
BIOL 343

Advanced Statistics for Biologists

Winter Term (2014-15)

CALENDAR DESCRIPTION

An in-depth exploration of the general linear model and its application to biological problems, with special emphasis on the open-source R software for analysis.

LEARNING HOURS 120 (36L;12T;12O;60P)

PREREQUISITE BIOL 243/3.0 or STAT 269/3.0.

SCHEDULE

Lectures: Monday 9:30-10:30am, Wednesday 8:30-9:30am, Thursday 10:30-11:30am. BIOSCI 1120 .
Tuts: See SOLUS for a list of various lab times. BIOSCI 2306.

Instructor	R. Montgomerie
Instructor Contact	mont@queensu.ca Phone: 613-533-6127
Office Hours	Weekdays 1400-1600
TA:	See Course Website
TA Contact Information	See Course Website
TA Office Hours	See Course Website

Learning Objectives

The goals of Biology 343 are to provide students with practical experience in the application of the general linear model to the analysis of biological data using R, and to develop general skills in the application and reporting of statistical analysis.

Learning Hours

<i>Teaching method</i>		<i>Average hours per week</i>	<i>Number of weeks</i>	<i>Total hours</i>
In-class hours	Lecture	3	12	36
	Seminar			
	Laboratory			
	Tutorial	1	12	12
	Practicum			
	Group learning			
	Individual instruction			
Other	Online activity	1	12	12
	Off-campus activity			
	Private study	5	12	60
Total hours on task				120

Course Outline

The main topics to be covered in this course are data visualization and the practical application of the general linear model (anova, regression, categorical data analysis) using R software and a variety of on-line tools. This course builds in the foundation provided in BIOL-243 (and equivalent courses) to give students considerable practical experience in data analysis and presentation. Students who are successful in BIOL-343 should be well prepared for the sorts of data analysis required in field courses, honours theses and graduate student research.

Proposed weekly schedule

w1	Intro to course and R
w2	simulations and resampling
w3	data vizualization
w4	general linear models (GLMs): intro to lm
w5	GLM: anovas
w6	GLM: regression and correlation
w7	GLM: categorical variables
w8	GLM: ancovas
w9	GLM: logistic regression
w10	intro to multivariates: regression, PCA
w11	nonparametric stats
w12	nonparametric stats

Textbooks/Readings

Whitlock M and Schluter D. 2009. The Analysis of Biological Data. Roberts and Co, Colorado. [New edition due out in 2015]

Grading Scheme

Component	Weight (%)	Date
quizzes	25	biweekly
assignments	50	biweekly
Projects	25	mid and end of term

Grading Method

- In this course, some components will be graded using numerical percentage marks. Other components will receive letter grades, which for purposes of calculating your course average will be translated into numerical equivalents using the Faculty of Arts and Science Letter Grade Input Scheme.

When letter grades are employed, the following scale will be employed for purposes of calculating your course average:

Arts & Science Letter Grade Input Scheme

Assignment mark	Numerical value for calculation of final mark
A+	93
A	87
A-	82
B+	78
B	75
B-	72
C+	68
C	65
C-	62
D+	58
D	55
D-	52
F48 (F+)	48
F24 (F)	24
F0 (0)	0

Your course average will then be converted to a final letter grade according to Queen's Official Grade Conversion Scale:

Queen's Official Grade Conversion Scale

Grade	Numerical Course Average (Range)
A+	90-100
A	85-89
A-	80-84
B+	77-79
B	73-76
B-	70-72
C+	67-69
C	63-66
C-	60-62
D+	57-59
D	53-56
D-	50-52
F	49 and below

Academic Integrity and Queen's Code of Conduct

Students are responsible for familiarizing themselves with the regulations concerning academic integrity and for ensuring that their assignments and conduct conform to the principles of academic integrity. Information is available in the Arts and Science Calendar (see Academic Regulation 1 - <http://www.queensu.ca/artsci/academic-calendars/regulations/academic-regulations>, on the Arts and Science website (see <http://www.queensu.ca/artsci/academics/undergraduate/academic-integrity>), and at Biology's website (<http://www.queensu.ca/biology/undergrad/integrity.html>) and from the instructor of this course. Departures from academic integrity include plagiarism, use of unauthorized materials, facilitation, forgery and falsification, and are antithetical to the development of an academic community at Queen's.

Given the seriousness of these matters, actions which contravene the regulations on academic integrity carry sanctions that can range from a warning or the loss of grades on an assignment to the failure of a course to a requirement to withdraw from the university.

Accommodation Policy, Exam Conflicts, and Other Conflicts

Students who feel they need accommodations for disabilities or extenuating circumstances, or have a conflict between exams or other commitments should consult the Biology Department's website for details about how to proceed (<http://www.queensu.ca/biology/undergrad/integrity.html>). In general, the earlier a course coordinator is apprised of an extenuating circumstance, the more likely an accommodation can be made. Students are encouraged to be proactive in anticipating difficulties, when it is possible to do so.

Students may apply to write a make-up or deferred exam if they have an exam conflict as defined in the Academic Regulations of the Faculty (See Arts and Science Calendar Regulation 8 - <http://www.queensu.ca/artsci/academic-calendars/regulations/academic-regulations>). In this case, the student should report to the Exams Office first to verify that there is a genuine exam conflict. Biology professors will not consider your situation to be a conflict unless it meets the criteria set out by the Faculty of Arts and Sciences.

Students may request a make-up or deferred exam if they have an exam conflict with off-campus travel associated with a field course (e.g BIOL-307/3.0 or 407/3.0) that is held during the fall or winter terms.

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Accommodation of Disabilities

Queen's University is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities to ensure they have an equitable opportunity to participate in all of their academic activities. If you are a student with a disability and think you may need accommodations, you are strongly encouraged to contact the Disability Services Office (DSO) and register as early as possible. For more information, including important deadlines, please visit the DSO website at: <http://www.queensu.ca/hcds/ds/>