

**ARE 210****INTRODUCTION TO MATHEMATICAL STATISTICS**

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<b>Office Hours</b>	1:00-2:00pm M, 1:30-2:30 Th
<b>Lectures</b>	9:30-11:00am Tu, Th 2032 Valley LSB

**Textbook:** Robert V. Hogg and Allen T. Craig, *Introduction to Mathematical Statistics*, 6<sup>th</sup> Edition, Upper Saddle River, New Jersey: Prentice Hall, 2004.

This is a course in the elements of probability and mathematical statistics for the ph.D. sequence in quantitative methods in Agricultural and Resource Economics at the University of California, Berkeley.

An important component of the course is the weekly homework. These assignments are mandatory. Your aggregate score on them will account for 50% of your course grade. Attempt to complete each problem. Show your work neatly. The remaining 50% of your grade will be your score on a final exam. This course is in Exam Group 7 (Thursday, 12/16/04, 8:00-11:00 am).

Hogg and Craig is a self-contained treatment of this subject matter at a level appropriate for seniors and 1<sup>st</sup>-year graduate students. The numerous examples in the text demonstrate the methodology and logic required for solving the problems at the end of each section. It is essential that you carefully read and understand the assigned material and work through the examples in each section of the text preceding the assigned problems at the end of that section before attempting the problems. To keep pace with the lectures and overall course schedule, it is important to complete at least one section of the textbook and the associated problems before each lecture.

The weekly homework is due in class on Tuesday the week after it is assigned. Late homework will not be accepted in order that we can keep pace with the course schedule.

**COURSE SCHEDULE**

<b>Week # 1</b>	August 30 – September 3
<b>Topics</b>	Set theory, $\sigma$ -algebras, probability set functions
<b>Readings</b>	Sections 1.1–.3, pp. 1–1
<b>Problems</b>	1.2.8, 1.2.9, 1.2.11, 1.2.13, 1.3.3, 1.3.5, 1.3.17
<b>Week # 2</b>	September 6 – 10
<b>Topics</b>	Conditional Probability, Independence, Random Variables
<b>Readings</b>	Sections 1.4-1.5, pp. 22–40
<b>Problems</b>	1.4.1, 1.4.2, 1.4.10, 1.4.30, 1.5.2, 1.5.6, 1.5.8
<b>Week # 3</b>	September 13 – 17
<b>Topics</b>	Discrete and Continuous Random Variables
<b>Readings</b>	Sections 1.6 – 1.7, pp. 41–53
<b>Problems</b>	1.6.3, 1.6.8, 1.7.1, 1.7.4, 1.7.7, 1.7.8, 1.7.12
<b>Week # 4</b>	September 20 – 24
<b>Topics</b>	Expectation
<b>Readings</b>	Sections 1.8 – 1.10, pp. 53–72
<b>Problems</b>	1.8.3, 1.8.9, 1.8.14, 1.9.6, 1.9.13, 1.9.14, 1.10.1
<b>Week # 5</b>	September 27 – October 1
<b>Topics</b>	Bivariate Distributions
<b>Readings</b>	Sections 2.1 – 2.2, pp. 73–93
<b>Problems</b>	2.1.1, 2.1.6, 2.1.12, 2.2.3, 2.2.4, 2.2.6
<b>Week # 6</b>	October 4 – October 8
<b>Topics</b>	Conditional Distributions, Correlation, Independence
<b>Readings</b>	Sections 2.3 – 2.5, pp. 93–115
<b>Problems</b>	2.3.3, 2.3.5, 2.3.8, 2.4.7, 2.4.8, 2.5.6, 2.5.8
<b>Week # 7</b>	October 11 – October 15
<b>Topics</b>	Multivariate Distributions
<b>Readings</b>	Sections 2.6 – 2.7, pp. 115–131
<b>Problems</b>	2.6.1, 2.6.2, 2.6.7, 2.7.1, 2.7.6
<b>Week # 8</b>	October 18– October 22

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<b>Topics</b>	Normal, Chi-Squared, T, and F Distributions
<b>Readings</b>	Sections 3.3 – 3.6, pp. 149–189
<b>Problems</b>	3.3.25, 3.4.21, 3.5.3, 3.6.10
<b>Week # 9</b>	October 25– October 29
<b>Topics</b>	Properties of Estimators
<b>Readings</b>	Section 4.1, pp. 197–203 Section 5.1, pp. 233–238 Section 5.4, pp. 254–263
<b>Problems</b>	4.1.6, 4.1.14, 5.1.3, 5.4.14
<b>Week # 10</b>	November 1– November 5
<b>Topics</b>	Hypothesis Testing
<b>Readings</b>	Sections 5.5–5.7, pp. 263–286
<b>Problems</b>	5.4.25, 5.5.3, 5.5.8, 5.6.4, 5.6.10
<b>Week # 11</b>	November 8– November 12
<b>Topics</b>	Maximum Likelihood Estimation and the Cramér-Rao Lower Bound
<b>Readings</b>	Sections 6.1–6.2, pp. 311–332
<b>Problems</b>	6.1.1, 6.1.3, 6.1.11, 6.2.1, 6.2.2, 6.2.8, 6.2.11, 6.2.14 (a) and (b)
<b>Week # 12</b>	November 15– November 19
<b>Topics</b>	Maximum Likelihood Tests and the Multiple Parameter Case
<b>Readings</b>	Sections 6.3–6.5, pp. 333–359
<b>Problems</b>	6.3.5, 6.3.13, 6.3.14, 6.4.2, 6.4.4, 6.5.2, 6.5.3, 6.5.4
<b>Week # 13</b>	November 30 (Thanksgiving Week)
<b>Topics</b>	Sufficiency
<b>Readings</b>	Section 7.1, pp. 367–373
<b>Problems</b>	7.1.1, 7.1.2
<b>Week # 14</b>	November 29– December 3
<b>Topics</b>	Sufficient Statistics, Completeness, and Uniqueness
<b>Readings</b>	Sections 7.2–7.4, pp. 373–394
<b>Problems</b>	7.2.1, 7.3.3, 7.3.4
<b>Week # 15</b>	December 6 – December 10

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**Topics**      Optimal Tests  
**Readings**    Sections 8.1–8.4, pp. 419–455  
**Problems**    8.1.7, 8.2.3, 8.2.4, 8.2.7, 8.3.6, 8.3.8

**FINAL EXAM:**    **Thursday, 12/16/04, 8:00-11:00 am**