GEOG*3440 GIS for Decision-Making

Fall 2022
Department of Geography, Environment and Geomatics
University of Guelph

Instructor
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Teaching Assistant
TBD

Course Objectives
1. Examine concepts behind the use of geomatics in decision-making.
2. Evaluate real-world use cases of geospatial decision-support tools.
3. Critically assess the roles maps can play in communicating science, persuading decision-makers, and provoking public dialogue.
4. Apply cartographic design principles to paper-based and online interactive maps.
5. Reflect on the ethical dimensions of mapping as a professional practice.

Description
This course trains students to use geomatics techniques as part of a decision-making process, and to critically reflect on the relationship between geospatial analysis and policy decisions in government, community, and corporate settings. Topics include: public and participatory GIS (PPGIS); webmapping and data visualization; multi-criteria analysis; scenario mapping. Students will further develop their skills in industry-standard mapping software, apply these skills in practice to issues such as habitat conservation and COVID-19, and reflect on subjects such as uncertainty that challenge spatial data-driven decision-making.
The course is organized into three sections based on MacEachren’s notion of the “cartography cube,” which provides a framework for understanding effective map-based communication. Each section involves lectures on the theory of GIS-based decision-making and hands-on lab projects:

1. **Communication**: mapping as a strategy to impart expert knowledge about a given topic. For instance, climate change communication maps showing where sea level rise will occur; web-based versions of these maps may even allow users to assess sea level rise in relation to specific places of interest like their homes.

2. **Engagement**: mapping as a strategy to engage diverse publics in their knowledge about a given topic and/or their opinions about decisions. For instance, “geoweb” maps can help planners enlist local residents in climate change adaptation efforts, asking what places they would like to see protected.

3. **Exploration**: mapping as a strategy to explore different scenarios and optimize outcomes. For instance, conservation organizations have developed maps to help decision-makers prioritize adaptation projects in one location against another, based on economic and/or environmental criteria.

Throughout, the course prompts students to reflect on the ethical dimensions of mapping as a professional practice – who gets to map, what, and for whom?

**Organization**

TBD

**Materials**

There is no required textbook for this course. However, there are assigned readings, which will be made available through Courselink.

**Evaluation**

Evaluation in this course is based on a set of 5 lab assignments, each of which is equally weighted in terms of your final grade (20%). Each is structured as follows:

- Tutorial (5%)
- Map (10%)
- Reflections (5%)

**How to do well in this course**

- Come to the lectures and lab and be present
- Do the readings in advance of the lectures
- Work through technical problems, with the help of fellow students, your TA, your prof, and online forums
- Ask questions when you’re feeling stuck!

Weekly Schedule

It is strongly recommended that you come to lecture and lab having already completed the week’s assigned reading(s).

<table>
<thead>
<tr>
<th>Week of...</th>
<th>#</th>
<th>Topic</th>
<th>Reading</th>
<th>Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sep 12</td>
<td>1</td>
<td>How maps work</td>
<td>MacEachren</td>
<td>Getting set-up</td>
</tr>
<tr>
<td>Sep 19</td>
<td>2</td>
<td>Map-based communication</td>
<td>Fish</td>
<td>Story Map tutorial</td>
</tr>
<tr>
<td>Sep 26</td>
<td>3</td>
<td>Webmapping (presentation)</td>
<td>Neset et al.</td>
<td>Create Story Map</td>
</tr>
<tr>
<td>Oct 3</td>
<td>4</td>
<td>Public and participatory GIS</td>
<td>Sieber et al.</td>
<td>Story Map debrief</td>
</tr>
<tr>
<td>Oct 10</td>
<td>5</td>
<td>User-centered design</td>
<td>Haklay</td>
<td>PPGIS tutorial</td>
</tr>
<tr>
<td>Oct 17</td>
<td>6</td>
<td>Webmapping (engagement)</td>
<td>Fast and Rinner</td>
<td>Census map</td>
</tr>
<tr>
<td>Oct 24</td>
<td>7</td>
<td>How does decision-making happen?</td>
<td>Cash et al.</td>
<td>PPGIS proposal</td>
</tr>
<tr>
<td>Oct 31</td>
<td>8</td>
<td>Multi-criteria analysis</td>
<td>Kostelnick et al.</td>
<td>MCA tutorial</td>
</tr>
<tr>
<td>Nov 7</td>
<td>9</td>
<td>Webmapping (exploration)</td>
<td>TBD</td>
<td>MCA map</td>
</tr>
<tr>
<td>Nov 14</td>
<td>10</td>
<td>Uncertainty and scenarios</td>
<td>Roth</td>
<td>MCA decision</td>
</tr>
<tr>
<td>Nov 21</td>
<td>11</td>
<td>Web spatial databases</td>
<td>TBD</td>
<td>Create Dashboard</td>
</tr>
<tr>
<td>Nov 28</td>
<td>12</td>
<td>Course review</td>
<td>TBD</td>
<td>Dashboard</td>
</tr>
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<td>TBD</td>
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<td>Take-home lab</td>
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Assignments

Lab #1: Story Mapping

- Due week 2
  - Tutorial: complete the assigned Esri tutorials
- Due week 3
  - Map: create a story map using COVID-19 data and share it with our class group on ArcGIS Online. Define your intended audience (apart from classmates).
- Due week 4
  - Reflections:
    - Evaluate your own map – what do you see as the opportunities and challenges in using a story map to present your findings to your intended audience?
- Evaluate one classmate’s map – what does it communicate? Does it do so effectively in terms of the intended audience?

**Lab #2: Planning Public and Participatory GIS**
- Due week 5
  - Tutorial: complete the assigned Esri tutorial (one of the following, TBD)
    - https://www.esri.com/training/catalog/60f730512a91fd21920df4bd/capture-emotions-and-the-urban-environment/
- Due week 6
  - Map: create a map based on Census data that would be useful for a Guelph non-profit organization. The map should support and be enhanced by community-based data sources (e.g. a survey, volunteered geographic information, etc.)
- Due week 7
  - Reflections:
    - Develop a proposal, based on your preliminary mapping, that outlines the nature of your intended engagement with the community organization (their needs, knowledge, and data; your skills) and suggests how it would be used and maintained.

**Lab #3: Multi-Criteria Analysis**
- Due week 8
  - Tutorial: complete the assigned Esri tutorial (TBD)
- Due week 9
  - Map: create a multi-criteria analysis of possible Greenbelt expansion areas using ArcGIS Pro’s Suitability Modeler. Share your analysis with our class on ArcGIS Online.
- Due week 10
  - Reflections:
    - Review a classmate’s analysis. Imagine you are the decision-maker on the receiving end of the analysis. Where would you expand the Greenbelt? How would you make your decision? What additional information would you want?

**Lab #4: Exploration through Map-Based Data Dashboards**
- Due week 11
  - Tutorial: complete the assigned Esri tutorial(s) (TBD)
• Due week 11
  o Map: create a dashboard version of the multi-criteria analysis you performed in Lab 3. Include interactive elements to address uncertainty (e.g. scenarios, weights).
• Due week 12
  o Reflections:
    ▪ Review a classmate’s dashboard. Imagine you are the decision-maker using the dashboard. Reflect on the quality of information you’ve been provided. How would you incorporate the scenarios or weights into your decision-making? Where would you expand the Greenbelt?

Lab #5: Take-home Final Lab
• Due during finals (TBD). Pick any one of the tools we’ve explored (Story Map, Survey 123, Suitability Modeler, Dashboard) and create a project around it with new data. Justify your approach in light of the cartography cube framework.

The laboratory material constitutes an integral part of this course and attendance at the lab session each week is mandatory.

Late assignments will only be accepted without penalty with prior approval of the instructor. Otherwise, there will be a penalty of 10% of the assignment’s value per day (including weekend days) for late assignments. Lost files are not a valid reason for handing in a late assignment.
A brief Q&A

Q: I have a question, who should I contact and how?
A: We’ve put together this flow chart to help you navigate who you should reach out to.

We will respond to your requests and questions as soon as we can. Please do not count on an immediate response, especially for important last-minute questions regarding assignments.

Q: I have to miss lecture or an exam/lab for a family/personal/medical emergency. What should I do?
A: As soon as possible, get in touch – please use the extension request form on Courselink. Lectures will be recorded and made available through Courselink.

Q: I’m not happy about my exam or lab grade. Will you change it?
A: Please wait at least 24 hours / over the weekend. Sit on it and think about what exactly the problem is. Then, email your TA. For regrades, we reserve the right to either increase OR decrease your grade depending on what we find in regrading.

Q: I’m confused about the material—what should I do?
A: First off, don’t feel embarrassed—few scholars, whether undergraduates or tenured professors - understand everything completely the first time! Please bring your questions to class and/or lab! If you are confused, it’s likely that your classmates are, too. If you bring me questions, it helps me evaluate how best to help you learn the material. If you are still confused, please come to my office hours. I am glad to help!
What you can expect from me

- To help you not only understand but get excited about the material, learning as much as possible about mapping! We're all coming from different perspectives and starting points, meaning that it is everyone's responsibility, but especially mine, to work to provide a respectful and engaging learning environment. I'm here to work with you from where you are and build up your understanding of the course content.
- To provide prompt feedback on assignments.
- To give you a sense of the flow of the semester – when the assignment load will be heavier, so that you can prepare appropriately.
- To assist in developing your critical analysis and communication skills, through our assignments. These are skills that will be useful to you in both your chosen profession and as a citizen.
- To advise you on future coursework, jobs, grad school, and/or volunteering opportunities.

What I expect of you

- To treat each other with respect. Our virtual classroom is a safe space for all students, regardless of sex, gender, race, ethnicity, religion, age, sexual orientation, nationality, ability or disability. Every person is welcome here.
- To communicate with me about what you expect from the course, what you need, and your challenges.
- To put your best possible effort into this class.
University of Guelph Policy Statements

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 make a booking at least 7 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time.

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. 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.

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).

For information on current safety protocols, follow these links: [https://news.uoguelph.ca/return-to-campuses/how-u-of-g-is-preparing-for-your-safe-return/](https://news.uoguelph.ca/return-to-campuses/how-u-of-g-is-preparing-for-your-safe-return/) [https://news.uoguelph.ca/return-to-campuses/spaces/#ClassroomSpaces](https://news.uoguelph.ca/return-to-campuses/spaces/#ClassroomSpaces)

Please note, these guidelines may be updated as required in response to evolving University, Public Health or government directives.

Disclaimer
Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via CourseLink and/or class email. This includes on-campus scheduling during the semester, mid-terms and final examination schedules. All University-wide decisions will be posted on the COVID-19 website ([https://news.uoguelph.ca/2019-novel-coronavirus-information/](https://news.uoguelph.ca/2019-novel-coronavirus-information/)) and circulated by email.