Department of Mathematics & Statistics

Dsci 310

Mathematical Computation

Fall 2021

Professor Information

Professor:	Bevan Ferreira
Campus:	Kelowna
Offices:	Online only (Virtual Office in Zoom)
E-mail:	bferreira@okanagan.bc.ca
Office Hours:	Online, via Zoom, Teams or Collaborate, by appointment.

Section Information

Section:	001		
Class Times:	Mon	14:00 - 15:30	Online
	Wed	14:00 - 15:30	Online
	Fri	14:00 - 15:00	Online

Calendar Description

DSCI 310-3-4

Mathematical Computation

This course introduces some of the software commonly used by mathematicians and statisticians including R(and Rstudio), Excel and LaTeX. Students will learn techniques for dealing with data, databases and version control. No prior computer skills are required for this course; however, familiarity with computers is considered an asset. Students who have taken DSCI 110 for credit can not take DSCI 310 for further credit. (4,0,0)

Prerequisites:

- ABE MATH 012[1] or Principles of Math 12[2] or Pre-Calculus 12[2]
  or MATH 120 and 3rd or 4th year standing, or admission to the Okanagan College Post-Baccalaureate Diploma in Marketing and Data Analytics.

[1] minimum grade of 67 required
[2] minimum score of 67 required

Transfer Information

Please refer to the transfer guide, available online at http://www.bctransferguide.ca. Students are encouraged to save a copy of current transfer information for their own records.

Course Materials

The required text for this course is:

Hadley Wickham & Garrett Grolemund, **R for Data Science, 1st Edition**
O'Reilly, Dec 2016,
ISBN# 978-1-491-91039-9

Additional references and resources will be made available if and when needed.

Course Content

The following is a synopsis of probable course content:
We aim to cover most of the 24 chapters in the book, time permitting, but will ensure our focus is on the critical items that follow. We will cover: visualisation of data using the 'ggplot2' package, setting up and reporting a data analysis, managing and tidying data using the 'dplyr' package, and develop ablities with coding, debugging, function-building, and code management. We will examine various data types and structures using R, and lastly will build simple models and explore hypothetical potential outcomes of random experiments using R. We will make extensive use of the provided examples and exercises, as well as some additional data sets and techniques. In addition, we will, over the course of the semester, build skills with the Excel™ package as well, in order to fully support your learning of key data analytic skills.

Professionalism

Students must be aware that they should conduct themselves during the course **at all times** in accordance with the highest standards of professionalism and dedication to their craft. The modern workplace requires care and sensitivity to a variety of requirements that go beyond the mere production of calculated quantities. These requirements are usually represented in the working world in the form of performance evaluations, incident reports, and general assessments of a candidate's ongoing suitability for a position. Accordingly, students are strongly encouraged to steer well clear of any of the following:

- 'Snarky' or otherwise rude and belittling remarks in the class, or by email, either to your colleagues, or your professor
- Repeated requests for extensions on work due
- Poor attendance and/or participation
- Any and all appearances of plagiarism, or suspicions about your work. You must, at all times, give the appearance of the utmost trustworthiness and integrity in your work! It is your responsibility to be as transparent and forthcoming as possible, and to give confidence to any potential employer or client, that you are to be trusted with their sensitive and confidential data and analyses.

Learning Outcomes

The following are the anticipated learning outcomes of the course.

1. Demonstrate appropriate statistical and mathematical computations with R.
2. Use knitr and LaTeXto compile reporting and analysis of results.
3. Use Excel functionality to perform computations, and manipulate data where needed.
4. Use appropriate techniques for handling missing data.
5. Explain the implications of using databases.
6. Use repositories such as Github, or RStudioCloud, for effective version control.
7. Use basic programming skills to accomplish elementary computations.
8. Create visualizations of data in R using appropriate graphic packages.
9. Organize various data structures in R in support of computation.
10. Write and read data in R.
11. Use date and time objects with R.
12. Apply scoping rules in R.
13. Use Loops and functions in R to accomplish iterative computations.
14. Debug simple code in R.
15. Create simulations in R.

Course Evaluation

Your grade in this course will be broken down as follows:

Assignments	40%
Midterm Exam	30%
Final Exam	30%
Total	100%

- **Assignments** will consist of take-home computer-based work, and may also include Moodle-based timed quizzes. Late assignment submissions may be subject to penalties on a 'per diem' basis, at the discretion of your professor. Students are encouraged to collaborate, and consult on assignment work, however your final presented work must be your own, compiled and delivered *independently*. Plagiarism (in particular - but not necessarily only - **cutting and pasting another's work, computations, or code!**) into your own submission is a serious breach of the College Academic Integrity Policy, and will result in escalation to College administrative staff!
- The **Midterm Exam** will take place on the 27^{th} of October, 2021, during class time. In the event that this is not possible, you **must** notify your professor on or before Monday, the 20^{th} of September, 2021. Students will be expected to write their midterm exams using their camera, using only approved resources and specific software, in accordance with College Academic Integrity Policies.
- **The Final Exam** will be cumulative and held at a time and place set by the college. The final exam schedule is generally made available approximately half way through the semester.

Online Examination Policy

Some students may be selected for individual follow-up interviews after an Exam. Such students will be contacted via email after the examination and will be requested to participate in a short interview about their conduct and approach during the examination and how they arrived at specific answers they submitted. Any student whose activities during the exam attracted particular attention or suspicion from their invigilator will be more likely to be requested to participate in a post-exam interview.

Department Policies

- All written assignments are due at the start of class. All assignments not handed in within the first five minutes of class will be assigned a grade of zero.
- The math department does not give make-up exams nor does the department allow students to write exams out of time without a valid medical or compassionate reason.
- It is expected the student attends all classes. If a student misses a class, it is the student's responsibility to get the material covered in class from their peers.
- No students may change sections of a course after the final add/drop date. If students wish to switch sections after the first day of class but before the final add/drop date, they should consult the chair of the Math department in order to not lose grade progress.
- Failure to achieve a grade of at least 45% on the final exam of a course will result in a failing grade for the course.
- When a student fails a course as a result of failing to achieve a final exam grade of 45%, the maximum grade that will be awarded is 49%.
- Calculators used for exams will satisfy the department's calculator policy. For Dsci 310, students are allowed a non-programmable, non-graphing scientific calculator. Graphing calculators are permitted at discretion of instructor.
- There will be no formula sheet given for this course.

Important Dates

Statutory Holiday (no classes)	Mon., Sep. 6
Orientation day (no classes)	Tue., Sep. 7
Classes begin	Wed., Sep. 8
Last day to register	Fri., Sep. 17
Last day to receive a refund for course drop	Fri., Sep. 17
Last day to drop a course without a withdrawal being recorded on the student's record	Fri., Sep. 17
Statutory Holiday (no classes)	Thu., Sep. 30
Statutory Holiday (no classes)	Mon., Oct. 11
Last day to withdraw without academic penalty	Fri., Oct. 29
Statutory Holiday (no classes)	Thu., Nov. 11
No classes	Fri., Nov. 12
Last day of classes	Mon., Dec. 6
Final exam period	Wed., Dec. 8 - Sat., Dec. 18

Okanagan College Policies

Final Exam Policy: The procedures relating to final exams are significantly different than those that involve midterms. Final exam policy is determined by the college and a much more formal process is invoked should a student be unable to write the final exam. It is stated in the final exam policy that student travel plans are not a valid reason for writing an out-of-time final exam. As such, it is essential that you do not make travel plans prior to the final exam schedule being posted. The full final exam policy can be found at the following link.

http://webapps-5.okanagan.bc.ca/ok/Calendar/Examinations

The final exam schedule is determined by the Office of the Registrar and posted at the following link sometime around the middle of the semester.

https://www.okanagan.bc.ca/office-of-the-registrar/scheduling-office/scheduling-office#finalexam

Academic Integrity Policy: Okanagan College requires that all students are informed of the Academic Integrity Policy included in the College Calendar which can be found at the following link:

http://webapps-5.okanagan.bc.ca/ok/Calendar/AcademicIntegrity

College Student Conduct Policies: Okanagan College requires that students are informed of acceptable Student Conduct Policies included in the College Calendar which can be found at the following link:

http://webapps-5.okanagan.bc.ca/ok/Calendar/StudentConduct

Student Advising & Counselling

Accessibility Services collaborates with the academic departments of the college to arrange appropriate accomodation for students with a disability. If you require academic accomodation, please contact disability services. Contact, and other relevant information, can be found at:

https://www.okanagan.bc.ca/accessibility-services

Counselling Services has professionally trained staff that are available to assist students in coping with problem areas in their life (including: personal & career counselling, study skills) that interfere with maximizing their academic and social potential. For more information visit:

http://www.okanagan.bc.ca/counselling-services