Tel Aviv University
Faculty of Engineering
School of Electrical Engineering

אוניברסיטת תל אביב
הפקולטה להנדסה
בית הספר להנדסת חשמל

Introduction to Probability and Statistics

Spring Semester

LECTURER **Dr. Galit Ashkenazi-Golan**

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COURSE DESCRIPTION & OBJECTIVES

At the end of this course students should be able to (i) model problems in a probability-theory setting; (ii) solve probability problems; (iii) know the main distributions and probability concepts used in following statistic course .

COURSE TOPICS

Week 1: **Basics of probability:** Probability Space, Sets, Events
Combinatory: n! , n over k, Probabilities over a symmetric sample space

Week 2: **Conditional probability:** Bayes' theorem, Dependent and independent events

Week 3: **Random variables:** Definitions of Discrete and continuous random variables

Week 4: **Random variables (cont.):** Expectation, Variance

Week 5: **Random variables (cont.):** special random variables – binom, geometric, hyper-geometric, Poisson (and Poisson process), exponential, Normal

Week 6: **Joint Distributions**: Joint Distributions, Independent variables

Week 7: **Joint Distribution(cont):** Conditional distributions, conditional expectation and variance Covariance, Pearson Correlation

Week 8: **Functions of several variables**: Functions of several variables, sum of variables, expectation of sum of variables

Week 9: **Covariance:** Variance of sum of variables, covariance, Pearson Correlation

Week 10: **Central Limit Theorem:** More on the Normal Distribution, **,** t-distribution

Week 11: **Estimation:** Point Estimator and Confidence Interval estimator

Week 12: **Hypothesis testing**: H_0, H_1, type I and type II mistakes, power of test

Week 13: **Hypothesis testing:** of mean when variance is known and unknown, comparing means – paired and independent samples

ASSIGNMENTS

Homework assignments will be distributed in class on a weekly basis with a due date of two weeks from the time of distributioin. At the due date of each assignment, the corresponding solution will be distributed. Assignments will not be evaluated BUT submission will be recorded. 80% of all homework assignments must be handed in for evaluation in order to be eligible to take the final exam. Assignments are submitted during class.

MIDTERM COURSE POLICY

A midterm exam will be scheduled in the beginning of the semester. During an examination, student shall not use books, papers, or other materials not authorized by the instructor. The midterm will count for 20% of the total course grade.

FINAL COURSE POLICY

The final exam will cover the entire course material and will count for 80% of the total course grade. The duration will be 3 hours. Students will have a first exam, Moed A. If the student does not pass, they can retake the exam, Moed B. The last exam taken will be the student's final grade for the exam.

REQUIRED READING

Sheldon M. Ross: *A First Course in Probability* Pearson Prenticce Hall, 8th Edition, 2010.
Bertsekas, Dimitri P. and Tsitsikis, John N., *Introduction to Probability.* Athena Science, 2nd editions, 2008.
Montgomery, D.C and Runger, G.C. and Hubele, N.F. *Engineering Statistics*. Wiley & Sons, NY, 4th Edition, 2007.