

INTRODUCTION TO STATISTICS (BIOL243/GPHY247/KNPE251/NURS323/PSYC202) Fall 2021

COURSE DESCRIPTION

The purpose of this course is to improve your numeracy and critical thinking skills to help you make better decisions in your professional and personal life. To achieve this, you will learn about probability, how to make sense of raw data, how best to describe data to others, and how to test hypotheses using statistics. 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.

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 key to 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, discuss the ideas with classmates, go through the quiz questions, and come to student help sessions.

UNIVERSITY OPERATING DATES

| | |
|-----------------------|---|
| Sept. 7 | Classes start |
| Sept. 20 | Last day to add courses Last day to drop courses without financial penalty |
| Nov. 1 | Last day to drop courses without academic penalty |
| Dec. 3 | Classes end |
| Dec. 8- 22 | Fall Term Final Assessment period |

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.

TOPICS

| Module | Topic |
|--------|-----------------|
| 0 | Course Overview |

Anatomy of a Statistical Study

| | |
|-----|--------------------------------|
| 1 | Study Designs and Sampling |
| 2 | Descriptive Statistics |
| 3 | Visualizations |
| 4 | Probability |
| 5 | Sampling Distributions |
| 7/8 | Hypothesis Testing and T-tests |
| 9 | Chi-Square Test |
| 10 | Linear Regression |
| 11 | Single-Factor ANOVA |
| 12 | Two-Factor ANOVA |

COURSE MATERIALS

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 rate [here](#). Note that no royalties are collected on this ebook.
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.
3. Software skills guides will be available in onQ. The course uses Microsoft Excel and RStudio, both of which are free for students.

[Arts and Science Calculator Policy](#)

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**.

This inexpensive calculator sells for around \$25 at the Queen's Campus Bookstore, Staples and other popular suppliers of school and office supplies.

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

WEIGHTING OF ASSESSMENTS

| Assessment | Location | Weight | Learning Outcomes | Content Elements |
|------------------------------|--------------------|--------|-------------------|--|
| Top Hat (lectures) | In-person / remote | 4% | 1-4 | Online modules |
| Software Skills Quizzes (x3) | Online | 10% | 1-5 | Software Guides |
| Weekly Quizzes | Online | 12% | 1-4 | Online modules, Software Guides |
| Tutorial Activities | Tutorial | 24% | 1-5 | Incorporates all content |
| Term Tests (x2) | Lecture | 20% | 1-4 | Online modules, Case study videos, Practice Problems |
| Final Exam | TBD | 30% | 1-5 | Online modules, Case study videos, Practice Problems |

Location and Timing of Final Examinations

Fall 2021 Arts and Science final exams will be administered to in-person and remote students as follows:

“Students taking on-campus courses (or course sections) will write their proctored final exams in-person and on-campus.”

“Students taking courses (or course sections) that are remote or online, but who have any other on-campus courses (or course sections) in their timetable, will write all of their final exams in-person and on-campus. These final exams will be administered* through the central Exams Office (applies to both Central Exams and Private Exams). Students who have only remote or online courses in their timetable, and who require remote proctoring, will have their exams proctored using Examity. These exams will be scheduled by the Exams Office, but run through onQ with the proctoring done by Examity.”

The exam period is listed in the key dates prior to the start of the academic year in the Faculty of Arts and Science Academic Calendar and on the Office of the University Registrar’s webpage. A detailed exam schedule for the Fall Term is posted before the Thanksgiving holiday; for the Winter Term it is posted the Friday before Reading Week, and for the Summer Term the window of dates is noted on the Arts and Science Online syllabus prior to the start of the course. 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.

ASSESSMENTS AND ACTIVITIES DESCRIPTION

Software Skills Quizzes

Software Skills quizzes are timed quizzes designed to evaluate your skills in Microsoft Excel and RStudio based on what you’ve been taught in the preceding tutorials. The quizzes start at a fixed time (see Timeline for dates and times) and are done online. It is the responsibility of the student to ensure that they are using a reliable computer and internet connection, and are working in a physical space that is amenable for the quiz.

Weekly Preparatory Quizzes

There are 11 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 online modules, self-assessment and software 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 live / synchronous tutorial activities in the course. 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 in your respective discipline.

Please note the following important policies related to in-person and remote 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). Each tutorial will have both in-person and remote groups. Remote groups will meet in zoom breakout rooms, and in-person groups may utilize zoom breakout rooms if a group member cannot attend in person due to illness.

See the Timeline and Live Tutorials and Help Sessions page for tutorial details and due dates.

Term Tests

The two term tests (2 x 10%) will be written in Week 6 and Week 10 (see the Timeline for exact dates). Term Test 1 covers material Weeks 1-5 and Term Test 2 covers materials from Weeks 1-9 with emphasis on Weeks 6-9. Term tests will be multiple choice and short answer. Each term test will cover material from the online modules, lectures, module practice problems and elements of the tutorials.

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 online modules, case study videos, module practice problems and elements of the tutorials.

Exam Dates

The specific dates for each exam will be announced later in the term by the Registrar's office. Once the exam schedule has been finalized the exam date will be posted on your SOLUS account.

Please note that the Senate Policy on Academic Consideration for Students in Extenuating Circumstances is applicable during the final examination period. In the Faculty of Arts and Science, students who are too ill to write the examination or are experiencing extenuating circumstances are being directed to the Academic Consideration Request Portal (ACRP) to submit a request for consideration.

Assessment Accommodations

Queen's University supports Universal Instructional Design to create more accessible learning environments. In addition to incorporating a variety of delivery methods and learning materials, this course has several academic accommodations built directly into the assessments. For most students, the assessment design incorporates extra time on assignments/tests and computer-assisted examinations.

If you have a formal academic accommodation that goes beyond the accommodations described below, please see the course homepage and click the blue "Submit QSAS Accommodation Letter or STAA Form" button. You may read more about our approach to academic accommodations and considerations in the relevant sections of the course syllabus (see Policies below).

Weekly Quizzes are completed online, in a location of your choosing, and are open for one week. The quizzes take from 30-50 minutes to complete depending on the week. The 7-day window provides for any time accommodations, as well as enough time to attend the help sessions. If you cannot write one or more of the weekly quizzes and have an approved academic consideration, your total quiz grade will be evenly redistributed across the completed quizzes.

Tutorial Activities are completed during live/synchronous tutorial times indicated on the Live Sessions page. Since the live tutorials include group work, students will need to work together during the scheduled time. It is not possible

to have individual accommodations for these group activities; however we open up the tutorial activity ahead of time so that you can prepare before coming to tutorial. 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.

Software Skills Quizzes are completed online at a scheduled time. These are timed quizzes and if you require extra time for an approved accommodation, we will gladly add that to your individual quiz once you submit your QSAS accommodation (see the course homepage). If you cannot write one or more of the software skills quizzes and have an approved academic consideration, your total software skills quiz grade will be evenly redistributed across the completed quizzes.

Term Tests and Final Exam are written during scheduled times—please see the Course Timeline for details. We provide extra time (up to 20 min per 1 hour) in the design of the assessment. For example, most students take about 80 minutes to complete the term tests, but we schedule 2 hours. If you require extra time beyond 20min/hr for an approved accommodation, we will gladly add that to your test once you submit your QSAS accommodation (see Accommodations in the Policies section below, or click the blue Accommodations button on the course homepage).

If you cannot write a term test and have an approved academic consideration, your final exam will be reweighed to include the weight of the term test. For example, if you miss the first term test (worth 10%), the final exam will increase from 30% to 40%. There are no makeup term tests because the final exam is cumulative and affords you the opportunity to demonstrate the knowledge that you would have otherwise exhibited in the term test(s).

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 following academic term.

[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.

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 |

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. Feel free to help answer your peers' questions on this forum. Most questions are answered within 24 hours.

Please use the course email for inquiries that are about the logistics of the course, such as where to find due dates, or where your exam is written. A Teaching Assistant 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

COURSE FEEDBACK

At various points during the course, students may be asked to take part in a variety of feedback activities (such as questionnaires and exit tickets).

This feedback enables the team to make any adjustments necessary to improve the online learning environment. Additional student feedback will be sought throughout the course. All surveys are anonymous, and directly related to activities, assessments, and other course material.

N/ETIQUETTE

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.

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.

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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 November 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 website \(click here\)](#).

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

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: in2stats@queensu.ca.

COMPUTER REQUIREMENTS

Microsoft Windows Client

Vista/Windows 7/Windows 8

Intel Core 2 Duo processor

4 GB RAM

Soundcard with speakers and microphone or preferably a headset

Webcam

Mac Client

OS X 10.8 or higher

Intel i5 processor

4 GB RAM

Internal, USB or external iSight microphone or preferably a headset

Webcam

Supported Browsers

Chrome (latest version)

Firefox (latest version)

Safari (latest version on 64-bit Intel processors only)

Internet Connection

Wired high speed access: Cable or better

(wifi is not recommended)

Java

Latest version

Media Player

Flash (latest version)

Adobe Reader

Latest Version

STUDENTS STUDYING OR TRAVELLING ABROAD

If you plan to travel, we strongly recommend that you confirm Internet availability in your host country prior to departure. In the past, students in other countries have been blocked from accessing certain websites relevant to their courses, as well as onQ. It is the responsibility of all students to book travel around course work, as we cannot change the format or timing on assessments or assignments as a result of travel plans.

