Contents

Chapter 1

Tues Sept 12: Syllabus

1.1 Instructor Information

Instructor: Dr. Amy Hurford
Office: Teaching remotely
Email: ahurford@mun.ca
WebEx: https://mun.webex.com/meet/ahurford
Course website: https://ahurford.github.io/math-4190/

Availability: I will try to reply to emails within 24 hours (excluding evenings, weekends and holidays). I am always available during the lecture times. Please email to request a meeting for a different time. Please check my schedule and suggest a time I am free that works for you.

1.2 Course Information

TR 2-3.15pm meet on WebEx

Course description:
MATH 4190 Mathematical Modelling is intended to develop students' skills in mathematical modelling and competence in oral and written presentations. Case studies in modelling will be analyzed. Students will develop a mathematical model and present it in both oral and report form.

Course format:
Due to online teaching the course will be delivered as a 'flipped classroom'.

Course expectations:
Any students that are disruptive, violating university policies, or acting in a potentially unsafe way will be warned and asked to leave.

Learning goals:
I consider your completed assignments to be a portfolio of your knowledge in population and evolutionary ecology. You will also get some exposure to coding in `R`. It takes time to become proficient in a programming language, but the time you will spend coding in this class will help you towards becoming more proficient. The course content emphasizes a deeper understanding of fewer concepts. You have the opportunity to further explore a topic of interest to you for the final project.

Required Text and Resources:
The course materials are online at https://ahurford.github.io/BIOL-3295-Fall-2020/. In addition you will need a computer to install `R` and `RStudio`. This will be covered on Thursday Sept 17 (see Chapter **??**). Class announcements and WebEx links will be provided on the course BrightSpace and your assignments are to be submitted to BrightSpace.

1.3   Method of Evaluation

- 27 assignments (equal weighting) - 50%
- Midterm (due Fri Nov 6 at 5pm) - 15%
- Final Project (due Monday Dec 14 at 9am) - 35%

You should aim to complete each assignment before the next class, but assignments will be accepted, without penalty, up to a week later.

Late assignments, labs, and missed midterms, and final exams will be accommodated as described by University Regulation 6.7.3 and 6.7.5 (see https://www.mun.ca/regoff/calendar/sectionNo=REGS-0474 for Regulations).

1.4   Additional Policies

1.4.1   Accommodation of students with disabilities

Memorial University of Newfoundland is committed to supporting inclusive education based on the principles of equity, accessibility and collaboration. Accommodations are provided within the scope of the University Policies for the Accommodations for Students with Disabilities see www.mun.ca/policy/site/policy.php?id=239. Students who may need an academic accommodation are asked to initiate the request with the Glenn Roy Blundon Centre at the earliest opportunity (see www.mun.ca/blundon for more information).

1.4.2 Academic misconduct

Students are expected to adhere to those principles, which constitute proper academic conduct. A student has the responsibility to know which actions, as described under Academic Offences in the University Regulations, could be construed as dishonest or improper. Students found guilty of an academic offence may be subject to a number of penalties commensurate with the offence including reprimand, reduction of grade, probation, suspension or expulsion from the University. For more information regarding this policy, students should refer to University Regulation 6.12.

1.4.3 Equity and Diversity

A safe learning environment will be provided for all students regardless of race, colour, nationality, ethnic origin, social origin, religious creed, religion, age, disability, disfigurement, sex (including pregnancy), sexual orientation, gender identity, gender expression, marital status, family status, source of income or political opinion.

You should not photograph or record myself, teaching assistants, or other students in the class without first obtaining permission. Accommodation will be made for students with special needs.

The sound should be turned off on phones and computers during class.

1.5 Additional Supports

Resources for additional support can be found at:

- www.mun.ca/currentstudents/student/

- https://munsu.ca/resource-centres/

1.6 Tentative course schedule

The course schedule is found in the toolbar of the class materials, see https://ahurford.github.io/BIOL-3295-Fall-2020/.

The last day to drop the course without academic prejudice is Wednesday Nov. 4.

1.7   Handing in your work

1.7.1   Making figures to hand-in

The graphs you hand in need to have descriptive axeses and a figure caption. You may put these elements together using a word processing software such as *Microsoft Word*. Elements of a good figure caption:

- Has a label, i.e., "Figure 1",

- The first sentences provides a summary of what the figure shows, i.e., "The price of oranges has increased steadily since 1964",

- Provide all necessary information to understand everything in the figure, i.e., if the figure has no legend, but multiple line types/symbols, be sure to indicate what is represented by the different symbols. If the axes labels are overly brief due to space constraints in the graph, provide a more thorough description in the figure caption. If any assumptions have been made in making the figure, disclose these, i.e., a point that was excluded from the analysis due to being considered an outlier.

1.7.2   Writing R scripts to hand-in

To write your own R scripts follow the guidelines described in Chapter 7 Best Practices of *Quantitative training in Biology*. If you are asked to hand in your R script this means you need to submit an `.R` file on Brightspace.

Chapter 2

Quantitative skills laboratory

PURPOSE

1. To learn how to record data in electronic format
2. To learn how to write hypotheses as equations
3. To learn how to choose the appropriate visualizations
4. To learn how to make graphs using R Studio

Before coming to the laboratory:

1. If you have not already, install `R` and `RStudio`.

2. Before coming to the laboratory read:

- Introduction to R
- Making graphs in R
- Entering and loading data

EXERCISE 1. Data entry and graphing with a continuous independent variable