

**SPRING 2009
COURSE DESCRIPTION**

MATH 6263: Testing Statistical Hypotheses

Time: TR, 12:05-13:25 pm; Place: Skiles 169

Instructor: Vladimir Koltchinskii

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Office Time: Tuesday: 3:00-4:00; Thursday: 11:00-noon (subject to change)

A brief description. The main goal of the course is to develop a rigorous mathematical framework for the theory of hypotheses testing, including notions of optimality of statistical tests and asymptotic theory. The course will also include a brief introduction to nonparametric curve estimation.

Prerequisites. Introductory courses in Mathematical Statistics (such as MATH 4261 and MATH 4262); Probability of the level of MATH 6241; more advanced courses on Statistical Estimation such as MATH 6262.

Texts (recommended).

A.W. van der Vaart, Asymptotic Statistics, Cambridge University Press, 1998.

E. L. Lehmann and J.P. Romano, Testing Statistical Hypotheses, third edition, Springer, 2005.

Once in a while, we will also use:

A. Tsybakov, Introduction to Nonparametric Estimation, Springer, 2009.

You can find a number of reasonable problems in the following book:

Shao, Jun. Mathematical Statistics: Exercises and Solutions, Springer, 2005.

Topics.

• Neyman-Pearson Lemma and its generalizations; UMP tests and monotone likelihood ratio families.

• Invariance in testing problems; rank methods; permutation tests.

• Large sample theory and testing problems; asymptotics of likelihood ratios; large sample optimality.

• Goodness of fit tests.

• General large sample methods; elements of asymptotic theory of bootstrap.

• Classification problems.

• Nonparametric estimation problems; kernel estimators; local polynomial estimators; projection estimators.

Grading. Your grade will be based on two midterm exams (60%) and a take home final exam (40%). The first midterm exam will be during the last week of September and the second one by the end of October.

In addition to this, many problems will be assigned during the semester. They will not be graded, but the best way to get prepared for the exams is to solve them on your own.

2nd
midterm