Enquire Teaching Timetable

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Course Outcome

MATH 4240 - Stochastic Processes

Learning Outcome

This is a second course in probability theory. We expect students to learn systems which vary in time in a random manner. In the course they will learn the use of probability and mathematics in the theory and to see many examples that are related to real life problems. The basic learning outcomes are:
- Students will be familiar with the basic probability notations: independence, conditioning, random variables, distributions, expected values, moments.
- Students learn the important concept of Markov chain, transition probability, hitting time, transient and recurrent states. They will learn the computation techniques in linear analysis, and examples like gambler's ruin problem, birth and death chains, branching chains, queuing chains.
- Students learn the stationary distribution, existence and uniqueness, convergence and long time behavior, applications to real life problems.
- Students learn the continuous-time Markov chains, basic properties, generator of the chains, differential equation technique, Poisson processes, birth and death processes queuing chains.
- Students learn the Gaussian processes and Brownian motions.

Course Syllabus

Bernoulli processes and sum of independent random variables, Poisson processes, times of arrivals, Markov chains, transient and recurrent states, stationary distribution of Markov chains, Markov pure jump processes, and birth and death processes. Students taking this course are expected to have knowledge in probability.

Assessment Type

	Assessment Type	Current Percent
1	Essay test or exam	50
2	Others	10
3	Short answer test or exam	40

Feedback for Evaluation

Mid-term evaluation (optional)
End-term evaluation (mandatory)

Required Readings

None

Recommended Readings

Main Reference:
- Introduction to Stochastic Processes, by P. Hoel, S. Port and C. Stone, Waveland Press

Other References:
- Essentials of Stochastic Processes, R. Durrett, Springer (many real life examples)
- Introduction to Stochastic Processes, G. Lawler, Chapman & Hall (more condense, a good book)
- Introduction to Stochastic Processes, E. Cinlar, Prentice Hall (detail in Bernoulli processes and Poisson processes)
- Basic Stochastic Processes, Z. Brzezniak andn T. Zastawniak, Springer (more rigorous mathematically)
- A Course in Probability, K.L. Chung, Academic Press (graduate text)