Course: Stat 333 – Stochastic Processes I

Sections:
Lec 001: M-W 14.30-15.50, First Class: Jan. 5th, 2022, Location: RCH 103 or MS Teams
Lec 002: M-W 10.00-11.20, First Class: Jan. 5th, 2022, Location: DWE 3522 or MS Teams

Note: Until Jan 27 (or later if directed by the university) lectures will be delivered online. In this case, we will live-stream during the Wednesday time slot for Lec 001 and during the Monday timeslot for Lec 002. Recordings will then be posted for students in the other sections later that day (or as soon as they become available). For instance, the first lecture on Jan 5th will **ONLY** be live-streamed at the time of Lec 001; students registered in Lec 002 are encouraged to watch live-stream at 14.30-15.50 or watch the recording of the live-stream later that day. Similarly, the lecture on Jan 10th will be live-streamed at 10.00-11.20 and students from Lec 001 are encouraged to participate live during that time or watch the uploaded video later that day.

Instructors:
Lec 1: Aukosh Jagannath, Office: M3 2114
Email: a.jagannath@uwaterloo.ca **OH:** See Learn

Lec 2: Kelvin Shuangjian Zhang, Office: M3 3102
Email: ks3zhang@uwaterloo.ca **OH:** See Learn

Course Website: grades and assignments will be available through Learn and Crowdmark unless otherwise indicated.

Blurb: This course introduces stochastic processes, with an emphasis on regenerative phenomena. Topics cover generating functions, conditional probability distributions and conditional expectation, discrete-time Markov chains with a countable state space, limit distributions for ergodic and absorbing chains, applications including the random walk, the gambler's ruin problem, and the Galton-Watson branching process, an introduction to counting processes, connections between the exponential distribution and Poisson process, and non-homogeneous and compound Poisson processes.

Official Pre-requisites: STAT 230 with a grade of at least 60% or STAT 240; MATH 237 or 247. Antireq: STAT 334

Required Textbook:
Durrett, Essentials of Stochastic Processes, (3rd Ed, 2016), available for free via Springerlink (Springerlink can be accessed through lib.uwaterloo.ca using your university credentials)

Recommended Textbooks:
Resnick, “Adventures in Stochastic Processes”, available for free via Springerlink
Lawler, “Introduction to Stochastic Processes”

Midterms: Each midterm will be 1 hour and 50 minutes in total (1 h and 20 mins for writing the exam and 30 mins for uploading the answers.)

Midterm 1: Feb 7th
Midterm 2: March 14th

Final Exam: 4:00 PM-6:00 PM, April 23rd, Location: M3, 1006

Tutorials: Biweekly Tutorial, online, starting Jan 25th, covering homework problems
Tut 001 Tuesday 13:30-14:20, First Class: Jan 25th, 2022, Location: MC2065 or online
Tut 002 Monday 11:30-12:30, First Class: Jan 24th, 2022, Location: DWE1501 or online

Homework policy: Homework is due online via Crowdmark, Eastern Standard Time 11pm **sharp** of the due date. **Late homework will not be graded.** To receive full credit**,** problems **must** be placed in the correct question box**.** You are free to collaborate however you must write up your work **entirely on your own** and you may not share the write-up you are handing in with others. You may use several resources to help you better grasp the material, but you **may not** search for the solution for a specific problem or use a solution manual. The usual university policies apply regarding academic dishonesty.

Homework important dates:

Assignments	**Post dates**	**Due dates (Eastern Standard Time 11pm sharp)**
Assignment 1	Jan 14	Jan 21
Assignment 2	Jan 28	Feb 4
Assignment 3	Feb 11	Feb 18
Assignment 4	March 4	March 11
Assignment 5	March 25	April 1

Assessment: The grade breakdown will be: 30% homework, 30% mid-term 1 and 2, 30% final assessment, plus 10% the highest among these three. The lowest homework score will be dropped.

Regrades: If you have issues with the way a homework or a test was marked, you may submit it to us with a written explanation of your concerns within 1 week of getting them back. Bear in mind that the entire homework/test is then subject to be regraded.

Email Policy: Please send email for administrative/marking purposes only. For math questions, please ask your instructor or during class/tutorial or office hours or via Piazza. You must use your ****@uwaterloo.ca email account when sending us emails "[STAT333]" at the beginning of the subject line. Otherwise, they may be filtered as spam and deleted automatically.

Illness: If you miss a midterm and provide satisfactory documentation to justify your absence (illness or family emergency) within 2 weeks of the examination date, the weight of that midterm

will be shifted equally to the homework and to the final. If you miss the final exam for a valid reason, an INC grade will only be granted if (1) you have written midterm 1 (2) you have at least 50% in the course going into the final exam. If you miss homework and provided satisfactory documentation to justify your inability to solve the problem set in the allotted time, the first missed will count toward the dropped homework and the weight of further assignments missed will be shifted to the final.

Contingencies: If due to illness, quarantine requirements, or at the request of public health, the instructor cannot teach the course in person, our course may return to an all-online format until such a time as deemed necessary.

Diversity: It is our intent that students from all diverse backgrounds and perspectives be well served by this course, and that students' learning needs be addressed both in and out of class. We recognize the immense value of the diversity in identities, perspectives, and contributions that students bring, and the benefit it has on our educational environment. Your suggestions are encouraged and appreciated. Please let us know ways to improve the effectiveness of the course for you personally or for other students or student groups. In particular:

- We will gladly honour your request to address you by an alternate/preferred name or gender pronoun. Please advise us of this preference early in the term so we may make appropriate changes to our records.
- We will gladly honour your religious holidays and celebrations. Please inform of us these at the start of the course.
- We will follow Accessibility Services guidelines and protocols on how to best support students with different learning needs.

Mental Health Support: The Faculty of Math encourages students to seek out mental health support if needed.

On-campus Resources:

- Campus Wellness https://uwaterloo.ca/campus-wellness/
- Counselling Services: counselling.services@uwaterloo.ca 519-888-4567 ext 32655
- MATES: one-to-one peer support program offered by Waterloo Undergraduate Student Association (WUSA) and Counselling Services: mates@wusa.ca
- Health Services: located across the creek from the Student Life Centre, 519-888-4096.

Off-campus Resources:

- Good2Talk (24/7): Free confidential help line for post-secondary students. Phone: 1-866-925-5454 (Ontario and Nova Scotia only)
- Here 24/7: Mental Health and Crisis Service Team. Phone: 1-844-437-3247 (Waterloo Region only)

- OK2BME: set of support services for lesbian, gay, bisexual, transgender or questioning teens. Phone: 519-884-0000 extension 213 (Waterloo Region only)
- EMPOWER ME 1-833-628-5589 for Cdn./USA other countries
  see: http://studentcare.ca/rte/en/IHaveAPlan_WUSA_EmpowerMe_EmpowerMe
    - EMPOWER ME in China:
      China North 108007142831
      China South 108001402851