ECE 7103 (Approved): Discrete Stochastic Processes

Course Description

Stochastic processes in discrete time or space for electrical engineering. Renewal theory, Markov chains and processes, dynamic programming, basic large deviations theory and martingales.

Prior Course Number: 894.01
Transcript Abbreviation: Disc Stoc Process
Grading Plan: Letter Grade
Course Deliveries: Classroom
Course Levels: Graduate
Student Ranks: Masters, Doctoral, Professional
Course Offerings: Spring
Flex Scheduled Course: Never
Course Frequency: Even Years
Course Length: 14 Week
Credits: 3.0
Repeatable: No
Time Distribution: 3.0 hr Lec, 3.0 hr Rec
Expected out-of-class hours per week: 3.0
Graded Component: Lecture
Credit by Examination: No
Admission Condition: No
Off Campus: Never
Campus Locations: Columbus
Prerequisites and Co-requisites: Prereq: 6001 (804).
Exclusions: Not open to students with credit for 894Q or 894.01.
Cross-Listings:

Course Rationale: Existing course.

The course is required for this unit's degrees, majors, and/or minors: No
The course is a GEC: No
The course is an elective (for this or other units) or is a service course for other units: Yes

Subject/CIP Code: 14.1001
Subsidy Level: Doctoral Course

Course Goals

Develop the understanding and intuition necessary to apply stochastic process models to problems in engineering, science and operations research
Build the ability to construct simple examples to build insight about the structure of stochastic processes and about the generic effect of these phenomena in real systems
Learn the tools and the methods, imperative to do fundamental research in the broad area of communication and networking

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Review of probability	4.0							
Renewal processes and renewal theory	10.0							
Finite-state Markov chains	5.0							

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Markov decision processes and dynamic programming	3.0							
Markov chains with countably-infinite state spaces	6.0							
Large deviations and martingales	12.0							

Grades

Aspect	Percent
Problem Sets	15%
Midterm	35%
Final Exam	50%

Representative Textbooks and Other Course Materials

Title	Author
Stochastic Processes: Theory for Applications, 2014, Cambridge University Press, ISBN: 9781107039759	Robert G. Gallager

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
***	a	An ability to apply knowledge of mathematics, science, and engineering.
	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
*	c	An ability to design a system, component, or process to meet desired needs.
	d	An ability to function on multi-disciplinary teams.
***	e	An ability to identify, formulate, and solve engineering problems.
	f	An understanding of professional and ethical responsibility.
*	g	An ability to communicate effectively.
	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
	i	A recognition of the need for, and an ability to engage in life-long learning.
	j	A knowledge of contemporary issues.
**	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Additional Notes or Comments

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Updated abbreviation, prereqs, exclusions, and goals  to conform to university format
3/29/12
Changed text. 3/25/15. CED
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