Course Syllabus - BIOL 243 / GPHY 247 / KNPE 251 / PSYC 202

Course Information

General Course Information

Course: BIOL 243 / GPHY 247 / KNPE 251 / PSYC 202
Course title: Introduction to Statistics
Pre-requisites: None.
Semester and year: Fall 2023
Number of credits: 3.0
Modality (on campus, blended, or online): Blended (in-person class and tutorial)

Course Description

An introduction to the analysis of data from real life situations. Covers study design, descriptive and inferential statistics. Topics include probability, t-tests, regression, Chi-square tests, analysis of variance. Emphasis is in the foundation of statistical inference and practical application of statistical methods using statistical software.

Topics

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

Suggested Time Commitment

Students can expect to spend approximately **9** hours a week in study/practice and online activity for this course.

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

Study Habits for Success

Active learning requires a different set of study habits than passive learning—here are some study habits to help you succeed.

Preparation is key

Make sure to devote enough time to master the weekly module material. Cramming at the last minute may work for passive learning, but it does not give you enough time to build the connections across the material that you need for active learning.

Seek help early

The online material contains lessons, quizzes, and additional resources to get you ready for each week. Give yourself the time to work through the main material, and any of the additional resources when you find concepts more challenging.

Reading is not enough

The central part of active learning is that you are at the centre of your learning. Working through the online material gives you a foundation, but you need to develop the connections that come from applying the material. Some good strategies are to write a brief set of paragraphs to summarize the material, work in study groups to discuss the ideas, go through the quiz questions with a study partner, and come to help sessions.

Important University Dates

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

Inclusion

Land Acknowledgement

Queen's University is situated on the territory of the Haudenosaunee and Anishinaabek.

Ne Queen's University e'tho nón:we nikanónhsote tsi nón:we ne Haudenosaunee táhnon Anishinaabek tehatihsnonhsáhere ne onhwéntsya.

Gimaakwe Gchi-gkinoomaagegamig atemagad Naadowe miinwaa Anishinaabe aking.

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. We are committed to continual examination of our practices and ongoing change to improve equity, diversity, and inclusion in our community.

Netiquette and Expectations – Building a Classroom Community

For Instructors

As instructors we are committed to:

- Engagement with the course material – we love finding ways to navigate the sometimes complex course material, and to share our love of data!
- The student learning experience – we aim to create many, and varied, opportunities for students to interact with the course material.
- The process of learning – mistakes and practice are an important part of learning the material, and 'learning how to learn', more generally. We are here to help you navigate this experience.
- Respectful communication – we look forward to communicating with you in person (in lecture, in tutorial), in weekly student help sessions, online via discussion boards, and through the course email (in2stats@queensu.ca).
- Differences in learning – We apply universal design to account for differences in learning where possible and arrange additional accommodations in collaboration with the Queen's Exam Office and QSAS. We are always open to discussion – we know that a complex set of factors affect you learning and will work to support your education.
- Challenges – Please discuss your challenges with us during class, tutorial, help sessions and the Course Questions Forums. You can also always reach us at in2stats@queensu.ca.

For Students

To achieve teaching and learning success, our expectation of students includes:

- Preparation for weekly class via online e-book modules
- Preparation for tutorials via class and the Software Skills Guides (OnQ)
- Preparation of necessary technology for participation in class, tutorial, and online activities (e.g., weekly quizzes, software skills development)
- Attendance and participation in class and tutorial to the best of your ability

- Respectful communication and interactions with all tutorial group members, teaching assistants and instructors – we know group work often comes with challenges, but there is also a lot of opportunity to learn from one another and to share your strengths.
- Academic integrity with respect to all course assignments and examinations

Netiquette

In any course you often communicate with your peers and teaching team through electronic communication. You are expected to use the utmost respect in your dealings with your colleagues or when participating in activities, discussions, and online communication.
Here is a list of n/etiquette guidelines. Please read them carefully and use them to guide your communication in this course and beyond.

1. Make a personal commitment to learn about, understand, and support your peers.
2. Give others the benefit of the doubt.
3. Ensure your writing is respectful and inclusive.
4. Recognize and value the experiences, abilities, and knowledge that each person brings.
5. Recognize and value the diversity of learning and communication styles.
6. Carefully re-read your writing before posting or sending to others.
7. It is okay to disagree with ideas, but personal attacks will not be tolerated.

Fostering Accessibility

All of us have a shared responsibility for 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

There are three types of course materials (all required).

1. The first is an eBook entitled "Taking the Anxiety out of Statistics" by Nelson & Beyer (Kendall Hunt Publishing). Queen's students can purchase a special subscription. Note that no royalties are collected on this eBook.
   Modules of the e-book must be completed before attending class. In class (lecture) we will spend more time with challenging topics and use case studies to begin applying your knowledge.
2. The second is a Top Hat account for active learning during lectures. https://tophat.com/ You will receive an email inviting you to join the Top Hat course. Top Hat 'clicker' questions will be used during lectures to check in with your understanding of key concepts, and to navigate case studies as a class.
3. Software skills guides will be available in onQ. The course uses Microsoft Excel and RStudio, both of which are free for students. Software skills guides will be assigned ahead of each tutorial, and this material will also be assessed in two R-focused term tests (weeks 6 and 10).

Educational Technologies, Help, Privacy, and Accessibility

This course makes use of the following website(s), program(s), and/or application(s) for specific educational use/purposes.

Privacy: Be aware that your independent use of the website(s), programs, and/or application(s) used in this course*, beyond what is required,* is subject to their terms of use and privacy policy. You are encouraged to review the applicable privacy statements before using the site. Please see below.

Accessibility: Queen's University is committed to developing courses that are accessible. For further information on accessibility compliance of the website(s), program(s) application(s) used in the course, please consult the links below.

Software	Use	Support	Privacy	Accessibility
Top Hat	Interactive learning	https://tophat.com/students/	https://tophat.com/company/security/	https://tophat.com/company/legal/accessibility-top-hat/

Notice of Recording

While lectures for this course will be delivered in-person, classes may be recorded via auditorium lecture capture with video and audio (and, in some cases, transcription) and in this

case will be made available to students in the course for the duration of the term. The recordings may capture your image or voice through the video and audio recordings. By attending lecture, 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 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 website.

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 on the Homepage of the course (see Teaching Team).

For general questions about the course and content, please post to the weekly Course Questions Forums (OnQ). Feel free to help answer your peers' questions on this forum. Most questions are answered within 24 hours.

Please use the course email for inquires that are about the logistics of the course and a team member will typically respond within 24 hours. Note: If you have questions about course material you should bring those to a student help session or post them to the online forum.

Course email: in2stats@queensu.ca

Throughout this course, you may come upon some general questions about the course and assignments. If you think that your question may benefit other students, you are invited to post your question in the Course Questions discussion forum. Feel free to help answer your peers'

questions on this forum. The teaching team will monitor this discussion forum and answer questions. Most questions are answered within 24 hours. Any other questions that you would prefer to share privately, please contact me or your TA at one of the emails listed at the top of this syllabus. The teaching team contact information is located on the homepage of the course.

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, you may be asked to take part in a variety of feedback activities, such as surveys and questionnaires. This feedback enables the teaching team to improve 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
TopHat (lectures)	1-4, 6	5%
Software Skills R Tests	1-5	20%
Weekly Quizzes	1-4	10%
Tutorial Activities	1-5	23%
Term Test	1-4, 6	12%
Final Exam	1-5, 6	30%
Total		100%

Descriptions of Learning Activities and Assessments

Software Skills R Tests

Software Skills Term Tests are in-person, timed computer-based tests 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, and potentially software, will be used to restrict the use of the internet to the context of approved programs/sites. It is the responsibility of the student to ensure that they bring a reliable computer (with internet connection). There are two Software Skills Term Tests, and they are written in weeks 6 and 10.

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 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 graded. 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 1-7, up to module 6). 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).

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 at some point during the deferred exam period.

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.

Late Policy

Tutorial activities are due at the end of your scheduled tutorial. The late penalty is 10% per day and this is first applied 30 mins after a tutorial session ends.

Policy Review of Graded Work (Regrading)

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.

Students who believe grades on their assessments are 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 of 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.

Calculator Policy

As noted in Academic Regulation 9.2, "Calculators acceptable for use during quizzes, tests and examinations are intended to support the basic calculating functions required by most Arts and Science courses. For this purpose, the use of the **Casio 991 series calculator** is permitted and is the only approved calculator for Arts and Science students."

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,

- Short term Physical or Mental Illness or Injury (stomach flu, anxiety/depression, mononucleosis, concussion, broken bones, surgery, medical treatments, etc.)
- Traumatic Event/Confidential (Bereavement, serious injury, illness or required treatment for a significant other/family member or a traumatic event such as divorce, sexual assault, social injustice, etc.)

- Requirements by Law or Public Health Authorities (court dates, jury duty, requirements to isolate, etc.)
- Significant Event (varsity athletic event, distinguished event, serving in the Reserve Forces, etc.)

Queen's University is committed to providing academic consideration to students experiencing extenuating circumstances. For more information, please see the Senate Policy on Academic Consideration for Students in Extenuating Circumstances.

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.

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.

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. Queen's students, faculty, administrators and staff therefore all have responsibilities for supporting and upholding the fundamental values of academic integrity. Academic integrity is constituted by the five core fundamental values of honesty, trust, fairness, respect and responsibility and by the quality of courage. These values and qualities are central to the building, nurturing and sustaining of an academic community in which all members of the community will thrive. Adherence to the values expressed through academic integrity forms a foundation for the "freedom of inquiry and exchange of ideas" essential to the intellectual life of the University.

The following statements from "The Fundamental Values of Academic Integrity" (2nd edition), developed by the International Center for Academic Integrity (ICAI), contextualize these values and qualities:

1. **Honesty** Academic communities of integrity advance the quest for truth and knowledge through intellectual and personal honesty in learning, teaching, research, and service.
2. **Trust** Academic communities of integrity both foster and rely upon climates of mutual trust. Climates of trust encourage and support the free exchange of ideas which in turn allows scholarly inquiry to reach its fullest potential.
3. **Fairness** Academic communities of integrity establish clear and transparent expectations, standards, and practices to support fairness in the interactions of students, faculty, and administrators.
4. **Respect** Academic communities of integrity value the interactive, cooperative, participatory nature of learning. They honor, value, and consider diverse opinions and ideas.
5. **Responsibility** Academic communities of integrity rest upon foundations of personal accountability coupled with the willingness of individuals and groups to lead by example, uphold mutually agreed-upon standards, and take action when they encounter wrongdoing.
6. **Courage** To develop and sustain communities of integrity, it takes more than simply believing in the fundamental values. Translating the values from talking points into action -- standing up for them in the face of pressure and adversity — requires determination, commitment, and courage.

Students are responsible for familiarizing themselves with and adhering to the Senate regulations concerning academic integrity, along with Faculty or School specific information. Departures from academic integrity include, but are not limited to, plagiarism, use of unauthorized materials, facilitation, forgery and falsification. Actions which contravene the regulation on academic integrity carry sanctions that can range from a warning, to loss of grades on an assignment, to failure of a course, to requirement to withdraw from the university.

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