



Physical & Environmental Sciences
UNIVERSITY OF TORONTO

SCARBOROUGH

WINTER 2018
GRADUATE COURSE OUTLINE

EES1137H Quantitative Applications for Data Analysis
Wednesdays and Fridays, 11:00-12:00
Dr. Erik Spence, Dr. Marcelo Ponce
ejspence@scinet.utoronto.ca, mponce@scinet.utoronto.ca
Wednesdays 12:30-14:30 (EV344)

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.

[Insert a description which is consistent with and expands upon the one available on the MEnvSc Program website through the following URL: <https://www.utoronto.ca/gradpes/master-courses-winter-2018>]

COURSE OBJECTIVES

The goal of this course is to prepare graduate students to perform scientific data analysis. Students will learn 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 (large) data.

SCHEDULE

Introduction to command line and linux.

Introduction to programming with R. IDEs and R standard console.

Programming best practises, functions, libraries, modular programming.

Data structures (vectors, matrices, arrays, data frames).

Software version control.

Basics statistics using R (GLM, regression methods, cluster analysis, decision trees).

Binary file input/output.

Visualization of data, publication-quality figures.

Generation of online and interactive plots.

Parallel techniques and distributed data analysis.

Python, different "Integrated Development Environments" (IDEs, eg. Canopy, Anaconda).

Numerics.

Scientific Software Packages: NumPy and SciPy.

Scientific Visualization.

Numerical Integration and Ordinary Differential Equations & Partial Differential Equations.

Data Analysis with Pandas.

EVALUATION

Final grade will be based on weekly/bi-weekly assignments. Assignments will be graded on 10 points basis. All assignments must be submitted. Passing mark: 70% of combined final grade.

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>

EMERGENCY PLANNING

Students are advised to consult the university's preparedness site (<https://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.uts.utoronto.ca/~ability/>

We also suggest you also refer to the following University of Toronto Scarborough Library link: <http://uts.utoronto.ca/services-persons-disabilities>

PLAGIARISM

University of Toronto code of Behaviour on Academic Matters states that "It shall be an offense 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://www.writing.utoronto.ca/advice/using-sources/documentation>

The full Code of Behaviour regulations could be found from consulting

<http://www.sgs.utoronto.ca/facultyandstaff/Pages/Academic-Integrity.aspx>

The University of Toronto has a site license that enables all faculty and students to use Turnitin.com

(<http://www.turnitin.com/>), a plagiarism prevention system. For more information on this service please consult <http://teaching.utoronto.ca/ed-tech/teaching-technology/turnitin/> **and students must be informed at the start of the course** that the instructor will be using Turnitin.com. The course syllabus must include the following statement:

WRITING AND ENGLISH LANGUAGE

As well as the faculty writing support, please see English Language and writing support at University of Toronto:

<http://www.sgs.utoronto.ca/currentstudents/Pages/English-Language-and-Writing-Support.aspx>

Students have commented that they found the latter address extremely helpful for writing term papers.

The following are 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 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

[Insert any references as required for the course. Confirm with faculty library that material is available, providing as soon as possible course readings and information on required materials.]

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 on the lectures and the presentations will be available on the course website:

<https://support.scinet.utoronto.ca/education/go.php/340/index.php>

FINAL EXAM DATE (IF APPLICABLE)

N/A

In special cases, when needed, we might schedule a make-up test.

For reference only.
Cannot be copied.
University of Toronto copyright.