GEOG*4480 Applied Geomatics (W21)

1. Introduction

GEOG*4480 (Applied Geomatics) is a full-credit (1.0CR) course focusing on the use of geographic information systems (GIS) and remote sensing to address practical problems in resource management, planning (rural, urban or regional) or any other area where a spatial approach is appropriate. In addition to GIS project design and application, students will learn about and use various GIS functions and models and will develop skills relating to data creation and manipulation, data quality assessment, and the presentation of the findings of analytical work.

2. Contact information

Course Instructor: Ben DeVries, HUTT126, bdv@uoguelph.ca

Graduate Teaching Assistants (GTAs):

- Zohreh Alijani, zalijani@uoguelph.ca
- Nigel van Niewenhuizen, vannieun@uoguelph.ca

3. Meeting times

Lectures: Mondays and Wednesdays, 2:30pm – 3:50pm

Labs:

- Section 0101: Tuesdays, 7:00pm – 8:50pm
- Section 0102: Wednesdays, 9:30am – 11:20am

4. Approach

Most of the learning in the course will take place in a hands-on manner. Students will design and carry out projects involving GIS and remote sensing datasets and spatial analysis. Live, remote sessions will be used selectively to lay the foundation for project design and problem solving and to introduce students to emerging themes in Geomatics. The core of the course is a group project. The students in a team will identify a problem, design a solution, gather the necessary data, implement their solution, and present results. Labs are used to demonstrate techniques and approaches that will support your project.

5. Learning Outcomes

At the end of the course, you should have acquired the following:

- Knowledge on a wide range of geomatics applications
- Ability to locate data sources for geomatics applications and assess data quality
- Skills on processing real-world data for a geomatics project
- Experience with project design and proposal writing
- Skills on geomatics-based problem solving
• Experience preparing professional research reports and web publishing
• Presentation skills
• Enhanced teamwork skills

6. Prerequisite

The prerequisite for this course is GEOG*3480 GIS and Spatial Analysis. The two remote sensing courses offered by the Department - GEOG*2420 and GEOG*3420 - are not required courses but are strongly recommended for any students interested in working with remote sensing data in their projects. In addition, strong computer skills and familiarity with GIS software packages (ArcGIS and/or QGIS) are essential.

7. Course Content and Evaluation

7.1 Mark Breakdown

<table>
<thead>
<tr>
<th>Item</th>
<th>Percent of Final Grade</th>
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</thead>
<tbody>
<tr>
<td>Labs (individual)</td>
<td>10%</td>
</tr>
<tr>
<td>Elements of Project Proposal (Group)</td>
<td>15%</td>
</tr>
<tr>
<td>Project Proposal, final version (Group)</td>
<td>25%</td>
</tr>
<tr>
<td>Final Report, first version (Group)</td>
<td>15%</td>
</tr>
<tr>
<td>Final Report, final version (Group)</td>
<td>30%</td>
</tr>
<tr>
<td>Participation in group project (Individual)</td>
<td>factored into final report grade</td>
</tr>
<tr>
<td>Poster presentation (Group)</td>
<td>5%</td>
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</table>

7.2 Labs

Five labs are tentatively scheduled for the course. The purpose of the labs is to familiarize you with computer setup, data preparation, GIS functions, and GIS modelling techniques that may be important for your group projects. These labs will tentatively include the following topics:

• Using model builder in ArcGIS
• Python scripting for GIS using ArcGIS and Arcpy
• Python scripting for GIS using open source libraries
• Introduction to the Google Earth Engine
• Tutorials in topic(s) of your own choice

A more detailed schedule of labs and their due dates will be published during the week of January 18th. All labs will be conducted using Azure Virtual Machines set up by the Department of Geography, Environment and Geomatics for the use of remote learning (see Section 12 for more details).

7.3 Project Proposal

The aim of the project proposal is to establish a firm foundation for the course project. The team should review literature and extensively examine data to develop a strong grasp both of
the research problem being addressed and of the role GIS and remote sensing data and methods will play in addressing the problem.

Before submitting the project proposal, project groups will submit a number of smaller deliverables, including a group contract, a 1-2 page document outlining the research problem and objectives, and a 1-2 page document outlining data sources to be used in the project. Some of these deliverables will eventually be incorporated into the project proposal. In addition, each group will be expected to set up a meeting with me and their respective GTA to discuss their research objectives after submitting them and before submitting the proposal. These deliverables will be evaluated together as outlined in Section 7.1.

7.4 Project Report, First and Final Versions

The project report will take the form of a summary of the problem, the objectives, the research approach, the findings and conclusions. The first version of the report must be complete and polished; it is not a rough draft! Based on evaluation of the first version by the TAs and myself, project groups will revise their reports and produce a final version of their reports. The report should be approximately 3,000 words, not including tables and figures. Although some lenience will be given with respect to report length, reports exceeding this limit by a large margin (e.g., 500 words or more) will result in a reduced overall grade.

7.5 Participation in Group Projects

Your individual contribution to your group projects will be evaluated through participation in regular meetings with your group, TA and myself, as well as a peer evaluation report to be completed and submitted by all group members. Since learning in the W21 will take place remotely, it is even more important that you make a conscious effort to stay in regular contact with your group members, GTA’s and myself. Groups will be asked to set up regular meeting times and keep notes during project meetings. In addition, all students will be asked to fill out a peer-evaluation report, which will include a detailed outline of what each group member contributed to the project, as well as a confidential assessment of each group member’s contribution throughout the project. I will take these peer reviews, as well as my own evaluation of ongoing participation in the group project (e.g., meeting notes, etc.) into consideration when assigning a final report grade. Failure to participate and contribute in the group project will have a significant impact on your final report grade.

7.6 Project presentation

The purpose of the presentation is to share your research findings with your colleagues and other interested members of the department/community. The presentation should be concise (approximately 10 minutes) and build on your project report. The presentations will either be held live via Zoom videoconferencing, or you will be asked to pre-record a ~10-minute video outlining your research project. Specific requirements will be announced later in the course.
7.7 Examinations
There are no mid-term or final exams in this course. The final version of the Final Report, due Friday, April 9th, is considered to be the final assessment for this course.

8. Courselink Page
This course has a Courselink page that contains data sources, GIS resources, selected copies of overheads used in lectures, information about readings, and other useful materials. You can access the page from any computer that has a web browser.

9. Office hours
Office hours for myself and the GTA’s will be announced at the beginning of the course. Office hours will be held via Zoom or Teams videoconferencing.

10. Teaching Assistants
The TAs will provide instruction during lab periods and will be your primary contact for practical advice for your projects. They will have office hours, to be posted, which will vary over the course of the semester in accordance with student workload.

11. Student Responsibilities
Attendance at scheduled class meetings and lab sessions is mandatory. Furthermore, I expect that you will be prepared to participate in class discussions. Assignments must be submitted in class or lab sessions, on time. Late assignments will be penalized at the rate of 10 percent per day, including Saturday and Sunday. Students whose assignments are late because of valid medical, psychological, or compassionate grounds will not be penalized. I do not require medical notes for any reason, but I do ask that you get in touch with me as soon as possible regarding any challenges you may be facing in the course.

12. Computing Requirements and Resources
Live lectures, workshops and lab sessions will be held either through Zoom or Microsoft Teams videoconferencing. Students will need access to a computer with a connection to the internet. Zoom and Teams software can be downloaded free of charge. Group projects will be carried out using GIS software. In previous years, most students in GEOG*4480 have chosen to use ArcGIS, given their experience with the software and the spatial data processing tools available in it. However, ArcGIS is not cross-platform (it only works on Windows machines). Since the HUTT GIS lab will not be accessible during W21, the department has set up Virtual Machines which host Windows operating systems and all the necessary software, including ArcGIS. All groups will be encouraged to make use of these Virtual Machines for data processing purposes, and their University of Guelph OneDrive accounts for data storage and sharing with group members. Lab assignments will be based on a mixture of ArcGIS and other open source libraries, all of which will also be available on the Virtual Machines.
13. Tentative Lecture Schedule

In the first half of the semester, interactive lecture sessions will be held to discuss aspects of project design, data, methods and emerging themes in geomatics. A number of guest lectures and workshops will also be held, including speakers and facilitators from Student Experience (SE), the Community Engaged Scholarship Institute (CESI) and the Data Resources Centre (DRC) at the University of Guelph. These interactive sessions are designed to help you with various aspects of your projects, including project management, identifying (geo)data sources and engaging with community partners. Attendance at all scheduled lecture and workshop session is mandatory. The following schedule of lecture topics and deliverable due dates is tentative and subject to change as the semester progresses:

<table>
<thead>
<tr>
<th>Week</th>
<th>Date (start of week)</th>
<th>Lecture / Workshop Topic(s)</th>
<th>Deliverable(s)</th>
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<tr>
<td>1</td>
<td>2021-01-11</td>
<td>Introduction to the course</td>
<td>Groups and tentative topics</td>
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<td>2</td>
<td>2021-01-18</td>
<td>Groupwork and dynamics (SE)</td>
<td>Signed group contracts</td>
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<td></td>
<td></td>
<td>Community-Engaged Scholarship (CESI)</td>
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<td></td>
<td></td>
<td>Project Proposals</td>
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<tr>
<td>3</td>
<td>2021-01-25</td>
<td>GIS data sources (DRC)</td>
<td>Research objectives (~1 pg.)</td>
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<td>Project proposals</td>
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<td>4</td>
<td>2021-02-01</td>
<td>GIS Models</td>
<td>Description of data and sources (~1 pg.)</td>
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<td>Topic TBA</td>
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<tr>
<td>5</td>
<td>2021-02-08</td>
<td>Topics TBA</td>
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<td></td>
<td>2021-02-15</td>
<td>READING WEEK</td>
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<tr>
<td>6</td>
<td>2021-02-22</td>
<td>Final Reports</td>
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<tr>
<td>7</td>
<td>2021-03-01</td>
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<tr>
<td>8</td>
<td>2021-03-08</td>
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<td>9</td>
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<tr>
<td>10</td>
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<td>Final Reports (First version)</td>
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<tr>
<td>11</td>
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<td>Poster Presentations</td>
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<td>12</td>
<td>2021-04-05</td>
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<td></td>
<td>2021-04-12</td>
<td>FINAL EXAMS START</td>
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14. Statements on University Policies

14.1 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.
14.2 Illness
The University will not require verification of illness (doctor's notes) for the fall 2020 or winter 2021 semesters.

14.3 Territorial Acknowledgements
We acknowledge that the University of Guelph resides on the ancestral lands of the Attawandaron people and more recently, 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 our respect to our Anishinaabe, Haudenosaunee and Métis neighbours as we strive to strengthen our relationships with them.

Today, this gathering place is home to many First Nations, Métis and Inuit peoples and acknowledging them reminds us of our important connection to this land where we learn and work.

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

14.5 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.

14.6 Drop Date
The last date to drop one-semester courses, without academic penalty, is Monday, April 12th. For regulations and procedures for Dropping Courses, see the Undergraduate Calendar.

14.7 Copies of out-of-class assignments
Keep reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

14.8 Accessibility
The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Student Accessibility Services (SAS) as soon as possible.
For more information, contact SAS at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website.

14.9 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. 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. An example of academic misconduct that might occur in this course is copy material from another student. This includes graphic elements of map design. Another example would be copying material for a report without properly and sufficiently citing the source of that material. If you are unsure about whether something would be considered plagiarism and/or misconduct, please contact me or your TA with questions before submitting your work.

14.10 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.

14.11 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.