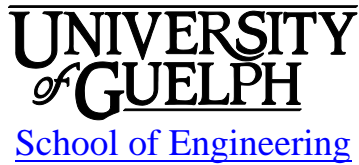


# ENGG\*3340 GIS in Environmental Engineering

## Fall 2014



(Revision 0: August 26, 2014)

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## 1 INSTRUCTIONAL SUPPORT

### 1.1 Instructor

Instructor: Jana Levison, PhD, EIT  
Office: RICH 3505, ext. 58327  
Email: [jlevison@uoguelph.ca](mailto:jlevison@uoguelph.ca)  
Office hours: By appointment

### 1.2 Lab Technician

N/A

### 1.3 Teaching Assistant

<u>GTA</u>	<u>Email</u>	<u>Office Hours</u>
Shoaib Saleem	<a href="mailto:saleems@uoguelph.ca">saleems@uoguelph.ca</a>	TBA on CourseLink

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## 2 LEARNING RESOURCES

### 2.1 Course Website

Course material, news, announcements, and grades will be regularly posted to the ENGG\*3340 CourseLink site. You are responsible for checking the site regularly.

### 2.2 Required Resources

M. Price. *Mastering ArcGIS 6th Edition*, McGraw Hill, 2014. [FYI: The 5th edition that was used previously is **no longer suitable** for the new version of the software we use in class.]

## 2.3 Recommended Resources

N/A

## 2.4 Additional Resources

**Lecture Information:** The lecture slides will be posted on CourseLink each week.

**In-class Tutorial Exercises:** Specific tutorial exercises (unmarked) based on the course textbook will be assigned most weeks. Further instructions on finding the required geospatial data will be discussed in class.

**In-class Test:** The format of the test will be discussed during a lecture prior to the test.

**Term Project:** The instructions and marking scheme for each portion of the term project (i.e., proposal, methods, final report, final presentation, and peer/self-evaluation) will be available on CourseLink. Samples of past reports and presentations will also be posted (for inspiration, not duplication!)

**Exams:** The format of the final exam will be discussed during a lecture in November.

**Miscellaneous Information:** The Data Resource Centre provides geospatial data and GIS support for UofG students: <http://www.lib.uoguelph.ca/about/about-our-teams/learning-curriculum-support/data-resource-centre-drc>

## 2.5 Communication and Email Policy

Please use lectures and lab help sessions as your main opportunity to ask questions about the course. Major announcements will be posted to the course website (CourseLink). **It is your responsibility to check the course website regularly.** As per university regulations, all students are required to check their <[mail.uoguelph.ca](mailto:mail.uoguelph.ca)> e-mail account regularly: e-mail is the official route of communication between the University and its student.

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# 3 ASSESSMENT

## 3.1 Dates and Distribution

**Tutorial Exercises:** unmarked

Tutorial exercises will be assigned most weeks in class. It is essential to stay up to date with these exercises to learn the course material and software in order to complete your term project and be successful on the in-class test and final exam.

**In-class Test:** 10% total

There will be test held during the lecture period on November 13. This will be a “hands-on” test conducted using ArcGIS software, to test your knowledge of GIS theory as well as your ability to use the software. More information will be provided in class prior to the test.

**Term Project: 55%** total (completed in groups of 4 or 5)

***Group Formation:*** Term project groups of 4 or 5 students must be formed before **Monday, September 15 at 4 pm**. The student names must be included in a memo addressed to the GTA. One student in each group to upload the memo to Dropbox on CourseLink. Following this the GTA will randomly assign group numbers.

***Project Proposal:*** Due on **Friday, October 3 at 4 pm**. One student in each group to upload the document to Dropbox on CourseLink. See further instructions on CourseLink and in class. **(10%)**

***Methods Summary:*** Due on **Monday, October 27 at 4 pm**. One student in each group to upload the document to Dropbox on CourseLink. See further instructions on CourseLink and in class. **(5%)**

***Final Presentation:*** Electronic copy of presentation due on **Wednesday, November 19 at 4 pm**. One student in each group to upload slides (i.e., PowerPoint file) to Dropbox on CourseLink. In class presentations: groups 1, 2, 3, 4 on **Thursday, November 20**; groups 5, 6, 7, 8 on **Tuesday, November 25**; and groups 9, 10, 11, 12 on **Thursday, November 27**. See further instructions on CourseLink and in class. **(10%)** [The uploaded presentation is the version that you will present!]

***Final Report:*** Due on **Monday, November 24 at 4 pm**. Both paper and electronic copies are required. One student in each group to: 1) upload full report to Dropbox on CourseLink; and 2) submit to the instructor (in Richards 3505) a hard copy of the report and all associated electronic files (including ArcMap files and data) on a DVD or USB flash drive. See further instructions on CourseLink and in class. **(25%)**

***Peer/Self-Evaluation:*** Due on **Friday, November 28 at 4 pm**. Each student to upload their individual, confidential evaluation to Dropbox on CourseLink. See further instructions on CourseLink and in class. **(5%)**

**Final Exam: 35%**

**Monday, December 1, 2:30 pm to 4:30 pm**, Room TBA on WebAdvisor

### **3.2 Course Grading Policies**

**Missed Assessments:** If you are unable to meet an in-course requirement due to medical, psychological, or compassionate reasons, please email the course instructor. See the undergraduate calendar for information on regulations and procedures for Academic Consideration:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

**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 undergraduate calendar for information on regulations and procedures for Academic Accommodation of Religious Obligations:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-accomrelig.shtml>

**Passing Grade:** In order to pass the course, you must pass the final exam. Students must obtain a grade of 50% or higher on the final exam in order for the term project and in-class test to count towards the final grade.

**Late Submissions:** Late submissions will be penalized by 20% per day past the deadline.

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## 4 AIMS, OBJECTIVES & GRADUATE ATTRIBUTES

### 4.1 Calendar Description

Geographical information system structure and functions. Data structuring and application program development. Data input, display and analysis. Applications in environmental engineering and natural resource development/management. Students will be able to use a GIS software package to build geographical information systems.

*Prerequisite(s)*: (CIS\*1500 or CIS\*1600), (1 of MATH\*1000, MATH\*1080, MATH\*1200)

*Corequisite(s)*: none

### 4.2 Course Aims

This course provides basic-level knowledge of Geographic Information System (GIS) principles, techniques and practice in environmental and water resources engineering and natural resources management. In this course students will learn about data sources, visualization, query, analysis, and integration using “ESRI ArcGIS 10.2.1” which is a popular desktop GIS and mapping software.

### 4.3 Learning Objectives

At the successful completion of this course, the student will have demonstrated the ability to:

1. Understand basic GIS terminology, structure and functions including data structuring and application program development.
2. Appropriately find, select and apply data, perform analyses and produce a final map or data-based product.
3. Apply and use GIS as a tool to facilitate and enhance a variety of environmental and water resources engineering as well as natural resource management projects.
4. Use a commercial GIS software package to build geographic information systems.
5. Communicate effectively in both written and verbal format the results of a GIS-based project.

### 4.4 Graduate Attributes

Successfully completing this course will contribute to the following CEAB Graduate Attributes:

<b>Graduate Attribute</b>	<b>Learning Objectives</b>	<b>Assessment</b>
1. Knowledge Base for Engineering	1, 2, 3, 4	Term project, Exam
2. Problem Analysis	2, 3	Term project, Exam
3. Investigation	2, 3, 4, 5	Term project, Test
4. Design	2, 3, 4, 5	Term project
5. Use of Engineering Tools	1, 2, 4	Term project, Test
6. Communication	5	Term project, Exam
7. Individual and Teamwork	2, 3	Term project

8. Professionalism	-	-
9. Impact of Engineering on Society and the Environment	3	Term project
10. Ethics and Equity	-	-
11. Environment, Society, Business, & Project Management	3	Term Project
12. Life-Long Learning	3	Term Project

#### 4.5 Instructor’s Role and Responsibility to Students

The instructor’s role is to develop and deliver course material in ways that facilitate learning for a variety of students. Slides will be made available to students on CourseLink but these are not intended to be stand-alone course notes. During lectures, the instructor will expand upon and explain the content. Students should be prepared to take supplemental notes. Scheduled classes will be the principal venue to provide information and feedback for the practical tutorial exercises, test, term project and final exam.

#### 4.6 Students’ Learning Responsibilities

Students are expected to take advantage of the learning opportunities provided during class time. Classes will generally comprise lectures on various topics and practical tutorial exercises based on textbook content. Since hands-on practice is of great importance in learning GIS skills, and specific software is required, regular attendance is emphasized. Students, especially those having difficulty with the course content, should also make use of other resources recommended by the instructor. Students who do (or may) fall behind due to illness, work, or extra-curricular activities are advised to keep the instructor informed. This will allow the instructor to recommend extra resources in a timely manner and/or provide consideration if appropriate. Each student is responsible to contribute fully to their group term project.

#### 4.7 Relationships with other Courses & Labs

##### Previous Courses:

**CIS\*1500/1600:** Basic computing, coding and data organization.

**MATH\*1000/1080/1200:** Unit conversion, trigonometry and math skills.

##### Follow-on Courses:

**ENGG\*4130/4150:** GIS is not a prerequisite for this course, but interested students can use GIS as a tool for environmental/water resources design projects where geospatial analysis and/or mapping is required.

## 5 TEACHING AND LEARNING ACTIVITIES

### 5.1 Timetable

#### Lectures:

Tuesday                      16:00 – 17:20      THRN 2313

Thursday 16:00 – 17:20 THRN 2313

**Tutorials:**

N/A

**Laboratory:**

N/A

Please note that there will time during some lectures to work on the tutorial exercises.

## 5.2 Lecture Schedule

<b>Lectures</b>	<b>Topics</b>	<b>References</b>	<b>Learning Objectives</b>
1	Introduction to GIS	Intro. and Chapter 1	1
2-3	Term project introduction; Mapping and presenting GIS data	Chapters 2, 3	1, 2
4-5	Attribute data	Chapter 4	1, 2
6-7	Data resources; Term project work period	Data Resource Centre	1, 2, 3
8-9	Coordinate systems	Chapter 11	1, 2
10-11	Map overlay and geoprocessing	Chapter 7	1, 2, 3
12	Queries and spatial joins	Chapters 5, 6	1, 2, 3
13-14	ArcGIS Spatial Analyst	Chapter 8	1, 2, 3, 4
15-16	Guest lecturer from industry; ArcGIS 3D Analyst	Lecture slides	1, 2, 3, 4
17-18	Network analysis	Chapter 9	1, 2, 3, 4
19-20	Editing; In-class test	Chapter 12	1, 2, 3, 4
21	Term project work period	all	1, 2, 3, 4
22-24	GIS applications: term project presentations	all	1, 2, 3, 4, 5

## 5.3 Lab Schedule

N/A

## 5.4 Other Important Dates

Thursday, September 4, 2014: First class

Monday, October 13, 2014: Thanksgiving holiday

Tuesday, October 14, 2014: Fall study break day (no class)

Friday, October 31, 2014: drop date – 40th class

Thursday, November 27, 2014: classes rescheduled from Tuesday, October 14 (Tues. schedule in effect)

Friday, November 28, 2014: classes rescheduled from Monday, October 13 (Mon. schedule in effect)

Please refer to the undergraduate calendar for the semester scheduled dates.

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## 6 SAFETY

Safety is critically important to the School and is the responsibility of all members of the School: faculty, staff and students. As a student in a lab course you are responsible for taking all reasonable safety precautions and following the lab safety rules specific to the lab you are working in. In addition, you are responsible for reporting all safety issues to the laboratory supervisor, GTA or faculty responsible.

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## 7 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.

### 7.1 Resources

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

A tutorial on Academic Misconduct produced by the Learning Commons can be found at:

<http://www.academicintegrity.uoguelph.ca/>

Please also review the section on Academic Misconduct in your [Engineering Program Guide](#).

The School of Engineering has adopted a Code of Ethics that can be found at:

<http://www.uoguelph.ca/engineering/undergrad-counselling-ethics>

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## 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 for a short-term disability should contact the Centre for Students with Disabilities as soon as possible

For more information, contact CSD at [519-824-4120 ext. 56208](tel:519-824-4120) or email [csd@uoguelph.ca](mailto:csd@uoguelph.ca) or see the website: <http://www.csd.uoguelph.ca/csd/>

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## 9 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, classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

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## 10 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:  
<http://www.uoguelph.ca/registrar/calendars/index.cfm?index>