Kalamazoo College **Spring Quarter**

MATH 260 **2009**

Applied Statistics I

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Goals:

1. **Data sense:** To develop competence in applying data description and analysis techniques to uncover patterns and make observations from data sets; special emphasis will be placed on the importance of graphical descriptions of data.
2. **Data-based decision-making:** To appreciate the usefulness of obtaining and analyzing data for making decisions and advancing knowledge.
3. **Data collection:** To understand the importance of the use of suitable data collection methods when trying to advance knowledge about a subject.
4. **Statistical inference:** To obtain a firm understanding of the logic and techniques involved in performing basic statistical inference; students should be able to interpret the results of a statistical analysis using the concepts of confidence intervals, margins of error, and tests of significance.
5. **Tool identification:** To be able to identify the appropriate technique for handling a particular statistical problem; or, to recognize that the problem is beyond the scope of techniques discussed in the course.
6. **Omnipresence of statistics:** To recognize the prevalence of data and statistical (mis-) analysis everywhere in daily life and especially in the print and electronic media.
7. **Communication:** To learn to effectively communicate the results of statistical analyses in both oral and written forms.
8. **The big picture:** To understand that statistical investigation is a multi-faceted process involving the collection of data related to a process or population, summarization and interpretation of the data, and inference back to the original process or population.

Approach:

Hands-on, collaborative, data-oriented workshop approach to master the collection, description, analysis, interpretation, and communication of results. Technology will be used where possible to minimize tedious calculations.

Topics:

1. **Data Display and Description:** graphical and numerical methods for displaying and summarizing data.
2. **Relationships:** graphical and numerical methods for investigating and describing relationships between two variables.
3. **Randomness:** the role of randomness in data collection and statistical inference.
4. **Statistical inference:** using data to address interesting problems in a variety of settings using confidence intervals and significance tests.

Resources:

The required text for this course is:

- *The Basic Practice of Statistics, 4th ed.*, (2007), David S. Moore, Freeman, New York.

If you are comfortable using an eBook and you own a portable computer, you may wish to look into the possibility of buying the eBook rather than the hard copy text. You should note, however, that the eBook is not formatted to allow you to print or save locally the entire book.

You are also expected to have access to a calculator that will compute basic statistics such as means and standard deviations. A specialized statistics calculator such as the TI-83 or TI-84 is not required but are among the best suited.

Evaluation:

Grades will be assigned based on the following components and corresponding weights:

Component	Objectives	Weight
Routine homework	To improve understanding of statistical methods and to aid understanding of the concepts/material presented in class.	20-30%*
Classroom activities and participation	To develop and reinforce mastery of statistical techniques through hands-on investigations and data analysis.	10%
Midterm Exams	To demonstrate developing mastery of statistical methods.	35-45%*
Final Exam	To demonstrate mastery of statistical methods and the ability to identify appropriate methods for particular data analysis problems.	20-30*

***Important**: For those components for which a range is provided (say, 20-30%), you will need to tell me the weights you would like me to assign in computing your grade. Of course, the total weights must add to 100%. Your selection of the weights you prefer will be due 1 week after the graded first exam is returned to the class. If you do not let me know, the assigned weight will be the midpoint of the range (e.g., 25% if the range is 20-30%).

Tentative Schedule:

Week	Chapters	Topics
1	1-2	Displaying and Describing Data
2	3, 8	Normal Distributions; Sampling
3	9	Experiments; EXAM I
4	10-11	Probability; Sampling Distributions
5	14-15	Confidence Intervals; Tests of Significance
6	15-17	Tests of Significance (cont'd); Inference in Practice; Review
7	18-19	EXAM II; Inference about Means
8	20-21	Inference about Proportions
9	22, 4	Review; Correlation
10	5, 7	Regression; Review
Exam Week		FINAL EXAM (Wednesday 1-4 pm)

Important Tentative Dates: Please note that the midterm dates are tentative and subject to change.

Exam I	April 17 (Friday, Week 3)
Exam II	May 11 (Monday, Week 7)
Final Exam	June 10, 1-4 pm (Wednesday, Exam Week)

Homework assignments:

Reading will be assigned for every class period. Two kinds of homework problems will also be assigned: "warm-up" and "hand-in" problems. The "warm-up" problems are based on material from the previous lecture and are designed to prepare you to solve the hand-in problems from the same sections that will be collected at the following class session. Many of the warm-up problems are odd-numbered so that you may check your answers in the back of the textbook. Our class sessions will often begin with presentations of a few warm-up problems by randomly selected students. Your performance on these presentations will constitute part of your participation grade for the class. Your presentation must be based on your own work, perhaps with prior consultation of other students, the Academic Resource Center, and/or the instructor. To ensure that you are prepared to present, you should work all of the warm-up problems in advance and seek assistance with any you do not understand. Simply reporting the answer from the back of the book without explanation will not constitute a satisfactory presentation.

Assigned "hand-in" problems are due at the beginning of class. These hand-in problems will be graded and returned in a timely manner (the next class session when possible). **Late homework assignments will not be accepted. Instead, the 2 lowest homework scores for each student will be dropped before calculating the homework grade.** Students are encouraged to *collaborate* while working on homework assignments but to write up their solutions independently.

Exams:

Two midterm exams and a final exam will be given during the quarter according to the schedule above. Make-ups of mid-term exams will only be given in extraordinary circumstances and must be discussed with me at least one week in advance of the regularly scheduled date. So that we can together work out a strategy for improvement, I shall require all students scoring a grade of C- or lower on a midterm exam to meet with me during the week following the exam.

Attendance:

In view of the workshop nature of this class, attendance at all class sessions is required. If you must miss a class for a legitimate reason, you should be sure to consult one of your colleagues to find out what you missed.

Classroom Citizenship:

Consistent with the interactive nature of this class, all students are expected to come prepared for class and to participate actively. This means contributing to discussions of the entire class and working with partners or groups on the classroom activities. I will also expect that you have *earnestly* attempted all warm-up problems before class.

Academic Dishonesty:

Representing another's work as one's own (i.e., copying) on homework, exams or projects is not acceptable and will result in failure of the course.

Special Accommodation:

Any student with a disability who needs an accommodation or other assistance in this course should make an appointment to speak with me as soon as possible.