GEOGRAPHY AND ENVIRONMENTAL STUDIES
Carleton University

COURSE OUTLINE - Winter 2021

COURSE: **Applications in Geographic Information Systems – GEOM 4009A**

INSTRUCTOR: **Derek Mueller**
                       Room A427, Loeb Building
                       Email: derek.mueller@carleton.ca
                       Phone: 613-520-2600 x1984

OFFICE HOURS: **Tuesdays 11:30 – 12:30**, by chance or appointment.

PREREQUISITES: GEOM 3005 & (COMP 1006 or GEOG 3003), or permission of the department.

WORKSHOPS: Tuesdays   08:35 - 11:25   Loeb A237

COURSE DESCRIPTION:
Project design and customization, application development within a GIS, digital atlas compilation and geomatics education (*from Carleton University, Undergraduate Calendar*).

The course is normally delivered as a 3 hour workshop which will entail both lecture and practical work. Under COVID-19 restrictions there will be some synchronous activity during that time slot and likely some asynchronous learning as well. The intent of this course is to provide you with the tools needed to develop applications in Python that allow for automation to solve geomatics problems. You will be introduced to the Python programming language (open source language) and various libraries that can manipulate geospatial data. QGIS and the Graphical Modeler may also be used. Other programming options available within other GIS platforms/software applications may also be explored. Existing scripts and extensions will be analyzed in order to understand how they can be used to perform a task and you will develop new tools directed to specific problems. The application of these tools will be in the areas of: a) customization of spatial analysis; b) batch automation of geoprocessing operations; c) geomatics education.

COMMUNICATION:
This course uses cuLearn, Carleton's learning management system. To access your courses on cuLearn go to http://carleton.ca/culearn. For help and support, go to http://carleton.ca/students. Any unresolved questions can be directed to Computing and Communication Services (CCS) by phone at 613-520-3700 or via email at ccs.service.desk@carleton.ca

Private correspondence with the Instructor should be through a Carleton email account (this is accessible in cuLearn). If you have questions of a general nature, please post it to the discussion board in cuLearn so that others can benefit from the answers. The Instructor will check email and cuLearn every 24 hours and do their best to respond to queries within 48 hours.

Information on cuLearn or sent via email will be considered to have been provided to all students within 24 hours of posting and students will be fully responsible for reading and responding appropriately to this information.

COURSE STRUCTURE:
A one term course with workshops, assignments and a group project.

TEXTBOOK/READINGS:
You will find what you need online in various locations (primarily via a search engine). If you want to get a head start on Python programming in general (you need a foundation in that before looking at geospatial applications) have a look at any Python textbook (books by O'Reilly publishing are good). The Python lessons in Software Carpentry are recommended: https://swcarpentry.github.io/python-novice-inflammation/. Other documentation will be provided as pdf files or web links via cuLearn.

TECHNOLOGICAL REQUIREMENTS:
To provide a consistent development environment across personal and/or Carleton computers, this course will use virtual computer for workshops and assignments. You must have access to a computer with a 64-bit CPU, 8 GB RAM (it is possible that it will work with less RAM – to be determined), 15-25 GB of free hard disk space and a high speed Internet connection. You need to download and install VirtualBox version 6.1 or higher (https://www.virtualbox.org/) to run the virtual machine. This software works on Windows, Mac and Linux. The virtual machine itself (~5 GB file) will be made available for download closer to the beginning of term. A webcam and headset are recommended for online synchronous activities. If you do not have access to these resources, please contact the Instructor at your earliest convenience to discuss the matter.

EVALUATION:
The evaluation in this course will be based upon your performance in the following:

Participation	15%
Weekly Assignments	30%
Group Project Progress Report1	05%
Group Project Progress Report2	10%
Group Project Progress Report3	05%
Group Project Progress Report4	08%
Group Project Final Report	12%
Group Project Presentation	05%
Group Project Participation	10%

Note that standing in a course is determined by the course instructor subject to the approval of the Faculty Dean. This means that grades submitted by the instructor may be subject to revision. No grades are final until they have been approved by the Dean. Also, due to COVID-19, flexible and compassionate grading options/accommodations can be made.

Participation
You are either here for the *entire* workshop, or you are not. Likewise, you are either asking questions and participating in discussions, or you are not. Think of this as ~1.5% per week with a discretionary absence or lack of participation in 2 weeks. Note that participation in the group project will be evaluated separately.

Participation will be split into three components: Attendance, engagement in the workshops (asking questions, offering points of view/information, submitting short in-class assignments), completion of a short online quiz between the end of the workshop and 23:55 that same evening.

Weekly Assignments
After most of the weekly workshops there will be a short assignment that will help students consolidate what they learned. eg., work on a piece of code. Best 6 of 8 assignments @ 5% each.

Group Project and Progress Reports
For this group (3 to 5 students) project you will be required to address a real world request to develop/extend functionality in a geospatial workflow for an organization. You will meet with the 'client', research the topic and develop tools (scripts) and fully document them to meet the needs of the project. The projects and the group membership will be assigned in class.

A series of progress reports for the group projects is required to ensure a continuing flow of progress during this course. Each group will make 4 progress reports.

Groups will make a final presentation on the last day of class and hand in a final report with scripts and documentation at the end of term. Since a large portion of your mark is based on a group effort, you will be asked to comment on your participation within the group (list your contributions and describe where you provided leadership and helped your team-mates). This will be evaluated to determine your participation within your group. The group project, therefore, totals to 55% of your final grade.

Late Policy
No late submissions will be accepted for the group project deliverables. Weekly assignments are time stamped by culearn upon receipt and the time they are late will be rounded up to the nearest hour. Each student can be late up to 48 hours *in total* without penalty. After this number of late hours is accumulated, any subsequent *late submission* for weekly assignments will receive zero. Students with medical or extenuating circumstances which cover the duration of the assignment period will be accommodated. However, students who anticipate missing course deadlines for these reasons must notify the instructor as soon as possible. Please complete the Medical Self-Declaration form available here as appropriate.

Other Information
Technical problems occasionally cause delays. Every effort will be made to prevent this from the lab systems perspective. It is your responsibility to reduce your exposure to potential problems by reading and listening to all instructions thoroughly and carefully, and taking care to avoid risky practices. You must practice careful file management (saving files in the proper directories, deleting all unwanted files, naming files thoughtfully, and keeping track of where everything is) at all times.

Academic Accommodation:
Carleton provides academic accommodation to students for reasons of disability, religious observance, pregnancy and/or parental leave, sexual violence, and student activities.

Providing accommodations simply means providing alternatives to students who cannot perform the essential requirements of their academic programs due to the reasons mentioned above. At no time does academic accommodation undermine or compromise the learning objectives that are established by the academic authorities of the university.

This section provides only a brief overview of the accommodations policy and process. Please contact Equity and Inclusive Communities for a full explanation.

COVID-19
Students are encouraged to connect directly with their instructors to discuss required accommodations arising from the COVID-19 situation. Equity and Inclusive Communities and Academic Advisors can also be reached if students are unable to reach out to instructors directly.

Carleton University has suspended the need for a doctor's note or medical certificate until further notice when requesting academic accommodation related to COVID-19. Students should complete the self-declaration form available on the Registrar's Office website to request academic accommodation for missed course work including exams and assignments. Here is the link to the form: https://carleton.ca/registrar/wp-content/uploads/self-declaration.pdf.

The Senate has approved the optional conversion of one 0.5 credit passing grade to Satisfactory (SAT) for the Winter 2021 term. SAT/UNS grades are not used in the calculation of CGPA, which means that changes in academic performance due to the current disruption will not affect students' permanent records. More

information can be found at: https://carleton.ca/academicadvising/faqs-about-sat-uns/.

Religious Observation
A request should be made in the first two weeks of the academic term, or as soon as possible where the scheduling of an event or activity conflicting with a religious obligation does not appear in the course outline or calendar. A list of multi-faith holy days is accessible through the Equity Services website. Instructors can also contact Equity Services to confirm the eligibility of a religious event or practice.

Pregnancy and/or Parental Leave
Requests for parental leave must be made in writing to the Registrar's Office, or in the case of graduate students, to the Office of the Dean of Graduate and Postdoctoral Affairs.
A student who is pregnant may request a temporary modification to her program (e.g., laboratory or field work). The student should meet with the instructor(s). The department chair/director and the faculty dean can assist in the discussion. An Equity Services advisor can also be consulted if a student has questions about pregnancy and/or parental leave.

Students with Disabilities
Carleton is strongly committed to providing access and accommodation for all individuals with identified and duly assessed disabilities. The university has a Senate-approved policy on academic accommodation that forms part of its human rights policy. The policy promotes efforts to accommodate students with disabilities so that they will have the opportunity to meet learning outcomes and be fairly evaluated in their performance. In no case, however, does academic accommodation negotiate away, lower, or remove the academic standards and learning outcomes of any course or program, rule, regulation, or policy at the university.
Some students with disabilities may require special accommodations for tests and exams. In these cases, students must present you with a signed accommodation form from the Paul Menton Centre detailing their accommodation needs well in advance of the date of an exam. A copy of the Paul Menton Centre accommodations policy can be found here.

Survivors of Sexual Violence
As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit carleton.ca/sexual-violence-support.

Accommodation for Student Activities
Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, see the policy.

Contacts

Equity Services
503 Robertson Hall
613-520-5622
equity@carleton.ca
carleton.ca/equity

Paul Menton Centre
501 University Centre
613-520-6608
pmc@carleton.ca
carleton.ca/pmc

Student Conduct:

The University has adopted a policy to deal with allegations of academic misconduct. This policy is expressed in the document Carleton University Academic Integrity Policy, effective July 1, 2006. The policy describes in detail its scope of application, principles, definitions, rights and responsibilities, academic integrity standards, procedures, sanctions, transcript notations, appeal process, and records implications.
The complete policy is available at: http://www2.carleton.ca/studentaffairs/student-rights-and-responsibilities/

Plagiarism:
Plagiarism is presenting, whether intentional or not, the ideas, expression of ideas or work of others as one's own. Plagiarism includes reproducing or paraphrasing portions of someone else's published or unpublished material, regardless of the source, and presenting these as one's own without proper citation or reference to the original source. Examples of sources from which the ideas, expressions of ideas or works of others may be drawn from include but are not limited to: books, articles, papers, literary compositions and phrases, performance compositions, chemical compounds, art works, laboratory reports, research results, calculations and the results of calculations, diagrams, constructions, computer reports, computer code/software, and material on the Internet.Project progress report 3 due

The University Senate defines plagiarism as "*presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one's own."* This can include:
- reproducing or paraphrasing portions of someone else's published or unpublished material, regardless of the source, and presenting these as one's own without proper citation or reference to the original source;
- submitting a take-home examination, essay, laboratory report or other assignment written, in whole or in part, by someone else;
- using ideas or direct, verbatim quotations, or paraphrased material, concepts, or ideas without appropriate acknowledgment in any academic assignment;
- using another's data or research findings;
- failing to acknowledge sources through the use of proper citations when using another's works and/or failing to use quotation marks;
- handing in "substantially the same piece of work for academic creProject progress report 3 duedit more than once without prior written permission of the course instructor in which the submission occurs."

Plagiarism is a serious offence that cannot be resolved directly by the course's instructor. The Associate Dean of the Faculty conducts a rigorous investigation, including an interview with the student, when an instructor suspects a piece of work has been plagiarized. Penalties are not trivial. They can include a final grade of "F" for the course.
(see: http://www2.carleton.ca/studentaffairs/academic-integrity and http://www.library.carleton.ca/help/avoid-plagiarism)

Other Important Locations on Campus:
Paul Menton Centre (501 University Centre) for students needing accommodation
Writing Services https://carleton.ca/csas/writing-services/ (4th Floor, Library)
Centre for Student Academic Support https://carleton.ca/csas/ (CSAS, 4th Floor, Library)

CLASS SCHEDULE/TOPICS (Subject to modification!!)

Month	Day	Topic	Assign.	Notes
Jan	12	01 – Introduction to the course, QGIS, Graphical modeler	1	
	19	02 – Python basics 1 – IDEs, variables, data types	2	
	26	03 – Python basics 2 – slicing, flow control, modules	3	Group projects assigned
Feb	02	04 – Python basics 3 – functions and scripts	4	
	09	05 – Python basics 4 – object-oriented paradigm	5	Project progress report 1 due
	16	READING WEEK – NO CLASS		
	23	06 – Project management		
Mar	02	07 – Geospatial libraries 1	6	Project progress report 2 due
	09	08 – Geospatial libraries 2	7	
	16	09 – Geospatial libraries 3	8	
	23	10 – Python debugging, error handling, version control		Project progress report 3 due
	30	11 – Google API/Earth Engine or TBD		
Apr	06	12 – TBD		Project progress report 4 due
	13	13 – Project Presentations		Project final report due