

STAT 3030 Section A01
Introduction to Stochastic Processes
Winter 2024

Time Tu.Th. 11:30 p.m. – 12:45 p.m.
CRN 59790

Instructor Dr A.Thavaneswaran
326 Machray Hall
Email:Aearmabamoorthy.Thavaneswaran@umanitoba.ca

Web Pages UM Learn: <http://umanitoba.ca/umlearn>
Statistics: <http://umanitoba.ca/statistics>
R Download: <https://cran.r-project.org/mirrors.html>
R scripts <https://people.carleton.edu/~rdobrow/stochbook/RScripts.html>

Office Hours: Tu.Th. 12:45 p.m. - 1:15 pm

Evaluation

Test 1	20%
Test 2	20%
Assignments	20%
Final Examination	40%

The following are the minimum percentage grades required to receive each of the various letter grades: A⁺ (90%), A (80%), B⁺ (75%), B (70%), C⁺ (65%), C (60%), D (50%).

Exam Information

The Test 1 will be held on **Tuesday Feb.06h, 2024 (11:30 am to 12:45 pm)** and Test 2 will be held on **Thursday March 14th, 2024(11:30am to 12:45 9pm)**.

Test1 and Test2 Information

Both midterm tests and final exam will be closed book. Inappropriate collaboration, plagiarism, or contract cheating of any kind will be dealt with severely and forwarded to the appropriate disciplinary committee at the University of Manitoba.

Final Exam Information

The final exam will be of two hours in duration and will be scheduled by the Student Records Office. The final exam will cover the whole syllabus.

If there is a need to change any of these tools or instructions, I shall let you know well in advance.

Should you miss one test, you will be assigned a grade of zero unless you provide valid documentation. The other test and final exam would then be worth 30% and 50%, respectively. Should you miss both tests, you will be assigned a grade of zero unless you provide valid documentation. The final exam would then be worth 80%. **There are no make up tests.** Students who miss both tests, with or without valid documentation, will be reported to the Dean's office as having completed no term tests. This will have repercussions on their ability to write a deferred exam for the course, should such a deferral be requested.

Assignments

There will be three assignments in this course. Moreover, numerous practice problems (some with solutions) will be distributed in class. Students are strongly encouraged to try these practice problems on a regular basis.

Topics

The following list of topics serves only as an approximate outline and is subject to change:

- Review of random variables and probability generating functions. Branching processes and random walks.
- Markov chains (general formulation and properties; classification of states; steady state distributions and applications in pattern mining). Markov chain models for DNA sequences and applications. Page ranking algorithm and financial networks.
- Moment properties of discrete time processes. stationary processes and autocorrelation functions. Brownian motion, diffusion processes and geometric Brownian motion.
- Exponential random variables and their properties, Poisson processes and continuous time Markov chains.

Text

Introduction to Stochastic Process with R, by Robert P. Dobrow, Published by Wiley. ISBN-978-1-118-76065-1(not required).

Software

To apply the theory and methods taught in this course it is required that you download and install the statistical software package, R. It is a free program available at the URL at the top of the course outline. Throughout the lectures and through additional handouts you will be taught how to use the program.

Note that these textbooks are provided for extra reference and practice only. Coverage and notation may differ somewhat from the course notes. (Notes may cover topics that are not covered in the textbooks or vice-versa.) **Where there are any discrepancies between the way topics are covered in the course notes and in the textbook, please refer to the course notes.**

Voluntary Withdrawal

The voluntary withdrawal date is **March 20**(by which time you will have received your marks for the term tests).

Academic Dishonesty

It is important that you understand what constitutes academic dishonesty and that you are familiar with the very serious consequences. Links to resources that describe academic dishonesty (including plagiarism, cheating, inappropriate collaboration and examination impersonation, as well as typical penalties) can be found at:

<http://umanitoba.ca/science/undergrad/resources/webdisciplinedocuments.html>

Copyrighted Material

All course notes, assignments, tests, exams, practice exams and solutions are the intellectual property of your instructor or the Department of Statistics. Reproduction or distribution of these materials is strictly forbidden without their consent.

Recording of Class Lectures

Your instructor and the University of Manitoba hold copyright over the course materials, presentations and lectures which form part of this course. No audio or video recording of lectures or presentations is allowed in any format, openly or surreptitiously, in whole or in part without permission from your instructor.

Use of Electronics in the Classroom

It is the general University of Manitoba policy that all technology resources are to be used in a responsible, efficient, ethical and legal manner. A student may use technology in the classroom setting only for educational purposes approved by the instructor and/or the University of Manitoba Accessibility Services. Students should not engage in electronic messaging/posting activities (e-mail, texting, video or voice chat, social networking (e.g. Facebook)) or electronic gaming during scheduled class time.

Class Communication

The University requires all students to activate an official University email account. Please note that all communication between your instructor and you as a student must comply with the Electronic Communication with Students Policy. Please see

http://umanitoba.ca/admin/governance/governing_documents/community/electronic_communication_with_students_policy.html

You are required to obtain and use your U of M email account for all communication between yourself and the university.

Student Accessibility Services

If you are a student with a disability, please contact SAS for academic accommodation supports and services such as note-taking, interpreting, assistive technology and exam accommodations. Students who have, or think they may have, a disability (e.g. mental illness, learning, medical, hearing, injury-related, visual) are invited to contact SAS to arrange a confidential consultation.

<http://umanitoba.ca/student/saa/accessibility/>

ROASS Schedule A

Schedule A of the Responsibilities of Academic Staff with regards to Students (ROASS) policies of the University of Manitoba lists resources and policies for students. It is important that you familiarize yourself with these resources and policies. Schedule A will be posted on your instructor's UMLearn page.

Appendix For Winter 2024 Course Syllabi (uploaded to UM Learn)