Stochastic System Analysis
MEM 520 (80)
Fall Session II 2024 Syllabus

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Carolina University Mission Statement

We are a Christ-centered university committed to student success.

Course Information

Course Prerequisites
Admission into the Masters of Engineering Management program

Course Description
This course provides an in-depth exploration of stochastic processes and their applications in system analysis within the context of engineering management. Students will learn to model, analyze, and interpret systems subject to uncertainty, enabling them to make informed decisions in complex, dynamic environments. The course covers probabilistic modeling, statistical methods, and simulation techniques, emphasizing practical applications in engineering and management.

Course Delivery and Methods
The course will utilize textbook reading, professor lectures, and student interaction through discussions, web tours, and peer-reviewed projects.

Objectives **(Course Learning Outcomes)**

Upon completion of this course, students will be able to:

1. Apply various modeling techniques, such as mathematical modeling, simulation, and optimization, to represent and analyze complex systems through hands-on experience with software tools
2. Understand how to integrate knowledge from different engineering disciplines to analyze and solve system-level problems
3. Develop proficiency in using analytical methods to assess system performance, identify bottlenecks, and propose improvements
4. Evaluate and choose among alternative system designs and operational strategies by implementing decision-making tools and frameworks

Course Resources

Suggested Texts:
A Course of Stochastic Analysis, 1st edition
eTextbook
eBook ISBN: 978-3-031-25326-3 (2023)

Required Resources:
Computer and internet connection

Recommended Resources:
Additional contents (reading or video) will be offered in the resources section of the course shell. Will be shared along the classes.

Course Requirements and Assignments

Participation (Course Engagement)
How much a student is active and engaged in the class is important. For online students, being active and participating in discussion board's discussions, responding to specific in-person and written (by email/announcement or on the discussion board) instructions, punctuality, sincerity, interest, etc., everything will be monitored to assess the students' engagement.

Quiz
Students' grasp and understanding of the matter in the deep level will be monitored through Quizzed. The quizzes may be open/closed books/notes, pre-communicated or pop-up. These quizzes are designed to assess learning outcomes comprehensively.

Assignments
This will be aimed to assess students' capability to use the learned methods by hands-on practice. Different techniques and problems will be assigned to students in this part.

Papers/Projects
Papers: The objective of the paper is to take the students through the process of remembering, understanding, applying, analyzing, evaluating, and creating their own ideas through technical writing of the subject matter. This task will prepare them to connect their ideas with their communication and expression skills via writing.

Project: This activity is designed to assess students' understanding and skills of application of the course matters. The submission date will be within the final week of the session and the specific date will be shared later.

The paper or project may be assigned or either of them may be assigned based on the requirement of the class.

Final Exam
During the course's final week, students will complete a cumulative final exam, designed to assess the understanding of key elements and mastery of the subject matter of this course. The detailed format of the final exam will be shared later, based on the requirements of the students.

Course Schedule

Week 1 (Oct 21- Oct 27): Stochastatic Process
- The Key Features
- Markov Process
- Poisson Process
- Brownian Motion
- Random Walk

Project Work-Step1

Week 2 (Oct 28- Nov 03): Stochastatic Process in Engineering Management

Application in different domains
Examples
Project Work-Step2

Week 3 (Nov 04- Nov 10): Decision Theory and Optimization under Uncertainty
Statistical Modeling
Practical World Application
Software Tools
Project Work-Step3

Week 4 (Nov 11- Nov 17): Probabilistic Modeling
Statistical Modeling

Week 5 (Nov 18- Nov 24): Simulation Techniques
Practical world Applications
Examples

Week 6 (Nov 25- Dec 01): Project Week
Review
Week 7 (Dec 02- Dec 08): Project Presentation, Project Submission, Final

Course Specific Policies

The instructor has the authority to change/update the syllabus at any point in the session/semester. The change/update will be communicated to the students in a timely manner. If any students have questions or concerns about anything regarding the course, they can reach the instructor in a proper manner. Late submissions will be penalized by 10% of points, for each day. If any student has any issues/complaints about any grading, they need to communicate to the instructor within seven days of the grading. Any issue older than seven days will not be dealt with.

Use of Artificial Intelligence

The use of generative AI tools is permitted in this class for the following activities:

- Brainstorming and refining ideas
- Fine-tuning research questions
- Finding information on a topic
- Drafting an outline
- Checking grammar and style
- AI-specific assignments (per the provided instructions)

The use of generative AI tools is not permitted for the following activities:

- Impersonation in classroom context (e.g. composing discussion board posts)
- Completing group work
- Writing a draft of a writing assignment
- Writing entire sentences, paragraphs, or papers to complete class assignments

Course Grading

Assignment Type	Weight (points or percentage)
Class Participation	**10%**
Quiz	**20%**
Assignments	**25%**
Papers/projects	**20%**
Final Exam	**25%**
Total	**100%**

Course Assessment Mapping

Assessment	Objective(s) Met
Class Participation	CLO 1-4
Quiz	CLO 3
Assignments	CLO 1-4
Papers/projects	CLO 1-4
Final Exam	CLO 1-4

University Policies

Late Assignment Policy

- Students are expected to inform professors prior to a scheduled absence and understand work may be made up at the professor's discretion to ensure full credit.
- Upon an unexpected absence from class, the student should contact the professor immediately to discuss make-up work and submit such work in a timely manner.
- Students should not wait until the end of the session to deal with concerns about absences.

Grading Scale

Grade	Point Value	Range	
		Undergraduate	Graduate
A	4	94-100	96-100
A-	3.7	90-93	93-95
B+	3.3	87-89	90-92
B	3	83-86	87-89
B-	2.7	80-82	85-86
C+	2.3	77-79	82-84
C	2	73-76	79-81
C-	1.7	70-72	77-78
D+	1.3	67-69	74-76
D	1	60-66	70-73
F	0	<60	<70

Instructor Student Interaction & Communication

- Please use email whenever possible.
- Throughout an active course, faculty should respond to all emails and voicemail messages within 24 hours.
- Grading of assignments is to be done within 3 days for regular assignments (this includes attendance) and 7 days for larger assignments.
- Some assignments may require additional time to grade due to the length of the project and the directive to provide substantive feedback that will assist you throughout the learning process. In cases where the assignment is not returned with feedback within the stated period, refer to communication from your professor to facilitate expectations on subsequent assignments. Students are not expected to apply adjustments on subsequent assignments in advance of returned grading and feedback.

All CU faculty and students are provided with means of electronic communication (e.g. email, video conferencing, chat features, discussion boards, etc.) All employees and students are required to use official university electronic accounts for official university correspondence. This policy is meant to include both synchronous and asynchronous communication. **Faculty and staff are not obligated to read, receive, or respond to communications where these guidelines are not followed.** Email must be checked regularly, especially when enrolled in an active course. Adhere to the following guidelines when communicating online with professors, university employees, and other students.

- Accounts: Only university email and related systems should be used for institutional communications. Do not use personal email or video conferencing accounts.
- Names: Refer to professors and CU employees by their last names with appropriate honorifics (e.g., “Dr.” or “Prof.”). For professors, if you cannot easily verify their degree or status, “Prof.” is most appropriate—not “Ms.” or “Mr.” *Under no circumstance should you use first names unless given explicit permission.*
- Introductions: Use subject lines appropriately and begin any course-specific email with your first and last name, the course number, and your exact section number or meeting time (e.g., “101-05,” “9 am MW,” but not “this morning”).
- Grammar and Style: All written communications must conform to standard English. Emails and discussion board posts should not resemble text message, chat, or social media posts. Use complete sentences with correct capitalization, spelling, punctuation, and grammar.
- Coordination: All members of a synchronous, online interaction should participate by the same mode of interaction when possible. For example, join video conferences with video. This is especially true for one-on-one meetings with your professor and small group video discussions in or outside of class.
- “Class” Conduct: When participating in synchronous classes or meetings (especially when using video), conduct yourself as if in the classroom. Be on-time and mentally present. Be seated at a desk or table. Dress according to classroom standards. Do not introduce distractions into the interactions and be prepared to stay for the duration of the session per normal classroom behavior.
- Complexity: In general, asynchronous communication is appropriate for simple questions and activities. Complex questions that require more than one simple response should be

addressed synchronously—during class is often best. If you are unable to ask your question during class, or it is too personal to do so, use an asynchronous method to arrange a synchronous meeting.
- Boundaries: Synchronous communication is less formal than asynchronous. However, the appropriate use of names, language, acronyms, and emojis must still conform to classroom standards. Since we do not all share the same online culture, be prepared to explain yourself if your acronym or emoji is not understood. Be polite and respectful when asking for clarification, and gracious when misunderstandings occur.

Student Complaints

Informal Resolution

Carolina University seeks to provide an excellent educational experience for all students. If a student wishes to make a complaint of an academic nature, in the first instance, they should seek to resolve the matter by informal discussion with the faculty member.

If the discussion is in person, it is recommended that the student follow up with an email summarizing the discussion (complaint and resolution if one is reached).

If the discussion with the faculty member does not resolve the issue, the student may also contact Dr. Murchtricia Jones.

Filing a Formal Complaint

If informal discussions do not resolve the complaint, a student may file a formal complaint. No student shall suffer retaliation or other punitive action for the sole reason of filing a complaint or participating in a related process. A student must be enrolled at the institution to file a complaint under this policy. A student may file a complaint about a matter related to teaching, learning, assessment, grading, or student performance in a course.

A student must complete and submit the Student Academic Complaint Form to the Registrar's Office no later than 7 days after the events that are alleged to have caused the complaint. Any supporting evidence must be attached to the form. A vague complaint stating unsupported allegations, obvious falsehoods, based on differences of opinion about academic content or faculty expertise, or is unrelated to academic matters is liable to be dismissed summarily.

For the full text and a thorough explanation of the university's complaint policy, visit: https://catalog.carolinau.edu/student-academic-complaints

Course Attendance and Participation

All courses follow specific attendance policies found in the Academic Catalog for that course level and format. It is the student's responsibility to be familiar with these policies and to keep track of their own attendance. Per the university attendance policy, accrued absences may contribute negatively toward a student's final grade. Attendance and participation may be used by instructors to determine a portion of a student's grade for a particular course. Whereas attendance is typically defined by statuses identifying a student's presence in a class, participation typically includes the assessment of activity within that course. In some cases, the methodology, subject matter, learning environment, or other factors may require attendance.

Traditional in-class attendance will be recorded for hybrid courses, whereas attendance for online courses will be gauged by regular academic engagement. Students should refer to the course syllabus for the course's grade weighting table and course-specific policies regarding the grade percentages attributable to each component in a course, which may include attendance and participation. It is the student's responsibility to be familiar with these policies and to keep track of their own attendance and comply with the rules.

Disability Assistance

Carolina University welcomes students, faculty, staff and visitors with disabilities to our campus and to our programs. Our goal at CU is to ensure an accessible, inclusive welcoming learning and working environment for individuals with disabilities while complying with federal and state regulations.

Students with disabilities are encouraged to reach out to University Accessibility Services (UAS) as soon as possible to explore possible accommodations. UAS serves as a central resource on disability-related information, procedures and services for the university community and partners will work with the student and any other campus partners to identify barriers and implement plans for access. More information about UAS can be found at https://carolinau.edu/university-accessibility-services

Academic Integrity and Misconduct

The Student Handbook has a detailed list of different ways students show a lack of academic integrity, including academic technology misuse, cheating, complicity, fabrication or invention, falsification, forgery, multiple submissions, plagiarism, and sabotage.

Academic integrity is the honest and responsible conduct of studies, scholarship, research, information collection, and presentation. The university expects students to submit assignments that are original to them and to properly cite and reference other peoples' ideas using the prescribed style guide. The very foundation of a good university education is academic integrity. Learning how to express original ideas, cite sources, work independently, and report results accurately and honestly are skills that carry students beyond their academic careers. If a student is uncertain about an issue of academic honesty, they should consult the faculty member to resolve questions in any situation prior to the submission of the academic exercise.

Maintaining your academic integrity involves:

- Creating and expressing your own ideas in course work.
- Acknowledging all sources of information including verbal, written, digital, and graphic.
- Completing assignments independently or acknowledging collaboration.
- Attending classes, exams, and required academic events.
- Accurately reporting results when conducting your own research.
- Honesty during examinations.
- Not tampering with or misusing technology.
- Not aiding or abetting other students in violating any academic rules or policies.

Courses at Carolina University will utilize proctoring for select exams to ensure exam integrity. Per Carolina University directives, all exams that represent 25% or more of a course grade are required to be proctored. Instances of cheating or inappropriate behavior will be considered violations of the Academic Integrity policy and will result in disciplinary action.

Plagiarism is the use of another person's distinctive ideas or words without acknowledgment. All researchers are expected to acknowledge the use of another author's words by the use of quotation marks around those words in the text of a paper and by appropriate citations. Plagiarism can occur in an oral, written, or media project submitted for academic credit or for some other benefit. Examples of plagiarism include (but are not limited to), the following:

- Word-for-word copying of another person's ideas or words;
- Mosaic (interspersing of one's own words here and there while, in essence, copying another's work);
- Paraphrasing without citation (the rewriting of another's work, yet still using their fundamental idea or theory);
- Submission of another's work as one's own;
- Having another person write a paper;
- Buying or procuring a ready-made paper from a research paper "service" on the Internet or from another such service;
- Neglecting quotation marks on material that is otherwise acknowledged;
- Fabrication of references (inventing or counterfeiting sources)

BIBLIOGRAPHY

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