1 ESS345 Computational Geology - 2019

Instructor: Ulrich G. Wortmann

TA: Payman Janbaksh

1.1 Class Times

Lectures: Mondays 09:00 — 12:00 and Wednesdays 09:00 — 11:00.

The First meeting is on Monday September 9^{th}

1.2 About this course

This course will introduce you to the basic principles of programming with python. In the second half of the course we will use actual data to explore every day tasks, e.g., to generate basic statistical data, clean up data, or produce simple graphical figures.

Note that coding is a practical skill which can only be learned by doing it. Therefore, this course is being taught as an inverse classroom, i.e., mots of the class time you will work on practical assignments. Additional assignments will be given as homework.

1.3 Learning Outcomes

- Basic python coding skills
- Working with Jupyter Notebooks
- Working with popular python libraries like pandas, or seaborn
- Manipulating actual data
- Understanding error messages
- How to ask for help
- Where to find help
- How not to give up

1.4 Recommended Reading

"Learn Python in one day and Learn It Well" by Jamie Chan. Not exactly a textbook, and you can do this course without, but you can get it for $16 on Amazon, and it surely will come in handy at times (especially if you want to go beyond the course content).

1.5 Marking Scheme

Type	%	Due Date
Attendance	10	cont.
Quizzes	20	cont.
Assignments	70	cont

1.6 Tentative Course Outline

1.6.1 What is a computer anyway?

1. Storing data in bits and bytes
   (a) Mapping numbers to transistors
   (b) Binary numbers and calculations
   (c) The von Neumann architecture
   (d) Assembler
   (e) Variables: Symbolic math versus programming
2. Elements of a program
   - Variables
   - Repetitions
   - Control statements
   - Comments

1.6.2 Interacting with your working environment

1. Understanding your file system
   - How is information stored

- What are files
- What are directories

In class assignment to map file system

2. First steps with Jupyter
    - Login
    - Directory creation
    - Upload a sample notebook (play with numbers)
    - Create your own notebook (as assignment)
    - Download your notebook
    - Submit your notebook

1.6.3 Elements of a program

1. Working with variables
    - Assignments
    - Differences between variables in symbolic math and computing
    - Error messages
    - Lists
    - Accessing elements of a list
    - List copy vs reference
    - Strings
2. Repetitions
    - for loops and indentation
    - while loops
3. Control statements
    - Comparison operators
    - AND and OR statements
4. Simple IO
    - Providing useful program output

- Receiving simple user input

5. The Programming process
    - Requirements (what it should do)
    - Specification (what it will do)
    - Algorithms & Code design (pseudo code)
    - Documentation
    - **Coding**
    - Testing
    - Debugging if testing fails
    - Release
    - Maintenance (documentation!)
    - Revisions (documentation!)
6. Understanding why it does not work
    (a) Reading error messages
    (b) Using the documentation
    (c) Using the internet
    (d) How to ask for help
7. Functions
8. Working with libraries
    (a) File I/O
        i. Pandas
            A. Simple Stats
            B. Clean up data
    (b) Graphical Output

1.7 Submission of Assignments/Missed Assignment policy

Unless agreed to otherwise, assignments are to be submitted via Quercus The deciding date is the time stamp when the assignment is received by Quercus.

If you require a deadline extension, you must request this in writing **before** the submission deadline. Note that extension requests longer than 5 business days must be made through your registrar

If you miss an assignment deadline, you must apply within 5 business days of the missed assignment using the Request for Exemption Form. If your petition is approved you will be pro-rated on the missed assignment/test (i.e,. be given a mark which is equal to your average course mark).

1.8 Plagiarism

Plagiarism is not allowed and will be dealt with according to the UofT guidelines. As 4th your students, I expect that you are well versed in the pitfalls of correctly attributing the ideas of others. If you are unsure, please come and ask how to deal with a specific situation before you submit your assignment. The course discussion board on the LMS is an excellent forum to do so. Please familiarize yourself with the Academic Integrity Resources provided by UofT: http://www.artsci.utoronto.ca/osai/students (lots of useful info, including information on what to do when you committed and offence. https://guides.library.utoronto.ca/plagiarism (excellent advice on how to prevent mishaps when using the works of others).

1.9 Writing Support

1.9.1 Support at the College level:

http://writing.utoronto.ca/writing-centres/arts-and-science/. The teaching approach of the college writing centres is described at http://writing.utoronto.ca/writing-centres/learning/.

1.9.2 UofT wide support initiatives:

http://writing.utoronto.ca. You can use the navigation bar or the search function to find pages relevant to your course. Ask your Prof for

recommendations where to start.

More than 60 Advice files on all aspects of academic writing are available at http://advice.writing.utoronto.ca.

A complete list of printable PDF versions are listed at http://advice.writing.utoronto.ca/student-pdfs/.

"How Not to Plagiarize" and other advice on documentation format and methods of integrating sources; these are listed in the section at http://advice.writing.utoronto.ca/using-sources/.

1.9.3 Writing Workshops

Please refer students to the Writing Plus workshop series, described at http://writing.utoronto.ca/writing-plus/.

1.9.4 English Language Learning program (ELL)

http://www.artsci.utoronto.ca/current/advising/ell.

The Communication Cafe, which meets weekly at five different times and locations for the first seven weeks of each term for practice with oral skills like class discussion and presentations.

Reading eWriting, an online program that helps students engage course readings more effectively. You can also find further instructional advice files for students and for classroom instruction on this site. For more information, please contact the ELL Coordinator Leora Freedman at leora.freedman@utoronto.ca