GEOG 264 Programming for Environmental Sciences

General Information

Term:	Fall 2023
Prerequisites:	None. However, students who have received credit for STAT 280 or for this topic under a GEOG 298 number may not take this course for credit.
Credits:	3
Class time:	Monday and Wednesday 8:45 AM – 10:00 AM
Class room:	H 431 SGW
Lab time:	Monday (Group A) or Wednesday (Group B) 10:15 AM – 11:30 AM
Lab room:	H 1267 SGW

Instructor Information

Name:	Hongyu Zhang
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	*Please email from your @concordia.ca account and use "**GEOG 264** – Email Topic" on the subject line.*
Office hours:	By appointment

Teaching Assistant Information

Name:	Cerine Madi
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Important Dates

Last day to register:	**Monday, September 18, 2023**
Last day to withdraw (refund):	**Monday, September 18, 2023**
Last day to discontinue (no refund):	**Tuesday, December 5, 2023**
Last day of in-class testing:	**Monday, November 27, 2023**
Final exams:	**December 6-19, 2023 (Avoid making travel arrangements until the final exam schedule is posted)**

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Course Overview
This course is an introduction to the fundamentals of computer programming relevant for environmental sciences. It presents the basic building blocks of computer programming, including data types, variables and constants; expressions and operators; assignments, control structures, simple library functions and programmer-defined functions. Students learn how to develop algorithms and how to convert algorithms/pseudo code into a programming language — specific syntax (e.g. R, Python) — to collect, query, preprocess, visualize and analyze environmental datasets.

Learning Outcomes
At the end of this course, you will have acquired the essential skills in basic programming. With knowledge learnt from this course, you will be well-equipped to pursue further learning independently. Moreover, you will gain proficiency in producing publication-quality graphics using the free program R. By mastering R, you will find the statistical aspects of your future classes considerably more straightforward and manageable.

Instructional Method
Lecture and laboratory

Expectations for Student Participation
Attendance in all classes is strongly encouraged for all students. Active participation in both class and lab discussions is highly recommended. Please note that attendance in labs is mandatory, and records of attendance will be maintained. Your engagement in the learning process will significantly contribute to your overall success in the course.

Recommended Course Materials
- *An Introduction to R* by Alex Douglas, Deon Roos, Francesca Mancini, Ana Couto & David Lussea, 2023.
- *R Programming for Data Science* by Roger D. Peng, 2022.
- A USB data stick is a convenient tool for transferring files between school and home computers.
- Ensure that your computer is equipped with the necessary software, such as **R, R Studio,** and **Git**, to access and utilize course resources effectively.

Using Your Own Computer
You do not need to have your own computer or laptop to participate in this course. The computer lab provides free access to computers for all students. However, if you do have a personal computer or laptop, you have the option to install the required software on it and use it at home. The labs will guide you through the process of installing and utilizing the necessary software.

Course Content

This course is an introduction to the fundamentals of computer programming relevant for environmental sciences. It presents the basic building blocks of computer programming, including: data types, variables and constants; expressions and operators; assignments, control structures, simple library functions and programmer defined functions. Students learn how to develop algorithms and how to convert algorithms / pseudo code into a programming language – specific syntax – to collect, query, preprocess, visualize and analyze environmental datasets. We will use the freely available language R because of its widespread use in the environmental sciences. Knowing how to program in R will allow you to make maximal use of R's statistical features. The programming techniques in R you will learn in this class are readily transferable to other programming languages such as Python and are very useful in GIS. Programming is an invaluable skill that you will be able to use for the rest of your professional lives, whether in academia or out of it. It also greatly increases your employability. No knowledge of R or computers is assumed. We will start from the beginning.

Table 1: Tentative Course Schedule

Week	Date	Description	Test Dates
1	Sept 5-11	Introduction	
2	Sept 12-18	Basic algorithms	
3	Sept 19-25	Data types and data structures	
4	Sept 26-Oct 2	Importing and exporting data	
5	Oct 3-10	Data frames	
	Oct 9-13	Mid-Term Break	
6	Oct 16-20	Graphs	Test #1 on Oct. 18
7	Oct 23-27	Functions	
8	Oct 30-Nov 3	Conditional statements	
9	Nov 6-10	Loops	
10	Nov 13-17	Scope and strings	
11	Nov 20-24	Simple statistics	Test #2 on Nov. 22
12	Nov 28-Dec 4	Version control	

Evaluation

Grading Scheme:

- Assignments   40%
- Test #1 & #2   20%
- Final exam   40%

To pass the course, you must obtain at **50%** over all **and** you must get at least **40%** on the final exam to pass. There will be ~6-7 homework assignments. They will not be of equal weight or difficulty. Also, not all parts of an assignment may be graded. However, you will not know beforehand what will or will not be graded. Therefore, you should assume that all parts will be marked to be safe. For all grade appeals (except for mathematical errors), wait at least 24 hours after receiving your mark.

Assignment Deadlines

Assignments hold a vital significance in this course as they are instrumental in helping you learn how to program effectively. The primary approach to mastering programming skills is through hands-on experience, sitting at a computer, and actively figuring out how to run code.

Please ensure that you submit your assignments promptly, adhering strictly to the specified time and location mentioned on the assignment sheets. In most cases, assignments will be due at the beginning of the lab session, though there might be exceptions. To accommodate unexpected circumstances, all students have a grace period for lab assignments of 5 days <u>total</u> to use how they see fit. For instance, each assignment could be one day late, or one assignment could be 5 days late without penalty (weekend days are counted as days). How you use these 5 days is up to you. My suggestion is to bank these days for when you truly need them (e.g., if you are sick). After this grace period, late submissions will incur a penalty of 10% of the possible final marks for each 24-hour period up to a maximum of 5 days (including weekends). A mark of 0% will be recorded if work is submitted more than 5 days late. Per day is defined each 24-hour period succeeding the allocated assignment deadline – not midnight. If solutions to the assignments are distributed or discussed, late submissions will not be accepted.

Keep in mind that the computers will likely experience heavy usage in the days leading up to assignment due dates. Procrastination should be avoided, and it's crucial not to leave everything until the last minute. Using computer unavailability or congestion as an excuse for late assignments is not acceptable. Taking a proactive approach and managing your time efficiently will ensure timely completion of your assignments.

Grading System

A+	90 - 100	B+	77 - 79	C+	67 - 69	D+	57 - 59	F	0 - 49
A	85 - 89	B	73 - 76	C	63 - 66	D	53 - 56	NR	No report
A-	80 - 84	B-	70 - 72	C-	60 - 62	D-	50 - 52		

Please note that for 200-level courses, instructors in the Department of Geography, Planning and Environment reserve the right to adjust the final reported grades so that under normal circumstances no more than 25% of students registered in a course receive an outstanding grade (A-, A, A+).

More information on university regulations concerning evaluation can be found [here](). The grading system is described in [section 16.1.11]() of the Undergraduate Calendar.

Class Cancellation
Classes are officially considered cancelled if an instructor is 15 minutes late for a 50-minute class, 20 minutes late for a 75-minute class, or 30 minutes late for longer classes.

Behaviour
All individuals participating in courses are expected to be professional and constructive throughout the course, including in their communications.

Concordia students are subject to the [Code of Rights and Responsibilities]() which applies both when students are physically and virtually engaged in any University activity, including classes, seminars, meetings, etc. Students engaged in University activities must respect this Code when engaging with any members of the Concordia community, including faculty, staff, and students, whether such interactions are verbal or in writing, face to face or online/virtual. Failing to comply with the Code may result in charges and sanctions, as outlined in the Code.

Intellectual Property
Content belonging to instructors shared in online courses, including, but not limited to, online lectures, course notes, and video recordings of classes remain the intellectual property of the faculty member. It may not be distributed, published or broadcast, in whole or in part, without the express permission of the faculty member. Students are also forbidden to use their own means of recording any elements of an online class or lecture without express permission of the instructor. Any unauthorized sharing of course content may constitute a breach of the [Academic Code of Conduct]() and/or the [Code of Rights and Responsibilities.]() As specified in the [Policy on Intellectual Property](), the University does not claim any ownership of or interest in any student IP. All university members retain copyright over their work.

University Regulations
Students should be aware of the following university regulations (see [Undergraduate Calendar]() for complete details).
- Late Completion of courses with "INC" notations – Procedures and Regulations ([Undergraduate Calendar 16.3.5]())
- Academic Re-evaluation ([Undergraduate Calendar 16.3.9]())
- Degree Requirements for BA, BSc, BEd – 24 credit rule and general education requirements for students in degree programs offered by Faculty of Arts & Science ([Undergraduate Calendar 31.003]())

Extraordinary Circumstances

In the event of extraordinary circumstances and pursuant to the Academic Regulations, the University may modify the delivery, content, structure, forum, location and/or evaluation scheme. In the event of such extraordinary circumstances, students will be informed of the changes.

Academic Integrity

Academic integrity means that every student must be honest and accurate in their work. The Academic Code of Conduct includes rules and regulations students must follow. Unacceptable practices include the following:

- Copy from ANYWHERE without saying from where it came.
- Omit quotation marks for direct quotations.
- Let another student copy your work and then submit it as his/her own.
- Hand in the same assignment in more than one class without permission.
- Have unauthorized material in an exam, such as cheat sheets, or crib notes. YOU DON'T HAVE TO BE CAUGHT USING THEM - JUST HAVING THEM WILL GET YOU INTO TROUBLE!
- Copy from someone else's exam.
- Communicate with another student during an exam by talking or using some form of signals.
- Add or remove pages from an examination booklet or take the booklet out of an exam room.
- Get hold of or steal an exam or assignment answers or questions.
- Write a test or exam for someone else or have someone write it for you.
- Hand in false documents such as medical notes, transcript or record.
- Falsify data or research results.

PLAGIARISM: The most common offense under the Academic Code of Conduct (see link below) is plagiarism, which the Code defines as "**the presentation of the work of another person as one's own or without proper acknowledgement**."

This could be material copied word for word from books, journals, internet sites, professor's course notes, etc. It could be material that is paraphrased but closely resembles the original source. It could be the work of a fellow student, such as an answer on a quiz, data for a lab report, or a paper or assignment completed by another student. It could be a paper purchased through one of the many available sources. Plagiarism does not refer to words alone. It can also refer to copying images, graphs, tables, and ideas. Plagiarism is not limited to written work. It also applies to oral presentations, computer assignments and artistic works. Finally, if you translate the work of another person into French or English and do not cite the source, this is also plagiarism. In simple words: DO NOT COPY, PARAPHRASE OR TRANSLATE ANYTHING FROM ANYWHERE WITHOUT SAYING FROM WHERE YOU OBTAINED IT!

Take care to inform yourself of the rules, regulations and expectations for academic integrity.

List of Student Services
[Academic Code of Conduct](#)
[Academic Integrity](#)
[Access Centre for Students with Disabilities (ACSD)](#)
[Advocacy and Support Services](#)
[Campus Services](#)
[Conduct on Campus](#)
[Counselling & Psychological Services](#)
[Dean of Students Office](#)
[Financial Aid & Awards Office](#)
[HOJO (Off Campus Housing & Jobs)](#)
[International Students' Office](#)
[Library Services](#)
[Library Citation and Style Guides](#)
[Ombuds Office](#)
[Otsenhákta Student Centre](#)
[Safety and Security](#)
[Sexual Assault Resource Centre](#)
[Student Academic Services](#)
[Student Health Services](#)
[Student Hub](#)
[Student Success Center](#)

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