DALHOUSIE UNIVERSITY

Faculty of Graduate Studies Course Syllabus
Department of *Biology*
BIOL5062
Analysis of Biological Data
Fall 2021

Instructors: *Hal Whitehead* *hwhitehe@Dal.ca* *LSC3076*

Derek Tittensor *derek.tittensor@dal.ca* *LSC4089*

Office hours: *TBA (HW first half of course; DT second half); if set time does not work email instructors to set up time.*

Lectures: *Tues, Thurs 13:05-14:25*

Classroom: LSC 240

Laboratories: -

Tutorials: TBA

Course delivery: In person (unless university policies change)

Course Description

Biologists are increasingly using quantitative techniques to analyze larger and larger data sets. A command of the available analytical techniques is an important part of the set of skills which are expected of a trained biologist, especially those working in the broad area of ecology. The class will introduce techniques available for the analysis of biological data, including correlation, regression, multivariate, Bayesian and hierarchical methods. Emphasis will be on the practical use and abuse of these techniques rather than derivations or mathematical formulae; the idea being that students will learn a suite of approaches that will enable them to select suitable techniques for multiple data types. Students will explore real and realistic data sets, as well as simulated data.

Course Prerequisites/Restrictions

Prerequisites: Students should have familiarity with R, or some other statistical, command-line, programming language (e.g. Python, MATLAB; but support is only in place for R).

Course Objectives/Learning Outcomes

Knowledge of methods of analyzing biological data

Course Materials

DALHOUSIE UNIVERSITY

Brightspace site

Course Assessment

Component	Weight (% of final grade)	Date
Presentations		
Presentation of Type 2 analysis	*15%*	*18-30 Nov*
Assignments		
Report of analysis of data set 1a	*10%*	*5 Oct*
Report of analysis of data set 1b	*10%*	*12 Oct*
Report of analysis of data set 1c	*10%*	*19 Oct*
Report of analysis of data set 1d	*10%*	*26 Oct*
Report of analysis of data set 1e	*10%*	*16 Nov*
Description of data set 2 and proposed analysis	*5%*	*12 Oct*
Report of analysis of data set 2	*30%*	*7 Dec*

Other course requirements

Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

A+ (90-100)	B+ (77-79)	F (<70)
A (85-89)	B (73-76)	
A- (80-84)	B- (70-72)	

Course Policies

Papers must be sent in through Brightspace by 16:30 on due date

10% off for each weekday late, without medical or other legitimate excuse (use the *Student Declaration of Absence* form; up to 3 times in course)

Just put your B00.... number on paper

Single-spaced, 12pt or more font

Page limits do not include reference lists, figures, tables, etc.

If an assignment deadline is unavoidably missed, students may submit it later

No collaboration on assignments

Plagiarism detection software may be used

DALHOUSIE UNIVERSITY

Course Content

Introduction to data analysis and the course
Inference in Biology
R--a refresher
Correlation, and linear regression
Introduction to multivariate analysis and multivariate distances, association measures
Principal component analysis
Multivariate analysis with grouped units or grouped variables
Multivariate analysis of association matrices; Cluster analysis
Categorical Data: Contingency Tables and Log-Linear Models
Introduction to likelihood
Multiple linear regression and path analysis
Generalized linear models
Logistic regression
Bayesian data analysis using STAN
Hierarchical models
Simulating data to check your models and cross-validation
Diversity analysis, sampling effort, and bootstrapping
Analysing temporal data
Spatial data analysis and good modelling practice
Graduate presentations:
Graduate presentations:
Graduate presentations:
Graduate presentations:

University Policies and Statements

This course is governed by the academic rules and regulations set forth in the University Calendar and by Senate

Academic Integrity

At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student, you are required to demonstrate these values in all of the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity.
Information: https://www.dal.ca/dept/university_secretariat/academic-integrity.html

Accessibility

The Advising and Access Services Centre is Dalhousie's centre of expertise for student accessibility and accommodation. The advising team works with students who request accommodation as a result of a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (Canada and Nova Scotia).
Information: https://www.dal.ca/campus_life/academic-support/accessibility.html

DALHOUSIE UNIVERSITY

Student Code of Conduct

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner—perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution.

Code: https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html

Diversity and Inclusion – Culture of Respect

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness

Statement: http://www.dal.ca/cultureofrespect.html

Recognition of Mi'kmaq Territory

Dalhousie University would like to acknowledge that the University is on Traditional Mi'kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel and support. Visit or e-mail the Indigenous Student Centre (1321 Edward St) (elders@dal.ca).

Information: https://www.dal.ca/campus_life/communities/indigenous.html

Important Dates in the Academic Year (including add/drop dates)

https://www.dal.ca/academics/important_dates.html

University Grading Practices

https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html

Student Resources and Support

Advising

General Advising https://www.dal.ca/campus_life/academic-support/advising.html

Science Program Advisors: https://www.dal.ca/faculty/science/current-students/academic-advising.html

Indigenous Student Centre: https://www.dal.ca/campus_life/communities/indigenous.html

Black Students Advising Centre: https://www.dal.ca/campus_life/communities/black-student-advising.html

International Centre: https://www.dal.ca/campus_life/international-centre/current-students.html

Academic supports

Library: https://libraries.dal.ca/

Writing Centre: https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html

Studying for Success: https://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html

Copyright Office: https://libraries.dal.ca/services/copyright-office.html

Fair Dealing Guidelines https://libraries.dal.ca/services/copyright-office/fair-dealing.html

Other supports and services

DALHOUSIE UNIVERSITY

Student Health & Wellness Centre: https://www.dal.ca/campus_life/health-and-wellness/services-support/student-health-and-wellness.html

Student Advocacy: https://dsu.ca/dsas

Ombudsperson: https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html

Safety

Biosafety: https://www.dal.ca/dept/safety/programs-services/biosafety.html

Chemical Safety: https://www.dal.ca/dept/safety/programs-services/chemical-safety.html

Radiation Safety: https://www.dal.ca/dept/safety/programs-services/radiation-safety.html

Scent-Free Program: https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html

Dalhousie COVID-19 information and updates: https://www.dal.ca/covid-19-information-and-updates.html