

Stochastic Models and Analysis

ESI 6546 Section 3C87

Class Periods: T 4:05PM – 4:55PM, R 4:05PM – 6:00PM

Location: ROG 0106

Academic Term: Spring 2020

Instructor:

Dr. Xu Sun

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Office Hours: TBD at Weil 401D

Course Description

Stochastic processes, with emphasis on model building and probabilistic reasoning. Review of elementary probability theory. Poisson process and renewal theory. Continuous-time Markov chains. Brownian motions and stochastic calculus. Applications in queuing, inventory theory, and finance.

Course Pre-Requisites / Co-Requisites

- (I) Elementary probability theory.
- (II) A good mathematical background. In particular, basic concepts in linear algebra and calculus will be used frequently.
- (III) An ability to prove basic mathematical statements.

Course Objectives

To gain fundamentals of probability theory; to get familiarized with stochastic processes; to ability to stochastic models and to analyze results obtained with such models.

Recommended Materials

- Title: [Introduction to Modeling and Analysis of Stochastic Systems](#)
- Author: V. G. Kulkarni
- Publisher: Springer; 2nd ed. 2011 edition (December 27, 2012)
- ISBN-10: 1461427355
- ISBN-13: 978-1461427353

Course Schedule

Week	Topics / Activities
1/06 – 1/11	Review of Probability Theory / Limit Theorems
1/12 – 1/18	Method of Conditional Probability / Gambler's Ruin Problem
1/19 – 1/25	Discrete-Time Markov Chain / Classification of States / Limiting Distributions
1/26 – 2/01	Exponential Distributions / Midterm Exam I
2/02 – 2/08	No class
2/09 – 2/15	Poisson Processes / Generalizations of the Poisson Processes
2/16 – 2/22	Continuous-Time Markov Chain / Birth-Death Processes / Backward & Forward Equations
2/23 – 2/28	Limiting Probabilities / Time Reversibility / Renewal Processes / Renewal Function
3/09 – 3/14	Wald's Equation / Elementary Renewal Theorem / Renewal Reward Processes
3/15 – 3/21	Inspection Paradox / Midterm Exam II
3/22 – 3/28	Little's Formula / M/G/1 System / G/M/1 System
3/29 – 4/04	Brownian Motion / Hitting Time / Running Maximum / Reflection Principle
4/05 – 4/11	Wald's Identities / Applications of Wald's Identities
4/12 – 4/18	Quadratic Variation / Final Exam
4/19 – 4/25	Project Presentations

Attendance Policy, Class Expectations, and Make-Up Policy

State whether attendance is required and if so, how will it be monitored? What are the penalties for absence, tardiness, cell phone policy, laptop policy, etc. What are the arrangements for missed homework, missed quizzes, and missed exams? This statement is required: Excused absences must be consistent with university policies in the Graduate Catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>) and require appropriate documentation. Additional information can be found here: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

Evaluation of Grades

Assignment	Percentage of Final Grade
Participation	5%
Homework Sets (6-drop-1)	10%
Midterm Exams (2)	40%
Final Exam	30%
Project	15%
<i>Total</i>	<i>100%</i>

Grading Policy

The following is given as an example only.

Percent	Grade	Grade Points
90.0 - 100.0	A	4.00
87.0 - 89.9	A-	3.67
84.0 - 86.9	B+	3.33
81.0 - 83.9	B	3.00
78.0 - 80.9	B-	2.67
75.0 - 79.9	C+	2.33
72.0 - 74.9	C	2.00
69.0 - 71.9	C-	1.67
66.0 - 68.9	D+	1.33
63.0 - 65.9	D	1.00
60.0 - 62.9	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:

<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>
<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Homework Assignment

- All assignments are due by the time listed on Canvas. No late submissions will be accepted.
- Absolutely no information regarding homework solutions may be shared by students except at a conceptual level. Any submitted homework assignments that are identical (or nearly so), either to each other, or to a solution key will receive a credit of zero.
- Grade reviews must be requested within one week of a grade being posted. After this one-week period, no grade will be revisited. In the event of a grade review, the entire assignment will be reviewed.

Exams

- **A make-up exam will not be offered except in extenuating circumstances.** For make-up consideration students will be required to submit written documentation from a reputable source as evidence. For any planned event (such as a wedding), the student is expected to contact the instructor no less than two weeks

in advance for consideration. Please note that there is no guarantee that requests will be accommodated. Social, networking, and club events may be taken into consideration strictly at the discretion of the instructor.

- Exams may be reviewed during office hours but will not be distributed.

Expectation for the Class

Students are expected adhere to the following guidelines in this course:

- **Take advantage of office hours.** Please do not send email to or send private messages to the instructor to engage in-depth discussion about academic topics. These issues are often better handled in person (i.e., during office hours). For homework related questions, the instructor reserves the right to ask students to attend office hours if the question via email is judged overly complicated.
- **Students should not distract others in class.** Students are not compelled to attend against their will. Students should refrain from watching videos; playing games; talking; sleeping; howling; and other distracting behaviors in classroom.
- **Important correspondence (other than project help) should be engaged via email.** Please allow 48 business hours for a response; the instructor has many responsibilities and will respond to messages as efficiently as is practical.

Email Etiquette

- Begin the email with a proper salutation and end the email with a closing and your signature. For example, an email to the instructor should start with “Dear Prof. LastName”, “Hi Dr. LastName”, or “Good morning, Dr. LastName”, among other acceptable forms. End the message with a closing and signature, such as “Sincerely, YourName” or “Thanks, YourName”.
- Be clear and concise. All emails sent ought to be easy to understand and should omit unnecessary details. If the question is short or direct, a one-sentence email (provided it includes a greeting and signature) is fine.
- Please avoid emailing to ask what your current grade is, or how many points you need on this project/final to get a certain grade in the class.

Students Requiring Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://gatorevals.aa.ufl.edu/>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://gatorevals.aa.ufl.edu/>.

University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu.
<https://lss.at.ufl.edu/help.shtml>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.
<https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.
<https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.