The Wharton School, University of Pennsylvania  
Course Syllabus  
OIDD 9310 - STOCHASTIC MODELS II  
Q3, Jan 18 – February 29, 2024  
Status: January 5, 2024

Instructor:  
Professor Maria Rieders  
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Lectures:  
Tuesday, Thursday 10:15-11:45 am, room JMHH F94

Office hours:  
Thursdays 1:30-2:30 pm, 517 JMHH (in person),  
Mondays 5:00-6:00 pm, via zoom  
and always by email and/or appointment

Evaluation:  
Weekly/biweekly homework assignments (40%);  
participation (10%);  
final exam (50%)

Prerequisites:  
Calculus (including differential equations), linear algebra, probability  
(no measure theory required), stochastic models as in OIDD 9300

Texts:  
- Ross Stochastic Processes, 2nd edt, Wiley (required)  
- Karlin and Taylor A First Course in Stochastic Processes, 2nd edt., 1975,  
  Academic Press (recommended)  
- Some relevant texts have been put on reserve; see Canvas  
- Class handouts and assignments will be made available on Canvas

Website:  
https://canvas.upenn.edu/courses/xxxxx  
Please, check the Canvas website frequently during the semester for up to date  
information, assignments, and class handouts.

Course Description:  
This is the second part of our Stochastic Models course sequence. We start by revisiting continuous  
time Markov chains, with a special focus on computational methods and time reversibility. Building  
on the elementary counting processes presented in Stochastic Models I, we now study the more  
general theory of renewal processes. Of particular interest are limiting results such as the Key  
Renewal Theorem that enable us to calculate long run performance measures of interest. We then  
introduce martingales which provide a basic approach for studying applied probability models.  
Martingales will prove particularly useful in analyzing Brownian motion processes. Besides presenting  
general results on Brownian motion, we will look at applications including some financial models of  
interest.
Course Topics:
A tentative course outline follows.

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Homework:
Assignments will be given on a weekly/biweekly basis. Please, submit your solutions on Canvas by the due date listed. If you can’t make the deadline due to extenuating circumstances, please ask the instructor before the due-date for a possible extension. Unless otherwise stated, homework is to be done individually; some group work may be assigned as well. You are encouraged to discuss the problems (and any of the material covered in class) with each other; yet the work that you submit must be your own. If you significantly benefited from discussions with a peer, please do acknowledge the collaboration. Students are expected to refrain from soliciting solutions from other sources (e.g. internet, previous years’ classes, etc). If you do use outside information, academic honesty requires you to state such sources.

Participation:
This is a Ph.D. level course. Our class sessions are meant to provide a learning environment that involves all participants. I am always open for questions, both during our sessions and during office hours. Students are expected to come prepared to class, ask relevant questions, and actively participate in classroom discussions.

Exams:
There will be an open book final exam during the last session on February 29.