STA447H1 S

Stochastic Processes (formerly STA348H1)

Winter 2025 Syllabus

Course Meetings

STA447H1 S

Section	Day & Time	Delivery Mode & Location
LEC2501	Wednesday, 6:00 PM - 9:00 PM	In Person: MS 3154

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

Course website: https://mouwenlong.github.io/teaching/sta447w24/index.html.

All the course material will be posted on this website.

Course Contacts

Instructor: Wenlong Mou
Email: wenlong.mou@utoronto.ca

Course Overview

Discrete and continuous time processes with an emphasis on Markov, Gaussian and renewal processes. Martingales and further limit theorems. A variety of applications taken from some of the following areas are discussed in the context of stochastic modeling: Information Theory, Quantum Mechanics, Statistical Analyses of Stochastic Processes, Population Growth Models, Reliability, Queuing Models, Stochastic Calculus, Simulation (Monte Carlo Methods).

This is an introductory course for stochastic processes. In this semester, we will discuss stochastic processes with various structures, including (discrete-time) Markov chains, martingales, Brownian motion and Poisson processes. Topics include, but are not limited to, recurrence and convergence of Markov chains, optional stopping and martingale convergence, and basics of stochastic calculus. If time permits, we will also cover applications including Monte Carlo algorithms, random walks on graphs, branching processes, option pricing, queueing theory, and more.

Prerequisites: STA347H1/MAT377H1/STAC62H3
Corequisites: None
Exclusions: STA348H5, STAC63H5
Recommended Preparation: None
Credit Value: 0.5

Marking Scheme

Assessment	Percent	Details	Due Date
Mid-term test #1	25%		2025-02-05
Mid-term test #2	25%		2025-03-12
In-Person Final Exam	50%		Final Exam Period

The final grade will be determined by the maximum possible grade by taking into account dropping one or both of the midterm grades and allocating its weight to the rest of the exams. That is, the final grade = max (25% * midterm1 + 25% * midterm2 + 50% * final, 33.3% * midterm1 + 66.7% * final, 33.3% * midterm2 + 66.7% * final, 100% * final)

If a student cannot attend the final exam, then they should submit a petition for a deferred exam.

Late Assessment Submissions Policy

All the exam solutions must be submitted in-person immediately at the end of the tests. There are no graded assignments for this course.

Policies & Statements

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/department/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.

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). 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) and the University of Toronto Website on Academic Integrity (https://www.academicintegrity.utoronto.ca).

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.

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Re-marking Policy - Timeline and Protocol

This item is listed here to remind you that A&S policy on re-mark requests for term work specifies that students have two weeks from when the work was returned to make such a request. If you want to include a re-marking policy in your syllabus, please consult Section 4.13 in the A&S Academic Handbook on re-marking protocol (https://www.artsci.utoronto.ca/faculty-staff/teaching/academic-handbook#AssignmentsAssessmentTermWork).

Re-marking Policy - Timeline and Protocol

Regrading requests should only be made for genuine grading errors, and should be initiated by writing or typing a complete explanation of your concern (together with your full name, student number, e-mail address) on a separate piece of paper, and giving this together with your original unaltered exam to the instructor, within one week of when the graded work was first available (not counting Reading Week). WARNING: If the instructor does not find any genuine grading errors, then your entire paper might get re-graded firmly, with a critical eye, and your mark might well go DOWN rather than up. Note that if a student requests for a regrading, the entire exam may be re-graded. So, the new grade may go up or down, or remain the same.

Equity, Diversity and Inclusion

The University of Toronto is committed to equity, human rights and respect for diversity. All members of the learning environment in this course should strive to create an atmosphere of mutual respect where all members of our community can express themselves, engage with

each other, and respect one another’s differences. U of T does not condone discrimination or harassment against any persons or communities.

Additional Content

Instruction for Exams

On all in-person exams, bring your student card, and do not sit next to each other. You are allowed to bring a one-page letter-sized cheat sheet (you can use both sides), and we will provide enough blank scratch papers. No books, collaboration, or electronics (including calculators) are allowed during exams. The tests will cover all lecture material up to that time. If you continue an answer on the back of the page, write "OVER".