MA 2612
Applied Statistics II

Term B, 2009

Instructor

Balgobin Nandram

Department of Mathematical Sciences
Stratton 103
509-831-5539
balnan@wpi.edu, http://www.wpi.edu/~balnan

Office Hours
Tue 2:00-2:50; Thu 1:00-1:50
(Other times by appointment)

Teaching Assistant

Xiao Zhong
Stratton 204
508-831-5546, xiaozh@wpi.edu

Office Hours
Mon, Tue, Thu, Fri 10:00-10:50
(Other times by appointment)

Class: SL 104; **Labs**: HL230

1 Textbook

MA2612 is a continuation of MA2611. The text book is "Applied Statistics for Scientists and Engineers" by Petruccelli, Nandram and Chen. If you have taken MA2611, you would have done Chapters 1-6. We will spend up to three lectures reviewing the material in Chapters 5 and 6, and we will do Chapters 7, 8, 9, 11. However, each chapter is very long, and you are required to read much of the material. These chapters cover simple linear regression, multiple linear regression, and one-way analysis of variance for the CRD and RCBD, and distribution-free inference to robustify the matertial in Chapters 5-9.

2 Overall Goals and Expectations

1. Learn more about statistics beyond MA2611.
    a. Extend your knowledge of basic statistical concepts.
    b. Become a "critical thinker" about data.
    c. Learn the role of statistics in scientific investigation, in particular how to analyze data from randomized experiments.
    d. Develop the skills to perform basic and appropriate data analysis and inference.
    e. Understand how to identify sources of variability, and deal with them.
    f. Appreciate the benefits of distribution-free statistical analyses.
    g. Become proficient in the use of SAS statistical software.
2. Improve statistical skills for working effectively with others. These can be obtained through the homework and laboratory activities.

3 Course Requirements

1. Attend and actively participate in class. This includes being prepared for each day's activities. (Class participation will help you think more critically about the material.)
2. Read all assigned materials. In particular, read all material (see below) **before** the class in which that material will be discussed.
3. Submit all required homework assignments.
4. Participate in all labs and submit all required lab reports.
5. Pass both tests and all quizzes.

4 Course Activities

The course is divided into chapters, each taking roughly one to two weeks. Within each chapter one aspect of statistics will be studied using a variety of activities both in and out of class. The activities are:

(1) At the beginning of the course, you will be asked to form yourselves into groups of three or four. Those who cannot form groups on their own will be assigned to a group. These groups, called **learning groups**, will serve several functions during the course. One of these functions is to help you learn in lectures, and to collaborate on the labs and the homework assignments.

(2) There are four scheduled lecture hours per week. During lectures, you may be asked to do some activity with your learning group, such as working out a problem, or discussing a concept.

(3) Each chapter has one or more **labs**. There are two types of labs: computer-based and hands-on.

- Computer-based labs sometimes use computer simulation to answer "what if?" questions, such as "What if we add large outliers to an x-y data set: does least squares estimation still work well?" Other computer-based labs use the power of computer simulation and computer graphics to give you a deeper understanding of statistical ideas and methods.
- Hands-on labs are intended to give you insight into the statistical ideas you are studying by having you generate data by hand and then providing activities using that data to illustrate those ideas.

(4) Each chapter has alloted a one-hour lab period, but the labs may have to be finished outside of class. The labs are meant to be done by a group, even though some of them can be done by individuals. A lab report is required for each lab. This report may be done by the learning group (even if the lab is not a group lab).

5 Performance Measures

Several performance measures are used in the course. This section describes each measure and what is expected of you for each.

5.1 Tests

There will be **two** open book, open note tests, based on the chapters you have completed; each test will last up to forty-five minutes. **(The test must be finished not later than 11:50am.)** These tests are individual (not group) exams and involve problem solving and the analysis of data. Each test consists of three questions, each testing the materials on one or more chapter. Specifically, one question will be a multiple-choice question with

five mini-questions, each having three or four options, and the other two will be essay-type similar to the homework questions. Although the tests are not computer-based, a knowledge of SAS will be important. The purposes of the tests in this course are:

- To obtain an individual measure of your understanding of statistical ideas;
- To obtain an individual measure of your ability to apply statistics;
- To provide an incentive for you to review the material individually.

5.2 Quizzes

There will be one quiz each Friday based on the materials covered during the week. This is strictly a fifteen minutes' quiz (you can leave as soon as you are done), and is mainly used to test your understanding of the most recent material. We can make arrangement for you to take the quiz, not earlier than thursdays or later than Mondays, when it is difficult for you to take the quiz in class on Fridays. Please inform the instructor ahead of time.

5.3 Labs

Each lab requires a lab report. This report should be completed as a group lab report by the individual's learning group. Each lab report must clearly state the name(s) of the individual(s) who is (are) submitting it. Your grade for the lab will be proportional to the work you did on it; otherwise all individuals submitting a lab report will get the same grade. To give you an idea of what is expected in a lab report, a **sample** lab report can be obtained from my web page.

There are two purposes for a lab report:

- To show that you understand the ideas the lab was designed to demonstrate;
- To help you develop written communication skills.

5.4 Homework

Homework is assigned for your benefit and practice. You are to use it as a yardstick to measure your understanding of the course materials. You are also expected to discuss it with the members of your learning group, as a check on your understanding. Note that this does not mean copying it from another group member. If you find the entire learning group's understanding does not measure up, then seek help from your instructor. It is the responsibility of you and your learning group to see that you understand the principles and ideas behind the homework exercises. **(Up to two students in the same section are allowed to turn in a single homework report. If two of you are turning a single report, you must clearly show your names on the report. However, you are advised to turn in your own homework report.)** Also, please note that each homework exercise is worth five points; so that a homework assignment with five problems is worth 25 points. The instructor will state explicitly when a homework problem is worth

more than five points. The homework problems will be assigned throughout the week because problems are assigned after the appropriate material is covered. You should be thinking and doing the homework problems continually through the week; please do not wait for the last moment.

6 Communications

I will use my personal web page to communicate with you during the course. My web page is at http://www.wpi.edu/~balnan, and all information about MA2612 will be placed under "MA2612, Applied Statistics II". On my web page, you can find (a) the course description, (b) a sample lab report, (c) homework assignments, (d) general notices, and sometimes (e) additional course notes. You are welcome to read about me in the rest of the web page. You are advised to look at my web page frequently.

7 Grading

Grades will be assigned as follows:

Group Activities	**Percent**
Lab Reports (4)	15

Individual Activities	**Percent**
Homework Sets (6)	20
Quizzes (4)	15
Test 1	25
Test 2	25

Course Grades

A	At Least 85%
B	70% to 84%
C	55% to 69%

Each piece of work, you are required to turn in, will follow the same grading scheme. Usually you will be given numeric scores on each piece of work you are required to turn in; you can assign your own grades. Please note that in MA2612, I will not use the method of "grading on the curve" to adjust final grades. **Please note that there will no make-ups for assignments you have already turned in.**

8 Your Expected Time Commitment

Over twenty years ago, when the WPI Plan was conceived, it was decided to require full time students to take only three courses at a time (at other schools four or five are a full

load). The rationale was that students should be more responsible for their own learning, and therefore should put in the time required to be full time learners outside of class. The figure quoted was that students should spend (on average) **seventeen hours** per week per course. **I feel that seventeen hours is a fair figure for students taking only three courses, and I expect you to put in that amount in MA 2612, on average.** The Teaching Assistant and I will each put in about twenty hours of work. You can count the four hours in class, the one hour in the lab, and anytime you spend thinking about MA2612 at a cinema, baseball game or at any sporting event.

9 Disability

If you need course adaptations or accommodations because of a disability, or if you have medical information to share with me, please make an appointment with me as soon as possible; see my office hours on the first page of this document. If you have not already done so, students with disabilities, who believe that they may need accommodations in this class, are encouraged to contact JoAnn Van Dyke, Director of Academic Resources, Student Disability Services (DSO) Coordinator, as soon as possible to ensure that such accommodations are implemented in a timely fashion. The DSO is located in Daniels Hall, (508) 831-5235.

10 Academic Dishonesty

The website, http://www.wpi.edu/Pubs/Policies/Honesty, states "Any act that interferes with the process of evaluation by misrepresentation of the relation between the work being evaluated (or the resulting evaluation) and the student's actual state of knowledge is an act of academic dishonesty." See the website for the procedures associated with academic dishonesty.

11 Course Syllabus

Dates	**Activities**
October 27, 29, 30	Chapters 5 & 6
November 2, 3, 5, 6, 9, 10	Chapter 7
November 12, 13, 16, 17, 19	Chapter 8
November **20**	Test I
November 23, 24, 30	Chapter 9
December 1, 3, 4	Chapter 9
December 7, 8, 10, 11, 14, 15	Chapter 11
December **17**	Test II

Important Routine Dates

Dates	**What is due?**
Fridays	HW report
Fridays	Quiz (15 minutes)
Thursdays	Lab report

Good Luck !!!