# DEPARTMENT OF MATHEMATICAL AND COMPUTATIONAL SCIENCES
# UNIVERSITY OF TORONTO MISSISSAUGA

## STA348H5F LEC0101
## Introduction to Stochastic Processes
## Course Outline - Fall 2019

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| **Class Location & Time** | Tue, 11:00 AM - 01:00 PM MN 3190<br>Wed, 01:00 PM - 02:00 PM MN 3190 |
| **Instructor** | Alison Weir |
| **Office Location** | DH3036 |
| **Office Hours** | Mon 12:30-2:30pm, Wed 10:30-12:30pm, online before tests, and by appointment |
| **E-mail Address** | alison.weir@utoronto.ca |
| **Course Web Site** | https://q.utoronto.ca |

## Course Description

Discrete Markov chains with a finite number of states, random walks, single-server queues, continuous-time Markov chains, Poisson processes, branching processes, birth and death process, M/M/n queues, Monte-Carlo simulation may be introduced. [36L, 12T]

*Prerequisite:* STA260H5/STA261H5; MAT224H5/MAT240H5
*Exclusion:* STA347H1, STAC63H3 (SCI)
*Distribution Requirement:* SCI

Students who lack a pre/co-requisite can be removed at any time unless they have received an explicit waiver from the department. The waiver form can be downloaded from here.

## Textbooks and Other Materials

**Reference Books**

1. *Introduction to Stochastic Processes with R*, by Dobrow
2. *An Introduction to Stochastic Modelling* by Taylor and Karlin
3. *An Introduction to Stochastic Modelling* by Pinsky and Karlin
4. *Essentials of Stochastic Processes* , by Durrett
5. *Introduction to Probability*, by Grinstead and Snell
6. *Applied Probability Models*, by Minh (Caution - All transition matrices in this book are written in the Chinese and Russian style; they are transposed versions of the ones used in other countries.)

**Software**

1. Top Hat classroom response system

Small fee. Please wait for an emailed invitation, to be sent on 4-Sept, to sign up for this service.

1. Piazza online class discussion forum.

Free. Please wait for emailed invitation, to be sent on 4 Sept, to sign up for this service.

## Assessment and Deadlines

| Type | Description | Due Date | Weight |
|---|---|---|---|
| Term Test | | 2019-10-08 | 20% |
| Term Test | | 2019-11-19 | 20% |
| Assignment | | 2019-09-27 | 2% |
| Assignment | | 2019-11-01 | 2% |

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| Assignment | 2019-11-29 | 2% |
| Quiz | On-going | 9% |
| Final Exam | TBA | 45% |
| | **Total** | 100% |

## More Details for Assessment and Deadlines

**Term Tests**

The term tests are common to both lecture sections. Term tests are held in the lecture room. All term tests are 75 minutes. There is no extra time for late entrants. You will be required to bring R output to each term test. R assignments will be posted one week prior to the term test. Test solutions may be photocopied before they are returned.

*Missed Test Policy*:

- You must bring documentation to the professor within one week of the missed test. The professor must see an original signature on the documentation.
- All missed test weights will be moved to the final exam.
- For illness or injury, bring the Verification of Student Illness or Injury Form.
- For all other reasons, bring the Verification of Extenuating Circumstances Form.
- The above forms can be found at http://www.utm.utoronto.ca/registrar/forms.
- All documentation must be presented, to the professor, not the TA.
- Emailed documentation will be deleted and late documentation will not be accepted.

*Test Re-Mark Policy*

- Tests are returned in tutorials. Requests for remarking must be made in writing, and submitted to the TA within 10 minutes of test return.
- Requests must explain why you believe your solution(s) deserve more marks. If you write "remark Q2a", your request will not be considered.
- Remark decisions are made by the instructor, not the TA.
- Emailed remark requests and late remark requests will not be considered.

**Top Hat Lecture Questions**

Top Hat questions are asked in lectures, not in tutorials. Top Hat questions are identical to clicker questions, except that you answer using your own wireless device.

Starting on Tuesday 10th September, there will be at least one Top Hat question for each lecture hour. Top Hat questions are about the material in the current lecture.

No adjustments will be made for missed Top Hat questions.

Your lowest 10% of all Top Hat questions will be dropped.

*If you register late, you must complete your Top Hat Registration as follows:*

- Use your @mail.utoronto.ca email
- Enter your student number (not your utorid) when asked for your student ID, and check that you've typed it correctly
- Use your real name (as it appears on your T-card)

**Assignments**

Assignments will be posted one week before their due date. Your solutions must be submitted online using Quercus. Only pdf files will be accepted.

Late assignments are not accepted.

No adjustments will be made for missed Assignments.

## Penalties for Lateness

Late assignments are not accepted.

## Procedures and Rules

### Missed Term Work

To request special consideration, bring supporting documentation to the instructor in person during office hours at least one week in advance.

In case of illness, bring a U of T medical certificate to the instructor within one week of the missed work. The certificate must specify the exact period during which you were unable to carry out your academic work.

### Missed Final Exam

Students who cannot write a final examination due to illness or other serious causes must file anonline petition **within 72 hours of the missed examination**. Original supporting documentation must also be submitted to the Office of the Registrar **within 72 hours of the missed exam**. Late petitions will **NOT** be considered. If illness is cited as the reason for a deferred exam request, a U of T Verification of Student Illness or Injury Form must show that you were **examined and diagnosed at the time of illness and on the date of the exam, or by the day after at the latest**. Students must also record their absence on ACORN on the day of the missed exam or by the day after at the latest. Upon approval of a deferred exam request, a non-refundable fee of $70 is required for each examination approved.

### Academic Integrity

Honesty and fairness are fundamental to the University of Toronto's mission. Plagiarism is a form of academic fraud and is treated very seriously. The work that you submit must be your own and cannot contain anyone elses work or ideas without proper attribution. You are expected to read the handout How not to plagiarize (http://www.writing.utoronto.ca/advice/using-sources/how-not-to-plagiarize) and to be familiar with the Code of behaviour on academic matters, which is linked from the UTM calendar under the link Codes and policies.

## Final Exam Information

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| Duration: | 3 hours |
| Aids Permitted: | Statistical Calculators<br>Statistical Table |

## Additional Information

**TAs & Tutorials**

TA tutorial sections, contact info, and office hours will be posted in quercus before the end of the first week of term.

Tutorials are held every week except the first week and term test weeks. Tutorials are in these weeks:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9 Sept | 16 Sept | 23 Sept | 30 Sep | 21 Oct | 28 Oct | 4 Nov | 11 Nov | 26 Nov |

If you are not registered in a tutorial, please register in one. You need to be registered in a tutorial to get back your term tests and to email questions.

**Electronic Communication Policy**

Piazza is an online discussion forum designed for math, stats, and CS students. Post your questions and comments here. Respond to your fellow students' questions and comments. Nothing course related is off topic in Piazza. The only rule is BNBR *Be Nice and Be Respectful*. This site will be monitored by TAs and the professor, we will jump in if misinformation is posted.

Please don't email questions related to course content to your TA or the professor - post these questions in Piazza. If you have a question, it's almost certain that another student in the class has the same question!

- Do not email any missed test documentation. All of these will be deleted and ignored.
- Quercus emails will not be answered in a timely fashion.
- Remember that email is not secure and sensitive issues should be discussed in person.
- Your professor is happy to discuss any aspect of the course with you, in person. You can come to regularly scheduled office hours, or request an appointment.

**UofT Student Responsibilities**

All UTM students are expected to conduct themselves in accordance with the policies detailed in the Academic Calendar. Information you should read can be found online at this link - https://student.utm.utoronto.ca/calendar//calendar_detail2.pl?Topic=Responsibilities%20of%20Students

**Course Topics**

1. Probability and Random Variables
2. Probability Generating Functions
3. Randomly Stopped Sums
4. Markov Chains
5. Random Walks
6. Branching Processes
7. Poisson Processes

Last Date to drop course from Academic Record and GPA is November 7, 2019.