Department of Mathematics
Pomona College

Math 152. Statistical Theory Fall 2009

Course Outline

Time and Place:	MWF 9:00 am - 9:50 am Millikan 218
Instructor:	Dr. Adolfo J. Rumbos
Office:	Andrew 259
Phone/e-mail:	ext. 18713 / arumbos@pomona.edu
Office Hours:	MWF 10:00 am – 11:00 am; or by appointment
Text:	*Introduction to Mathematical Statistics,* Sixth Edition by Robert V. Hogg, Joseph W. McKean and Allen T. Craig.
Course Website:	http://pages.pomona.edu/~ajr04747/
Prerequisites:	Probability (Math 151 PO or equivalent course)

Course Description. This is a course in *statistical inference*. Loosely speaking, statistical inference is the process of going from information gained from a sample to inferences about a population from which the sample is taken. There are two aspects of statistical inference that we'll be studying in this course: estimation and hypothesis testing. In estimation, we try to determine *parameters* from a population based on quantities, referred to as *statistics*, calculated from data in a sample. The degree to which the estimates resemble the parameters being estimated can be measured by ascertaining the probability that a certain range of values around the estimate will contain the actual parameter. The use of probability is at the core of statistical inference; it involves the postulation of a certain probability model underlying the situation being studied and calculations based on that model. The same procedure can in turn be used to determine the degree to which the data in the sample support the underlying model; this is the essence of hypothesis testing. A solid knowledge of probability is therefore essential for understanding statistical inference.
The course topics are listed in the attached tentative schedule of lectures and examinations.

Assigned Readings and Problems. Readings and problem sets will be assigned at every lecture and collected on an alternate basis. Students are strongly encouraged to work on every assigned problem. **Late homework assignments will not be graded**.

Grading Policy. Grades will be based on the homework, three 50-minute examinations, plus a comprehensive final examination. The overall score will be computed as follows:

homework	20%
three 50-minute exams	50%
final examination	30%

Final Examination.

Time: Thursday, December 17, 2009 9:00 am - 11:00 am.
Place: Millikan 218

Math 152. Statistical Theory **Fall 2009**

Tentative Schedule of Lectures and Examinations

Date			Topic
W	Sep	2	Introduction: A problem from statistical inference
F	Sep	4	Sampling
M	Sep	7	Sampling (continued)
W	Sep	9	Estimating the mean
F	Sep	11	Estimating the mean (continued)
M	Sep	14	Approximate interval estimates
W	Sep	16	Interval estimates (continued)
F	Sep	18	The χ^2 and t-distributions
M	Sep	21	Goodness of fit
W	Sep	23	Introduction to hypothesis testing
F	Sep	25	Hypothesis tests (continued)
M	Sep	28	Review
W	Sep	30	**Exam 1**
F	Oct	2	Maximum likelihood estimation
M	Oct	5	Maximum likelihood estimation (continued)
W	Oct	7	Efficiency
F	Oct	9	Rao-Cramer lower bound
M	Oct	12	Maximum likelihood tests
W	Oct	14	Maximum likelihood tests (continued)
F	Oct	16	Sufficiency
M	Oct	19	*Fall Recess*
W	Oct	21	Sufficiency (continued)
F	Oct	23	Completeness and independence
M	Oct	26	Completeness and independence (continued)
W	Oct	28	Review
F	Oct	30	**Exam 2**
M	Nov	2	Power of hypothesis tests
W	Nov	4	Power of hypothesis tests (continued)
F	Nov	6	The Neyman-Pierson lemma

Date			Topic
M	Nov	9	Interval estimates (revisited)
W	Nov	11	Likelihood ratio tests
F	Nov	13	Likelihood ratio tests (continued)
M	Nov	16	Introduction to Bayesian inference
W	Nov	18	Bayesian procedures
F	Nov	20	Bayesian procedures (continued)
M	Nov	23	Bayesian procedures (continued)
W	Nov	25	Problems
F	Nov	27	*Thanksgiving Recess*
M	Nov	30	Problems
W	Dec	2	Review
F	Dec	4	**Exam 3**
M	Dec	7	Review
W	Dec	9	Review
Tu	Dec	17	**Final Examination**