

### Probability Theory and Statistics for IE

This course aims to provide an introduction to the concepts of probability and statistics. In the first part the course familiarizes students with the methods of measuring randomness. Random variables, their functions and moments are studied. Some well known discrete and continuous random variables are presented. In the second part the methods of analyzing and interpreting observed data is discussed. Methods for unbiased parameter estimation, confidence intervals and sampling size determination are presented. Finally hypothesis testing for different settings are introduced.

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Topic 1	Definition and Axioms of Probability Conditional Probability and Independence
Topic 2	Random Variables Expected Value and Higher Moments
Topic 3	Important Discrete Random Variables
Topic 4	Important Continuous Random Variables
Topic 5	Functions of a Random Variable
Topic 6	Joint Probability Distributions and Conditional Expectations
Topic 7	Limit Theorems The Normal Distribution and the Central Limit Theorem
Topic 8	Sampling Distributions
Topic 9	Parameter Estimation, Unbiased Estimates
Topic 10	Confidence Intervals
Topic 11	Hypothesis Testing, Power of a Test
Topic 12	Test for the Difference of Two Means, Paired Observations
Topic 13	Chi-square Goodness of Fit and Contingency Table Tests

#### Time and Place:

Lecture: Tuesday 15:00-16:00; Thursday 12:00-14:00 in M2200

PS and Quiz: Monday 15:00-17:00 in NBB 10 (Natuk Birkan in South Campus)

#### Recommended Text:

- Walpole, Myers, Myers and Ye, Probability and Statistics for Engineers and Scientists 8<sup>th</sup> Edition, Pearson.
- Ross, A First Course in Probability, Sixth Edition, Prentice Hall (on Reserve)
- Ross, Introduction to Probability and Statistics for Engineers and Scientists, Elsevier (on Reserve)

#### Grading:

Midterm 40 %; Average of Quizzes 20 %; Final: 40%

#### Instructor:

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For a visit outside the office hours please make an appointment.

#### Teaching Assistant:

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Enrolment Key: normality