STA 6327
THEORETICAL STATISTICS II
SPRING 2015

INSTRUCTOR: David M. Nickerson

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OFFICE HOURS: Tuesday – 12:00 to 2:00 pm
Thursday – 12:00 to 2:00 pm

TEXT: Casella, G. and Berger, R.L. (2002). *Statistical Inference*, 2nd Edition. Duxbury: Pacific Grove, California.

PREREQUISITE: STA 6326 (Theoretical Statistics I)

COURSE GOAL: The goal of this course is a better understanding of estimation (point and interval) and hypothesis testing. Under the topic of estimation we will learn methods of constructing estimators (e.g., maximum likelihood, method of moments, pivots, etc.) and properties which are characteristic of good estimators (e.g., consistency, unbiasedness, sufficiency, uniformly most accurate, etc). Regarding hypothesis testing, we will learn methods of constructing testing procedures (e.g., Neyman-Pearson, likelihood ratio, etc.) and properties of good testing procedures (e.g., unbiasedness, uniformly most powerful, etc.).

GRADING POLICY: During the semester there will be three exams and a cumulative final exam. All exams will be **open book** and **closed notes**.

There will be a total of 500 points to be earned during the semester with the following breakdown and tentative dates:

Exam	Points	Date
I	100	2/3/15
II	100	3/3/15
III	100	4/2/15
Final	200	4/30/15 @ 4-6:50 pm
Total	500	

The proposed grading scale is as follows:

Grade	A	A–	B+	B	B–	C+	C	C–	D+	D	D–	F
Range	500-460	459-440	439-420	419-400	399-380	379-360	359-340	339-320	319-300	299-280	279-260	259-0

The grade "I" will be given only in extreme circumstances.

COURSE OUTLINE: Tentatively, I expect to cover Chapters 6 through 9 in the textbook omitting Sections 6.2.3, 6.2.4, 6.3.2, 6.4, 7.2.4, 7.3.4, 8.2.3, 8.3.3, 8.3.5, 9.2.3, 9.2.4, 9.3.3, 9.3.4. The following is a list of chapters and topics for each chapter:

Chapter 6 – Data Reduction
- sufficient statistics
- minimal sufficient statistics
- complete statistics
- likelihood function

Chapter 7 – Point Estimation
- method of moments estimators
- maximum likelihood estimators (MLE)
- Bayesian estimators
- mean squared error
- unbiasedness
- sufficiency

Chapter 8 – Hypothesis Testing
- likelihood ratio tests
- Bayesian tests
- error probabilities
- power function
- most powerful tests
- p-values

Chapter 9 – Interval Estimation
- test inversion
- pivots
- minimum length confidence intervals
- *UMA* confidence intervals

ASSIGNED PROBLEMS: Homework problems are assigned from the text. Although the solutions to these problems will not be collected, it is strongly recommended that you work at least the problems given below in order to assist you in understanding the content of the course. Typewritten solutions to the assigned problems can be found on Webcourses@UCF.

CHAPTER 6: 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.9 (a & b), 6.10, 6.15 (b), 6.17, 6.18, 6.20, 6.24, 6.30 (a)

CHAPTER 7: 7.1, 7.2, 7.3, 7.4, 7.6 (a & b), 7.8 (a & b), 7.9, 7.10, 7.11, 7.12, 7.19, 7.20, 7.21, 7.22, 7.23, 7.24, 7.33, 7.37, 7.38 (a), 7.39, 7.40, 7.41, 7.42, 7.44 (find best unbiased estimator only), 7.47, 7.49, 7.52 (a)

CHAPTER 8: 8.3, 8.5 (a & b), 8.6, 8.7 (a), 8.10, 8.12 (use results of 8.37), 8.14, 8.15, 8.17, 8.18, 8.22, 8.23, 8.25, 8.27, 8.28, 8.31, 8.35 (a & b), 8.37 (for (c) assume $\left(\hat{\theta}_0, \hat{\sigma}_0^2\right) = \left(\overline{X}, \frac{n-1}{n} S^2\right)$, if $\overline{X} \le \theta_0$ or $\left(\hat{\theta}_0, \hat{\sigma}_0^2\right) = \left(\theta_0, \frac{1}{n}\sum_{i=1}^{n}\left(X_i - \theta_0\right)^2\right)$, if $\overline{X} > \theta_0$), 8.38, 8.39, 8.41 (a & b; assume $\left(\hat{\mu}_X, \hat{\mu}_Y, \hat{\sigma}^2\right) = \left(\overline{X}, \overline{Y}, \frac{n+m-2}{n+m} S_p^2\right)$ and $\left(\hat{\mu}_X^0, \hat{\mu}_Y^0, \hat{\sigma}_0^2\right) = \left(\hat{\mu}, \hat{\mu}, \frac{1}{n+m}\left(\sum_{i=1}^{n}\left(X_i - \hat{\mu}\right)^2 + \sum_{j=1}^{m}\left(Y_j - \hat{\mu}\right)^2\right)\right)$ where $\hat{\mu} = \frac{n\overline{X} + m\overline{Y}}{n+m}$), 8.49

CHAPTER 9: 9.1, 9.2, 9.3, 9.9, 9.12, 9.13, 9.16, 9.17 (assume $n = 1$), 9.25, 9.34, 9.35, 9.36 (find interval of form [T-b, T-a]), 9.37, 9.42, 9.44 (b), 9.45 (a, b & c), 9.48 (a & b)

FINANCIAL AID REQUIREMENT:

As of Fall 2014, all faculty are required to document students' academic activity at the beginning of each course. In order to document that you began this course, please complete the non-credit, introductory quiz in Webcourses@UCF by the end of the first week of classes or as soon as possible after adding the course, but no later than January 16th. Failure to do so may result in a delay in the disbursement of your financial aid.