Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
IND405	Introduction To Stochastic Processes	7	3	0	0	3	4

Prerequisites	ING241
Admission Requirements	ING241

Language of Instruction	English
Course Type	Elective
Course Level	Bachelor Degree
Objective	The stochastic processes enable students to model and analyze systems with random components. These stochastic models have several application areas such as supply chain management, inventory systems management, and call-center management. This course aims at introducing different types of stochastic models and their analyses, which can further be useful for students in their graduate studies and in industry. Consequently, the objectives of this course are as follows: 1- Enable students to model a given problem through different types of stochastic models 2- Enable students to analyze stochastic models 3- Enable students to apply their knowledge of stochastic processes to queueing and inventory models
Content	Review of probability (Ross, Chapter 1) Conditional probability and conditional expectation (Ross, Chapter 3) Markov chains, Chapman-Kolmogorov equations, and classification of states (Ross, Chapter 4) Gambler's ruin problem, branching process (Ross, Chapter 4) Poisson processes and exponential distribution (Ross, Chapter 5) Markov processes, birth and death processes (Ross, Chapter 6) Birth and death processes, transition and limiting probabilities (Ross, Chapter 6) Queueing models (Ross, Chapter 8) Inventory models (Ross, Chapter 9)
References	Ross, S., "Introduction to Probability Models", 9th Edition, Academic Press, New York, 2007.

Theory Topics

Week	Weekly Contents
1	Review of probability (Ross, Chapter 1)
2	Conditional probability (Ross, Chapter 3)
3	Conditional expectation (Ross, Chapter 3)
4	Markov chains, Chapman-Kolmogorov equations, and classification of states (Ross, Chapter 4)
5	Markov chains, Chapman-Kolmogorov equations, and classification of states (Ross, Chapter 4)
6	Gambler's ruin problem, branching process (Ross, Chapter 4)
7	Poisson process and exponential distribution (Ross, Chapter 5)
8	Poisson process and exponential distribution (Ross, Chapter 5)
9	Midterm
10	Markov process, birth and death processes (Ross, Chapter 6)
11	Markov process, birth and death processes (Ross, Chapter 6) Birth and death processes, transition and limiting probabilities (Ross, Chapter 6)
12	Queueing and inventory models
13	Queueing and inventory models
14	Midterm