ENGG*3340 Geographic Information Systems in Environmental Engineering

Fall 2019
Section(s): C01

School of Engineering
Credit Weight: 0.50
Version 1.00 - September 04, 2019

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1 Course Details

1.1 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.

Pre-Requisites: (CIS*1500 or CIS*1600), (1 of MATH*1000, MATH*1080, MATH*1200)

1.2 Course Description

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 10.4x” which is a popular desktop GIS and mapping software.

1.3 Timetable

Lectures:

Monday 8:30 AM – 9:50 PM THRN 1319

Tutorials:

Wednesday 8:30 AM – 9:50 PM THRN 1319

Laboratory:

N/A

Please note that Monday's will be predominantly lecturing and Wednesday's will be practicing hands-on tutorials to master ArcGIS software.

1.4 Final Exam

December 7, 2019. Time: 8:30 am to 10:30 am, Room TBA on WebAdvisor

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2 Instructional Support

2.1 Instructional Support Team

Instructor:	Prasad Daggupati Assistant Professor, Water Resource Engineering
Email:	pdaggupa@uoguelph.ca
Telephone:	+1-519-824-4120 x58303
Office:	RICH 3523
Office Hours:	Friday 10:30 AM to 12:30 PM and by appointment

2.2 Teaching Assistants

Teaching Assistant:	Nabil Allataifeh
Email:	nallatai@uoguelph.ca
Office Hours:	TBA

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3 Learning Resources

3.1 Required Resources

Course Website (Website)
http://courselink.uoguelph.ca
Course material, news, announcements, and grades will be regularly posted to the ENGG*3340 CourseLink site. You are responsible for checking the site regularly.

Mastering ArcGIS (Textbook)
Authors: Maribeth Price

Publisher: McGraw-Hill Higher Education

Year: 2018

Edition: 8th edition

ISBN - 13: 9781259929656

3.2 Recommended Resources

http://www.paulbolstad.net/gisbook.html (Website)
http://www.paulbolstad.net/gisbook.html

3.3 Additional Resources

Lecture Information (Notes)
The lecture slides will be posted on CourseLink each week.

In-class Tutorials (Notes)
Tutorials from the course textbook will be assigned most weeks. Further instructions on finding the required geospatial data will be discussed in class.

Term Project (Notes)
The instructions and marking scheme for each portion of the term project (i.e., proposal, methods, final report, and final presentation) will be available on CourseLink.

Exams (Notes)
The format of the midterm and final exam will be discussed during a lecture prior to test.

Miscellaneous Information (Other)
The Data Resource Centre provides geospatial data and GIS support for U of G students: http://www.lib.uoguelph.ca/get-assistance/maps-gis-data/gis-analysis

3.4 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 <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its student.

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4 Learning Outcomes

4.1 Course Learning Outcomes

By the end of this course, you should be able 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.

4.2 Engineers Canada - Graduate Attributes (2018)

Successfully completing this course will contribute to the following:

#	Outcome	Learning Outcome
1	Knowledge Base	1, 2, 3
1.4	Recall, describe and apply program-specific engineering principles and concepts	1, 2, 3
2	Problem Analysis	2
2.3	Construct a conceptual framework and select an appropriate solution approach	2
3	Investigation	2, 3, 5
3.2	Design and apply an experimental plan/investigative approach (for example, to characterize, test or troubleshoot a system)	2, 3, 5
4	Design	2, 3, 5
4.1	Describe design process used to develop design solution	2, 3, 5
4.5	Develop and refine an engineering design solution, through techniques such as iteration, simulation and/or prototyping	2, 3, 5
5	Use of Engineering Tools	1, 2, 3, 4
5.2	Demonstrate proficiency in the application of selected engineering tools	1, 2, 3, 4
7	Communication Skills	3, 5
7.2	Interpret technical documentation such as device specification sheets, drawings, diagrams, flowcharts, and pseudocode	3
7.3	Construct the finished elements using accepted norms in English, graphical standards, and engineering conventions, as appropriate for the message and audience	5

#	Outcome	Learning Outcome
7.5	Demonstrate ability to process oral and written communication by following instructions, actively listening, incorporating feedback, and formulating meaningful questions	3
12	Life Long Learning	3
12.3	Demonstrate capability for continuous knowledge and skill development in a changing world	3

5 Teaching and Learning Activities

5.1 Lecture

Topics:	Lectures	Topics	References
	9-Sep	Introduction to class; Term project introduction; Introduction to Geographic Information System	--
	11-Sep	COMP. LAB 1: Introduction to ArcGIS and GIS Data	Chapters 1
	16-Sep	GIS Data and Managing GIS data	Chapter 1,2
	18-Sep	COMP. LAB 2: GIS Data and Managing GIS Data Systems	Chapter 1,2
	23-Sep	Coordinate System	Chapter 3
	25-Sep	COMP. LAB 3: Coordinate Systems	Chapter 3

30-Sep	Mapping and presenting GIS Data	Chapter 4,5
2-Oct	COMP. LAB 4: Map Development	Chapter 4
7-Oct	Data Resource Center - Guest Lecture	--
9-Oct	COMP. LAB 5: Map Presentation	Chapter 5
14-Oct	No class	ThanksGiving Holiday
16-Oct	Raster Analysis	Chapter 11
21-Oct	Midterm Exam	
23-Oct	COMP. LAB 6: Raster Analysis	Chapter 11
28-Oct	Map Overlay and Geoprocessing	Chapter 10
30-Oct	COMP. LAB 7: Map Overlay and Geoprocessing	Chapter 10
4-Nov	Attribute Data, Database Management	Chapter 6
6-Nov	COMP. LAB 8: Attribute Data	Chapter 6
11-Nov	Queries and Spatial Joins	Chapters 8, 9

	13-Nov	COMP. LAB 9: Queries and Spatial Joins	Chapters 8, 9
	18-Nov	Guest Lectures	Lecture slides
	20-Nov	GIS Applications and Remote Sensing	Lecture slides
	25-Nov	Term project presentations	all
	27-Nov	Term project presentations	all
	7-Dec	Final Exam	all
Learning Outcome:	1, 2, 3, 4, 5		

5.2 Other Important Dates

Monday, October 14, 2019: Holiday--NO CLASSES SCHEDULED

Tuesday, October 15, 2019: Holiday--NO CLASSES SCHEDULED

Friday, November 29, 2019: Last day to drop classes

Thursday, November 28, 2019: Classes rescheduled from Tuesday, October 15

Friday, November 329, 2019: Classes rescheduled from Monday, October 14

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6 Assessments

6.1 Marking Schemes & Distributions

Name	Scheme A (%)
Tutorials	25
Midterm Test	20
Term Project	35
Final Exam	20
Total	100

6.2 Assessment Details

Tutorials (25%)

Learning Outcome: 1, 2, 3, 4

Tutorials contain step-by-step instructions for learning GIS concepts and solving basic problems in ArcGIS. Tutorial will be assigned most weeks in class. Students will have to answer tutorial/exercise questions. The solved tutorials/exercise questions are due one week after assigned. The students should upload solved tutorials/exercise questions to the Dropbox. It is essential to stay up to date with these tutorials to learn the course material and software in order to complete your term project and be successful on the midterm and final exam.

Midterm Test (20%)

Date: Mon, Oct 21, THRN 1319

Learning Outcome: 1, 3, 4

There will be test held during the lecture period on October 21st. This will be a written and “hands-on” test to test your knowledge of GIS theory as well as your ability to use the ArcGIS software. More information will be provided in class prior to the test and will be posted to the Courselink.

Term Project (35%)

Learning Outcome: 1, 2, 3, 4, 5

Group Formation: Term project groups of 4 or 5 students must be formed before **September 18 at 10 pm**. The student names must be included in a memo addressed to the Instructor. One student in each group to upload the memo to Dropbox on CourseLink. Following this, the GTA will randomly assign group numbers.

Project Proposal: First version of the project proposal due on **October 2 at 10 pm.** The instructor will discuss the proposal and suggest necessary corrections during class on October 7 or 9th. The final version of the project proposal is due on **October 23 at 10 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 **November 24 at 10 pm**. One student in each group to upload slides (i.e., PowerPoint file) to Dropbox on CourseLink. In class presentations will be on **November 25 and November 27.** See further instructions on CourseLink and in class. **(10%).** Note: The uploaded presentation is the version that you will present!

Final Report: Due on **November 29 at 10 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 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. (**20%**)

Final Exam (20%)
Date: Thu, Dec 14, 8:30 AM, TBA
Learning Outcome: 1, 2, 3
December 7, 8:30 am to 10:30 am, Room TBA on WebAdvisor

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7 Course Statements

7.1 Course Grading Policies

Missed Assessments: If you are unable to meet an in-course requirement due to medical, psychological, or compassionate reasons, please contact the course instructor. See the undergraduate calendar for information on regulations and procedures for Academic Consideration: https://www.uoguelph.ca/registrar/calendars/undergraduate/2016-2017/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\

Missed Midterm Exam: If you miss the midterm exam due to grounds for granting academic consideration or religious accommodation, the weight of the missed exam will be added to the Final exam. There will not be any makeup exam.

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, midterm, and tutorials to count towards the final grade.

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

8 School of Engineering Statements

8.1 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. Selected lecture notes will be made available to students on Courselink but these are not intended to be stand-alone course notes. Some written lecture notes will be presented only in class. During lectures, the instructor will expand and explain the content of notes and provide example problems that supplement posted notes. Scheduled classes will be the principal venue to provide information and feedback for tests and labs.

8.2 Students' Learning Responsibilities

Students are expected to take advantage of the learning opportunities provided during lectures and lab sessions. 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.

8.3 Lab 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.

9 University Statements

9.1 Email 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.

9.2 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. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Graduate Calendar - Grounds for Academic Consideration
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions
https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml

9.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Graduate Calendar - Registration Changes
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml

Associate Diploma Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml

9.4 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.

9.5 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.

For Guelph students, information can be found on the SAS website
https://www.uoguelph.ca/sas

For Ridgetown students, information can be found on the Ridgetown SAS website
https://www.ridgetownc.com/services/accessibilityservices.cfm

9.6 Academic Integrity

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 encourages academic integrity. 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.

Undergraduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Graduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

9.7 Recording of Materials

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

9.8 Resources

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

Academic Calendars
https://www.uoguelph.ca/academics/calendars
