

MATH 140 HONORS *INTRODUCTORY STATISTICS* COURSE SYLLABUS

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Office Hours: M 1:15-2:15, Tu 11-12, 1:15-2:15 or by appointment, in Santa Susanna Hall 415.

Required Text: *Workshop Statistics, Discovery with Data* (second edition), by Rossman and Chance.

Supplemental Recommended Manual: *We All Make Mistakes: Common Errors in Introductory Statistics (and How to Avoid Making Them)*, by Mark Schilling.

What to Expect in Class: We will cover approximately one section of the text per class. This is an *active learning* course. I will generally not lecture for more than ten minutes at a time. You will spend much of the class period participating in In-Class Activities. Some of these activities will ask you to work cooperatively with a partner or group. Your work on the In-Class Activities will be graded. Due to the interactive nature of the classroom learning environment, it is essential to attend every class meeting.

Homework: Homework problems will be assigned from each Topic (Chapter) covered. Questions on the HW will be taken at the beginning of the next class period after it is assigned, and it will be due, **stapled**, two class periods (one week) after it is assigned. Late HW will not be accepted.

On-Line Component: The Carnegie Mellon Open Learning Initiative Statistics course will be used as a significant course supplement. You will be required to read this on-line material and do the associated activities, including quizzes. The pacing will be keyed to that of the lectures and textbook.

Calculator: A calculator that can perform basic statistical functions for both one and two variable analyses is helpful. Suitable models are available at the bookstore and elsewhere for under \$20. You will need to refer to your calculator's manual to learn how to perform statistical calculations.

Cell phones: Important--cell phones must be turned *off* during every class period.

Grade Components: Three tests (40% total)
Comprehensive final exam (25%)
In-Class Activities (5%)
Homework (20%)
On-line work (10%)
Other factors are participation and a good attitude towards learning.

Attendance Policy: Two absences are allowed without penalty. Each additional absence results in a deduction of 1% from the total number of points achievable for the course, up to a maximum penalty of 10%. The maximum penalty is normally sufficient to drop your grade by one full letter, e.g. from B⁻ to C⁻ or from C to D. You will receive a bonus of 2% for perfect attendance, or 1% if you have just one absence. Tardiness is not acceptable and may result in a loss of attendance credit. Moreover, you must be on time for class in order to keep up with the In-Class Activities.

Examinations: Examinations will include problem solving, short answer questions on concepts, construction and interpretation of graphical displays, definitions, and multiple choice. The Final Exam is comprehensive.

**** NO MAKE UP EXAMS WILL BE GIVEN ****

Measurable Course Objectives

Statistics can be defined as the science of reasoning from data. Data and statistical thinking abound in everyday life and in almost all academic disciplines, so the ability to reason with data is essential to educated citizenship. This course will focus on understanding statistical concepts and reasoning; organizing, interpreting and producing data; analyzing statistical arguments and communicating findings clearly; and appreciating the relevance of statistics to contemporary society. Specific course learning outcomes are listed below:

- Learn how to construct and interpret graphical and numerical summaries of data
- Understand many of the fundamental ideas of statistics, such as variability, distribution, association, sampling
- Understand how the nature of data collection methods affects the scope of the conclusions that can be drawn from statistical studies (especially cause and effect); the role of probability in sampling and experiments
- Learn the normal distribution and the Central Limit Theorem
- Learn the basics of statistical inference: estimation, assessing statistical significance, statistical reasoning; apply and interpret the results of a variety of statistical techniques
- Analyze and assess statistical arguments, such as those found in the popular press and scholarly publications;
- Learn about correlation and regression
- Communicate knowledge of statistical ideas effectively

G.E. Student Learning Outcomes

As a course that fulfills the above mentioned General Education requirement, this class will address the following Student Learning Outcomes (SLO's) that have been established by the Mathematics Department:

SLO 1 Represent, understand and explain mathematical information symbolically, graphically, numerically and verbally.

SLO 2 Develop mathematical models of real-world situations and explain the assumptions and limitations of those models.

SLO 3 Use models to make predictions, draw conclusions, check whether the results are reasonable, and find optimal results using technology where necessary and appropriate.

SLO 4 Demonstrate an understanding of the nature of mathematical reasoning including the ability to prove simple results and/or make statistical inferences.

Examples of activities that will involve the SLO's are given below:

SLO 1: Summarizing distributions with numerical measures such as mean, median, standard deviation, interquartile range; making and interpreting dotplots, histograms, stem plots, bar charts, scatterplots; describing relationships with least squares regression equations; standard scores (Z-scores). A majority of homework and examination questions will involve verbal statements that involve statistical interpretations.

SLO2: The normal and other distributions; random number tables to represent populations; simulation; least squares regression equations; tests of significance.

SLO3: Probability models; confidence intervals and tests of significance; statistical pitfalls; choosing the sample size; using experimental design to reduce variability. The Minitab statistical software will be used frequently in class and for homework to generate statistical graphs, perform simulations, and make statistical computations.

SLO4: Understanding the logic and structure of methods of statistical inference is a critical aspect of the course. This includes making correct interpretations and conclusions for confidence intervals and tests of significance.