STA 4322/STA 5328 Mathematical Statistics 2 Spring, 2007

Course Outline and Policy

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Catalog Description [Credits: 3; Prereq: STA 4321 or equivalent]

This is a direct continuation of STA 4321 (or STA 5325). It provides basic background material for distribution theory, estimation, and hypothesis testing, including comparison of two population parameters, and analysis of variance. A good knowledge of calculus (I, II, and III) will be very helpful.

Textbook: (**optional**) An Introduction to Mathematical Statistics and its applications, by R. J. Larsen and M. L. Marx, 4th Edition, 2006, Prentice Hall. A copy of this book has been placed on reserve at Marston's Science Library.
Students are expected to take notes in class as the exams and homework assignments will be based on these notes. The homework assignments and their solutions will be placed on the course's web page. Students are urged to review these solutions before exams and quizzes

Topics Listing

1. **A Short Review**
   (a) Continuous random variables (Section 3.4).
   (b) Expected value and variance of a continuous random variable (Sections 3.5-3.6).
2. **Some Continuous Distributions**
   (a) The normal distribution (Section 4.3).
   (b) Distributions derived from the normal distribution.
      - The chi-square distibution (p. 474).
      - The t-distribution (p. 476).
      - The F-distribution (p. 475).
   (c) The gamma distribution (Section 4.6).
3. The sampling distribution of the sample mean and the sample variance.
   (a) The Central Limit Theorem (p. 302).
   (b) The sampling distribution of the sample mean (Section 7.2).
   (c) The sampling distribution of the sample variance (pp. 474-475).
4. **Estimation of Parameters**
   (a) Maximum likelihood and the method of moments (Section 5.2).
   (b) Interval estimation (Section 5.3).

(c) Properties of estimators (Section 5.4).

(d) Efficiency and the Cramér-Rao lower bound (Section 5.5).

(e) Sufficient estimators (Section 5.6).

(f) Factorization Theorem (p. 401).

(g) Consistency (Section 5.7).

5. **Hypothesis Testing**

   (a) Large-sample test concerning the population mean (Section 6.2).

   (b) Small-sample test concerning the population mean (Section 7.4).

   (c) Large-sample test concerning a poulation proportion (Section 6.3).

   (d) Type I and Type II error rates (Section 6.4).

   (e) Generalized likelihood ratio test (Section 6.5).

   (f) Test Concerning a population variance (Section 7.5).

6. **Inference Concerning Two-Sample Problems**

   (a) Comparing two population means (Section 9.2).

   (b) Comparing two population variances (Section 9.3).

   (c) Comparing two population proportions (Section 9.4).

   (d) Confidence Intervals for the two-sample problem (Section 9.5).

7. **One-Way Analysis of Variance** (Chapter 12)

   (a) Completely randomized designs.

   (b) The one-way analysis of variance (ANOVA).

   (c) Testing equality of treatment means using the F-test.

   (d) Multiple comparison of treatment means - the *least-significant difference procedure*, *Tukey's test*, and the *contrast procedure*.

8. **Two-Way Analysis of Variance** (Chapter 13)

   (a) Randomized complete block design.

   (b) Two-way ANOVA.

   (c) Testing the treatment effect and the block effect using F-tests.

Exams and Quizzes Dates

	Points	Date
Test 1	100	February 21
Test 2	100	April 4
Final Exam	150	May 3, 5:30-7:30 PM
Quiz 1	25	January 24
Quiz 2	25	February 7
Quiz 3	25	March 7
Quiz 4	25	March 28
Quiz 5	25	April 18
Homework Assignments	100	to be announced

Course Policy

1. **Exams and Quizzes**: The final exam is comprehensive. Each quiz lasts about 15 minutes and is given at the end of the class period. Of the 5 quizzes given, the lowest quiz score will be dropped. Quiz 5 can be considered as a make-up quiz. **No other make-up quizzes will be given**. Make-ups for Exams 1, 2 and the Final are considered only if a **Very Valid Excuse is Presented** with written documentations when applicable. Solutions to all quizzes and exams will be posted on the course's web page immediately after they are given.

2. **Homeworks**: Homework assignments are posted on the course's web page on Mondays and will be collected the following Friday, except when there is a holiday. Solutions to the homework problems will be posted on the same day they are collected. Therefore, **Late Homeworks Will Not be Accepted For any Reason**. If you have to miss the period on which the HW is due, then you need to arrange to turn in your homework early.

   Each homework assignment is worth 30 points. The lowest HW score will be dropped. The final HW score is computed by dividing the student's total by the maximum total, then multiplying this ratio by 100.

3. **Class Attendance**: **Students are urged to attend classes on a regular basis. The exams, quizzes, and homework assignments are completely based on material covered in class. Students are therefore expected to take good notes during the class period**. Please let me know in advance if you have to miss a class period. In this case, please arrange with someone in class to take notes for you.

   The class period begins at exactly 9:35 AM and ends at 10:25 AM. Please recognize these times and avoid coming late to class, if possible, as this will be very disturbing to the people in class and the instructor. If you are already in class by 9:35 AM, then please refrain from talking to other people in class as soon as the lecture begins. **Remember that full attention is needed in order to fully grasp the presentation of the material in class**. Your cooperation will be very much appreciated.

"We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity".