

**PSY201H1F-L0101, Statistics I: Course Syllabus**

**University of Toronto, Fall 2023**

**Class schedule: September 7 – December 6**

**People**

Role	Name	Email
Course instructor	Marco A. Sama	marco.sama@mail.utoronto.ca
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**Instructor Contact**

I will try to respond within 24 hours. Please try to ask content related questions to office hours or lecture breaks as I get dozens of emails per day. I ask students to use their UofT emails, as they are more secure and are governed by the University's codes of conduct. If contacting me, please include "PSY201" somewhere in the subject line and the topic of the email.

**Course Delivery**

PSY201H1F is an in-person course. Lectures take place Monday from 10:00 AM – 12:00 PM and Wednesday from 10:00 AM – 11:00 AM, both in PB-B250. Optional (but highly recommended) tutorials will be held as well, following lectures.

This course is delivered through live, in-person lectures and optional virtual tutorials. Lecture recordings should be used to supplement your studying. There will also be an oral assessment at the end of the course delivered through Zoom, requiring a stable internet connection.

Students are also recommended to use a scientific calculator to complete practice questions and quizzes. This is because tests (i.e., midterm test and final exam) will be handwritten, requiring the use of a calculator to aid arithmetic completion. Office hours will take place primarily through Zoom.

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## Course Description, Learning Outcome, and General Information

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### Prerequisite

Introductory to Psychology (PSY100H1, or PSY100Y5, or both PSYA01H3 and PSYA02H3, or COG250Y1). Recommended to have Grade 12 Calculus. A basic comprehension of psychology/neuroscience is recommended as these are where many examples are drawn from.

### Course Description

In this course, we will learn theory and application techniques for various statistical tests. A focus will be on interpreting data beyond the mere results, and providing a theoretical background to learn where these tests came from. No one just sat down and came up with these equations. They all derive from earlier sources and mathematical logic. Understanding this logic, rather than purely memorizing, is the key to a good comprehension this material.

### Learning Outcome

My goals for this course are threefold. First, for you to be able comprehend research data. Statistics is the language of science and the most important tool at its disposal. As you will all be either future producers or consumers of science, a statistical background will be an invaluable aid to your daily life. Second, to help inoculate yourselves against the misuse of statistics. In 1907, Mark Twain popularized the quote *"There are lies, damned lies, and statistics"*, highlighting the prevalence of their misuse. Finally, I hope you have an appreciation of statistics and math. Even if you still do not like the topic, I hope you at least realize their importance.

### How to approach this course

The best approach is to understand, not memorize, the course material. Since the emphasis is on comprehension, you will not be asked to memorize formulae. Instead, focus on knowing how to apply appropriate tests to answer data-driven and theory-driven questions. Thus, learning statistics is like learning to cook. It is not about memorizing ingredients, but knowing how to apply them, what to add, and how to modify them to fit unique situations. We start with basic "recipes" and build on them. This does not mean you are learning categorically

different tests, rather how tests change to fit new parameters. Thus, it is imperative that you keep up with the material or you may quickly fall behind. If you miss a lecture, make sure you catch up before attending the next class. To help students ensure they are keeping up with the material, basic post-lecture quizzes will be given following each class. Please reach out if you find you are struggling. Due to its cumulative nature, is very easy to fall behind in this course.

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## Materials

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### **A Note on Accuracy of Course Material**

I will ensure calculations and theory are accurate to the best of my ability. Like all humans, I am not infallible. If you notice a mistake anywhere in the course, please point it out and I will be sure to correct it.

### **Course website**

PSY201H1F uses the University's learning management system, Quercus, to post information about the course. This includes posting readings and other materials required to complete class activities and course assignments, as well as sharing important announcements and updates. The site is dynamic and new information and resources will be posted regularly as we move through the term, so please make it a habit to log in to the site on a regular, even daily, basis. To access the course website, go to the U of T Quercus log-in page at <https://q.utoronto.ca>. Once you have logged in to Quercus using your UTORid and password, you should see the link for PSYB07. All content will be posted through this Quercus page. This includes video streams for lectures and tutorials.

### **Textbooks**

*Gravetter, F.J., Wallnau, L.B., (2020). Statistics for the Behavioral Sciences (10th Ed.). Boston, MA: Cengage Learning. ISBN-9781337280754.* While not mandatory, it is as a great resource both in the course and as a future reference.

## Required Software

For assignments, the use of Microsoft Word is a requirement, as part of the assignment is responding to feedback. You can access a browser version of Word by logging into your student email on Microsoft Outlook and launching Word from the app tab. Additionally, the University provides Office licenses to all students which can be accessed here:

<https://onesearch.library.utoronto.ca/ic-faq-categories/microsoft-365-proplus>.

## Content Schedule

The course schedule is outlined in the table below. **PLEASE NOTE** that the order of lecture may change to accommodate the midterm scheduling. If that happens, an updated syllabus with the modified lecture schedule will be posted.

Week	Date	Lecture: Topic	Readings**
1	Sep 11 & 13	L1: Introduction, terminology, and descriptives	Ch 1, 2
2	Sep 18 & 21	L2: Visualizing data, distributions	Ch 2, 3, 4
3	Sep 25 & 28	L3: Introduction to probability	Ch 6
4	Oct 2 & 4	L4: Probability distributions	Ch 7
5	Oct 11	L4: Probability catchup	Ch 6, 7
6	Oct 16 & 19	L5: Hypothesis Testing: z tests and $t$	Ch 5, 8, 9
7	Oct 23 & 26	L6: Independent and paired $t$ tests	Ch 10, 11
8	Oct 30 & Nov 1	Midterm review; Midterm week	
<i>RW</i>	Nov 6 & 8	<i>Reading week break</i>	
9	Nov 13 & 15	L7: Power for $t$ tests, nonparametric equivalents	Ch 9, 10, 11
10	Nov 20 & 22	L8: Correlation and regression	Ch 15, 16
11	Nov 27 & 29	L9: Chi-squared tests	Ch 17, 18
12	Dec 4 & 6	L10: Introduction to ANOVA and multiple regression	Ch 12
12	Dec 7	L11: Introduction to machine learning	

\*Both lectures each week focus on the same topic for the Monday (M) and Wednesday (W) class. Week 5, class is only on Wednesday, and Week 12 has class on Monday, Wednesday, and Thursday for a makeup lecture.

\*\* Readings are suggested, but not mandatory. There will be substantial overlap between textbook and lecture content, though all exams will be taken out of lecture content.

### **Attending Lectures**

Content from each new lecture builds on the preceding class. Due to this hierarchical structure, lectures should be viewed in the order they are delivered. Missing one lecture without properly reviewing the material will result in confusion for subsequent lectures. During lecture, you are invited to ask questions by raising your hand and waiting until I acknowledge you. Please be respectful during lecture and tutorial. Do not interrupt without being acknowledged, do not converse with a neighbor, and avoid distractions (e.g., playing a game on your phone or computer) which may impact the focus of other students, and myself.

### **Attending Tutorials**

During tutorial, Teaching Assistants will work through practice material and answer student questions. There are four virtual sessions. They are optional, but highly recommended. Tutorials are imperative to gaining a practical understanding of the course material. Lecture is not enough, *you need to practice the material*. Just like learning to bake a cake begets *baking the cake*.

### **Attending the Term Test and Exam**

Information will be made available on Quercus. Please follow instructions closely to ensure a smooth and efficient experience. You are required to bring your University of Toronto Student ID. Oral assessments will take place virtually. The term test and final exam will be handwritten unless you have been granted an appropriate accessibility accommodation. You will be given a formula sheet so you don't have to focus on memorization of formulae, but instead learn to understand them. Make sure to bring a calculator. No other material is permitted.

### **COVID-19 Contingency**

If conducting in-person lectures, tutorials, or exams begin to pose an increased health risk due to the changing nature of the pandemic, some parts of the course may be moved to a virtual environment. It is up to all of us to do our part to ensure the safety of the UofT community by wearing masks where appropriate and following public health guidelines.

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**Evaluative Material**

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The purpose of this course is to facilitate your analysis and comprehension ability of common statistical techniques. Evaluations are designed to reflect this objective.

Assessment	Quantity	Weight	Due
Post-lecture quizzes	10	8% (1% × top 8)	Prior to the next lecture
Written assignments phases	2	20%	Oct 27, Nov 20
Challenge quizzes*	2	7% (3.5% x 2)	Nov 3, Dec 7
Midterm Term test**	1	25%	Nov 3
Final exam**	1	25%	During final exam period
Oral assessment**	1	15%	During final exam period

\* These quizzes are technically worth 10%, but only 7% goes towards the final grade and 3% are allocated as bonus marks.

\*\* Synchronous evaluation, requiring University of Toronto student ID. Oral exam will require a microphone, internet, and webcam access.

**Completing Evaluative Material**

Students are required to complete all graded assessments (those listed in the above table) INDIVIDUALLY. It is considered an academic offense for students to work together to complete these. An academic offense includes, but is not limited to, discussing answers to questions, discussing ways to complete questions, sharing answers, completing another student’s work, or having another student complete your work, or using generative AI content. All non-graded assessments (problem sets, practice questions, etc.) can be discussed with your peers. You are also prohibited from using any statistical analysis or spreadsheet software when completing graded material.

**Post Lecture Quizzes: 8%**

Despite being allocated the smallest percentage, these quizzes are probably the most important evaluations. These quizzes exist as a self-reflection on your understanding of the course material. This is to ensure that, if you fall behind in one lecture, you do not fall behind in subsequent lectures. For example, to understand *t* tests you need to understand *z* tests, which requires you to understand hypothesis testing. The more you fall behind or do not keep up with course material, the exponentially greater your confusion will be. These quizzes catch areas of confusion, allowing you to seek help and prevent yourself from falling behind. Quizzes will ask

questions from their assigned lecture, and will involve either a quick calculation or short answer. Students should prepare by following along in lecture and tutorial, asking questions when necessary, and practicing calculations. It is understandable that students will miss certain classes, or may struggle with the occasional lecture material, so we will only include the top 8 quizzes out of the 10 given. Make sure to take advantage of the opportunity to improve your comprehension if you realize you are struggling with a lecture topic!

Each quiz is worth 1% of your final grade and only the top 8 of 10 will count. Again, while this is a minor contribution to your final mark, these quizzes are invaluable in ensuring you are keeping up with the material. Therefore, it is imperative that students complete these short self-evaluations. They will be posted after each tutorial and should take roughly 10-15 minutes to complete. These quizzes are before the subsequent lecture. Please do not wait until the last minute to complete quizzes in case you have technical difficulties. Late submissions will not be allowed. Since students may be adding or dropping the course in the first week, a quiz will not be given after the first lecture.

**Written Assignments: 20%**

Since no students' writing is perfect, the goal of these assignments is to evaluate the ability for students to improve their writing while thinking critically about statistical results, beyond mere significance values. To this end, the evaluation of these assignments will be based on a student's ability to consider reviewer feedback and revise their work. The written assignment is divided into two phases: an initial and revised component. This means that students who provide a comprehensive revision of their written assignment can receive 10/10 as the final grade, even if the writing is not considered "perfect", insofar that they have adequately demonstrated their ability to revise and improve. More information will come on the Assignment specific module on Quercus. Assignments will be submitted through Quercus, and checked using Ouriginal. Phase I: submit an APA section on hypothesis testing (due October 27). Phase II: submit a revised section on hypothesis testing (due November 20)

**Challenge Quizzes (CQ): 10%, 7% towards the final course grade, 3% bonus**

A more challenging quiz, designed to enhance “outside the box thinking” will occur near the midterm test and final exam. Unlike the post-lecture quizzes, these will not be simple evaluations that ensure you a surface-level comprehension of the material. As their name suggests, they will focus on a higher-conceptual understanding. They will evaluate your ability to think beyond a narrow focus and apply the material to novel situations you may not have seen in lecture or tutorial. This reflects how, in real research, we are often met with data that lack a clear complementary analysis. We want to enhance a flexible thinking strategy towards data analysis and learn how to play with the inner workings of these tests to fit such diverse situations. Given this, these quizzes have a unique weighting. Although each quiz is worth 5%, only 3.5% goes towards your final grade and 1.5% is bonus. Therefore, a 50% on the quiz is technically 1.75/5. Getting a 70% (3.5/5) on the quiz grants you the full 3.5% towards your final grade. Anything above 70% on the quiz counts as a bonus towards your final grade.

**Term Test: 25%**

This serves as the midterm test and will include up to and including Lectures 6. The length is three hours. Work will be handwritten, unless accommodated through accessibility. Students must bring a calculator. There will be a variety of short answer, short calculation, and one long calculation question.

**Final Exam: 25%**

Content will be comprehensive, with a focus on the latter half of the course. The format will be consistent with the midterm test.

**Oral Assessment: 15%**

An oral assessment focusing a cumulative theoretical understanding of the course material will take place during the final exam period. You will be paired one-on-one with a TA. During this time you will need to have a webcam and microphone available. Your TA can give follow-up questions as deemed necessary.



### **Extensions, Late Penalties, and Missed Assessments**

We all live busy lives and sometimes it is difficult to make deadlines even with fair notice. To aid you, all students get two free, unquestioned 72-hour extensions to be applied at any stage of the written assignments or CQs. Requests will be made via a dedicated Quercus submission.

*This does not mean all due dates are automatically extended by 72 hours.* The ability to request the extension expires after the deadline and late penalties will occur. For accessibility, illness, or any related reason, or if you require more than 72 hours, you need to provide the appropriate documentation for extension approval. Extensions do not apply to tests, exams, or quizzes.

Submitting the written assignment late, without an approved extension, accrues a 10% (1 mark) penalty per day it is late. An assignment is deemed late the moment the clock strikes midnight and accumulates late days every midnight following. Please do not wait until the last minute to complete and submit your assignment. Be cognizant of increased Quercus traffic near midnight, and possible internet connectivity issues. After three late days have past, the student will no longer be allowed to submit the assignment and it will receive a final grade of zero.

### **Specific Medical Circumstances**

If you become ill and it affects your ability to do your academic work, consult me right away. Normally, I will ask you for documentation in support of your specific medical circumstances. This documentation can be an Absence Declaration (via ACORN) or the University's Verification of Student Illness or Injury (VOI) form. The VOI indicates the impact and severity of the illness, while protecting your privacy about the details of the nature of the illness. You can submit a different form (like a letter from a doctor), as long as it is an original document, and it contains the same information as the VOI. For more information on the VOI, please see <http://www.illnessverification.utoronto.ca>. For information on Absence Declaration Tool for A&S students, please see <https://www.artsci.utoronto.ca/absence>. If you get a concussion, break your hand, or suffer some other acute injury, you should register with Accessibility Services as soon as possible.

### **Requests for Regrading**

Students should expect fair evaluation and feedback from the instructor and TAs. Students are more than welcome to request a regrade if they believe their assigned grade is incorrect or does not accurately reflect the submitted work insofar that they provide valid reasoning (i.e., a student cannot simply say “I feel I deserve a higher mark”, but must justify where they believe they were unfairly penalized). I, the Course Instructor, will do the regrade, and there is no guarantee the grade will increase, it is possible that the grade may decrease. This new grade becomes the assigned grade. Requests must come in within two weeks of the posted grade.

### **Bonus Marks**

Throughout the course, bonus material may be assigned as they are deemed necessary at the discretion of the Course Instructor. These do not count towards the main 100% of your final grade and are, instead, additional boosters to your final grade. Note that some bonus marks are already allocated to the CQs.

### **Quercus Grades**

No grades are considered official, including any posted in Quercus at any point in the term, until they have been formally approved and posted on ACORN at the end of the course. Please contact me as soon as possible if you think there is an error in any grade posted on Quercus.

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## **Academic Integrity**

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### **About Academic Integrity**

All students, faculty and staff are expected to follow the University's guidelines and policies on academic integrity. For students, this means following the standards of academic honesty when writing assignments, discussing material with fellow students, and writing tests and exams. Ensure that the work you submit for grading represents your own honest efforts. Plagiarism — representing someone else's work as your own or work that you have previously submitted for marks in another class or program — is a serious offence that can result in sanctions. Speak to

me or your TA for advice on anything that you find unclear. To learn more about how to cite and use source material appropriately and for other writing support, see the U of T writing support website at <http://www.writing.utoronto.ca>. Consult the Code of Behaviour on Academic Matters for a complete outline of the University's policy and expectations. For more information, please see <https://www.artsci.utoronto.ca/current/academic-advising-and-support/student-academic-integrity> and <http://academicintegrity.utoronto.ca>. Plagiarism is not necessary the textual copying of another's work. Using someone else's idea as your own, even if rewritten in your own words, is also a form of plagiarism.

### **Use of Original**

Normally, students will be required to submit their course essays to the University's plagiarism detection tool for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the tool's reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of this tool are described on the Centre for Teaching Support & Innovation web site (<https://uoft.me/pdt-faq>).

### **Important Links**

Definition of Academic Integrity: <https://www.academicintegrity.utoronto.ca/>

University of Toronto Code of Behaviour on Academic Matters:

<https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019>

### **How to ensure Academic Integrity**

Here are three easy ways to ensure you meet academic integrity

1. Turn in original work. Do not copy/paste from any external source (including websites, encyclopedias). Do not use work you have submitted in other classes. Do not reword another source without citing it as the original author's intellectual property.

2. Do not use data analyses software, spreadsheets, or any other unauthorized software.
3. All graded work, unless otherwise specified, should be completed independently. This includes assignments, quizzes, and assessments/tests/exams.

### **What Counts as Plagiarism**

There are many forms of plagiarism. Many people assume plagiarism occurs when one directly copies another authors' work as their own. However, rewording another's work without proper credit is also a form of plagiarism. This is because you are essentially taking another person's ideas and making them your own. Self-plagiarism occurs when you reuse your own work without acknowledgement. Thus, all student submissions should be the student's own fresh and original work, not used in other courses. They should be the ideas of the student submitting them, and not from another student, person, or computer/AI generated idea.

### **Repercussions for violating Academic Integrity**

Academic misconduct may receive one or both of the following, among other unlisted consequences:

1. An assigned grade of zero to any graded material in the course
2. Acceleration to the Department or other disciplinary action

### **Use of Generative AI**

Students may use artificial intelligence tools (e.g., ChatGPT) for creating an outline for an assignment, but the final submitted assignment must be original work produced by the individual student alone. Students may not use artificial intelligence tools for taking tests, writing research papers, creating computer code, or completing major course assignments. However, these tools may be useful when gathering information from across sources and assimilating it for understanding. Students may not use artificial intelligence tools for taking tests in this course.

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## Support for Students

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### Accessibility Services

Students with diverse learning styles and needs are welcome in this course. If you have an acute or ongoing disability issue or accommodation need, you should register with Accessibility Services (AS) at the beginning of the academic year by visiting the UTSC accessibility page at <https://www.utsc.utoronto.ca/ability/welcome-accessability-services>. Without registration, you will not be able to verify your situation with your instructors, and instructors will not be advised about your accommodation needs. AS will assess your situation, develop an accommodation plan with you, and support you in requesting accommodation for your course work. Remember that the process of accommodation is private: AS will not share details of your needs or condition with any instructor, and your instructors will not reveal that you are registered with AS to any student in the course.

### Mental Health

As a student, you may experience challenges that can interfere with learning, such as strained relationships, increased anxiety, substance use, feeling down, difficulty concentrating and/or lack of motivation, financial concerns, family worries and so forth. These factors may affect your academic performance and/or reduce your ability to participate fully in daily activities. Everyone feels stressed now and then – it is a normal part of university life. Some days are better than others, and there is no wrong time to reach out. There are resources for every situation and every level of stress. There are many helpful resources available through your College Registrar or through Student Life (<http://studentlife.utoronto.ca> and <http://www.studentlife.utoronto.ca/feeling-distressed>). An important part of the University experience is learning how and when to ask for help. Please take the time to inform yourself of available resources.

### Writing Support

Developing your writing ability is a critical skill to take advantage of during your undergraduate career. A strong writing ability is crucial to communicate ideas. I often recommend students to

re-read their first university writing assignment and their final university writing assignment to gauge how much they improve. The university offers writing support centers, which I encourage students to take advantage of: <https://writing.utoronto.ca/writing-centres/>. English language support is also offered through the Writing Center (<https://writing.utoronto.ca/support/english-language-support/>) and the Center for International Experience (<https://www.studentlife.utoronto.ca/cie/els>).

### **Other Support**

The Center for International Experience offers support for international students (<http://www.studentlife.utoronto.ca/cie>). The University provides support for students with children or who have family responsibilities (<https://familycare.utoronto.ca/>).

### **Office of Academic Success**

The university has a support center for students to engage in learning strategies and develop a roadmap for undergraduate success (<http://www.studentlife.utoronto.ca/asc>).

### **External Help with Statistics**

Khan academy is an external source that has numerous resources pertaining to statistics: <https://www.khanacademy.org/math/statistics-probability>. Crash Course is an amazing YouTube series which condenses numerous topics. They have a great one on statistics: [https://www.youtube.com/playlist?list=PL8dPuualjXtNM\\_Y-bUAhbISAdWRnmBUcr](https://www.youtube.com/playlist?list=PL8dPuualjXtNM_Y-bUAhbISAdWRnmBUcr). Note that what we cover in this course is a small piece of the Statistics field. These external resources contain much more information than will be covered in the course and thus should not be used as study material. However, I encourage students to continue expanding their knowledgebase during and after the course. Understanding statistics is one of the most important skills one could have.

### **Lecture Capture by Instructor**

If lecture recordings are provided, they are only for the exclusive use of enrolled students, for their personal learning. Lecture recordings are not to be shared in any way beyond enrolled students.

### **Privacy/FIPPA Statement**

Personal information is collected pursuant to section 2(14) of the University of Toronto Act, 1971 and at all times it will be protected in accordance with the Freedom of Information and Protection of Privacy Act. Please note that this course requires presentations of one's work to the group. For more information, please refer to <http://www.utoronto.ca/privacy>.

### **Course Materials, Including Lecture Notes**

Course materials are provided for the exclusive use of enrolled students. Do not share them with others. I do not want to discover that a student has put any of my materials into the public domain, has sold my materials, or has given my materials to a person or company that is using them to earn money. The University will support me in asserting and pursuing my rights, and my copyrights, in such matters.