Math 138-01 & -02: Statistics
Fall, 2009

Instructor:	Erin McNicholas	email: `emcnicho@willamette.edu`
	Office: Ford Hall, Room 211	Phone: 503-370-6590
	Office Hours: TBA	

Math Tutoring Hours:	6:30-9:30 pm Sunday-Thursday in the Math Hearth
Class Web Site:	`http://www.willamette.edu/~emcnicho/courses/Stats138/M138.html`
Class Listserv:	`math-138-01@willamette.edu` and `math-138-02@willamette.edu`
Class Meetings:	Section 01 meets in Ford 301 every Monday, Wednesday and Friday from 10:20-11:20 am Section 02 meets in Ford 204 every Monday, Wednesday and Friday from 1:50-2:50 pm

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"He uses statistics as a drunken man uses lampposts - for support rather than for illumination." - Andrew Lang

Class Objectives/'Big Questions'

You have probably heard the saying 'Statistics can be made to prove anything - even the truth.' In fact, statistics is a very powerful collection of tools used to measure the certainty of our inferences and reveal patterns and trends obfuscated by natural variation. Statistical analysis is only as valid as the data and assumptions which go into it. Used incorrectly or without context, statistical results are meaningless. In this class we will learn to use statistics for illumination.

By the end of the course, students should be able to:

- Understand when and how to apply standard statistical techniques
- Use statistics to make informed decisions in their other classes and in their everyday lives
- Design, implement, and statistically analyze the results of an experiment or survey

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Required Course Materials:

Stats: Data and Models, 2^{nd} ed., by De Veaux, Velleman, and Bock

Course Grades:

Grades are based on five components

- 1 Midterm (worth 100 points)

- 3 out of 4 Group Exams (each worth 50 points)

  Group Exams are done in groups of three, with each group member having a unique problem to work on. Group members proof-read each other's work and offer suggestions. Of the 50 points possible for each group exam, 40 will be based on your work and 10 will be based on your work proof-reading your team members' exams. Each team member is allowed one page, one-sided, of notes. Your lowest group exam score will be droped

- Homework (worth a total of 100 points)

  You will have three types of homework throughout the semester: reading assignments, journal problems, and problems to turn-in.

  I expect you to read the corresponding section of your text before each class. I chose this textbook because it is very interesting and readable. I will hold you accountable for material assigned as reading, even if it is not covered in class.

  For each chapter assigned as reading, you should attempt at least eight of the problems found at the end of the chapter. You should keep these problems in a homework journal. Every Monday I will look over your journals and make sure you are keeping up with the class. Solutions to these problems will be made available in the math hearth. Your homework journal is worth 20 points.

  I will assign one or two problems each week for you to write up and turn in. These problems will often be somewhat more involved and may require the use of a computer to analyze some provided set of data. These graded problems will be worth a total of 80 points.

- Final Project (worth 100 points)

  The final project will give you a chance to apply your newly acquired statistics skills to design and analyze the results of an experiment or survey. You will be working in teams of three, with each team turning in a single project. Each member of the team will receive the same grade.

  There are three components to your final project grade. The first is an oral proposal given by your team in my office. I will make a sign-up sheet for each team to schedule a meeting.

  The second component will be a poster session on Wednesday, December 9th. It will be your job to explain your experiment and analysis in a clear and convincing manner. Your grade will be based both on presentation and accuracy. Each team will be responsible for designing an attractive and informative poster explaining their results to their classmates and other poster session attendees.

  The third component of your final project grade will be a paper due on the last day of class. The goal of this paper is for your group to convey how much work you have put into the project.

- Cumulative Final (worth 100 points)

- Total Points Possible in the Course: 550

For more information, see the handouts 'Group Tests', 'Final Project Proposal Requirement', and 'Final Project Poster and Paper Requirements', available from the class web site under Class Handouts & Notes.

Course grades will be based on a point system. Grade cut-offs will be determined at the end of the semester with the guarantee that:

- 495 points or more will be at least an A-
- 440 points or more will be at least a B-
- 385 points or more will be at least a C-
- And 330 points or more will be at least a D

Course Outline:

Ch. 1-6: Descriptive Statistics

Group Exam #1

Ch. 7-10: Association, Correlation, and Linear Regression

Group Exam #2

Ch. 11-13: Sampling Design

Ch. 14-17: Randomness and Probability

MIDTERM

Ch. 18-22: Confidence Intervals and Hypothesis Testing

Group Exam #3

Ch. 23-26: Inferential Statistics: Comparing Means

Group Exam #4

Ch. 27-31: Inferential Statistics: Multifactor Analysis

Final Project Poster Presentation

FINAL

Late Assignments and Missed Classes:

I expect everyone to attend all classes and turn in all assignments. Unfortunately, it is inevitable that some people will have crises during the semester which prevent them from attending class or turning in an assignment on time. If for some reason you are unable to attend class or turn in an assignment, please let me know as soon as possible, preferably *before* the missed class or assignment. The longer you wait to tell me, the less sympathetic I will become. The worst is to never tell me about it at all.

Cell Phone Policy:

Electronic devices such as cell phones, pagers, i-pods, etc. must be turned off during class meetings. *If your cell phone goes off during class you will be responsible for bringing treats for the entire class at the next class meeting.* Papers should not be read during class, though I applaud your efforts to stay abreast of current events and tackle the latest crossword or sodoku puzzle.

Academic Integrity:

In accordance with Willamette University CLA catalog: "Plagiarism and cheating are offenses against the integrity of the courses in which they occur and against the College community as a whole... Ignorance of what constitutes plagiarism shall not be considered a valid defense. If students are uncertain as to what constitutes plagiarism for a

particular assignment, they should consult the instructor for clarification." Cheating is unethical and I take it very seriously. The Deans Office will be notified if anyone is found cheating and appropriate sanctions will be given.

Below are some guidelines for each of the components of this course. If you have any questions on what resources are acceptable, please just ask me.

Homework: You may, and are encouraged to, discuss the homework with anyone and get help from Excel (or other statistical computer packages), your textbook, etc. However, your submitted written work should be your own.

Group Exams: You are allowed one sheet of 8.5x11 paper with notes on *one side*. You must generate this page of notes. You are free to type it up, but you may not use photocopies of textbook pages or other resources as your note page.

Final Project: All team members should contribute equally to producing the final product. Do not put your name on a paper, poster, or presentation written by others.

Final Exam and Midterm: You are allowed one 3x5 note card (both sides) of notes. You must generate this note card, photocopies of other resources are not allowed.

Student Responsibility:

Most of you already know this, but previous experience has shown that a friendly reminder is sometimes in order :). You are all adults and responsible for your own education. I will do everything in my power to help you learn. You should always feel free to stop by my office or make an appointment to meet with me. You should also feel free to ask me questions in class. Stop me if you are confused and ask me to explain things again. I welcome student questions! Although I will do everything in my power to help you through this class, you are ultimately responsible for your grade. The following is a list of things I expect from you.

1. THINK CRITICALLY. Your goal in this class should be to understand the concepts and strengthen your mathematical reasoning skills. Mimicking problem solving strategies, or working through processes you don't understand is a waste of your time. Throughout the course you should be asking yourself "Why are we doing this? Why does this method work? How is this related to other topics I've learned?"
2. ASK QUESTIONS & SEEK HELP! Ask questions in class, after class, during office hours, whenever! If you are confused or having problems with a certain section of the material see me AS SOON AS POSSIBLE. I am happy to help you but it is impossible to go over weeks worth of material right before an exam.
3. DO THE ASSIGNMENTS. Mathematics is not a spectator sport. You will only learn mathematics by practicing, that is what homework is for. I encourage you to work with your fellow students on homework assignments, though the final write-ups should be your own. Not doing the homework will have a negative impact on your exam scores and your final grade.
4. STUDY. You should invest some time and effort into this course. Set aside time for both homework and studying.