

MATH 4320-01 (11630)

Introduction to Stochastic Processes, Fall 2022

Instructor:	Edward P. C. Kao	
Time:	TTh : 10:00-11:30 am	
Class Venue:	SEC105	
Office:	629-PGH (713) 743-3456, website: www.math.uh.edu/~edkao ekao@uh.edu	
Grader/TA:	Michael Batista, mrbatist@cougarnet.uh.edu	
Course Objective:	This course provides a overview of stochastic processes. We cover Poisson processes, discrete-time and continuous-time Markov chains, renewal processes, diffusion process and its variants, martingales. We also study Markov chain Monte Carlo methods, and regenerative processes. In addition to covering basic theories, we also explore applications in various areas such as mathematical finance.	
Grading Guide:	Homework	10%
	Midterm	40%
	Final	50%
Final Exam:	11:00 a.m. – 2 p.m., December 8, 2022, hursday (per UH Fall 2022 Final Exam Schedue)	
References:	<i>An Introduction to Stochastic Processes</i> , by Edward P. C. Kao, Dover 2019, Duxbury Press, 1997. <i>An Introduction to Probability with Mathematica</i> , by Edward P. C. Kao, World Scientific, May 2022.	
Homework:	Weekly homework assignments. To be completed in the form of a Mathematica Notebook and emailed to the grader. late submissions will not be accepted.	

Week	Dates	Topics
1	8/23, 8/25	Introduction, Poisson processes
2	8/30, 8/31	Poisson Processes
3	9/6, 9/8	Poisson Processes
4	9/13, 9/15	Discrete-time Markov chains
5	9/20, 9/22	Discrete-time Markov chains
6	9/27, 9/29	Discrete-time Markov chains
7	10/4 10/6	No class Continuous-time Markov chains
8	10/11, 10/13	Continuous-time Markov chains
9	10/18, 10/20	Midterm Exam Continuous-time Markov chains
10	10/25, 10/27	Brownian motion
11	11/1, 11/3	Diffusion processes and their variants
12	11/8, 11/10	Martingales
13	11/15, 11/17	Applications in financial mathematics
14	11/22 11/24	Markov chains Monte Carlo Thanksgiving Holiday (no classes)
15	11/29, 12/1	Semi-Markov processes and regenerative processes

UNIVERSITY OF HOUSTON SYLLABUS LANGUAGE: FALL 2022

Required Language for Courses with a Face-to Face Component

If you are experiencing any COVID-19 symptoms that are not clearly related to a pre-existing medical condition, do not come to class. Please see [Student Protocols](#) for what to do if you experience symptoms and [Potential Exposure to Coronavirus](#) for what to do if you have potentially been exposed to COVID-19. Consult the (select: [Undergraduate Excused Absence Policy](#) or [Graduate Excused Absence Policy](#)) for information regarding excused absences due to medical reasons.

Required Language for All Courses

COVID-19 Information

Students are encouraged to visit the University's [COVID-19](#) website for important information including diagnosis and symptom protocols, on-campus testing, and vaccine information. Please check the website throughout the semester for updates.

Vaccinations

Data suggests that vaccination remains the best intervention for reliable protection against COVID-19. Students are asked to familiarize themselves with pertinent [vaccine information](#) and to consult with their health care provider. The University strongly encourages all students, faculty and staff to be vaccinated.

Reasonable Academic Adjustments/Auxiliary Aids

The University of Houston complies with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, pertaining to the provision of reasonable academic adjustments/auxiliary aids for disabled students. In accordance with Section 504 and ADA guidelines, UH strives to provide reasonable academic adjustments/auxiliary aids to students who request and require them. If you believe that you have a disability requiring an academic adjustments/auxiliary aid, please contact [the Justin Dart Jr. Student Accessibility Center](#) (formerly the Justin Dart, Jr. Center for Students with DisABILITIES).

Excused Absence Policy

Regular class attendance, participation, and engagement in coursework are important contributors to student success. Absences may be excused as provided in the University of Houston [Undergraduate Excused Absence Policy](#) and [Graduate Excused Absence Policy](#) for reasons including: medical

illness of student or close relative, death of a close family member, legal or government proceeding that a student is obligated to attend, recognized professional and educational activities where the student is presenting, and University-sponsored activity or athletic competition. Under these policies, students with excused absences will be provided with an opportunity to make up any quiz, exam or other work that contributes to the course grade or a satisfactory alternative. Please read the full policy for details regarding reasons for excused absences, the approval process, and extended absences. Additional policies address absences related to [military service](#), [religious holy days](#), [pregnancy and related conditions](#), and [disability](#).

Recording of Class

Students may not record all or part of class, livestream all or part of class, or make/distribute screen captures, without advanced written consent of the instructor. If you have or think you may have a disability such that you need to record class-related activities, please contact the [Justin Dart, Jr. Student Accessibility Center](#). If you have an accommodation to record class-related activities, those recordings may not be shared with any other student, whether in this course or not, or with any other person or on any other platform. Classes may be recorded by the instructor. Students may use instructor's recordings for their own studying and notetaking. Instructor's recordings are not authorized to be shared with *anyone* without the prior written approval of the instructor. Failure to comply with requirements regarding recordings will result in a disciplinary referral to the Dean of Students Office and may result in disciplinary action.

Syllabus Changes

Due to the changing nature of the COVID-19 pandemic, please note that the instructor may need to make modifications to the course syllabus and may do so at any time. Notice of such changes will be announced as quickly as possible through (*specify how students will be notified of changes*).

Recommended Language

Resources for Online Learning

The University of Houston is committed to student success, and provides information to optimize the online learning experience through our [Power-On](#) website. Please visit this website for a comprehensive set of resources, tools, and tips including: obtaining access to the internet, AccessUH, and Blackboard; requesting a laptop through the Laptop Loaner Program; using your smartphone as a webcam; and downloading Microsoft Office 365 at no cost. For questions or assistance contact UHOnline@uh.edu.

UH Email

Please check and use your CougarNet email for communications related to this course. To access this email, [login](#) to your Microsoft 365 account with your CougarNet credentials.

Webcams

Access to a webcam is required for students participating remotely in this course. Webcams must be turned on (*state when webcams are required to be on and the academic basis for requiring them to be on*). (Example: Webcams must be turned on during exams to ensure the academic integrity of exam administration.)

Academic Honesty Policy

High ethical standards are critical to the integrity of any institution, and bear directly on the ultimate value of conferred degrees. All UH community members are expected to contribute to an atmosphere of the highest possible ethical standards. Maintaining such an atmosphere requires that any instances of academic dishonesty be recognized and addressed. The [UH Academic Honesty Policy](#) is designed to handle those instances with fairness to all parties involved: the students, the instructors, and the University itself. All students and faculty of the University of Houston are responsible for being familiar with this policy.

Title IX/Sexual Misconduct

Per the UHS Sexual Misconduct Policy, your instructor is a “responsible employee” for reporting purposes under Title IX regulations and state law and must report incidents of sexual misconduct (sexual harassment, non-consensual sexual contact, sexual assault, sexual exploitation, sexual intimidation, intimate partner violence, or stalking) about which they become aware to the Title IX office. Please know there are places on campus where you can make a report in confidence. You can find more information about resources on the Title IX website at <https://uh.edu/equal-opportunity/title-ix-sexual-misconduct/resources/>.

Security Escorts and Cougar Ride

UHPD continually works with the University community to make the campus a safe place to learn, work, and live. Our Security escort service is designed for the community members who have safety concerns and would like to have a Security Officer walk with them, for their safety, as they make their way across campus. Based on availability either a UHPD Security Officer or Police Officer will escort students, faculty, and staff to locations beginning and ending on campus. If you feel that you need a Security Officer to walk with you for your safety please call [713-743-3333](tel:713-743-3333). Arrangements may be made for special needs.

Parking and Transportation Services also offers a late-night, on-demand shuttle service called Cougar Ride that provides rides to and from all on-campus shuttle stops, as well as the MD Anderson Library, Cougar Village/Moody Towers and the UH Technology Bridge. Rides can be requested through the UH Go app.

Days and hours of operation can be found at <https://uh.edu/af-university-services/parking/cougar-ride/>.

Helpful Information

Coogs Care: <https://uh.edu/dsa/coogscare/>

Student Health Center: <https://www.uh.edu/healthcenter/>