

Course Outline for Statistics 4654/965A: Markov Chains

Department of Statistical and Actuarial Sciences. University of
Western Ontario

September, 2019

The course webpage is

<http://fisher.stats.uwo.ca/faculty/kulperger/Stat4654/Stat4654.htm>

This course outline is posted there and on the course OWL page.

1. Instructor: R. J. Kulperger

- e-mail: kulperger@stats.uwo.ca or rkulp@uwo.ca (this is automatically forwarded to my stats.uwo.ca email)
- phone 661-3627. Office WSC 231.
- If a student wishes to contact me by email they should use their UWO e-address and mailer as sometimes other addresses are blocked or classified as spam.

2. Text: Introduction to Probability Models, 12th edition, by Sheldon M. Ross (Academic Press). This is the most recent edition of the Ross text.

3. Course coverage : Discrete time and continuous time Markov chains. Phase-type distributions. Queuing theory. As time permits Markov chain Monte Carlo.

4. Course schedule: Monday, Tuesday and Wednesday 4:30 PM – 5:30 PM, SSC 3026

5. Web page for the course:

<http://fisher.stats.uwo.ca/faculty/kulperger/Stat4654/Stat4654.htm>

6. Office Hours: to be announced in class, and will be held on Monday and Friday weekly. There are no office hours on the day of a test and exam. The course TA will also have office hours, starting in week 2 or 3.

Course Description:

The course calendar description is given in the UWO online calendar

<http://www.westerncalendar.uwo.ca/>

Course Objectives

An introduction or review (depending on students' background) of discrete time Markov chains (chapter 4). An introduction to the theory and application of continuous time Markov chains (chapter 6), including Poisson processes (chapter 5) and including phase-type distributions. An introduction to Markov Chain Monte Carlo (chapter 4.9). Application of both discrete-time and continuous-time Markov chains to model queues (chapter 7). The later part of the course will consider particulars of queuing system. Congestion in single-server and multi-server queues under first-come, first-served

(FCFS), and other server rules, priority arrangements. Networks of queues will be considered as well. The role of occupancy and variability on the degree of congestion will be analyzed, as well as the impacts of pooling of service resources and priority queueing arrangements. Motivating examples will be drawn from call centres and health care applications.

Dr Stanford will present the advanced queuing material in the last few weeks of the course.

Policies:

1. Grading:

Students should have a calculator for exams.

Assignments	15%	either 4 or 5 assignments
Mid-term	35%	dates to be announced in class at end of first week, tentatively either October 16 or 23. The test will held in the lecture time.
Final Exam	50%	To be scheduled by the Registrar's Office. It will be a 3 hour exam. Students are required to wait until the exam schedule is posted before making any travel plans in December. No accommodation will be made for students who ignore this requirement.

2. Formal notices and further course information.

1. Prerequisites: SS3657A/B A minimum mark of 60mark of 60% in Statistical Sciences 3657A/B.

2. Antirequisites:The former Statistical Sciences 3652A/B, former Statistical Sciences 4652A/B, former Statistical Sciences 4657A/B and former Statistical Sciences 4737A/B.

3. Warning: Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. You can be deregistered at any time even after writing the final exam. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

4. Statement on academic offences Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

5. **Department Policy on Missed Course Requirements**

(a) If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or supporting documentation to the Academic Counselling Office of your home faculty as soon as possible. A student requiring academic accommodation due to illness must use the Student Medical Certificate (student.uwo.ca) when visiting an off-campus medical facility. For further information, please consult the university's medical illness policy at http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf.

(b) Missed Midterms: The policy of the department of Statistical and Actuarial Sciences is that there will be no make-up exams for missed midterms or tests. If recommendation for accommodation is received from your Dean's office, the weight of the missed midterm will be reassigned to the final exam. If no recommendation is received, then you will receive a mark of 0 for your midterm.

- (c) Missed Final Exam: If you miss the Final Exam, please contact your Faculty's Academic Counselling Office as soon as you are able to do so. They will assess your eligibility to write the Special Exam (the name given by the university to a make-up Final Exam). You may also be eligible to write the Special Exam if you are in a Multiple Exam Situation (see http://www.registrar.uwo.ca/examinations/exam_schedule.html).

Additional notes and comments.

Student Health and Wellness

As part of a successful student experience at Western, we encourage students to make their health and wellness a priority. Western provides several on campus health-related services to help you achieve optimum health and engage in healthy living while pursuing your degree. For example, to support physical activity, all students, as part of their registration, receive membership in Western's Campus Recreation Centre. Numerous cultural events are offered throughout the year. Please check out the Faculty of Music web page <http://www.music.uwo.ca/>, and our own McIntosh Gallery <http://www.mcintoshgallery.ca>. Information regarding health- and wellness-related services available to students may be found at <http://www.health.uwo.ca/>.

Students seeking help regarding mental health concerns are advised to speak to someone they feel comfortable confiding in, such as their faculty supervisor, their program director (undergraduate chair), or other relevant administrators in their unit. Campus mental health resources may be found at http://www.health.uwo.ca/mental_health/resources.html.

To help you learn more about mental health, Western has developed an interactive mental health learning module, found here: http://www.health.uwo.ca/mental_health/module.html. This module is 30 minutes in length and provides participants with a basic understanding of mental health issues and of available campus and community resources. Topics include stress, anxiety, depression, suicide and eating disorders. After successful completion of the module, participants receive a certificate confirming their participation.

Accessibility

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 519-661-2111 ext. 82147 if you have questions regarding accommodation.

Attendance

Classroom attendance is viewed as an important part of the learning process. Students are advised that excessive absenteeism may result in the student being disbarred from the final exam (see Western Academic Calendar).

Classroom Environment

The Department has adopted a Mutual Expectations policy governing the classroom environment and all work submitted by students. The full text of the policy can be found at: <https://www.uwo.ca/stats/undergraduate/mutual-expectations.html>. In summary, the policy was developed under the premise that all interactions between students and faculty should be governed by the principles of courtesy, respect and honesty

Support Services

Learning-skills counsellors at the Student Development Centre (<http://www.sdc.uwo.ca>) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Students who are in emotional/mental distress should refer to Mental Health@Western (http://www.health.uwo.ca/mental_health) for a complete list of options about how to obtain help. Additional student-run support services are offered by the USC, <http://westernusc.ca/services>.

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