

BIOL 243 – Introduction to Statistics for Biologists

Fall Term (2026-2027)

Instructor	See Course OnQ page
Instructor Contact	Email: BIOL243@queensu.ca ; discussion board on OnQ
Teaching Assistants	See Course OnQ page

Course Description

The purpose of this course is to improve your numeracy and critical thinking skills. To achieve this, you will learn how to make sense of raw data, how best to describe data to others, and how to test hypotheses using statistics. These quantitative skills can contribute to a deeper understanding of data relevant to your professional and personal life. The components of this course have been designed with care to maximize your opportunities to learn in an engaging and supportive environment. We look forward to exploring the world of statistics with you!

Learning Outcomes

After completing this course, students should have the knowledge and skills to do the following:

1. Identify the features of a data set to determine how best to summarize and display it.
2. Choose the appropriate statistical test and provide the rationale for selection.
3. Compute basic parametric statistical tests to test hypotheses.
4. Interpret the results of statistical tests and data software output to draw valid conclusions.
5. Communicate results of statistical analyses with clear figures and text.
6. Apply knowledge of statistics and research design to critically evaluate research findings.

Course Materials and Technologies and Missing Assignments

Resource	Type	Access	Further Information
Online Textbook	"Taking the Anxiety out of Statistics"	https://he.kendallhunt.com/product/taking-anxiety-out-statistics (\$55 USD)	Mandatory! Not at Queen's library
Software Skills Guide	Website modules	OnQ	Preparation for tutorials and R test
Qlicker	Website	https://qlicker.queensu.ca/	Active-learning tool
Lectures and Tutorials	In-person	Location provided in SOLUS	

All other course materials will be provided online via OnQ

Weighting of Assessments

Component	Weight (%)	Date
Midterm	15%	Week 7
R Skills Test	15%	Week 12
Final exam	30%	TBD (Dec 10-23)
Weekly Quizzes	10%	Weekly
In-class Participation (Qlicker)	5%	Every lecture
Tutorial Assignments	25%	Weekly (with exceptions)

Assessments and Activities Description

Midterm – 15%

The midterm will cover material for the first half of the course (weeks 1-6, inclusive). The test will consist of multiple choice and short answer questions. The midterm will cover material from the eBook modules, lectures, module practice problems, and some components of the tutorials and software skills guides. Any student with approved QSAS accommodations will have their accommodations managed by the exams office (via Ventus). The midterm will be written in person during the tutorial timeslot of week 7. You will be allowed to use a calculator.

R-Skills Test – 15%

The R-Skills Test is an in-person, timed, computer-based test designed to evaluate your skills in Microsoft Excel and RStudio based on what you have learned in the Software Skills Guides and Tutorials. Invigilation will be used to restrict the use of the internet to the context of approved programs/sites (ie: course OnQ site, course text book, R/RStudio). It is the responsibility of the student to ensure that they bring a reliable, fully charged computer (with internet connection). Students are advised to bring a power cord in case charging is required, but should not expect that there will be sufficient power outlets for all students to charge. The R Term Test will be written in week 12.

Final Exam – 30%

The Final Exam is three hours in length and includes multiple-choice and short answer questions based on the material from the entire term, including all e-book modules, lectures, module practice problems and components of the tutorials and software skills guides. This final exam will be scheduled by FAS, during the exam period (Dec 10-23). Any student with approved QSAS accommodations will have their accommodations managed by the exams office (via Ventus). If you cannot write the final exam and have an approved academic consideration, you will be required to write a deferred exam during the deferred exam period specified by the exams office. The final exam is cumulative, but will cover the second half of the course in more detail than the first. You will be allowed to use a calculator.

Weekly Quizzes – 10%

There are 11 quizzes, each open for a week (see Timeline for dates and times). The quizzes will consist of multiple-choice questions or fill in the blank questions based on the weekly material from

e-book modules, lectures, self-assessments and the software skills guide. You can take the quiz up to 5 times. Your highest mark will be recorded as your mark for the quiz.

In-Class Participation – 5%

There are in-class Qlicker questions that count for participation during the 12 class lectures. Students who attend and actively participate in at least 11 classes will be eligible to receive the full 5%. This allows for 1 absence without penalty. Students who attend fewer than 11 classes will earn participation credit proportionally, based on the number of classes attended and participated in.

Tutorials - 25%

There are 10 in-person tutorial activities in the course, 9 of which are graded (lowest grade is not dropped for tutorial activities. The first tutorial is ungraded). Each of these are completed in a group of 3-4 students. The tutorials are performance-based activities designed to provide the opportunity for students to combine theoretical and skills-based concepts from modules and software skills guides. Statistical analyses are performed to test scientific hypotheses. Tutorial descriptions are open ahead of time so that you can familiarize yourself with the topic before coming to tutorial.

Please note the following important policies related to group tutorials. You will be assigned to a tutorial group within your section for the semester. You must attend the tutorial that you signed up for and work with your group to receive a grade. If you attend a tutorial that you did not sign up for, you will receive a grade of zero (even if you completed the tutorial activity). You must have attended the tutorials to submit a report. If you are absent and have an approved academic consideration, your tutorial grades will be redistributed over the tutorials for which you were present.

Lectures

Lectures will be presented live at the designated lecture time (Tuesday: 1:30PM-2:20PM). Slides will be posted before each lecture. Students are expected to attend lectures (content knowledge will be required for assessments).

Absences and Missing Assignments

Please refer to the Step-by-step procedures for Academic Accommodations and Considerations document on the Course Home page.

Tutorial Assignments: Tutorial reports / R scripts are due at the end of your scheduled tutorial. Late reports will not be accepted. A 30 min grace period is set in OnQ to compensate for any technical issues in submission; it is the responsibility of each student to confirm that their group tutorial report has been successfully submitted.

Midterm, R-Skills Test, and Final Exam: If you miss a test (Midterm, R-Skills Test or Final Exam) you must apply for academic consideration to be eligible to write a deferred test at a later date. If you are also unable to write a deferred Midterm, the weight of the test will be transferred to the final exam. Deferred tests may not follow the same structure as the original test, and may consist of more short answer questions.

Quizzes: Quizzes in OnQ must be conducted during the window provided, unless you have an approved academic consideration. Note that principles of universal design have been built into the quizzes so extra time will not be provided and no extensions will be granted.

Your lowest quiz grade will automatically be dropped, so if you miss one quiz you do not need to apply for academic consideration. If you miss more than one quiz you must apply for academic consideration to have that quiz grade exempted. Your quiz can only be exempted if your academic consideration spans the duration of the quiz window (e.g. if you are ill for only one day while the quiz is running you will not be eligible for an exemption). Up to 2 quizzes may be exempted, in addition to the one that will be automatically dropped. After that, the weight of any missed quizzes will be transferred to the final exam.

Contacting the Teaching Team

The teaching team contact information is located on the Homepage of the course (see “Teaching Team”). Please use the course email BIOL243@queensu.ca and/or OnQ Discussion Forums to contact the teaching team.

For general questions about the course, please post to the Course Questions Forum, (located under Help in the navigation bar). For questions about course content (lectures, quizzes, etc) please post to the Course Content Forum (located in the Communications tab). Feel free to help answer your peers’ questions on these forums. Most questions are answered within 24 hours (Monday - Friday).

Please use your Queen’s email for inquiries that are more personal in nature, or for issues such as academic accommodations or marking. If you need to have a more detailed conversation, please contact your instructor.

Queen's Email

The university communicates with students via Queen's email. Please check your email regularly to ensure you do not miss important information related to your course.

Grading

All components of this course will receive numerical percentage marks. The final grade you receive for the course will be derived by converting your numerical course average to a 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

Etiquette

You are expected to maintain respect in your dealings with fellow students and the teaching team in any course. The following guidelines are a reference to guide your online communication in this course. Make a personal commitment to learn about, understand, and support your peers.

1. Give others the benefit of the doubt.
2. Ensure your writing is respectful and inclusive.
3. Recognize and value the experiences, abilities, and knowledge that each person brings.
4. Carefully re-read your writing before posting or sending to others.
5. It's okay to disagree with ideas, but personal attacks will not be tolerated.

Copyright

Course materials created by the course instructor, including all slides, presentations, handouts, tests, exams, and other course materials are the intellectual property of the instructor. It is a departure from academic integrity to distribute, publicly post, sell, or otherwise disseminate an instructor's course materials or to provide an instructor's course materials to anyone else for distribution, posting, sale, or other means of dissemination, without the instructor's consent. A

student who engages in such conduct may be subject to penalty for a departure from academic integrity and may also face legal consequences for infringement of intellectual property rights.

Accessibility/Accommodations

Queen's University is committed to achieving full accessibility for all students. 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. The Senate Policy for Accommodations for Students with Disabilities was approved at Senate in Nov 2016.

If you are a student with a disability and think you may need academic accommodations, you are strongly encouraged to contact the Queen's Student Accessibility Services (QSAS) and register as early as possible. For more information, including important deadlines, please visit the QSAS site.

To register your academic accommodation for this course, please select the Accommodations button on the course homepage and follow the instructions.

Note that principles of universal design have been built into the quizzes and tutorial assignments so extra time will not be provided and no extensions will be granted. Individual extra time accommodations will be applied to the midterm tests and final exam.

Academic Considerations for Students in Extenuating Circumstances

Queen's University is committed to providing academic consideration to students experiencing extenuating circumstances that are beyond their control and are interfering with their ability to complete academic requirements related to a course for a short period of time. [Click here to view the Senate Policy on Academic Consideration for Students in Extenuating Circumstances.](#)

Please see the Academic Consideration Requests button on the course homepage to apply for an academic consideration in this course. Note that you will be taken to the student request portal where you will be required to provide the name and email address of the instructor/coordinator. For this course, please be sure to use the following email address: biol206@queensu.ca.

For more information about missing an assessment, please refer to the section "Assessments and Activities Description".

Academic Integrity

Academic integrity is constituted by the six core fundamental values of honesty, trust, fairness, respect, responsibility, and courage.

Students are responsible for familiarizing themselves with the regulations concerning academic integrity and for ensuring that their assignments conform to the principles of academic integrity. Information on academic integrity is available in the Arts and Science Calendar (see Academic Regulation 1), on the Arts and Science website, 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 regulation 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.

Agentic AI

Agentic AI refers to tools that act autonomously on your behalf, including tools that log into systems, navigate platforms, or complete multi-step tasks without your continuous direction.

The use of agentic AI tools to complete or submit academic work on your behalf is **not permitted** in this course. This restriction applies regardless of any course-specific permissions granted for the use of generative AI. Such use falls within the definitions of unauthorized content generation and contract cheating in the [Academic Integrity Procedures](#). You should not authorize any third-party application or tool to access institutional systems using your Queen's credentials.



Course Schedule

Week	Lecture Topic	Module Topic	Software Skill Guide Topic	Tutorial Topic *
1	Populations, samples, units	Anatomy of a Statistical Study	Getting Started with Excel & R	Installing Software
2	Sample, study designs	Study Designs & Sampling	Working with Data	Anatomy of a Statistical Population
3	Descriptive statistics	Descriptive Statistics	Calculating Descriptive Statistics	Variables and Descriptive Statistics
4	Visualization	Visualizations	Visualizations	NO TUTORIAL - catch up and review!
5	Probability	Probability	Calculating Probabilities	Data Visualization
FALL BREAK				
6	Sampling distributions	Sampling Distributions	Confidence Intervals	Probability and Distributions
7	Review	MIDTERM		
8	Hypothesis / T-tests	Hypothesis Testing & T-tests	T-tests	Sampling Distributions and CI's
9	Chi squared	Chi-Square Test	Chi-Squared Tests	Hypothesis Testing / T- tests
10	Linear regression	Linear Regression	Correlation and Linear Regression	Chi-squared Test
11	ANOVA	Single-Factor ANOVA	Single-Factor ANOVA	Linear Regression
12	Two-factor ANOVA	Two-Factor ANOVA	Two-Factor ANOVA	Single-Factor ANOVA
13	R test – Tuesday Week 13 (Wednesday schedule)		* For all weeks (except Wk 2 and 3) the Tutorial is based on the previous week's Software Skill	