GEOG 381 / PLAN 381

Spatial Analysis Using Geographic Information Systems

Spring 2012

Instructor:	Derek T. Robinson
Room:	EV1-105a
Email, phone:	dtrobins@uwaterloo.ca; (519) 8884567 ext. 31789
Office hours:	Thursday 10:30 a.m. – 12:00 noon
Class time:	Tuesday 1:30 p.m. – 4:20 a.m.
Lecture room:	EV1-132
Computer lab:	EV1-240 (Galileo centre)
Prerequisites:	GEOG/PLAN 281 (or GEOG/PLAN 255)
CourseID:	006014

Teaching assistant:	Andrew Blakey
Email:	ablakey@uwaterloo.ca
Office hours:	To be announced at a later date.

Calendar Description

"This course is organized into modules, each of which addresses a common type of GIS analysis. Topics covered include digital terrain models, spatial analysis, cell-based modelling and network analysis. In addition, the course explores automation procedures using models and scripts."

Course Description

The course builds on the knowledge and skills you developed in GEOG/PLAN 281 and focuses on using GIS to perform selected types of spatial analyses. Students will learn how to perform different types of spatial analyses, identify the types of questions different analysis approaches can answer, critically evaluate the advantages and limitations of different approaches, and gain a better understanding of the use of capabilities of spatial analysis. This course is a prerequisite for GEOG / PLAN 481 and 487 and is part of the requirements for the Diploma of Excellence in GIS.

The course is organized into four modules: (1) the ArcGIS Model Builder for Geoprocessing, (2) customization of geoprocessing tasks using python, (3) network analysis, and (4) other spatial analysis tools are evaluated, applied, and presented by students within the class.

References

There is no required textbook for this course. Course notes and slides will be provided as electronic documents on Waterloo LEARN. Students are expected to make use of the online help files for the ArcGIS software, discussion groups in the online learning platform, and other web-based GIS resources. The following books cover part of the course and are suitable for further reading and available in the course reserves either electronically or at the Porter library:

De Smith, M.J., M.F. Goodchild & P.A. Longley (2007). *Geospatial analysis: a comprehensive guide to principles, techniques and software tools*. Matador.
Available electronically at http://www.spatialanalysisonline.com

Lloyd, C.D., (2010). Spatial data analysis: an introduction for GIS users. Oxford University Press.

Lutz, M. (2009). *Learning Python*. 4th edition, O'Reilly.
Available electronically through the library / course e-reserves.

O'Sullivan, D. & D.J. Unwin (2003). *Geographic information analysis*. Wiley.

Wilson, J.P. & J.C. Gallant (2000). *Terrain analysis: principles and applications*. Wiley.

Schedule

The course comprises a 3-hour lecture held on Tuesdays from 1:30-4:20pm and a 2-hour lab held on Thursdays. The lecture will be used to introduce the theory and concepts behind spatial analysis methods as well as to demonstrate techniques that will aid the completion of lab assignments. Significant additional time will be required for independent study to complete assignments and develop necessary skills (see also section *Getting Help* below). The schedule of course content, assignments, and quizzes is subject to change. An updated version will be posted on the course website.

#	Date	Type (*)	Topic	Assignment
1	1 May	Lec	Introduction to Spatial Analysis	Quiz* (5%)
	3 May	Lab	No Official Lab – Could get a head start on tutorials	
2	8 May	Lec	Introduction to Multi-Criteria Evaluation using ArcGIS Model Builder	1. Geoprocessing with Model Builder (15%)
	10 May	Lab		
3	15 May	Lec	Geoprocessing and Model Builder.	
	17 May	Lab		
4	22 May	Lec	Introduction to Geoprocessing using models and Python scripts	Ass. 1 due; 2. Geoprocessing with Python (15%)
	23 May	Lab		
5	29 May	Lec	Geoprocessing and scripting with Python	Quiz* (5%)
	31 May	Lab		
6	5 June	Lec	Geoprocessing and scripting with Python continued.	
	7 June	Lab		
7	12 June	Lec	Introduction to Network Analysis	Ass. 2 due; 3. Network analysis (20%)
	15 June	Lab		
8	19 June	Lec	ArcGIS Network Analyst Tutorial	
	21 June	Lab		
9	26 June	Lec	Selected Topics in Spatial Analysis	Ass. 3 due; 4. Selected topics in spatial analysis (15%)
	28 June	Lab		
10	3 July	Lec	Approaches to positioning and georeferencing	
	5 July	Lab		
11	10 July	Lec	Assignment 4 poster presentations Spatial analysis case study (additional time required)	Quiz* (5%)
	12 July	Lab		
12	17 July	Lec	Guest Lecture or Review Session	Ass. 4 due
	19 July	Lab		
13	24 July	Lec	Written test	Test (25%)

* Only the best two of the three quizzes count towards the final grade, for a total 10% contribution of quizzes.

Method of Evaluation
There is one written test (25%), four assignments (65% in total), and quizzes (the best two out of three quizzes will count; 10% in total). Assignments are prepared and submitted in small groups. Assignments must be submitted to the appropriate drop box on the course website by 11:55 pm on the due date. All students will be permitted to submit one assignment late (up to 7 days late maximum) without penalty. Otherwise, late assignments will not be accepted and will receive a mark of zero. Exceptions may be made for documented medical reasons.

Computer Labs
You can use the Galileo (EV1-240), Geddes (EV2-1002A) or Magellan (EV2-1014) labs for practical work in this course when they are not booked for other courses. The required software is also available in the main MAD lab and can be accessed from off-campus by logging on to the terminal server (festerm1.uwaterloo.ca). Directions for accessing the terminal server can be found here: http://www.env.uwaterloo.ca/computing/services/wts/index.html

NOTE: No food or drink is allowed in the labs. Failure to abide by this rule may result in your computer accounts being suspended.

Course Website
A course website has been created on the new learning platform "Learn" (Desire2Learn). Information on access to the website will be provided in class. An automatic forward from the old learning platform UW-ACE should be in place, but this may change since "Learn" is still under development. Students registered in the course can access the course website after May 1st by going to the LEARN website (http://learn.uwaterloo.ca)
and logging in using your WatIAM/Quest username and password. Once logged in, you will see the course listed under "My Courses and Communities". Click on GEOG 381/PLAN 381 to see the course content.

The course website provides access to lecture presentations, course notes on selected topics, datasets needed for the assignments, and assignment scripts. These documents can be opened or downloaded by clicking on the appropriate link. In addition, the course website supports announcements, discussion groups and e-mail. Assignments will be handed in via the LEARN course website and students should become familiar with the website and submission process early so as not to receive a late submission.

Getting Help
Students are expected to get into the habit of using the on-line help files as the **first** source of help. The TA and instructor will be available during scheduled help sessions and office hours to answer questions related to the assignments. Additional help is available from the MAD help desk.

Email
Please include the course shortcode and your family name in the subject of your email (e.g. Robinson GEOG/PLAN 381). I will try to respond to emails within 24hrs excluding weekends (i.e. Friday 5pm to Monday 8am). I will respond to emails regarding course content or logistics, while questions or concerns regarding evaluation will be reserved for discussion during office hours.

Email and online discussions are governed by the same rules of academic conduct as your behavior in class. Please use common courtesy, be polite, and, of course, avoid sending or forwarding aggressive, sexist, racially discriminatory, obscene, offensive, libelous, or defamatory comments of any kind. If I do not respond to your email within 24 hours please send me another email or see me in person as it may have been deleted by a spam filter or a server may have been down when the email was sent. Email can be a benefit to both the student and instructor objectives; however, email is not a substitute for one-on-one discussion and therefore I prefer to meet with you during office hours.

Administrative Matters

Academic Integrity: To create and promote a culture of academic integrity, the behaviour of all members of the University of Waterloo is based on honesty, trust, fairness, respect and responsibility.
Students are strongly encouraged to review the material provided by the University's Office of Academic Integrity: http://www.uwaterloo.ca/academicintegrity/. Students who are unsure what constitutes an academic offence are requested to visit the on-line tutorial at: http://www.lib.uwaterloo.ca/ait/

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, http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm. When in doubt, please contact your Undergraduate Advisor for details.

Discipline: A student is expected to know what constitutes academic integrity, to avoid committing academic offenses, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. When misconduct has been found to have occurred, disciplinary penalties will be imposed under Policy 71 – Student Discipline. For information on categories of offenses and types of penalties, students should refer to Policy 71 - Student Discipline, http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm . For typical penalties, check Guidelines for Assessment of Penalties, http://www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm

Appeals: A student may appeal the finding and/or penalty in a decision made under Policy 70 - Student Petitions and Grievances (other than regarding a petition) or Policy 71 - Student Discipline if a ground for an appeal can be established. Read Policy 72 - Student Appeals,
http://secretariat.uwaterloo.ca/Policies/policy72.htm

Research Ethics: Please also note that the 'University of Waterloo requires all research conducted by its students, staff, and faculty which involves humans as participants to undergo prior ethics review and clearance through the Director, Office of Human Research and Animal Care (Office). The ethics review and clearance processes are intended to ensure that projects comply with the Office's Guidelines for Research with Human Participants (Guidelines) as well as those of provincial and federal agencies, and that the safety, rights and welfare of participants are adequately protected. The Guidelines inform researchers about ethical issues and procedures which are of concern when conducting research with humans (e.g. confidentiality, risks and benefits, informed consent process, etc.). If the development of your research proposal consists of research that involves humans as participants, the please contact the course instructor for guidance and see: http://iris.uwaterloo.ca/ethics/human/index.htm

Note for students with disabilities: The Office for Persons with Disabilities (OPD), located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the OPD at the beginning of each academic term.

Religious Observances: Please 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.

***Turnitin* Software**: Plagiarism detection software (Turnitin) may be used to screen assignments in this course. This is may be done to verify that use of all materials and sources in assignments is documented. Students will be given an option if they do not want to have their assignment screened by Turnitin. In the first week of the term, details will be provided about arrangements and alternatives for the use of Turnitin in this course.

Annotated bibliography: For advice on how to prepare an annotated bibliography, see:
http://www.lib.sfu.ca/help/writing/annotated-bibliography