GEOG*3480 - GIS and Spatial Analysis
Fall 2024 Course Outline
Section: 01
Credits: 0.50

Land Acknowledgement: Guelph

The University of Guelph resides on the ancestral lands of the Attawandaron people and the treaty lands and territory of the Mississaugas of the Credit. We recognize the significance of the Dish with One Spoon Covenant to this land and offer respect to our Anishinaabe, Haudenosaunee and Métis neighbours. Today, this gathering place is home to many First Nations, Inuit, and Métis peoples and acknowledging them reminds us of our important connection to this land where we work and learn.

Calendar Description

This course focuses on the use of raster and vector-based geographic information systems to analyze spatial data. Topics include map digitizing, data query and overlay, spatial interpolation, multi-criteria evaluation, least cost pathway determination and digital elevation models. This course requires some familiarity with numerical methods and computer operations.
Prerequisite(s): 10.00 credits, including GEOG*2480
Department(s): Department of Geography, Environment and Geomatics

Course Fit Within Program/Curriculum

This course is one of four 3rd year courses (the others being GEOG*3420 Remote Sensing of the Environment, GEOG*3430 Geomatics for Environmental Analysis, and GEOG*3440 GIS for Decision Making) in the Geomatics stream of courses offered by Geography (https://www.uoguelph.ca/registrar/calendars/undergraduate/2015-2016/c12/c12geog.shtml/). GEOG*2480 Mapping and GIS an introduction to the fields of cartography and geographical information science, which is necessary to provide the theoretical foundation on which this course, GEOG*3480, is positioned. The focus of this course is on the analysis of geographical data using GIS and related Geomatics technologies. The third-year geomatics courses provide the analytical background necessary for the thematic capstone course, GEOG4480 Applied Geomatics.

Lecture Schedule

MonWedFri 1:30pm-2:20pm (9/5 to 12/13)

Lab / Seminar Schedule

Day	Time	Location	Section
Mondays	3:30 PM - 5:20 PM		0101
Fridays	9:30 AM - 11:20 AM		0102

Instructor Information

John Lindsay
Email: jlindsay@uoguelph.ca

Textbook and Readings

To facilitate learning in this course we will be using an open-access textbook.

de Smith, M, Goodchild, MF, and Longley, PA (2024) Geospatial Analysis 7th Edition, online: https://www.spatialanalysisonline.com/HTML/index.html?introduction_and_terminology.htm (https://www.spatialanalysisonline.com/HTML/?introduction_and_terminology.htm)

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Readings for this course are intended to reinforce and supplement the content covered within lectures and are required. A free online version of this book is available at www.spatialanalysisonline.com (http://www.spatialanalysisonline.com/). If you prefer, a print version of the 6th edition of this book is available on Amazon (~$75) and a printable PDF (ePUB as well) version is available from the book website for £29.95.

Course Level Learning Outcomes

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

- Understand the foundational theories of GIS including the unique character of spatial data.
- Analyze geospatial data using GIS software.
- Understand spatial analysis techniques and practices.
- Practice communicating concepts through formal written and visual forms.
- Identify key issues related to spatial data error.

Schedule of Topics and Assignments

Day	Date:	Topic	Activities	Due
Fri	9/6	Welcome - Course introduction		
Mon	9/9	Intro to GIS		
Wed	9/11	Intro to GIS		
Fri	9/13	Intro to GIS		
Mon	9/16	Spatial data and data quality	Lab 1 assigned	Quiz 1
Wed	9/18	Spatial data and data quality		
Fri	9/20	Spatial data and data quality		
Mon	9/23	Basic GIS data analysis		Quiz 2
Wed	9/25	Basic GIS data analysis		
Fri	9/27	Basic GIS data analysis		
Mon	9/30	Multi-criteria evaluation (MCE)		Quiz 3
Wed	10/2	Multi-criteria evaluation (MCE)		
Fri	10/4	Least-cost pathway analysis (LCPA)		
Mon	10/7	Least-cost pathway analysis (LCPA)	Lab 2 assigned	Quiz 4 Lab 1
Wed	10/9	GIS modelling		
Fri	10/11	GIS modelling		
Mon	10/14	Thanksgiving Holiday		
Wed	10/16	GIS programming		
Fri	10/18	Exam 1		
Mon	10/21	GIS programming		Quiz 5
Wed	10/23	Descriptive statistics for geospatial data		
Fri	10/25	Spatial autocorrelation		
Mon	10/28	Point pattern analysis	Lab 3 assigned	Quiz 6 Lab 2
Wed	10/30	Regression analysis and GWR		
Fri	11/1	Analysis of circular data		
Mon	11/4	Spatial interpolation		Quiz 7
Wed	11/6	Spatial interpolation		
Fri	11/8	Spatial interpolation		
Mon	11/11	Surface Analysis	Lab 4 assigned	Quiz 8 Lab 3
Wed	11/13	Landscape visibility analysis (viewsheds)		
Fri	11/15	Spatial hydrological analysis		

Mon	11/18	Spatial hydrological analysis	Quiz 9
Wed	11/20	Network analysis	
Fri	11/22	Network analysis	
Mon	11/25	Wrap up and the future of GIS	Quiz 10
Wed	11/27	Wrap up and the future of GIS	
Fri	11/29	Exam 2	
Wed	12/4		Lab 4

Grading Scheme

- Lab Assignments: 4 lab assignments x 11% = 44%
- Quizzes: best 8 out of 10 x 1% = 8%
- Exam 1: Friday October 18, in class = 24%
- Exam 2: Friday November 29, in class = 24%

The mid-term exams will be held in class, during regularly scheduled times and there will be no lecture those days. **Exam 2 is NOT cumulative and will only cover topics after the cut-off point (given in lecture) for Exam 1.**

Each week I will provide students a short online quiz consisting of about 10 questions via CourseLink. These relatively low-stakes quizzes will keep you on track with the readings and lectures and provide you with timely feedback. **Each week's quiz is due the following Monday before class.**

Last Day to Drop Course

The final day to drop Fall 2024 courses without academic penalty is the last day of classes: November 29

After this date, a mark will be recorded, whether course work is completed or not (a zero is assigned for missed tests/assignments). This mark will show on the student's transcript and will be calculated into their average.

Course Grading Policies

Laboratory Exercises

The labs are designed to familiarize you with basic GIS operations, and to teach you problem solving skills. You are going to solve a variety of problems using ArcGIS Pro. By completing the labs, you will gain practical experience in using the software to create and edit datasets, manipulate and analyze data, and generate maps that communicate spatial information effectively. At the same time, you will lay the foundation for learning any other GIS software.

Your GTA will make an arrangement with you regarding handing in the labs. Your GTA will be available to help you during the scheduled lab times. GTAs are not required to be available outside of these times! If your GTA helps you outside of scheduled times, then he/she is doing you a favour; please be considerate of this.

All of the labs require that you submit your own work. It's okay to learn the software with a classmate, or to ask other people for help when you run into trouble. (In fact, you should do the tutorials with a classmate.) However, the labs that you submit must be the product of your own effort.

Depending on your experience, you will have to learn ArcGIS Pro and a range of new skills to complete these labs. This is a real challenge, even for someone who is familiar with computers. From previous experience, when students had difficulty completing the labs, problems often occurred because of unfamiliarity with the computer and its operating system. You need to be a competent computer user, or be willing to upgrade your skills in the first weeks of the course. Losing 10 hours of work because you didn't copy your files properly is no fun!

Once you have completed the tutorials and know the programs, you should be able to complete the labs in 4 to 8 hours each. However, it may take you much longer if you combine learning the program with doing the labs. Therefore, until you are comfortable using the computer and the software, you should plan to spend a lot of time learning the basics.

Lab attendance is mandatory and attendance will be recorded by the GTA each week. GTAs will not respond to the e-mail questions of students who fail to regularly attend a lab section.

Note, lab due dates are subject to change in the event of unforeseen scheduling conflicts. Please confirm the exact due dates and times with your GTA well in advance. These should be provided during the GTA introduction of each new lab assignment. Changes to this schedule will be posted on

CourseLink if required. Generally, **lab assignments are due when a new lab is introduced. Notice that each of the labs have a different amount of time available to complete them. This reflects the fact that they are unequal in the effort needed to complete them, and the expectation is that your growing familiarity with the software and lab process implies that later labs will take less time to complete than earlier labs. You should carefully study the schedule of lab assignments above and plan accordingly.**

Submission of Assignments and Late Policy

The lab material constitutes an integral part of this course, since this is where students receive hands on work with data, and must apply the techniques they have learned. Labs must be handed in to the teaching assistant at the beginning of lab section in the week they are due, with a late penalty of 10% of the total assignment grade per day.

Getting Help in this Course

If you have questions regarding the lab, please see one of the course Graduate Teaching Assistants (GTA). GTA office hours will be announced upon first meeting and posted to CourseLink. For any other matters, including lecture content, exams, quizzes, and any personal issues, please feel free to visit me during my office hours (stated above), e-mail me (jlindsay@uoguelph.ca). I would also encourage students to seek help for lab/lecture/quiz/ exam related issues using the discussion forum on Courselink. It should be your first approach to getting help unless you wish to discuss a personal issue with myself or the GTA.

CSAHS Academic Misconduct Policy

The *Academic Misconduct Policy* is detailed in the Undergraduate Calendar. The University of Guelph is committed to upholding the highest standards of academic integrity and **it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct** and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Instructors **shall not** determine if academic misconduct has occurred. This is up to the Associate Dean Academic's office. Instructors shall not assign a grade of zero even if they believe that the student has committed some form of academic misconduct (e.g., copied material from a website like CourseHero) on an assignment or exam.

Instructors **can** determine if a student has poorly paraphrased and/or improperly cited material and can provide a grade accordingly as long as this is clearly identified as part of the assessment criteria via a rubric or other assessment tools.

For more information about Academic Integrity resources and how to prevent Academic Misconduct.

Standard Statements for Undergraduate Courses

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The Academic Misconduct Policy (https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-misconduct/) is outlined in the Undergraduate Calendar.

Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability. Use of the SAS Exam Centre requires students to make a booking at least 10 days in advance, and no later than the first business day in November, March or July as appropriate for the semester. Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time. For students at the Guelph campus, information can be found on the SAS website. (https://www.uoguelph.ca/sas/)

Accommodation of Religious Obligations

If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements.

See the Academic calendar for information on regulations and procedures for Academic Accommodations of Religious Obligations (https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-accommodation-religious-obligations/).

Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all undergraduate students except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in the Undergraduate Calendar - Dropping Courses (https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/dropping-courses/).

Email Communication

As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

Health and Wellbeing

The University of Guelph provides a wide range of health and wellbeing services at the Vaccarino Centre for Student Wellness (https://wellness.uoguelph.ca/). If you are concerned about your mental health and not sure where to start, connect with a Student Wellness Navigator (https://wellness.uoguelph.ca/navigators/) who can help develop a plan to manage and support your mental health or check out our mental wellbeing resources (https://wellness.uoguelph.ca/shine-this-year/). The Student Wellness team are here to help and welcome the opportunity to connect with you.

Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g., final exam or major assignment).

Recording of Materials

Presentations that are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

Resources

The Academic Calendars (http://www.uoguelph.ca/registrar/calendars/?index) are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.

When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. See the Undergraduate Calendar for information on regulations and procedures for Academic Consideration. (https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-consideration-appeals-petitions/)