



MASTER OF BIOTECHNOLOGY PROGRAM

Compulsory Course Component

MSC2011H

SPECIAL TOPICS IN
BIOMEDICAL
COMMUNICATIONS:
Coding in R Language

Sebnem Kuzulugil

Summer Term, 2022

MASTER OF BIOTECHNOLOGY

UNIVERSITY OF TORONTO MISSISSAUGA

MSC2011H – Special Topics in Biomedical Communications: Coding in R Language

Course Outline (Summer, 2022)

Class Location:	Maanjiwe nendamowinan Building, Room 2210 (MN-2210)
Class Times:	See Schedule below and iCal, Fridays 3:00PM-6:00PM (unless otherwise listed). Note that we have three online sessions.
Instructor:	Dr. Sebnem Kuzulugil
Office Hours:	Online, by appointment
Contact:	Sebnem.Kuzulugil@utoronto.ca

Course Description

The objective of this course is to help you learn how to think about coding, start programming in R and how to use R for effective data analysis. You will learn how to install and configure software necessary for a statistical programming environment and describe generic programming language concepts as they are implemented in a high-level statistical language.

The course covers an intensive, hands-on introduction to the fundamental programming skills required to start your journey to becoming a modern day data analyst such as programming in R, reading data into R, accessing R packages, writing R functions, debugging, profiling R code, and organizing and commenting R code.

The first hour of each meeting will have a more academic format. I will introduce the topic of the week, along with some examples, use cases and additional considerations as appropriate. The rest of the meeting is going to be dedicated to hands-on exercises, code snippet reviews and in-class assignments.

Learning to code is pretty much like learning a new language. Grammar (syntax) and writing (scripting) is very helpful, but not nearly enough. Reading what others have written (code review) is a very useful tool in learning how to say (script) what you mean to say in the most efficient manner. To help you get the most out of this course, I will ask you to conduct weekly code reviews on the work of your classmates.

You will have six assignments throughout the course. You should upload your scripts/links to your scripts on Quercus on a timely manner. I will then randomly pick, for each of you, a script to evaluate and comment. You are encouraged to praise good work and clever solutions, point out errors or inefficiencies, offer suggestions and make sure that the code runs reliably even with edge cases (e.g., incorrect user input). This code review is part of your assignment and will contribute towards 30% of your assignment grade.

As the midterm project, I will ask you to locate and load a dataset, wrangle it appropriately and apply some basic exploratory analysis on the dataset. This project ties loosely to the statistics/data science courses.

The final project will be a team project, in which you will be asked to apply most of what we have covered in class and combine it with some extra research to develop a tool/dashboard to solve a data analysis problem.

Course Material

You will find all the required readings and lecture notes on Quercus. Additional readings can typically be found online (for example, the UofT library website, CRAN website) or will be made available on Quercus as necessary. For the purposes of this course, Stack Overflow and Google will be very good companions.

Marking Scheme

The breakdown of the grade for the course will be as follows:

Assignments with code reviews.....	35%
Midterm Project	25%
Final Project	40%
TOTAL	100%

Other Resources

IMI Health & Wellness Resources: IMI graduate students have access to a variety of health and wellness resources which we encourage you to use at any time. The [IMI Embedded Counsellor](#) is a dedicated counsellor, through the HCC, available to meet with IMI students directly. Call 905-828-5255, share that you are an IMI graduate student, and ask for an appointment. You may also access [MySSP](#) (open 24 hours), the [Mental Health Wayfinder Tool](#), [Good2Talk](#) and the [UTM Health and Counselling Centre](#) at any time.

SCHEDULE OF ACTIVITIES

[CP] = Course Pack

Session	Date	Topic	Assignments
1	27-May 3:00-6:00PM	Introduction to the Course R environment and the basics	Reading materials: <ul style="list-style-type: none"> ○ Installation Guide (Please install R and RStudio IDE before class) ○ A (very) short introduction to R
2	30-May 3:00-6:00PM ONLINE	Getting and saving data	<ul style="list-style-type: none"> ○ Assignment 1 posted
3	3-Jun 3:00-6:00PM	Reproducible Research and Version Control	<ul style="list-style-type: none"> ○ Create your very own GitHub repos
4	7-Jun 5:30-8:30PM ONLINE	Programming I – Control Flow	<ul style="list-style-type: none"> ○ Assignment 2 posted
5	17-Jun 3:00-6:00PM	Programming II – Loops and Functions	<ul style="list-style-type: none"> ○ Assignment 3 posted
6	20-Jun 1:00-3:00PM ONLINE	Data Wrangling	<ul style="list-style-type: none"> ○ Assignment 4 posted
7	24-Jun 3:00-6:00PM	Tidy Programming	Midterm project posted
CANADA DAY HOLIDAY			
8	8-Jul 3:00-6:00PM	Cleaning Data	
9	15-Jul 3:00-6:00PM	Web Scraping	<ul style="list-style-type: none"> ○ Final Project posted
10	22-Jul 3:00-6:00PM	Data Visualisation – ggplot2	<ul style="list-style-type: none"> ○ Assignment 4 posted
11	29-Jul 3:00-6:00PM	Reporting Findings - Reports	<ul style="list-style-type: none"> ○ Assignment 6 posted
12	5-Aug 3:00-6:00PM	Reporting Findings - Dashboards	
	26-Aug		<ul style="list-style-type: none"> ○ Final Project due

Conduct of Classes

Full attendance, preparation and participation are required for all in-class sessions and group work. We recognize that there may be valid reasons of illness and other major circumstances which prevent full attendance. Due to the condensed nature of the course material and hands-on sessions, any absence could seriously impact on your ability to satisfy the program requirements. We ask that you phone or email the instructor in advance and upon your return, provide the instructor with written documentation supporting the reason for your absence.

Expectation for Online Courses

Students are expected to display tolerance and respect in all communication. Communicate with others the same way you would in a traditional classroom. Comments and language should be respectful and appropriate for a university community. All comments should also follow acceptable grammar and spelling.

Students in an online course will login as requested by the instructor. Maintaining a professional appearance and attire throughout the duration of the online classes is required.

Online students must be self-starters and have the maturity and motivation to work independently. It is recommended to use time wisely, be organized, self-directed and be willing to use new modes of communication and learning. Students in online classes must follow the timetable of the class strictly. Although it is an online class, it is still a classroom session and punctuality is a must. It is important to put in the needed time for classes, read all the required course material carefully, and actively participate in online class activities.

Procedures & Rules

MISSED TEST(S)/FINAL EXAM: A student that misses a test due to illness must submit a completed University of Toronto Student Medical Certificate (available at: http://www.utm.utoronto.ca/registrar/sites/files/registrar/public/shared/pdfs/medcert_web.pdf) to the Instructor or Program Office. Only the University of Toronto Student Medical Certificate will be accepted in support of petitions that cite illness as the reason for the request. Documentation concerning physician examinations must show that the physician was consulted on the day of the test date or immediately after, i.e. the next day. A statement from a physician that merely confirms a report of illness and/or disability made by the student is not acceptable. Documentation citing non-essential, preplanned medical procedures will not be acceptable. All documents must be originals and must be presented in person with a valid UofT student card within 72 hours of missing the test. Beyond 72 hours from the test date, further documentation of continued illness or disability will be required from a physician.

A student that misses a test due to domestic tragedy, at the discretion of the instructor, must provide acceptable documentation validating the explanation for absence. If a test is missed and the student does not provide acceptable documentation validating the explanation for absence, a grade of "0" may be assigned at the instructor's discretion.

If a test is missed and validating documentation is accepted the students are expected to write a make-up test. Students must contact the instructor immediately by phone or email to make arrangements.

LATE ASSIGNMENTS: Assignments and code reviews are due at the dates and times as listed in the course outline. **No assignments will be accepted late and a grade of ZERO will be given for that assignment.**

ACADEMIC MISCONDUCT: Students should note that copying, plagiarizing, or other forms of academic misconduct will not be tolerated. Any student caught engaging in such activities will be subject to academic discipline ranging from a mark of zero on the assignment, test or examination to dismissal from the university as outlined in the School of Graduate Studies academic handbook. Any student abetting or otherwise assisting in such misconduct will also be subject to academic penalties.

Students agree that by taking this course all required papers may be subject to submission for textual similarity review to Turnitin.com for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com web site.

Communication

LOGGING IN TO YOUR QUERCUS COURSE WEBSITE

Like many other courses, MSC2011H uses Quercus for its course website. To access the MSC2011H website, or any other Quercus-based course website, go to the UofT portal login page at: <https://q.utoronto.ca> and log in using your UTORid and password. Once you have logged in to the portal using your UTORid and password, look under the **Courses** menu item, where you'll find the link to the MSC2011H course website along with the link to all your other Quercus-based courses.

E-MAIL COMMUNICATION WITH THE COURSE INSTRUCTOR

At times, the course instructor may decide to send out important course information by e-mail. To that end, all UofT students are required to have a valid UofT e-mail address. You are responsible for ensuring that your UofT e-mail address is set up AND properly entered in the ROSI system.

Forwarding your utoronto.ca e-mail to a Hotmail, Gmail, Yahoo or other type of e-mail account is not advisable. In some cases, messages from utoronto.ca addresses sent to Hotmail, Gmail or Yahoo accounts are filtered as junk mail, which means that e-mails from your course instructor may end up in your spam or junk mail folder.

You are responsible for:

1. Ensuring you have a valid UofT e-mail address, properly entered in the ROSI system
2. Checking your UofT e-mail account on a regular basis.