Physical & Environmental Sciences
UNIVERSITY OF TORONTO
SCARBOROUGH

WINTER 2022
GRADUATE COURSE OUTLINE

EES1137H Quantitative Applications for Data Analysis
Lectures: Tuesdays 10:30am - 12:00pm and Thursdays 11:00am - 12:30pm
Dr. Erik Spence, Dr. Alexey Fedoseev
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Office Hours: Tuesdays 12:00pm - 1:00pm (online)

COURSE DESCRIPTION
In this course data analysis techniques utilizing Python and R statistical language will be discussed and introduced, as well as the basics of programming and scientific computing.

COURSE OBJECTIVES
The goal of this course is to prepare graduate students to perform scientific data analysis. Students will be taught how to use statistical inference tools to gain insight into large and small data sets, as well as be exposed to cutting-edge techniques and best practices to store, manage and analyze data.

SCHEDULE
Introduction to command line and Linux.
Introduction to programming with R.
Programming best practises, functions, libraries, modular programming.
Data structures (vectors, matrices, arrays, data frames).
Software version control.
Basics statistics using R. (GLM, statistical tests, hypothesis testing).
Visualization of data, publication-quality figures.
Python Scientific Software Packages: NumPy and SciPy.
Machine learning techniques (classification algorithms, cluster analysis, neural networks).

EVALUATION
Final grade will be based on approximately-weekly assignments. Assignments will be graded on 10 points basis. Passing mark: 70% of combined final grade.

The evaluation will be carried out in accordance with the Graduate Grading and Evaluation Practices Policy (and how that policy is interpreted and applied in this Dept.) http://www.governingcouncil.utoronto.ca/Assets/Governing+Council+Digital+Assets/Policies/PDF/grading.pdf

VERIFICATION OF ILLNESS

A ***Verification of Illness*** **(also known as a "doctor's note") is temporarily not required.** Students who are absent from academic participation for **any reason** (e.g., COVID, cold, flu and other illness or injury, family situation) and who require consideration for missed academic work should report their absence through the online absence declaration. The declaration is available on **ACORN under the Profile and Settings menu.** Students should also advise their instructor *of* their absence. Visit COVID-19 Information for University of Toronto Students page on the Vice-Provost, Students website for information on this and other frequently asked questions.

EMERGENCY PLANNING

Students are advised to consult the university's preparedness site (http://www.preparedness.utoronto.ca) for information and regular updates regarding procedures relating to emergency planning.

ACCESSIBILITY NEEDS

The University of Toronto is committed to accessibility. If you require accommodations for a disability or have any accessibility concerns about the course, the classroom or course materials, please contact the UTSC Accessibility Services as soon as possible: http://www.utsc.utoronto.ca/~ability/
We also suggest you also refer to the following University of Toronto Scarborough Library link:
http://utsc.library.utoronto.ca/services-persons-disabilities

PLAGIARISM

University of Toronto Code of Behaviour on Academic Matters states that "it shall be an offence for a student knowingly: to represent as one's own any idea or expression of an idea or work of another in any academic examination or term test or in connection with any other form of academic work, i.e., to commit plagiarism."

For accepted methods of standard documentation formats, including electronic citation of internet sources please see the UofT writing website at http://advice.writing.utoronto.ca/using-sources/documentation.

The full Code of Behaviour regulations could be found from consulting
https://www.sgs.utoronto.ca/policies-guidelines/academic-integrity-resources/

WRITING AND ENGLISH LANGUAGE

As well as the faculty writing support, please see English Language and writing support at University of Toronto or the Centre for Teaching and Learning at UTSC.

The following is also useful:
Sylvan Barnett, *A Short Guide to Writing About Art*. 5-7th edition (New York: Harper-Collins, 1997)
William Strunk Jr., E.B. White. The Elements of Style (New York: MacMillan Publishing)

LATE WORK

Assignments will be graded on a 10 points basis. Late submissions will be accepted, with 0.5 penalty point per day off for late submission until the final cut-off date a week after the original due date of the corresponding assignment.

READINGS

Most of the material will be covered in class, providing additional references when needed. Any introductory material or book on basic programming, specially using R and Python, could be used as supplementary material. The main topics and references will be presented during the lectures and the presentations will be available on the course website: https://scinet.courses/1211

FINAL EXAM DATE (IF APPLICABLE)

N/A