Course Profile

| Course Number: Math230 | Course Title: Probability |
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| Required / Elective: Required | Prerequisite: None |
| Catalog Description: <br> Basic topics in probability theory; sample <br> space, combinatorics, Bayes theorem and <br> conditional probability. Random variables, <br> marginal, joint and conditional distributions; <br> expectations and conditional expectations; <br> hypergeometric, binomial, geometric <br> distributions; Poisson, exponential, gamma <br> distributions and the Poisson arrival model; <br> moment generating functions, central limit <br> theorem, and the normal distribution; <br> variance, covariance, and correlation. | Textbook / Required Material: <br> A First Course in Probability, Sheldon Ross, <br> Pearson $7^{\text {th }}$ Ed. |
| Course Structure / Schedule: (3+1+0) 3 / 5 ECTS |  |
| Extended Description: <br> Principle of counting, permutations, combinations, Axioms of probability, sample spaces, set <br> operations, properties of probability, Joint and conditional probability, independence, Bayes <br> rule, law of total probability, chain rule, Random variables, CDF, PMF, expectation, mean, <br> variance, functions of random variables (discrete), Types of discrete random variables <br> (Bernoulli, Binomial, Poison, Geometric), Continuous random variables, CDF, PDF, <br> functions of continuous random variables, Expectation, mean, variance, basic probability <br> calculations, Uniform distribution, Normal and standard normal distributions, exponential <br> distribution. |  |
| Design content: None |  |

Course Outcomes: By the end of the course the students should be able to:

1. understand the basic knowledge on fundamental probability concepts, including random variable, probability of an event, additive rules and conditional probability [1, 6, 7],
2. compute probabilities and moments such as the expected value and variance of random variables and combinations/functions of random variables [1, 6, 7],
3. recognize and interpret a variety of deterministic and nondeterministic random processes that occur in engineering [1, 6, 7],
4. solve problems independently [3].
[1] demonstrate the ability of solving problems by using techniques from calculus, linear algebra, differential equations, probability and statistics,

## [3] demonstrate the ability to apply mathematics to the solutions of problems,

[6] have a basic knowledge of the main fields of mathematics, including analysis, algebra, differential equations, differential geometry,
[7] have an ability to function both independently and as a member of a multidisciplinary team.
Recommended reading:
Yates, R. D. and Goodman, D. J., Probability and Stochastic Processes, John Wiley \& Sons, 2004
Teaching methods:
Pre-readings, lectures, problem solving (PS), homework.
Assessment methods:
Quizzes, midterms, final exam
Student workload:

| Preparatory reading | 38 hrs |
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| Lectures, discussions | 56 hrs |
| Homework | 28 hrs |
| Final Exam | 3 hrs |

TOTAL ........................... 125 hrs ... to match $25 \times 5$ ECTS
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