assignments electronically.
- work with instructors to either reschedule or electronically/remotely complete exams, labs, and other academic activities.
- consistently communicate their status to the instructor during the absence.

Instructors have an obligation to provide reasonable accommodation for completing course requirements to students adversely affected by COVID-19. This policy relies on honor, honesty, and mutual respect between instructors and students. Students are expected to report the reason for absence truthfully and instructors are expected to trust the word of their students. UWL codes of conduct and rules for academic integrity apply to COVID-19 situations. Students may be advised by their instructor or academic advisor to consider a medical withdrawal depending on the course as well as timing and severity of illness and students should work with the Office of Student Life if pursuing a medical withdrawal.

FORMAT & COURSE ACCESS

This is a hybrid course. Due to the number of enrollments versus room capacity issue to maintain required physical distance, the student attendance in class will be split into two groups. The first group will attend the Monday/Wednesday 8:50 – 9:50AM session and the second group will attend the 9:55 –

10:50AM session. In the hybrid format, the lectures will be posted online and the students will be in class to work on their assignments. The students are responsible to study the online lectures on their own and take the associated quizzes. You need to complete the lecture quizzes every week to move on further. You can ask questions and clarify doubts with the instructor via discussion forum on in class during your session. You will need your UWL NetID to login to the course from the CANVAS homepage. All course materials will be available online, including lectures, lab assignments handouts, video demonstrations for assignments, quizzes, assignment dropboxes, and other miscellaneous instructions. The lab assignment data will be available via Geography server folders. In class, the instructor will be there primarily to help them with assignments, troubleshoot and discuss. Access to course materials in CANVAS will cease after the term ends. If you wish to archive materials for your personal records or portfolio you should do so as you progress through the course. As a general rule, you should always save local copies of course-related work. To avoid disasters, you should also save important files to external media or cloud storage.

TECHNICAL SUPPORT

For tips and information about Canvas visit the Canvas Guide for Student. You can also contact the ITS Support Center at (608) 785-8774 or helpdesk@uwlax.edu for questions about Canvas or any other technological difficulties. The hours for ITS are Monday through Thursday from 7:30 am to 6:30 pm, and Friday from 7:30 am to 4:30 pm, Central Time. For GIS software and computer issues in the lab please contact the GIS Lab Administrator Steve Fulton.

GRADING SCHEME

A	93 – 100	B	83 – 87	C	70 - 77	F	59 & below
AB	88 – 92	BC	78 – 82	D	60 - 69		

GRADING WEIGHT

Lab Assignments	10 lab assignments and homeworks	40%
Exams	2 exams and 1 lab exam	20%
Class Participation	attendance, syllabus quiz, reviews	15%
Final Project	Proposal, project presentation	25*%

**Graduate Students and Writing Emphasis Students*– The final project part also includes a final paper for graduate students and students with writing emphasis. The graduate students are encouraged to develop final project on based on application of GIS knowledge gained in this class on their thesis topic. The graduate student will be expected to produce higher quality output.

STUDENT SUPPORT SERVICES

A GIS Lab Assistant will be available in the classroom and/or online to help students with the lab assignments. More details will be provided on canvas.

TENTATIVE SCHEDULE (*Due dates are available on Canvas*)

Week	Topic	Reading	Lab
2/1	Course Intro & HW#-1	Lab#0	Ch. 1, 2
2/3	work on lab	–	–
2/8	Lec#1: Nature of Geog. Data	Lab#1	Ch. 4
2/10	Lec#2: Geo-DBMS & Topology - I	–	Ch. 8
2/15	Lec#3: Geo-DBMS & Topology - II, HW#2	Lab#2	Ch. 10
2/17	Lec#4: Uncertainty	–	Ch. 6
2/22	Lec#5: Map Algebra	Lab#3	O’Sullivan & Unwin
2/24	Lec#6: Spatial Modeling	–	Ch. 16
3/1	Lec#7: Working with Model Builder, HW#3	–	Ch. 14
3/3	Lec#8: Sampling & Interpolation	Lab#4	Demers: Sampling & Ch. 14(Pg. 373)
3/8	Student Review	–	–
3/10	Mid-Term Exam	–	–
3/15	Lec#9: Network Analysis I	Lab#5	Jensen & Jensen Ch.7
3/17	Lec#10: Network Analysis II	–	Lazer et al (2009)
3/22	Lec#11: Spatial Stat. I	–	Jensen & Jensen Ch.8
3/24	Lec#12: Spatial Stat. II, HW#4	Lab#6	Batty Ch.5
3/29	Lec#13: GIS Appli. in Crime Mapping	–	USDOJ Hndbk Ch. 2, 4
3/31	Lec#14: GIS Appli. in Public Health	–	Musa et al 2013
4/5	Lec#15: Cloud GIS, Mobile & Distri. GIS	Lab#7	Ch. 11
4/7	Lec#16: Managing GIS & Project Plng.	–	Ch. 17
4/12	Student Review	Proposal due	–
4/14	Lab Exam	–	–
4/19	Work on project	–	–
4/21	Work on project	–	–
4/26	Work on project	Draft presentation due	–
4/28	Work on project	–	–
5/3	Final Project Presentation	–	–
5/5	Final Project Presentation	–	–
5/10	Final Exam	4:45-6:45pm	–

The instructor reserves the right to change the content of the course material if she perceives a need due to pandemic, instructor illness or due to the pace of the course. Students are responsible for any announcement made in class.

HOW TO CONTACT THE INSTRUCTOR:

If you have any issues talk to your instructor during office hours or before or after the class. Do not completely rely on emails. If you have to send an email, email with clear subject, course and section number, and sign off with your name.

EXPECTATIONS FOR GRADED WORK:

Generally, I return graded assignments with individualized feedback, if needed, within 21 days from the due date of the assignment. I will notify you if I am unable to grade the work within the 21-day timeframe, and will identify a revised return date. If you submit work after the due date, it may not be returned within 21 days. The grades for any work that is graded electronically, such as scanned examinations or automated quiz, will be accessible to you within 21 days of the due date. If you submit electronically graded work after the due date, it may not be accessible within 21 days. Your graded coursework will be returned in compliance with FERPA regulations, such as in class, during my office hours, or via the course management system through which only you will have access to your grades.

UWL Syllabus Policy Information & Statements:

Please check here for statements regarding Academic integrity and misconduct, religious accomodation, sexual misconduct, student course and faculty related concern, students with disabilities, veterans and military personnel.

Please check here to find out more about Academic Services and resources at UWL