From the Associate Dean, Undergraduate Studies
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. **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/**

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: 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.

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**. 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 offence, 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. 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**. For typical penalties, check Guidelines for Assessment of Penalties, **www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm**

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**

Turnitin: Plagiarism detection software (Turnitin) will be used to screen assignments in this course. This is being 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. For further information on UW's Turnitin guidelines, see:
http://uwaterloo.ca/academic-integrity/home/guidelines-instructors
Unclaimed assignments: Unclaimed assignments will be retained until one month after term grades become official in quest. After that time, they will be destroyed in compliance with UW's confidential shredding procedures (uwaterloo.ca/central-stores/confidential-shredding)

LEARN: Users can login to LEARN via:
http://learn.uwaterloo.ca/
Use your WatIAM/Quest username and password. Documentation is available at:
http://av.uwaterloo.ca/uwace/training_documentation/index.html

Associate Dean, Undergraduate Studies, 1 September, 2013

WATERLOO
ENVIRONMENT
DEPARTMENT OF GEOGRAPHY AND
ENVIRONMENTAL MANAGEMENT

GEOG 471
Remote Sensing Project

Lecture: 8:30-10:20 Tu   EV3 3412

Lab 101: 12:30-14:20 Th   EV2 1002A

Lab 102: 14:30-16:20 Th   EV2 1002A

Remote Sensing Project: Course Outline *(Provisional)*

Instructor	**Course Assistant**	**Teaching Assistants**
Dr. Richard Kelly	Mike Lackner (MAD)	
Room: EV1-119, ext 35451	Mapping Analysis and Design	
E-mail: rejkelly@uwaterloo.ca	E-mail: mlackner@uwaterloo.ca	
Office Hours:	Office Hours: by appointment	
Tuesdays 11:30am - 1:00pm		*Office Hours*: TBA

Overview

This course has a very strong application focus in the form of ***remote sensing observations for climate and land cover change studies***. The aim of this course is to develop students' theoretical and practical understanding of remote sensing through project-based work using commercial image analysis software to address a substantive aspect of climate change. It builds on courses GEOG271 and GEOG371. Working in a group and individually, students undertake a study using remote sensing data sets to address a substantive issue related to climate change.

The objectives of this course:

1. To design, plan, and execute a science-based resource management project focusing on the application of remote sensing and digital information extraction;
2. To conduct a literature synthesis of your topic from the remote sensing research literature, perform a series of image processing tasks related to that topic, and place your work in context of what others have done
3. To communicate the results of your efforts to the instructor through a project report paper and to your peers through a class group presentation
4. To be competent in a range of geographical skills, particularly those relating to remote sensing data analysis and methodological issues;
5. To be aware of some of the inter-linkages within and between the remote sensing information content and knowledge in human and/or physical and human geography;
6. To develop further your range of personal transferable skills, including the ability to present material orally and in report form and to work effectively both as an individual and as a member of a group;
7. To be aware more keenly of your own range of personal transferable skills and be able to assess, critically and constructively, the contribution of team members, including yourself, to the group in which you work.

Text and Readings

There is no single text for this course. As you will be focusing on producing a remote sensing research project, you are not required to purchase a textbook for this course. The textbook *Introductory Digital Image Processing: A Remote Sensing Perspective* (Jensen, 2015) is highly recommended but does not cover everything. In addition, you will be expected to make use of remote sensing journal periodicals and other material in the university libraries, in addition to web-based information.

Textbooks:

Jensen, J.R., 2015. *Introductory Digital Image Processing: A Remote Sensing Perspective*. Fourth Edition. Prentice Hall, Toronto, Canada. (Available in the Library – 3 hour short loan). Earlier versions are also good, especially 3rd Edition)

Jensen, J.R. 2007. *Remote Sensing of Environment: and Earth Resources Perspective*, Second Edition, Prentice Hall, Toronto, Canada.

Lillesand, T.M., and Kiefer, R.W., 2003, *Remote Sensing and Image Interpretation* (Fifth Edition), John Wiley & Sons, Canada, 784pp.

Mather, P.M. 2004 *Computer Processing of Remotely-sensed Images*, (3rd Ed.). John Wiley & Sons Canada, 442pp.

Campbell, J.B., 2002 *Introduction to Remote Sensing* (Third Edition), The Guilford Press, 621pp.

Richards J.A. 2010, *Remote Sensing Digital Image Analysis: An Introduction*, 4th Edition. SpringerLink (**Online through UW library**)

Selected course notes and lecture presentations will be available on the course web site which will be maintained as part of the UW LEARN system.

Schedule

The course is organized around a weekly 2 hour lecture / discussion held on Tuesdays from 8:30-10:20 am in EV3-3412 and labs held on Thursdays from 12:30-2:20 pm and Thursdays from 2:30-4:20 pm in EV2 1002A (Geddes Lab). *Attendance is mandatory for each lecture and for each lab. You will be graded by your group peers on your overall contribution to the proposal and the final project report.*

Lecture Date	Topic
Jan 3	*Lecture: Introductions & course overview; project selection outline, establishment and design. Course expectations (GEOG271 and GEOG371 foundations).* Lab: identifying the project question, analysis approach and data needs.
Jan 10	*Lecture slot: exploring instruments and data sets available for project work.* Lab: Group discussions – project definition and data exploration
Jan 17	*Lecture: change detection analysis* Lab: Change detection analysis
Jan 24	*Guest Lecture: Rainwater Harvesting in India using Radar Remote Sensing* Lab: Expert systems and algorithms.
Jan 31	Group presentations on proposed projects (5 minutes each) (*Proposals due 31 Jan 2017*) Lab: data projections and multi-scale resolution
Feb 7	*Guest Lecture: Estimating forest transmissivity using MODIS data* *Focused Literature Review Due in class on 7th February 2017* Lab:
Feb 14	*Lecture: Verification and testing* Lab: design-based and model-based accuracy assessment
Feb 21	**UW READING WEEK**
Feb 28	*Lecture: Project report work* Lab: Project work
Mar 7	Lecture: mandatory update from each group on progress, problems and plans Lab: Project Work.
Mar 14	Lecture: group discussions with TAs and instructors Lab: Project Work
Mar 21	Lecture: mandatory update from each group on progress, problems and plans Lab: Project Work
March 28	*Lecture: Final Presentations* *Final Project Report Due (28 March, 2017)*

For readings refer to Jensen, 2005 Introductory Digital Image Processing: a remote sensing perspective, Pearson Education *and* Jensen, 2007 Remote Sensing of Environment: and Earth Resources Perspective, Pearson Education

Evaluation

All course activity will be focused around a major term project. The final contribution is broken into specific activities the requirements for which will be explained in detail at the start of the course:

Project Proposal	(Group + Individual)	10%
Project Literature Review (Individual 5000 words)		30%
Project Presentation (Class)		10%
Project Report (Group 20,000 words)		50%

Group and Individual contributions will be assessed for specific parts of the evaluation process. See course website for details of each element.

Resources

The Geddes Lab (EV2-1002A) Lab Code:

The Geddes Lab will be used for all practical work in this course. You can access this Lab 24 hours a day, 7 days a week. The Lab may occasionally be unavailable while maintenance operations are performed.

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

Course Website

A website for this course has been created as part of the UW-LEARN system. Students registered in the course can access the course website by going to the UW-LEARN homepage and entering their UW_Dir userid and password in the logon form displayed on this page. Once you are logged on to UW-LEARN, you will see a list of courses that you are registered in and that are using UW-LEARN. Click on Geog 471 to select this course.

The course website provides access to lecture presentations, course notes on selected topics, 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. Please use the discussion groups and/or UW-LEARN e-mail for messages related to this course. I will monitor course discussion groups and UW-LEARN e-mail more frequently than my regular e-mail. I will reply to e-mail messages, but where appropriate, I will post a response to questions or problems raised in e-mails to the course discussion group or I will add an announcement to the course home page.

Disk storage space

We have allocated each group disk storage space on the network for group project work. Once the groups have been formed, you will be allocated a group number. You will then be able to access a shared network space within which you can share documents and folders etc amongst other group members.

Getting Help

Students are expected to get into the habit of using the on-line files as the first source of help. I will be available in my office for consultation during regular office hours or by appointment. I will also check UW-LEARN course-related e-mail and discussion groups on a daily basis. Additional help is available from the MAD help desk and the TA. Mike Lackner will also be available to answer questions related to lab assignments in this course. A LEARN bulletin board is also available for posing questions to the wider group.

Course Conduct

GEOG 471 is a double weighted course. This means that there is significantly more expectation on students than on a single weighted course. It is in your interests, therefore, to attend lectures and seminars with your group and contribute strongly to the group project. In the past, students who have not been engaged in the group, have missed meetings and have not contributed strongly have lost marks in this course.

Lectures are there for your benefit. Please come prepared to engage in the material and be ready to ask questions. Open laptops will not be allowed during lectures unless expressly requested for note taking.

Labs are mandatory and are there for you to engage with group members and to ask for advice and assistance from TA, the instructor and Mike Lackner. Lab time is an essential core time to enable groups to work together on individual or common issues.

Students will choose their own groups. If you are unable to find a group, please let the instructor know so steps can be taken to find a home for you.

UW Policy on Plagiarism

Any evidence or instance of plagiarism will be dealt with according to the terms stated in University of Waterloo Policy #71. Plagiarism is defined in the policy as 'the act of presenting the ideas, words or other intellectual property of another as one's own. The use of other people's work must be properly acknowledged and referenced in all written material such as take-home data, computer programs and research results. The properly acknowledged use of sources is an accepted and important part of scholarship. Use of such material without complete and unambiguous acknowledgement, however, is an offence under this policy.' See
http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm

If you wish to learn more about his subject, please refer to the University's Office of Academic Integrity (http://uwaterloo.ca/academicintegrity/) or speak with the course instructor.