

Parametric Statistics

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Web: <https://polyhedron.math.uoc.gr/2122/moodle/course/view.php?id=20>

Class Hours: Monday, Friday 11.15-12.45. A212

Recitation Hours (not every week): Thursday, 11.15-12.45, Γ109

Office Hours: Monday, 13.00-15.00

This is a tentative syllabus for the course MEM-264: Applied Statistics.

Course Description

In this course, we will cover fundamental topics of applied statistics such as point estimation, hypothesis testing, and regression. We will also do some statistical programming.

Required Materials

The course notes are based on the following books:

(DGS) Probability and Statistics, Morris DeGroot and Mark Schervish (International Edition), 2014 (4th edition)

Course notes will be available on the class website. The material can also be found in Greek in the following books:

- Στατιστική: Ανάλυση δεδομένων με χρήση της R, Witte Robert, Witte John, Ανδρουλάκης Γεώργιος, Κουνετάς Κωνσταντίνος.
- Εφαρμοσμένες Πιθανότητες και Στατιστική, Κουτρουβέλης Ιωάννης.

Prerequisites

Required preliminary math tools are elementary probability, calculus and basic linear algebra. There are no formal prerequisites for this class, but I would advise that you have passed Calculus I, Calculus II and Probability Theory. I will only briefly cover Random variables, expectations and Large random samples in the class, so you should be familiar. If not, you can study Chapters 4, 5, and 6 of the DGS book.

Course Syllabus

The course will cover the following topics: Estimation, Hypothesis Testing, Linear Statistical Models (Linear Regression, Analysis of Variance). The following syllabus is tentative and subject to change. Readings correspond to chapters of the DGS book.

Week	Content	Readings
Week 1	Introduction/Recap of probabilities, random variables and expectations	Chapters 1-4
Week 2	Some probability distributions, the Normal Distribution, CLT	5.6, 6.3
Week 3	Maximum likelihood estimators and their properties	
Week 4	Sampling Distributions of Estimators, Chi square and t distributions	8.1-8.4
Week 5	Confidence Intervals, Intro to Hypothesis Testing lecture	8.5, 9.1
Week 6	Recap&Midterm Week	
Week 7	t-tests , F-distributions	9.5, 9.6, 9.7
Week 8	Chi-squared Goodness-of-fit Tests	10.1, 10.2
Week 9	Tests of Independence	
Week 10	Linear Regression	11.1-11.3
Week 11	ANOVA	11.6-11.8
Week 12	TBD	
Week 13	TBD	

Grading

Grading will be based on a midterm exam, accounting for 40% of the grade, a final exam, accounting for 40% of the grade (not comprehensive), and 1 homework assignment (due near the end of the semester), accounting for 20%. To pass the course, your average grade on the exams needs to be above 40/100.