

STA410H1 S

Statistical Computation

Winter 2026 Syllabus

Course Meetings

STA410H1 S

Section	Day & Time	Delivery Mode & Location
LEC0101	Friday, 9:00 AM - 12:00 PM	In Person: MS 2172

Refer to ACORN for the most up-to-date information about the location of the course meetings.

See the Quercus site for details on the course, include the time and location of office hours from all of the instructors.

Course Contacts

Instructor: Ricardo Baptista

Email: r.baptista@utoronto.ca

Office Hours and Location: Office 9133, 700 University Ave.

Course Overview

Programming in an interactive statistical environment. Generating random variates and evaluating statistical methods by simulation. Algorithms for linear models, maximum likelihood estimation, and Bayesian inference. Statistical algorithms such as the Kalman filter and the EM algorithm. Graphical display of data.

This course covers the methodological foundations of computational statistics, with a focus on developing and understanding broadly applicable methods across statistics, probability and data science. We focus on understanding both the principles behind these methods and their practical implementation. Along the way, we will also introduce key numerical methods for linear algebra and optimization, some basic theory of numerical analysis, and essential algorithms that underpin modern statistical methods, such as the Kalman filter and the Expectation-Maximization algorithm. Towards the end of the course, we will also build on earlier lectures to explore modern computational methods for Bayesian inference and generative modeling.

Course Learning Outcomes

The purpose of this course is to provide an introduction to computational methods, focusing on essential parts of the theory, the details required for implementation as well as some exciting applications and recent research developments. By the end of the course, we expect you to be familiar with the following topics: (i) generation of random variates, (ii) numerical linear algebra, (iii) optimization and (iv) modern techniques for inference.

Prerequisites: STA302H1/ STAC67H3/ STA302H5; CSC110Y1/ CSC148H1/ CSCA48H3/ CSC148H5; MAT223H1/ MAT224H1/ MAT240H1/ MATA22H3/ MATA23H3/ MAT223H5/ MAT240H5/ MATB24H3/ MAT224H5

Corequisites: None

Exclusions: None

Recommended Preparation: None

Credit Value: 0.5

Marking Scheme

Assessment	Percent	Details	Due Date
Assignment 1	10%		2026-01-29
Assignment 2	10%		2026-02-26
Assignment 3	10%		2026-03-26
Midterm Exam	30%		2026-02-27
In-Person Final Exam	40%		Final Exam Period

Late Assessment Submissions Policy

Homework may be submitted after the deadline for half credit until marks have been released. After the marks are released, we will not accept any additional homework.

Policies & Statements

Quercus Info (if using)

This Course 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. New information and resources will be posted regularly as we move through the term. To access the course website, go to the U of T Quercus log-in page at <https://q.utoronto.ca>.

SPECIAL NOTE ABOUT GRADES POSTED ONLINE: Please also note that any grades posted are for your information only, so you can view and track your progress through the course. 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.

Accommodation for Personal Reasons

There may be times when you are unable to complete course work on time due to non-medical reasons. If you have concerns, speak to me or to an advisor in your College Registrar's office; they can help you to decide if you want to request an extension or other forms of academic consideration. They may be able to email your instructors directly to provide a College Registrar's letter of support and connect you with other helpful resources on campus.

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. If you cannot submit a VOI due to limits on terms of use, 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 (including dates, academic impact, practitioner's signature, phone and registration number). 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.

Academic Integrity

All suspected cases of academic dishonesty will be investigated following procedures outlined in the [Code of Behaviour on Academic Matters \(https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019\)](https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019). If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, please reach out to me. Note that you are expected to seek out additional information on academic integrity from me or from other institutional resources. For example, 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 [A&S Student Academic Integrity \(https://www.artsci.utoronto.ca/current/academic-advising-and-support/student-academic-integrity\)](https://www.artsci.utoronto.ca/current/academic-advising-and-support/student-academic-integrity) and the [University of Toronto Website on Academic Integrity \(https://www.academicintegrity.utoronto.ca\)](https://www.academicintegrity.utoronto.ca).

Students with Disabilities or Accommodation Requirements

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 <https://studentlife.utoronto.ca/departments/accessibility-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.

Religious Accommodations

As a student at the University of Toronto, you are part of a diverse community that welcomes and includes students and faculty from a wide range of cultural and religious traditions. For my part, I will make every reasonable effort to avoid scheduling tests, examinations, or other compulsory activities on religious holy days not captured by statutory holidays. Further to University Policy, if you anticipate being absent from class or missing a major course activity (such as a test or in-class assignment) due to a religious observance, please let me know as early in the course as possible, and with sufficient notice (at least two to three weeks), so that we can work together to make alternate arrangements.

Late/Missed Assignments

Homework may be submitted after the deadline for half credit until marks have been released. Petition for deferrals of the final exam must be made through FAS. The course policies regarding absence conform to the new absence declaration policy.

Additional Content

Computing: All of the homework assignments will involve some computational work. The Python language will be used for examples in lecture and documents on Quercus, and it is strongly recommended for assignments. (Students may also choose to use an alternative language such as Matlab or R; however, no documentation will be provided.) Python is free software and can be downloaded (for Windows, Mac, and Linux operating systems). Instructions for downloading Python as well as documentation can be found at <https://www.python.org/downloads>. Of interest to many of you will be Virtual Studio, which provides a nice text editor and environment for using Python; and Anaconda, a useful package manager for Python modules

Policy on Generative AI: Use of generative AI in this course is strongly discouraged, but no academic penalties will be imposed for its use on assignments; it is required that you acknowledge its use. Generative AI tools can be useful provided that they are used primarily to enhance your understanding of the course material and not as a shortcut. It is worth noting that 70% of the course grade is based on supervised exams where these tools will not be available.