

Department of Geography and Planning
University of Toronto
GGR386 - Special Topics in Geographic Information Systems: Programming in GIS
COURSE OUTLINE
Fall 2019

Instructor: Kristian Larsen
Office: SS 5061
Office Hours: Thursday: 11:00am – 1:00pm
Email: kristian.larsen@utoronto.ca (will usually answer within 24 hours)

PREREQUISITE
GGR272

COURSE DESCRIPTION

This course will introduce students to the fundamentals of programming, followed by an applied focus on using these skills in geographic information systems. Students will learn how to programmatically edit spatial data, automate common processes, and conduct complex spatial analyses. Classroom time will be a mix of short lectures and laboratory exercises. Assessment will involve completion of six labs and a final exam.

RECOMMENDED PREPARATION

Students should be prepared to build on their GIS skills by learning how python can be used to complete analysis in GIS through coding. While not necessary, some coding experience would be an asset.

COURSE FORMAT

Most of this course will be spent in front of a computer learning and applying Python through laboratory exercises. Focus will be placed on developing basic programming skills using the Python language and applying those skills to various GIS problems. Typical exercises will involve a brief lecture introducing the tasks followed by lab time to complete the tasks. At the end of the labs, you may be asked to submit answers to relevant questions, some code and maps. You are encouraged and allowed to discuss and work together on the lab exercises, however all written assignments must be completed independently.

COURSE GOALS

- Learn the basic concepts of python programming
- Solve common GIS tasks using python
- Understand the integration of coding with ArcGIS

LECTURES

Thursday 1:00pm - 4:00pm, Location: SS 561

EVALUATION

Lab Assignments: 60%

Lab 1: 5%

Lab 2: 12.5%

Lab 3: 12.5%

Lab 4: 15%

Lab 5: 15%

Final Examination (during exam schedule): 40% (cumulative)

TA INFO

Amber DeJohn
amber.dejohn@mail.utoronto.ca

READINGS

The course text is available at the bookstore, and is also on reserve at the library:

Zandbergen PA. 2013. *Python Scripting for ArcGIS*. ESRI Press.

You will be assigned weekly readings from the course text. You are expected to have read the assigned materials prior to lecture. You will use what you learned in the readings to follow the in class lab exercises. The final exam will include questions to assess your ability to recall, define, and apply concepts and methods drawn from the assigned readings.

Consult the reading schedule included in this syllabus.

COURSE WEBSITE

q.utoronto.ca

Log in using your UTORid and password. All assignments will be submitted via quercus. The timestamp for submission will be used to determine whether the assignment is late.

EXAM

The final exam will be written during the exam period in December and will cover the content of the entire course. The final exam is designed to assess your comprehension and ability to apply foundational concepts and will be closed book.

ASSIGNMENTS

There will be **5 lab assignments** in this course. Assignments will be submitted electronically and due by 1pm on the due date.

ONLINE SUBMISSIONS FOR TERM WORK

It is every student's responsibility to ensure that their online submission is submitted successfully by the due date. Accommodations will not be made for unsuccessful submissions due to, but not limited to, i) the system timing out ii) submitting the incorrect document(s) iii) poor internet connection / no internet connection etc.

LATE PENALTIES

Late submission of assignments will result in a deduction of 10% per calendar day (weekends included) for a maximum of 7 days. If an assignment has been marked and handed back to the class, no other assignments will be accepted (even if it has not been 7 days).

IN CASE OF ILLNESS

Requests for deadline extensions must be made to the instructor within 5 business days after the deadline, and must be accompanied by an original copy of the official university medical form. Medical forms are accepted at the discretion of the instructor. U of T medical certificate is available online: <http://www.illnessverification.utoronto.ca/>

ACCESSIBILITY NEEDS

The University of Toronto is committed to accessibility. If you require accommodations or have any accessibility concerns, please visit <http://studentlife.utoronto.ca/accessibility> as soon as possible. Please follow up with the professor in private to ensure your needs are met. For other needs (i.e. Religious, Illness, etc.) please see the professor in private before the assignment or exam due date.

ACADEMIC INTEGRITY

All students are reminded of the seriousness of academic dishonesty of any form, particularly plagiarism. Plagiarism and other academic offences including false or altered medical forms, death certificates, or similar documents will not be tolerated. Students should also ensure they are submitting their own work and not that of others. Plagiarism is an academic offense at the University of Toronto. Plagiarism is quoting (or paraphrasing) the work of an author (including the work of fellow students) without proper use of citation. Quotation marks are required when using an author's words. Students also should not be submitting any academic work for which credit has previously been obtained or is being sought, without first discussing with the instructor. For more information, please refer to the universities Code of Behaviour on Academic Matters.

REMARKING REQUESTS

First consult the TA to re-review your assignment. If the TA is unable to assist then set up a meeting with the instructor. This must be completed within two weeks of returning the assignment. The same policy applies for the tests.

TECHNICAL PROBLEMS

This course uses computers, and there are many things can go wrong when using them. You are responsible for ensuring that you maintain regular backup copies of your files and schedule enough time when completing an assignment to allow for delays due to technical difficulties. Computer viruses, crashed hard drives, broken printers, lost or corrupted files, incompatible file formats, and similar mishaps are common issues when using technology, and are not acceptable grounds for an extension.

Lecture Schedule

NOTE: The following information offers a general outline of what will be covered in lecture. Depending on the background knowledge of the class we may accelerate through, or take more time on specific course topics.

COURSE TOPICS

Week	Date	Lecture	Lab		
			Reading	Assigned	Due
1	Sept. 5	Course Introduction About the class and instructor	Chapter 1	No labs	
2	Sept. 12	Foundational Concepts in Python Fundamentals and geoprocessing	Chapters 2, 3 and 4	Lab 1	
3	Sept. 19	Writing Scripts Geoprocessing and ArcPy	Chapter 5		
4	Sept. 26	Python with Spatial Data and Editing Data Using loops and SQL	Chapter 6, 7	Lab 2	Lab 1
5	Oct. 3	No lecture – work on Lab			
6	Oct. 10	Geometries and Spatial References Calculating geometry and geoprocessing	Chapter 8	Lab 3	Lab 2
7	Oct. 17	Raster Data Working with raster data in ArcPy	Chapter 9		
8	Oct. 24	Specialized Tasks The ArcPy mapping module	Chapter 10	Lab 4	Lab 3
9	Oct. 31	Debugging and Errors Common error codes and how to solve problems	Chapter 11		
	Nov. 7	NO CLASS READING WEEK			
10	Nov. 14	Creating Functions Scripts and packages	Chapter 12	Lab 5	Lab 4
11	Nov. 21	Creating and Using Script Tools Using custom tools	Chapters 13 and 14		
12	Nov. 28	Course Review Exam preparation			Lab 5

Notes:

1. The instructor may change the topic and content of the lectures at a later time.
2. All assignments will be assigned during the lectures. Each assignment will be digitally available through the course website (quercus) on the day of that week's lecture. No paper copies will be handed out.
3. The assignments are due 1pm – prior to class, except for Lab 5 which is due at the end of the lab section.