AUGUSTA STATE UNIVERSITY
DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE
Math 6260/6950
Understanding Data Analysis and Probability
Fall 2009

INSTRUCTOR: Carol J. Rychly. Ph.D.
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OFFICE HOURS: 3:00 – 4:00 pm Tuesday and Thursday and by appointment

CLASS TIMES: 4:00 – 5:15 pm Tuesday and Thursday

PREREQUISITES: Completion of MATH 6241 and permission of instructor.

COURSE DESCRIPTION: A study of data analysis, statistics and probability through the collection and interpretation of data. Includes graphical representation of data, experimental and theoretical probabilities, measures of central tendency and variation, interpretation of statistical studies and making predictions from data.

TEXTBOOK: *Workshop Statistics, third edition* by Rossman et. al.

CALCULATOR: A TI-83, TI-83+ or TI-84 graphing calculator is required. No calculator sharing is permitted.

CONCEPTUAL FRAMEWORK PRINCIPLES ADDRESSED:

1. Understand the central concepts, tools of inquiry, and structures of the discipline(s) and be able to create learning experiences that make these aspects of subject matter meaningful for learners.

4. Understand and use a variety of instructional strategies to encourage the learner's development of critical and creative thinking, problem solving, and performance skills.

6. Use knowledge of effective verbal, nonverbal, and information technology techniques to foster active inquiry, collaboration, and supportive interactions in the classroom.

NCTM STANDARDS ADDRESSED:

Standard 5: Data Analysis, Statistics, and Probability
Mathematical instructional programs should include attention to data analysis, statistics, and probability so that all students—

- Pose questions and collect, organize, and represent data to answer those questions;
- Interpret data using methods of exploratory data analysis;
- Develop and evaluate inferences, predictions, and arguments that are based on data;
- Understand and apply basic notions of chance and probability.

Standard 6: Problem Solving

Standard 7: Reasoning and Proof

Standard 8: Communication

Standard 9: Connections

Standard 10: Representation
Mathematical instruction programs should emphasize mathematical representations to foster understanding of mathematics so that all students--

- Create and use representations to organize, record, and communicate mathematical ideas;
- Develop a repertoire of mathematical representations that can be used purposefully, flexibly, and appropriately;
- Use representations to model and interpret physical, social, and mathematical phenomena.

GEORGIA PERFORMANCE STANDARDS ADDRESSED:

MKD1. Students will pose information questions, collect data, organize, and record results using objects, pictures, and picture graphs.

M1D1. Students will create simple tables and graphs and interpret them.
a. Interpret tally marks, picture graphs and bar graphs.
b. Organize and record data using objects, pictures, tally marks, and picture graphs.

M2D1. Students will create simple tables and graphs and interpret their meaning.
a. Organize and display data using picture graphs, Venn diagrams, bar graphs, and simple charts/tables to record results.
b. Know how to interpret picture graphs, Venn diagrams, and bar graphs.

M3D1. Students will create and interpret simple tables and graphs.

a. Solve problems by organizing and displaying data in bar graphs and tables.
b. Construct and interpret bar graphs using scale increments of 1, 2, 5, and 10.

M4D1. Students will gather, organize, and display data according to the situation and compare related features.
a. Represent data in bar, line and pictographs.
b. Investigate the features and tendencies of graphs.
c. Compare different graphical representations for a given set of data.
d. Identify missing information and duplications in data.

M5D1. Students will analyze graphs.
a. Analyze data presented in a graph.
b. Compare and contrast multiple graphic representations (circle graphs, line graphs, bar graphs, etc.) for a single set of data and discuss the advantages/disadvantages of each.
M5D2. Students will collect, organize, and display data using the most appropriate graph.

M6D1. Students will pose questions, collect data, represent and analyze the data,
and interpret results.
a. Formulate questions that can be answered by data. Students should collect data by using samples from a larger population (surveys), or by conducting experiments.
b. Using data, construct frequency distributions, frequency tables, and graphs.
c. Choose appropriate graphs to be consistent with the nature of the data (categorical or numerical). Graphs should include pictographs, histograms, bar graphs, line graphs, circle graphs, and line plots.
d. Use tables and graphs to examine variation that occurs within a group and variation that occurs between groups.
e. Relate the data analysis to the context of the questions posed.
M6D2. Students will use experimental and simple theoretical probability and understand the nature of sampling. They will also make predictions from investigations**.**
a. Predict the probability of a given event through trials/simulations (experimental probability), and represent the probability as a ratio.
b. Determine, and use a ratio to represent, the theoretical probability of a given event.
c. Discover that experimental probability approaches theoretical probability when the number of trials is large.

M7D1. Students will pose questions, collect data, represent and analyze the data,
and interpret results.
a. Formulate questions and collect data from a census of at least 30 objects and from samples of varying sizes.

b. Construct frequency distributions.
c. Analyze data using measures of central tendency (mean, median, and mode), including recognition of outliers.
d. Analyze data with respect to measures of variation (range, quartiles, interquartile range).
e. Compare measures of central tendency and variation from samples to those from a census. Observe that sample statistics are more likely to approximate the population parameters as sample size increases.
f. Analyze data using appropriate graphs, including pictographs, histograms, bar graphs, line graphs, circle graphs, and line plots introduced earlier, and using boxand-whisker plots and scatter plots.
g. Analyze and draw conclusions about data, including describing the relationship between two variables.

M8D1. Students will apply basic concepts of set theory.
a. Demonstrate relationships among sets through use of Venn diagrams.
b. Determine subsets, complements, intersection, and union of sets.
c. Use set notation to denote elements of a set.
M8D2. Students will determine the number of outcomes related to a given event.
a. Use tree diagrams to find the number of outcomes.
b. Apply the addition and multiplication principles of counting.
M8D3. Students will use the basic laws of probability.
a. Find the probability of simple independent events.
b. Find the probability of compound independent events.
M8D4. Students will organize, interpret, and make inferences from statistical data
a. Gather data that can be modeled with a linear function.
b. Estimate and determine a line of best fit from a scatter plot.

TECHNOLOGY COMPETENCIES:

- Explore, evaluate, and use computer/technology-based materials, including applications, educational software and associated documentation.
- Demonstrate knowledge of uses of computers for problem solving, data collections, information management, communications, presentations, and decision making.
- Use computer-bases technologies to access information to enhance personal and professional productivity.

EXPECTED LEARNING OUTCOMES:

By the end of the course students will be able to:

1. Construct multiple graphical representations of data and discuss the advantages/disadvantages of each for a given set of data.
2. Analyze data using measures of center and variation.
3. Pose questions, organize, interpret and make inferences from data.
4. Use experimental and theoretical probabilities.

ASSESSMENT PROCEDURES:

A comprehensive final exam will count 1/3 of the grade; part of the final examination grade will include completion of a unit lesson plan. Tests and graded assignments (which **may** include a portfolio, projects, homework, solved problems) will count the other 2/3. Graded assignments are due at the beginning of the class period and **will not be accepted late**. If you will not be in class on a day that an assignment is due, you may email it or place it in my mailbox before class starts or send with another student. The grading scale will be A, 100-90%; b, 89 – 80%; C, 79 – 70%; D, 69 – 60%; and F, below 60%. If you have a disability and wish to receive accommodations in class, please apply with the Office of Disability Services.

ATTENDANCE POLICIES: Attendance will be recorded. You **MAY** be dropped if you miss more than 10% of all classes. Midterm (Oct 12) is the last day to drop or be dropped without penalty. Please see me if you are considering dropping the course. If you are absent from a class, you are responsible for keeping up with all notes and assignments. Please obtain prior permission from the instructor before bringing visitors (including children) to class.

TEST DATES: Test 1 – Thursday, September 10, 2009
Test 2 – Thursday, October 1, 2009
Test 3 – Tuesday, October 27, 2009
Test 4 – Tuesday, December 1, 2009

Final Examination – Tuesday, December 8 from 6:00 – 8:00 pm.

BIBLIOGRAPHY

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Sonnabend, Thomas (1997). Mathematics for elementary teachers: an interactive approach, second edition. Fort Worth, TX: Saunders College Publishing Company.

Zawojewski, Judith S. (1991). Dealing with data and chance: Curriculum and evaluation standards for school mathematics addenda series, grades 5 – 8. Reston, VA: The National Council of Teachers of Mathematics.