


Faculty	Faculty of Environmental and Urban Change	
Course	GEOG 4440: Processing and Analysis of Earth Observation Data	
Credits	3.00	
Term	Winter 2024	
Course Director	Instructor	Dr. Tarmo K. Rimmel
	Office	HNE 212
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	Voicemail	416-736-2100 x22496
	Phone/Text	647-794-4033
	Twitter	@TKRspatial
	Web	http://www.yorku.ca/remmelt
	Moodle	http://eclass.yorku.ca
	Office Hour	Tuesdays 1300-1400h
		
Zoom	Currently, this course is scheduled to be in-person . Should the situation change, and this course be forced to pivot to a virtual format, lectures will be provided as pre-recorded videos (accessible via eClass) with additional weekly discussions and office hours with the TA and me via Zoom. Details on how to connect will be distributed only if this scenario were to happen.	
eClass	This course will be actively managed through eClass. As a student enrolled in this course, you will be guided through this course on a weekly basis. Pre-recorded lectures and labs, assessments, calendars, discussion forms, and all necessary interactivity will be coordinated through this platform. You are encouraged to log in regularly and to keep on top of requirements. Course: https://eclass.yorku.ca/course/view.php?id=74221 Mobile App: https://lthelp.yorku.ca/mobile-app	
Calendar Description	Sophisticated methods and techniques for collecting, processing and analyzing remote sensing data are examined. Special topics include image enhancement techniques (e.g., texture transforms), non-traditional image classification and data integration for incorporation of remote sensing data products into geographic information systems (GIS). Prerequisite: AP/GEOG 3440 3.00 or ES/ENVS 3521 3.00 or LE/EATS 4220 3.00 or written permission of the Instructor. Course credit exclusions: ES/ENVS 4521 3.00 (prior to Fall 2013). Previously offered as: AP/GEOG 4440 3.00, SC/GEOG 4440 3.00.	
Expanded Description	This course provides every student with a working knowledge of sophisticated methods and techniques for collecting, processing, and analyzing remote sensing data along with the theories and practices of undertaking remote sensing projects. Throughout the course, emphasis will be placed on image processing, image analysis, image classification, and data integration. The goal is to apply remote sensing in geographical analyses and environmental monitoring. This course is composed of lectures, laboratories, an individual term paper, and a group presentation.	
Textbook	There is no required textbook for this course.	
Readings	All required readings for this course are drawn from the peer-reviewed literature and have been published in academic journals. A listing of these selected papers is available in full on the course's eClass. Specific weekly readings are also identified in each weekly block of the course.	
Missed Assessments	You are encouraged to fully partake in all course activities. With course instructor approval, missed assessment weights <i>may</i> be added to your final term paper.	
Notice	In the best interest of the course, the instructor reserves the right to modify the schedule.	

Meetings Lectures Lectures are held in-person on Mondays 0930-1130h in DB 0007. **You are expected to complete the readings prior to the weekly lecture. Come prepared to discuss, ask, and contribute – your engagement is critical for success in this class.**

Lab 01 Labs are held in-person on Mondays 1230-1430h in HNE 253 (an undergraduate teaching computer lab). **You are expected to complete weekly readings and any additional requirements prior to the weekly lab session. Come prepared to discuss, ask, and contribute – your engagement is critical for success in this class.**

Teaching Assistant: Brian Waters (brianmah@yorku.ca)
Office Hours: TBD

- Learning Objectives** Students will...
1. **choose** and **articulate** a topic for an individualized remote sensing research project.
 2. **review** academic literature to **identify** and **explain** best practices and key messages related to a selected research project.
 3. **develop** and **test** hypotheses by processing and analysing remote sensing data.
 4. **create** meaningful summaries of remote sensing results.
 5. **evaluate** and **defend** the results of hypothesis tests by producing an academic term paper.
 6. in a small group, **produce** a short video to **communicate** the key messages of a selected remote sensing article for the general public.

Evaluation	Description	Weight (%)	Due	Submission Format
	Assignment 1	15	21 January @ 2355h	eClass
	Assignment 2	15	04 February @ 2355h	eClass
	Term Paper Proposal	10	11 February @ 2355h	eClass
	Group Video	15	15 March @ 2355h	eClass
	Engagement	15	Weekly	Various
	Final Term Paper	30	05 April @ 2355h	eClass

- Penalties**
- Late submission of course work will be penalized 15% of the total assignment value per calendar day. The first 15% penalty is applied once the deadline has passed; subsequent penalties are then applied every 24 hours thereafter that the work is not submitted.
 - Penalties accumulate until the work is submitted or a grade of zero is reached.
 - Upon reasonable grounds and with individual consultation with the course instructor, extensions may be granted for course work.

Schedule	Month	Date	Week	Lecture	Lecture: 1030-1230h		Lab: Scheduled (2h)	Assignments	Readings	
	January		8	1	1	Introduction	Review	PCI license, using AppsAnywhere, Algorithm Librarian	A1, Group, & Paper Assigned	Cracknell (1998); Hengl (2006)
		15	2	2	Compression		Modeler - task automation		None	
		22	3	3	Spectrometry	Atmospheric Correction	Atmospheric Correction/Line Drop/Filter noise	A1 Due (Sun 21); A2 Assigned	Herold et al. (2004); French et al. (2003)	
		29	4	4	Landscape Pattern		Binary classification (and morphology?)		Frazier and Kedron (2017); Rimmel and Csillag (2003)	
February		5	5	5	Fuzzy Classification	Segmentation	Segmentation & Fuzzy	A2 Due (Sun 4)	Tant et al. (2007); Zhang and Foody (1998)	
		12	6	6	PCA Transformation	TC Transformation	FFT Transformation	Paper Proposal Due (Feb 11)	Crist and Cicone (1984); Liu et al. (2017); Watson (1993)	
		19	7	Reading Week						McNolog (2003); McNolog (1998)
		26	8	7	Thermal Remote Sensing	Texture	Compute LST, Simple texture measurements		Irons and Petersen (1981); Park and Guilmann (2020); Dar et al. (2019)	
March		4	9	8	Advanced Accuracy Assessment		Making Cartographic Products		Congallon (1991); Mitchell et al. (2008)	
		11	10	9	CART	LiDAR	Term Paper Consultations (with Instructor); Web of Science and Zotero	Video Due (Mar 15)	Baker et al. (2006)	
		18	11	10	Group Videos		Grade peer-work: Videos; Term Paper Consultations		None	
		25	12	11	Forestry Applications		Term Paper Work and Consultations: Panchromatic Sharpening		Håme et al. (2001); Gallagher et al. (2020)	
April	1	13	12	UAV Remote Sensing	Concluding Remarks	Term Paper Work and Consultations: Panchromatic Sharpening	Paper Final Due (Apr 5)	Burkart et al. (2014); Di Gennaro et al. (2019)		

Academic Honesty and Integrity

York students are required to maintain the highest standards of academic honesty and they are subject to the Senate Policy on Academic Honesty. The Policy affirms the responsibility of faculty members to foster acceptable standards of academic conduct and of the student to abide by such standards. <http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senatepolicy-on/>

There is also an academic integrity website with comprehensive information about academic honesty and how to find resources at York to help improve students’ research and writing skills, and cope with University life. Students are expected to review the materials on the Academic Integrity website at: <http://www.yorku.ca/academicintegrity/>

Ethics Review Process

York students are subject to the York University Policy for the Ethics Review Process for Research Involving Human Participants. In particular, students proposing to undertake research involving human participants (e.g., interviewing the director of a company or government agency, having students complete a questionnaire, etc.) are required to submit an Application for Ethical Approval of Research Involving Human Participants at least one month before you plan to begin the research. If you are in doubt as to whether this requirement applies to you, contact your Course Director immediately.

Religious Observance

York University is committed to respecting the religious beliefs and practices of all members of the community and making accommodations for observances of special significance to adherents. Should any of the dates specified in this syllabus for an in-class test or examination pose such a conflict for you, contact the Course Director within the first three weeks of class. Similarly, should an assignment to be completed in a lab, practicum placement, workshop, etc., scheduled later in the term pose such a conflict, contact the Course director immediately. Please note that to arrange an alternative date or time for an examination scheduled in the formal examination periods (December and April/May), students must complete an Examination Accommodation Form, which can be obtained from Student Client Services, Student Services Centre or online at: http://www.registrar.yorku.ca/pdf/exam_accommodation.pdf

Access & Disability

York University is committed to principles of respect, inclusion and equality of all persons with disabilities across campus. The University provides services for students with disabilities (including physical, medical, learning and psychiatric disabilities) needing accommodation related to teaching and evaluation methods/materials. These services are made available to students in all Faculties and programs at York University.

Students in need of these services are asked to register with disability services as early as possible to ensure that appropriate academic accommodation can be provided with advance notice. You are encouraged to schedule a time early in the term to meet with each professor to discuss your accommodation needs. Please note that registering with disabilities services and discussing your needs with your professors is necessary to avoid any impediment to receiving the necessary academic accommodations to meet your needs.

Additional information is available at the following websites:

Counselling & Disability Services: <https://counselling.students.yorku.ca/>

Counselling & Disability Services at Glendon: <https://www.glendon.yorku.ca/counselling/>

York Accessibility Hub: <http://accessibilityhub.info.yorku.ca/>

Student Conduct in Academic Situations

Student Conduct in Academic Situations Students and instructors are expected to maintain a professional relationship characterized by courtesy and mutual respect. Moreover, it is the responsibility of the instructor to maintain an appropriate academic atmosphere in the classroom and other academic settings, and the responsibility of the student to cooperate in that endeavour. Further, the instructor is the best person to decide, in the first instance, whether such an atmosphere is present in the class. The policy and procedures governing disruptive and/or harassing behaviour by students in academic situations is available at:

<http://secretariat-policies.info.yorku.ca/policies/disruptiveandor-harassing-behaviour-in-academic-situations-senate-policy/>

Important Dates and Links

Please refer to <https://registrar.yorku.ca/enrol/dates/2023-2024/fall-winter> for important dates pertaining to the academic term. The course drop date (without receiving a grade) corresponding to your course is BEFORE 11 March 2024. Also see Financial Deadlines.

For details on grading schemes, assignment submissions, lateness Penalties, missed tests, group work, inclusivity in EUC, religious observance days, academic honesty, intellectual property notices, student conduct, student support and student accessibility services, see <https://euc.yorku.ca/academic-policies-procedures-petitions/> and go to “Undergraduate Courses Common Instructions”.
