

## Geography 187: Problem Solving in Geomatics

Fall 2017

**Instructor:** Dr. Peter Johnson, Department of Geography and Environmental Management,

**Meeting Time:** Wednesday 1:30pm - 3:20pm, Physics, room 235

**Lab Times:** Lab 101 – Monday 9:30am-11:20am EV2 1002A.  
Lab 102 – Monday 3:30pm – 5:20pm EV2 1002A.  
Lab 103 – Friday 1:30pm – 3:20pm EV2 1002A.  
Lab 104 – Tuesday 12:30pm – 2:20pm EV2 1002A.

**Office Hours:** Thursday 12:30pm to 2:30pm, EV1-236  
If you need to schedule an appointment outside of these hours, please contact me.

**E-mail:** peter.johnson@uwaterloo.ca  
From Monday to Friday, I make every effort to answer emails within 24hrs. Email sent on the weekend will normally be answered on the following Monday. Please note that I only discuss grading issues during office hours.

Teaching Assistants  
TBA

### Course Description:

A specialized introduction to fundamental concepts and emerging trends in Geomatics and Geographic Information Science. Focus on methods and techniques of spatial data capture, management, and analysis. Introduction to programming as applied to GIS.

Restriction: Honours Geomatics program only

### Student Learning Outcomes:

- 1) To devise a comprehensive work plan implementing an appropriate analytic approach and methodology to solve a given geospatial problem.
- 2) To create high quality primary geospatial data, directly related to a given geospatial problem.
- 3) To analyze geospatial data to create professional-level output that demonstrates an understanding of key cartographic fundamentals.
- 4) Critically assess the use of geospatial tools and data as applied to answering a geospatial problem

### Student Evaluation:

7 Assignments	50%
Tests (2 @ 25% each)	50%

### Administrative:

#### Deadlines

Assignments are due on the date specified at the top of the assignment handout.

**Unclaimed assignments:** Unclaimed assignments will be retained for one term after the course is finished. After that time, they will be destroyed in compliance with UW's confidential shredding procedures.

**Religious Observances:** Student needs to inform the instructor at the beginning of term if special accommodation needs to be made for religious observances that are not otherwise accounted for in the scheduling of classes and assignments.

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**LEARN:** Users can login to LEARN via:<http://learn.uwaterloo.ca/> use your WatiAM/Quest username and password. LEARN is an essential component of this course, so please be sure to login for course updates and information.

**Textbook:** For this class, we are using Krygier & Wood "Making Maps" 3<sup>rd</sup> edition.

<http://www.guilford.com/books/Making-Maps/Krygier-Wood/9781462509980>

This text is available at the campus bookstore, through popular online booksellers, and online for FREE via the UW library.

Lecture and Lab Schedule (This is just a draft, subject to changes)

Week#, Class date	Lecture Topic(s)	Lab Activities	Reading Materials
1 – Sept 13	<p><b>L01- Welcome to Geomatics at Waterloo</b></p> <ul style="list-style-type: none"> <li>- What is a geospatial problem?</li> <li>- What are the tools/approaches provided by Geomatics technology to address geospatial problems?</li> </ul> <p><b>Course overview and administration</b></p> <ul style="list-style-type: none"> <li>- Course structure, assignments, lab scheduling</li> <li>- Introduction to the textbook</li> <li>- Facilities access and procedures</li> <li>- Course expectations</li> <li>- How to succeed in the class – study skills, etc.</li> </ul>	No labs week #1	Prologue – pages 1-17. Chapter 1 Chapter 2
2 – Sept 20	<p><b>L02 - Maps, Mapping, and Cartography</b></p> <ul style="list-style-type: none"> <li>- Maps as statements</li> <li>- Cartographic principles, cartographic abstraction</li> <li>- What makes a good map? Map design</li> <li>- Terminology and approaches to evaluating maps</li> </ul>	<p><b>Assignment #1</b></p> <p>Mental Maps 4%</p>	Chapter 6 Chapter 7 Chapter 3
3 – Sept 27	<p><b>L03 - Making Maps</b></p> <ul style="list-style-type: none"> <li>- Map design</li> <li>- Map components</li> <li>- Map symbols</li> <li>- Colour on maps</li> </ul>	<p><b>Assignment #2:</b></p> <p>Map Assessment and Critique 5%</p> <p><b>Assignment #1</b> <b>Due in your lab</b></p>	Chapter 9 Chapter 10 Chapter 11 Chapter 12
4 – Oct 4	<p><b>L04 - Measuring and representing geographic phenomena</b></p> <ul style="list-style-type: none"> <li>- The shape of the earth</li> <li>- Coordinate systems</li> <li>- Map projections</li> </ul>	<p><b>Assignment #3:</b></p> <p>Fulcrum Data Collection 5%</p> <p>Using ArcGIS tutorial 2%</p> <p><b>Assignment #2</b> <b>Due in your lab</b></p>	Chapter 5

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<p>5 – Oct 13 NOTE – this is a Friday. This is a make-up day for Fall Reading week. Class will be held as normal</p>	<p><b>L05 - Mapping Data Spatially</b> - Types of maps (choropleth, point, isoline) - Data classification and symbolization</p>	<p><b>Assignment #4:</b> Scale, projections and creating point symbol maps. 8%</p> <p><b>Assignment #3</b> <b>Due in your lab</b></p>	<p>Chapter 8</p>
<p>6- Oct 18</p>	<p><b>Test #1 (25%)</b></p>	<p><b>Work on Assignment #4</b></p>	
<p>7 – Oct 25</p>	<p><b>L06 - Vector Data Model</b> - Points lines and polygons: what is vector data - Scale and representation of features - Topology</p> <p><b>Relational Data Base</b> - Querying and relationships between data</p> <p><b>Raster Data Model</b> - Resolution and Scale - Sensor platforms</p>	<p><b>Assignment #4</b> <b>Due in your lab</b></p> <p><b>Assignment #5:</b> Choropleth mapping 8%</p>	<p>Chapter 4</p>
<p>8 – Nov 1</p>	<p><b>L07 - Spatial Analysis</b> - Buffer analysis and overlay - Clustering</p> <p><b>Error and Accuracy</b> - Measuring and communicating error</p>	<p><b>Work on Assignment #5</b></p>	
<p>9 – Nov 8</p>	<p><b>Sources of Spatial Data</b></p> <p><b>Geospatial Centre Presentation</b></p> <p><b>L08 - Sharing Maps</b> - Web maps and the Geoweb</p>	<p><b>Assignment #6:</b> Spatial Analysis 8%</p> <p><b>Assignment #5</b> <b>Due in your lab</b></p>	
<p>10 – Nov 15</p>	<p><b>L09 - Critical GIS reflection on the use of GIS tools</b> - Professional and scholarly practice - Ethics, critical cartography, and Public Participation GIS</p>	<p><b>Assignment #7:</b> Web Mapping 10%</p> <p><b>Assignment #6</b> <b>Due in your lab</b></p>	
<p>11 – Nov 22</p>	<p><b>Semester Summary</b> - Overview and recap of main themes of the course - Next steps for Geomatics instruction - Geomatics as a career - Course evaluation</p>	<p><b>Assignment #7</b> <b>Due in your lab</b></p>	

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12 – Nov 29	Test #2 (25%)		
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## \*\*\*EXTREMELY IMPORTANT INFORMATION\*\*\*PLEASE READ THIS\*\*\*

**Accommodations and Access:** I want this class to be open and accessible to everyone, and to be a safe, welcoming, and collegial environment. So, please feel free to sit where you like, eat snacks, use a laptop, and come and go from the classroom when you need to, so long as none of these activities disturb the learning experience of other students. I recognize that classroom learning can be challenging, and I will try and reduce barriers to access in general and also work to meet any specific accommodation needs you may have. You can approach me directly, after class, in my office hours, or via email to discuss any accommodation. Some specific accommodations, such as note taking, extended test writing times, learning technology support, and other can be arranged at the AccessAbility office (located in Needles Hall, Room 1401, (<https://uwaterloo.ca/disability-services/>)). Please register with this office at the beginning of each academic term.

**Mental Health:** Pretty much every student has or will face some type of mental health challenge in their time at university. There are many types of physical and emotional challenges that can make it difficult to do your best work and enjoy your studies. **You are not alone, and help is available from many different places.** If you need help, go immediately to the place you feel most comfortable; your residence don, your friends, your professors (including me!), or to Counselling Services <http://www.uwaterloo.ca/counselling-services>, located on the 2<sup>nd</sup> floor of the new Needles Hall expansion. Counselling Services is an inclusive, non-judgmental, and confidential space for anyone to seek support. They offer confidential counselling for a variety of areas including anxiety, stress management, depression, grief, substance use, sexuality, relationship issues, and much more. Above all, seek help – these are challenges that you do not need to face alone.

## Academic Integrity Policies

**Academic Integrity:** In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. [Check [www.uwaterloo.ca/academicintegrity/](http://www.uwaterloo.ca/academicintegrity/).]

**Grievance:** A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4, [www.adm.uwaterloo.ca/infosec/Policies/policy70.htm](http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm). When in doubt please be certain to contact the department's administrative assistant who will provide further assistance.

**Discipline:** A student is expected to know what constitutes academic integrity [check [www.uwaterloo.ca/academicintegrity/](http://www.uwaterloo.ca/academicintegrity/)] to avoid committing an academic offence, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate Associate Dean. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline, [www.adm.uwaterloo.ca/infosec/Policies/policy71.htm](http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm). For typical penalties check Guidelines for the Assessment of Penalties, [www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm](http://www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm).

Within ENV, those committing academic offences (e.g. cheating, plagiarism) will be placed on disciplinary probation and will be subject to penalties which may include a grade of 0 on affected course elements, 0 on the course, suspension, and expulsion.

**Appeals:** A decision made or penalty imposed under Policy 70 (Student Petitions and Grievances) (other than a petition) or Policy 71 (Student Discipline) may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72 (Student Appeals) [www.adm.uwaterloo.ca/infosec/Policies/policy72.htm](http://www.adm.uwaterloo.ca/infosec/Policies/policy72.htm).

**What does a grade mean?** Students come to the University of Waterloo from a variety of backgrounds, where numeric grades may not be used, or have very different meanings. The following table gives a general definition for what type of work constitutes

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a particular grade. Please note that very good quality work typically merits a grade of between 70-79, with grades of over 80 being reserved for truly exceptional work.

Assigned Grades	Description
80-100	Grades in this category signal a sign of excellence and are not something that should be expected for work that simply meets the requirements of the assignment. In this category, a student has demonstrated a full understanding of the subject matter, has capacity to analyze, has demonstrated critical thinking, shows evidence of creative thinking, familiarity with literature and previous work in area, highly developed communication and presentation skills. The work is of outstanding quality according to the criteria established for evaluation.
70-79	Student has shown good comprehension of subject matter, evidence of critical and creative thought, familiarity with literature and previous work in subject area, competence in communication and presentation skills, but none of the above to the degree found in A category. The work is of very good quality according to evaluation criteria
60-69	Student has demonstrated some understanding of subject matter, can assimilate and communicate basic aspects of the subject matter. The work is of satisfactory or adequate quality according to evaluation criteria
50-59	Student has demonstrated minimal understanding of the subject matter, poorly developed communication skills, inability to apply subject matter understanding in other contexts, little evidence of critical or creative thinking. The work is of unsatisfactory but passable quality according to evaluation criteria.
0-49	Inadequate understanding of subject matter, failed to complete course requirements, no demonstration of critical thought, communication skills very poor. The work is clearly of unacceptable quality according to the evaluation criteria.