MATH 410A ADVANCED STATISTICAL METHODS I WINTER 2009

PREREQUISITE: Math 311 or equivalent or permission

Tuesday, 2:30-3:45 Bouillon Hall 101
Thursday, 2:30-3:45 Bouillon Hall 103 (PC Lab)

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STUDENT OUTCOMES FOR MATHEMATICS 410A: Students will gain a *thorough and correct* understanding of basic statistical inference from their first course, and will also achieve an *in-depth* study of linear and multiple regression analysis. Students will learn the applications of nonparametric statistical methods.

ATTENDANCE: To achieve success in *any* mathematics class, **regular attendance is almost imperative**.

INCOMPLETES: An "I" is appropriate *only* if you have finished most course requirements, and can complete the course without re-enrolling. (Example: missing the final exam due to illness.) The course must be completed within a year; otherwise, the "I" reverts to an "F."

TESTING AND GRADING: There will be two 100-point take-home exams, and a FINAL exam worth 100 points. In addition to exams, there will be several problems for which you may have to present an oral and/or written presentation. These will be worth 50 points. You will also be graded on assignments, classroom participation and attendance, which counts 50 points. This makes a total of 400 points. There is no predetermined scale for grades, but the usual scale of 93-100, etc, would give you a good approximation. I will let you know how you are progressing after each exam.

PROJECT:

One of the main course goals is for you to do a complete project, beginning with the design of the experiment, and progressing through the data collection, the analysis, and finally the write-up and presentation. The final project write-up will be due in spring's Math 410B course. It should in the format of a 10-page, double spaced paper that gives the project summary, statistical methods, data sources, data display, statistical analysis, and conclusion. Projects presented (either oral or poster presentation) at the undergraduate research symposium SOURCE (May 2009) will receive higher mark. In the past years, almost every student in this class has participated in the SOURCE research

symposium and felt accomplished. The abstract deadline for presentations at SOURCE is in April. Abstracts may be submitted via the web.

TEXT: Statistics, by McClave and Sincich, Prentice Hall, 11th Edition. This book is non-mathematical and covers the important topics for both this and the next quarter. I will supplement this book in certain areas.

COMPUTER and STATISTICAL SOFTWARE: There are three heavily used statistical packages: SAS, S-Plus, MINITAB, and SPSS. Professional statisticians and industries use SAS or S-Plus. Social science workers use SPSS. MINITAB is a very nice compromise choice. While not as powerful as SAS, it is powerful enough to do most real-world applications. What really makes it stand out is *ease of use*. We have recently upgraded the lab machines in Bouillon 103 to the full-blown, high-powered version. If you feel a strong affinity to another statistical package, feel free to use it. All in-class demonstrations, however, will use MINITAB. Starting from this quarter, students have accesses to the software Eviews, commonly used in business for regression models and forecasts.

MATERIAL TO BE COVERED: Because of your varied backgrounds, we will review material from your first stat course by using in-class and take-home worksheets. The concept of a sampling distribution is the most important idea for any of you who will ever use statistics. For this reason, we will ask you to review the material in Chapter 6-9 to be sure you have a good foundation. I hope to spend at least half of the course on Chapters 11 and 12 with a considerable amount of supplementation and problems for your in-class presentation. As a new addition based on the past SEOI, I will introduce nonparametric statistics in the last two weeks in order to broaden your skill set for your very own SOURCE project. Homework problems from the book will be announced in class or given to you later. In addition, there will be several handouts/worksheets given in class. I will *not collect homework* unless specifically mentioned. You should, however, work these problems in order to succeed in the course. *The best possible indication of exam-type problems is given by class examples from your notes along with the worksheets assigned in class*. You will have to work in groups on certain of the regression problems, and you will then present your analyses interactively in class.

Week	**Topic and Assignment**
0. 1/6-1/9	Central Limit Theorem Sampling Distribution Handout 1, 2, 3
1. 1/12-1/16 Conference Week	Comprehensive Review-- Inference Handouts 4, 5
2. 1/19-1/23	Exam 1: Review Inferential Stat (Take Home) Simple Linear Regression

	Handouts 6, 7, 8.
3. 1/26-1/30	Exam 2: Simple Linear Regression (Practice Exam) Exam 2: Simple Linear Regression (Take Home)
4. 2/2-2/6	Handouts: 10, 11 (Transform) Multiple Regression Handouts: 12, 13, 14
5. 2/9-2/13	Multiple Regression Handouts: 15, 16, 17 Presentation Problems: Handout 18, 19
6. 2/16-2/20	Multiple Regression: Lecture followed by student presentation
7. 2/23-2/27	Multiple Regression: Lecture followed by student presentation
8. 3/2-3/6	Nonparametric statistics
9. 3/9- 3/13	Nonparametric statistics
10. 3/16-3/20	Final Exam: nonparametric

The Final Exam Date will be announced