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Course Information

General Course Information

Course: BIOL243
Course title: Introduction to Statistics
Pre-requisites: NA
Semester and year: F2025
Number of credits: 0.5
Learning hours: ~9 hours per week

- Online Lesson: 2-4.5 hours (as needed)
- Lecture: 1 hour
- Tutorials: 1.5 hours
- Software Guides: 1 hour
- Additional Practice: as needed

Modality (on campus, blended, or online): Blended: In person class, tutorial, help + online modules (ebook/OnQ)
Classroom accessibility:
https://www.queensu.ca/classrooms/sites/tlswww/files/uploaded_files/Biosciences%201101.pdf
https://www.queensu.ca/classrooms/sites/tlswww/files/uploaded_files/Dunning%20Hall/Photo%20Docs/Dunning%20Hall%2010.pdf

Welcome to Introduction to Statistics

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!

Topics

Week	Module	Topic
1	Module 0	Course Overview
2	Module 1	Anatomy of a Statistical Study
3	Module 2	Study Designs and Sampling
4	Module 3	Descriptive Statistics
5	Module 4	Visualizations
6	Module 5	Probability
7	Module 6	Sampling Distributions
8	Module 7/8	Hypothesis Testing and T-Tests
9	Module 9	Chi-Square Test
10	Module 10	Linear Regression
11	Module 11	Single-Factor ANOVA
12	Module 12	Two-Factor ANOVA

Course 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 (e.g., sampling) to critically evaluate research findings.

Important University Dates

Please visit the Faculty of Arts and Sciences Sessional Dates website for all academic deadlines.

Inclusion

Land Acknowledgement

Let us acknowledge that Queen's University occupies traditional Anishinaabe and Haudenosaunee territory. To acknowledge this traditional territory is to recognize its longer history, one predating the establishment of the earliest European colonies. It is also to acknowledge this territory's significance for the Indigenous Peoples who lived, and continue to live, upon it and whose practices and spiritualties are tied to the land and continue to develop in relationship to the territory and its other inhabitants today. Indigenous communities in Kingston/Katarokwi continue to reflect the area's Anishinaabe and Haudenosaunee roots. There is also a significant Métis community and First Peoples from other Nations across Turtle Island present here today. To read more about the history of the land, see the Queen's Encyclopedia and to learn more about land acknowledgements, see the Office of Indigenous Initiatives.

Equity, Diversity, and Inclusivity Statement

Queen's University recognizes that the values of equity and diversity are vital to and in harmony with its educational mission and standards of excellence. It acknowledges that direct, indirect, and systemic discrimination exists within our institutional structures, policies, and practices and in our community. These take many forms and work to differentially advantage and disadvantage persons across social identities such as race, ethnicity, disability, gender identity, sexual orientation, faith, and socioeconomic status, among other examples. In this class I will work to promote an anti-discriminatory, anti-racist and accountable environment where everyone feels welcome. Every member of this class is asked to show respect for every other member. We are committed to continual examination of our practices and ongoing change to improve equity, diversity and inclusion in our community.

Building a Classroom Community

University is a place to share, question, and challenge ideas. Each student brings a different set of lived experiences. You can help to create a safer, more respectful classroom community for learners by following these guidelines:

- Make a personal commitment to learn about, understand, and support your peers.
- Assume the best of others and expect the best of them.
- Recognize and value the experiences, abilities, and knowledge each person brings to the course.
- Acknowledge the impact of oppression on other people's lives and make sure your words and tone are respectful and inclusive.
- Encourage others to develop and share their ideas.

- Pay close attention to what your peers say/write before you respond. Think through and re-read what you have written before you post online or send your comments to others.
- Be open to having your ideas challenged and challenge others with the intent of facilitating growth.
- Look for opportunities to agree with one another, building on and intentionally referencing peers' thoughts and ideas; disagree with ideas without making personal attacks, demeaning, or embarrassing others.

Fostering Accessibility

All of us have a shared responsibility for reducing barriers to learning and fostering accessibility and promoting meaningful inclusion of those with disabilities. The Accessibility Hub at Queen's University's Human Rights & Equity Office offer a host of tutorials that provide us all with practical tips for:

- creating accessible documents, e.g., to submit to your teaching team or share with peers in peer feedback activities/in a presentation,
- emails, e.g., while communicating with group members or your teaching team, and
- meeting practices (e.g., in tutorials/labs/seminars or virtual meetings.

Name/Pronoun

If, for whatever reason, you wish to change how your name appears in onQ and/or on class lists, please follow these steps. You may also use this process to add your pronouns to the appearance of your name.

1. Log into SOLUS.
2. Click on Personal Information tab.
3. Click on the Names tab
4. Click on the Add New Name tab
5. Choose Preferred from the Name Type drop down menu
6. Enter the name you would like to appear in onQ and/or on class lists.
7. Click Save.

Please allow 24 to 48 hours for your name to be registered within the system. If you have further questions or concerns, please contact ITS at Queen's University.

Course Materials & Technologies

Other Required Materials

Resource	Resource Type	Access	Cost	Further Information
'Qlicker' account	Website	https://qlicker.queensu.ca/	0	Active-learning tool
Software Skills Guide	Website	OnQ	0	Preparation for tutorials and R term test

Required Course Textbooks

Course Textbooks	Edition (s)	Publisher	For Purchase	Cost	At Queen's Library?
"Taking the Anxiety out of Statistics"	1	Kendall Hunt	https://www.khpcontent.com	$55.13 **USD**	No

Notice of Recording

Classes are in person but may be recorded. Steps have been taken by the University to configure these platforms in a secure manner. Classes will be recorded with video and audio (and, in some cases, transcription) and will be made available to students in the course for the duration of the term. The recordings may capture your name, image or voice through the video and audio recordings. By attending these live classes, you are consenting to the collection of this information for the purposes of administering the class and associated coursework. If you are concerned about the collection of your name and other personal information in the class, please contact the course instructor to identify possible alternatives.

To learn more about how your personal information is collected, used and disclosed by Queen's University, please see the Notice of Collection, Use and Disclosure of Personal Information.

Copyright of Course Material

Course materials created by the course instructor, including all slides, presentations, handouts, tests, exams, and other similar 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 express consent. A student who engages in such conduct may be subject to penalty for a departure from academic integrity and may also face adverse legal consequences for infringement of intellectual property rights.

Communication

Questions about the Course and Contacting the Teaching Team

The teaching team contact information is located in the Teaching Team widget on the homepage of the course.

This syllabus outlines all key course components and is your 'first stop' when seeking course details. If you have questions about course material you should bring those to the student help session or post them to the Weekly Course Questions Forum online forum. Feel free to help answer your peers' questions on this forum. Most questions are answered within 24-48 hours. There is also a FAQ page located in onQ that answers some frequently asked questions.

For inquires that fall outside of the above and extenuating circumstances please reach out at course email: BIOL243@queensu.ca

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.

Course Feedback

At various points during the course, I may ask you to take part in a variety of feedback activities, such as surveys and questionnaires. This feedback enables my teaching team and me to make any adjustments necessary to improve your learning environment. Additional feedback may be requested throughout the course. All surveys are anonymous and are directly related to activities, assessments, and other course material.

Assessments

Weighting and Alignment with Course Learning Outcomes (CLOs)

Assessment	Alignment with CLOs	Weighting
Clicker Qs (in class)	1-4, 6	5%
Weekly Quizzes	1-4	10%
Tutorial Activities	1-5	25%
Term Test	1-4, 6	15%

R Term Test	1-5	15%
Final Exam	1-5, 6	30%
Total		100%

Descriptions of Learning Activities and Assessments

Weekly Quizzes

There are 10 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, self-assessments and the software skills guide (when applicable). You can take the quiz up to 5 times. Your highest mark will be recorded as your mark for the quiz.

Tutorial Activities

There are 10 in-person tutorial activities in the course, 9 of which are each graded (lowest grade is not dropped for tutorial activities). 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. A wide variety of datasets are used to help you see the utility of statistics. Tutorial descriptions are opened 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.

Term Test

A term test will cover material for the first half of the course (weeks 1-6, up to module 5). The test will consist of multiple choice and short answer questions (the same format of the final exam). The term test will cover material from the eBook modules, lectures, module practice problems and elements of the tutorials. Any students with approved QSAS accommodations will have their accommodations managed by the exams office (via Ventus).

R Term Test

The Software Skills Term 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 preceding 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. There is one R Term Test written in week 10.

Final Exam

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 elements of the tutorials. Any students 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.

Proctored Exams

Timing of Final Examinations
Once the exam schedule has been finalized, the exam date will be posted on your SOLUS account. The exam dates for each term are listed on the Faculty of Arts and Science webpage under "Important Dates." Student exam schedules for the Fall Term are posted on SOLUS immediately prior to Thanksgiving and on the Friday before Reading Week for the Winter Term. Students should **delay finalizing any travel plans until after the examination schedule has been posted**. Exams will **not be moved or deferred** to accommodate employment, travel/holiday plans or flight reservations. For information regarding what is considered extenuating circumstances and qualifications for Academic Consideration, please visit the Faculty of Arts and Science's Academic Consideration webpage.

If you are unable to attend an exam and receive approval for a deferred proctored exam, a further deferral of that exam will not be accommodated.

Assignment Submission Policy

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.

Policy Review of Graded Work

Grades on assessments are allocated based upon demonstrated mastery of the materials and skills as evaluated by the instructor/TAs.

All assignments and learning activities will be graded by the teaching team in line with established marking practice.

A student who believes grade(s) on an assessment is in error or inaccurate should request a regrade by submitting the assessment to the appropriate assignment submission folder (linked under "Assignments" in the NavBar) with a written explanation as to why your work deserves a different grade than assigned.

The regrade will stand as the final mark, even if it is lower than the original mark.

Policies

Class Attendance

Your presence and participation in class contributes to the knowledge and skills that you will develop throughout this course. I expect that you attend class regularly, participate in class conversations and learning activities. These types of activities provide active engagement, promote a deeper understanding of the course content, and contribute to your success in this course.

Academic Support

All undergraduate students face new learning and writing challenges as they progress through university: essays and reports become more complex; effectively incorporating research into writing becomes more important; the types of assignments become more diverse; managing your time and developing the skills you need to read and think critically gets more challenging. I encourage students to contact Student Academic Success Services (SASS). SASS offers many different ways to receive support:

- Free online or in-person appointments to get personalized support on writing and academic skills from expert staff and trained peers.
- Workshops and drop-in programs. SASS' Events Calendar lists events coming soon.
- Online resources that provide strategies for academic skills and writing development at university.
- If English is not your first language, SASS has specific resources for English as Additional Language students, including weekly programs and EAL academic skills appointments. You can meet on an ongoing basis with an EAL consultant to work on your academic writing, speaking, listening, and reading skills.

Accommodations for Disabilities

Queen's University is committed to working with students with disabilities to remove barriers to their academic goals. Queen's Student Accessibility Services (QSAS), students with disabilities, instructors, and faculty staff work together to provide and implement academic accommodations designed to allow students with disabilities equitable access to all course material (including in-class as well as exams). If you are a student currently experiencing barriers to your academics due to disability related reasons, and you would like to understand

whether academic accommodations could support the removal of those barriers, please visit the QSAS website to learn more about academic accommodations or start the registration process with QSAS by clicking ***Access Ventus*** button at **Ventus | Accessibility Services | Queen's (queensu.ca)**

VENTUS is an online portal that connects students, instructors, Queen's Student Accessibility Services, the Exam's Office and other support services in the process to request, assess, and implement academic accommodations.

To learn more go to: https://www.queensu.ca/ventus-support/students/visual-guide-ventus-students

Academic Consideration for Students in Extenuating Circumstances

Academic Consideration is a process for the University community to provide a compassionate response to assist students experiencing unforeseen, short-term extenuating circumstances that may impact or impede a student's ability to complete their academics. This may include but is not limited to any extenuating circumstance (illness, bereavement, traumatic event, injury, family emergency, etc.) which is short-lived, begins within the term, and will not last longer than 12 weeks - see Academic Consideration webpage for details (https://www.queensu.ca/artsci/undergraduate/student-services/academic-consideration)

> Each Faculty has developed a protocol to provide a consistent and equitable approach in dealing with requests for academic consideration for students facing extenuating circumstances. For more information, undergraduate students in the Faculty of Arts and Sciences should consult the Faculty's webpage on Academic Consideration in Extenuating Circumstances and submit a request via the Academic Consideration Request Portal. Students in other Faculties and Schools who are enrolled in this course should refer to the protocol for their home Faculty.

Students are encouraged to submit requests as soon as the need becomes apparent and to contact their instructor and/or course coordinator as soon as possible once academic consideration has been granted. Any delay in contact may limit the options available for academic consideration. While we encourage instructors to accommodate, each instructor has discretion in deciding whether or how to apply the Academic Consideration. For more information on the Academic Consideration process, what is and is not an extenuating circumstance, and to submit an Academic Consideration request, please see the Faculty of Arts and Science's Academic Consideration website. ASO courses include links to information on **Academic Consideration** on your **Course Homepage** in onQ.

Please see the Teaching Team page for contact information for your instructor and TA(s), where relevant.

For more information, please see the Senate Policy on Academic Consideration for Students in Extenuating Circumstances.

Queen's Policy Statement on Academic Integrity

Queen's University is dedicated to creating a scholarly community free to explore a range of ideas, to build and advance knowledge and to share the ideas and knowledge that emerge from a range of intellectual pursuits. Each core value of academic integrity, as defined in the Senate Academic Integrity Policy, gives rise to and supports the next.

Honesty appears in presenting one's own academic work, whether in the context of an examination, written assignment, laboratory or seminar presentation. It is in researching one's own work for course assignments, acknowledging dependence on the ideas or words of another and in distinguishing one's own ideas and thoughts from other sources. It is also present in faithfully reporting laboratory results even when they do not conform to an original hypothesis. Further, honesty is present in truthfully communicating in written and/or oral exchanges with instructors, peers and other individuals (e.g. teaching assistants, proctors, university staff and/or university administrators).

Trust exists in an environment in which one's own ideas can be expressed without fear of ridicule or fear that someone else will take credit for them.

Fairness appears in the proper and full acknowledgement of the contributions of collaborators in group projects and in the full participation of partners in collaborative projects.

Respect, in a general sense, is part of an intellectual community that recognizes the participatory nature of the learning process and honours and respects a wide range of opinions and ideas. However, "respect" appears in a very particular sense when students attend class, pay attention, contribute to discussion and submit papers on time; instructors "show respect by taking students' ideas seriously, by recognizing them as individuals, helping them develop their ideas, providing full and honest feedback on their work, and valuing their perspectives and their goals" ("The Fundamental Values of Academic Integrity", 3rd Edition, p. 8).

Ultimately, responsibility is both personal and collective and engages students, administrators, faculty and staff in creating and maintaining a learning environment supported by and supporting academic integrity.

Courage differs from the preceding values by being more a quality or capacity of character – "the capacity to act in accordance with one's values despite fear" ("The Fundamental Values of Academic Integrity", 3rd edition, p. 10). Courage is displayed by students who make choices and integrous decisions that are followed by action, even in the face of peer pressure to cheat, copy another's material, provide their own work to others to facilitate cheating, or otherwise

represent themselves dishonestly. Students also display courage by acknowledging prior wrongdoing and taking proactive measures to rectify any associated negative impact.

All of these values are not merely abstract but are expressed in and reinforced by the University's policies and practices.

Generative Artificial Intelligence (AI) Tools Statement

In this course you are learning the basics of descriptive and inferential statistics. We encourage you to focus on understanding the fundamental concepts and achieving proficiency in the basics of R code generation.

Unless otherwise stated, in class, tutorials and assessments (i.e. weekly quizzes), the use of Generative AI is not permitted in "Introduction to Statistics". Because this is an introductory course we are focused on the pedagogy of establishing and growing your fundamental skills and understanding of data management and statistics. We understand that the use of Generative AI may well be part of your study-strategy, and you are welcome to explore this during your personal study time. Keep in mind that although Generative AI tools can be useful for understanding the material and generating relevant content, you will be required to generate answers and responses to statistical and R-based questions in written exams without access to these tools. As such, we strongly encourage you to focus your efforts on understanding course content.

The writing of text responses that is done for some assignments, such as tutorials, is minimal but if you use Generative AI to refine this writing, it must be cited in your report. Any other use of Generative AI (e.g. response generation) in this course constitutes a departure from academic integrity. Please review the current academic integrity policies (updated Sept 2025). https://www.queensu.ca/secretariat/policies/senate/academic-integrity-procedures-requirements-faculties-schools

Queen's Student Academic Success Services (SASS) offers a self-directed, online academic integrity module which we encourage all students to take which will help with:

- Understanding the nature of the academic integrity departure
- Understanding the expectations of and role of sources in scholarly writing
- Integrating sources into your writing (paraphrasing, quoting, summarizing)
- Understanding when and how to cite your sources
- Managing your time effectively to avoid the need for shortcuts
- Taking effective notes to ensure accuracy of source material and correct attribution

Turnitin Statement

This course makes use of Turnitin, a third-party application that helps maintain standards of excellence in academic integrity. Normally, students will be required to submit their course assignments through onQ to Turnitin. In doing so, students' work will be included as source documents in the Turnitin reference database, where they will be used solely for the purpose of detecting plagiarized text in this course. Data from submissions is also collected and analyzed by Turnitin for detecting Artificial Intelligence (AI)-generated text. These results are not reported to your instructor at this time but could be in the future.
Turnitin is a suite of tools that provide instructors with information about the authenticity of submitted work and facilitates the process of grading. The similarity report generated after an assignment file is submitted produces a similarity score for each assignment. A similarity score is the percentage of writing that is similar to content found on the internet or the Turnitin extensive database of content. Turnitin does not determine if an instance of plagiarism has occurred. Instead, it gives instructors the information they need to determine the authenticity of work as a part of a larger process.

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