GEOG*3480 GIS and Spatial Analysis (0.5 CR)

Fall 2020
University of Guelph (Main Campus),
Department of Geography, Environment & Geomatics CSAHS

Instructor: Dr John Lindsay
Office: Hutt Rm. 346
Email: jlindsay@uoguelph.ca
Phone: 519-824-4120 ext. 56074
Office hours: Mondays 10:30-11:20 (during the scheduled class time—see below)

Prerequisite 10.00 credits, including GEOG*2480

Overview
This course is one of two 3rd year courses (the other being GEOG*3420 Remote Sensing of the Environment) in the Geomatics stream of courses offered by Geography. 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. GEOG*3480, along with GEOG*3420 Remote Sensing of the Environment, provide the analytical background necessary for the thematic capstone course, GEOG4480 Applied Geomatics.

Course 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.

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.
- Identified key issues related to spatial data error.
Course Organization

Formally, this class has three scheduled lecture times per week, including Monday, Wednesday, and Friday 10:30 – 11:20 PM. However, given that the Fall semester will be taught remotely, due to the Covid-19 pandemic lockdown, these scheduled times will be largely used for drop-in times. Instead, lectures will be pre-recorded and available asynchronously. In addition to lectures, each student must attend one two-hour lab per week.

Text and Other Resources

The main recommended text for this class is:


Import Dates

Friday September 11 — First class
Monday October 12 — Thanksgiving holiday (no class), Oct. 13 is a study day.
Monday October 19 — Mid-term examination (in class; worth 30%)
Friday December 4 — lecture to make up for lost Thanksgiving Monday
TBA — Final examination, location to be announced (worth 30%)

Method of Evaluation

The lab material constitutes an integral part of this course, since this is where students receive hands on work with photographs, 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. Lab material will be covered on both the mid-term and final exams.

Grade Distribution

- Lab Assignments: 40% (4×10%)
- Mid Term Exam: 30%
- Final Exam: 30%

The mid-term exam will be held Monday October 19, 2020 in class time. The final exam is not cumulative and will only cover topics from the mid-term exam cutoff point.

Office Hours

If you are having difficulties with the lab, please see one of the course TAs. TA office hours are to be scheduled and will be announced upon first meeting. For any other matters, please feel free to visit me during my office hours (Stated above) or e-mail me.
Lecture Topics

- An introduction to GIS
- Data quality:
  - Accuracy and precision
  - Types of errors
  - Modifiable Areal Unit Problem (MAUP)
- Basic GIS data analysis
- GIS for decision making
- Statistical analysis of spatial data
  - Distance, areas, autocorrelation, point patterns, and directional (circular) statistics
- Spatial interpolation
- Least-cost pathway analysis and network analysis
- Terrain mapping and analysis (additional readings)
  - DEM derivatives
  - Viewsheds
  - Watersheds and other hydrological analysis
- GIS modelling and GIS programming
- Future considerations in the field

Please note individual readings to support lecture materials will be assigned at the start of each lecture and will be posted in the lecture slides. Also, the topics and topic order provided above are tentative and may change with the progression of the course. Please check with the lecture slides on the CourseLink site for a more accurate listing.

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 QGIS. By completing the labs, you will gain practical experience in using the program 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 Graduate Teaching Assistant (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 or she is doing you a favour.

All of the labs require that you submit your own work. It’s okay to learn the program 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 QGIS and a range of new skills in order 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 6 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.

**Laboratory Times**

You have been assigned to one of the three/four lab periods. All labs take place in the Hutt Building, Room 231. Your TA will be available to help you during your lab period. The computer facilities in Room 231 will be available outside these times on a first-come, first-served basis during scheduled free times. A schedule will be posted on the door of Room 231.

You must attend your assigned lab period. If you missed your assigned lab period for a valid reason, attend another session and inform the TA that you normally are in another lab (identify time and TA). You may not change your lab period without the permission of the instructor.

- 0101 Mon 07:00PM – 09:50PM Hutt 231
- 0102 Tues 07:00PM – 09:50PM Hutt 231

**Disclaimer**

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings and academic schedules. Any such changes will be announced via CourseLink and/or class email. All University-wide decisions will be posted on the COVID-19 website and circulated by email.
Illness

The University will not require verification of illness (doctor’s notes) for the fall 2020 or winter 2021 semesters.

E-mail 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.

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.

Drop Date

Courses that are one semester long must be dropped by the end of the last day of classes; two-semester courses must be dropped by the last day of classes in the second semester. The regulations and procedures for Dropping Courses are available in the Undergraduate Calendar.

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.

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 book their exams at least 7 days in advance, and not later than the 40th Class Day.

More information: www.uoguelph.ca/sas

**Academic Misconduct**

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.

Please note: 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. **An example of academic misconduct in this class would be if students shared their answers on a laboratory assignment. While students may work on their lab assignments in groups, they are expected to write their submitted reports independently.** 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.

The Academic Misconduct Policy is detailed in the Undergraduate Calendar.

**Recording of Materials**

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

**Resources**

The **Academic Calendars** are the source of information about the University of Guelph’s
procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.