MATH 300: Probability & Statistics I (Fall 2007) 5:10 – 6:25 MW in Ambrose 313B

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Overview:

This calculus-based course will introduce students to probability concepts and the science of statistics through lecture, discussion, and activities. Using applications from engineering, science, education, and business, students will develop skills in designing studies, collecting/analyzing data, making inferences, and presenting conclusions. Students will learn probability concepts and models in the context of statistical ideas and applications. Students will also gain hands-on experience with technology used to simulate and analyze statistical data.

This is the first in a trio of mathematical statistics courses at SAU: MATH 300, 301, and 305

Required Materials:

Probability & Statistics for Engineering & the Sciences by Jay L. Devore (7th edition) -- ISBN: 978-0-495038217-1
Binder for course notes, activities, and assignments
Calculator (TI-82 or higher recommended, but any calculator will work)

Prerequisites:

Students enrolled in this course have successfully completed differential and integral calculus (MATH 191/192). This prerequisite is primarily to ensure students are comfortable with mathematical concepts and notation. While we will use derivatives and integrals to investigate statistical theory, this course will focus more on statistical reasoning than on specific mathematical techniques. No previous knowledge of probability or statistics is assumed.

Outline of Major Topics:

1) Probability theory & applications
2) Random variables
3) Discrete and continuous probability distributions
4) Descriptive statistics; exploratory analysis
5) Statistical estimation
6) Statistical inference

Course Procedures:

Each topic will be introduced through guided classroom activities (which you can download from the class website). Working together, we will analyze applications of probability and statistics and learn important concepts and statistical reasoning. During these activities, I will ask questions – lots of questions. If you attend class and participate in these activities, you will learn the material. In addition, you will be able to use these activities (and any notes you write on them) on the unit exams.

Assigned readings and homework problems are listed at the top of each activity. I recommend you read the material and complete the homework before the next class. That way, you'll get more out of each lecture and classroom activity. The vast majority of the assigned problems are odds, so you can check your answers in the back of the textbook. You will also be able to ask questions about the homework at the beginning of each class period.

Throughout each unit, I will assign some take-home activities. These activities will be a chance for you to complete nonparametric statistical analyses. You will always have at least one week to complete these activities and I encourage you to work together with other students.

Exams (and any quizzes) in this course will be open-note, but not open-book. You can expect true-false, multiple-choice, and short-answer questions to check your understanding of concepts and statistical methods we learn in class. The test questions will sample content we cover in class.

Right after each exam, I will collect student portfolios. Students who complete all the assigned homework and classroom activities will receive credit. Students who do not complete the homework will not be penalized (see the grading procedures). The homework consists mainly of exercises that will reinforce the concepts and methods we learn in class. There will be, however, some homework problems that go slightly beyond what we'll cover in class.

Let me state once again that I want you to learn the concepts, logic, and applications of statistics. To do this, you will need to come prepared to class every day. This means you should: read the assigned textbook sections and complete the homework before class; actively participate in class discussions, and review your notes periodically. Don't fall behind in this class.

Student Expectations:

1) Attend class. Many concepts will be presented in class through activities that cannot be fully reproduced outside of class. Because of this, your test performance will suffer if you are absent from class. If you must miss class, I'd appreciate it if you let me know in advance.

2) Complete all assigned readings, assignments, homework problems, and exams by the scheduled due dates. All exams will be open-note. Students earning test scores lower than a C will be required to complete additional projects. Late work will not be accepted without prior permission. Students must get permission from me if they will be absent on the day of a test.

3) Actively participate in class discussions. Current research on teaching statistics to undergraduate students stresses the importance of active learning. If you actively participate in class (answering questions and analyzing data), you will learn the material. In order to be prepared to participate, you must have printed out the activities before class.

4) Take responsibility for their learning. Students are encouraged to work collaboratively on assigned problems, participate in class discussions (ask questions!), and seek assistance if needed. You can always visit my office during my posted office hours. If you need to meet with me outside my office hours, the best way to contact me is via e-mail.

Student Evaluation: Each successive unit will account for a slightly greater percentage of your grade.

		No Homework Option	Homework Option
Unit:	Exam	85%	65%
	Assignments/Quizzes/Participation	15%	15%
	Homework (answers online)	----	20%

One extra credit assignment will be assigned each unit
The grading scale will not be higher than: A (90%+), B(80%+), C(70%+), D(60%+)

Plagiarism:

Don't cheat. You can work with other students on the homework and take-home assignments, but the exams should only represent your level of understanding. Review the Policy on Academic Dishonesty in the University Catalog.

Accommodations:

Students with disabilities who believe they may need accommodations in this class are encouraged to contact the Office of Services for Students with Disabilities at 333-6275 as soon as possible to better ensure that such accommodations are implemented in a timely fashion.

Week 1 8/27 – 8/31	Course overview and introductions Activity #1: Statistical Thinking Activity #2: Probability Theory	 Read 2.1: 2, 9 Read 2.2: 11, 12, 13, 15, 17, 21, 25
Week 2 9/3 – 9/7 No class 9/3	Activity #3: Probability Applications Graded Activity #3a: Fisher' Exact Tests; Ranks Test	Read 2.3: 29, 30, 31, 33, 39, 41
Week 3 9/10 – 9/14	Activity #4: Conditional Probability Activity #5: Independence	Read 2.4: 45, 47, 49, 50, 53, 55, 59 Read 2.5: 71, 80, 83, 108 (supplement 1.4.11)
Week 4 9/17 – 9/21	Graded Activity #5a: Election 2000 Activity #6: Expected Value and Variance Activity #7: Binomial Distribution (Extra Credit Quiz)	Read 3.1: 1, 7 Read 3.2: 11, 13, 17 Read 3.3: 29, 31, 44
Week 5 9/25 – 9/28	Graded Activity #7a: Sign Test Review for Exam #1 **Exam #1: Basic Probability**	Read 3.4: 46, 47, 49, 50, 55, 57 **Homework Portfolios Due**
Week 6 10/1 – 10/5	Activity #8: Other Discrete Distributions Graded Activity #8a: 3rd Base coach Activity #9: Continuous Random Variables Graded Activity #9a: Industrial Robot	Read 3.5: 69, 71, 73, 75 Read 3.6: 79, 81, 83, 85 Read 4.1: 1, 3, 5, Read 4.2: 11, 15
Week 7 10/8 – 10/12	Activity #10: Continuous Distributions Activity #11: Normal Distribution Graded Activity #11a: Fishing Problem	Read 4.4: 59, 61 *Extra credit opportunity: Sections 4.5, 4.6 (ask in class)* Read 4.3: 28, 31, 33, 35, 37, 47
Week 8 10/15 - 10/19 No class 19th	*Activity #12: Experimental Design (optional)* Activity #13: Exploratory Data Analysis Activity #14: Statistical Inference – Point Estimation	Read 1.2: 14, 15, 23 Read 1.3: 33, 37, 39 Read 1.4: 47, 49, 51
Week 9 10/22 - 10/26	*Activity #15: Maximum Likelihood (optional)* Activity #16: Sampling Distributions Activity #17: Central Limit Theorem	Read 6.1: 1, 3, 5 *Read 6.2: 20 (optional)* Read 5.3: 37
Week 10 10/29 - 11/2	Activity #17a: Lecture times Graded Activity #17b: Central Limit Theorem Review for Exam #2	Read 5.4: 46, 47, 49, 53 Read 5.5: 59, 65
Week 11 11/5 - 11/09	**Exam #2: Applied Probability & Sampling Distributions** Activity #18: Confidence Intervals	**Homework Portfolios Due** Read 7.1: 1, 3, 5 Read 7.2: 13, 17, 19, 23
Week 12 11/12 - 11/16	Activity #19: Confidence Intervals (Student's t-distribution) Activity #20: Hypothesis Testing (z-tests)	Read 7.3: 29, 30, 33, 35, 37 Read 8.1: 1, 3, 5, 7
Week 13 11/19 – 11/23 No class 21-25	Activities #21 & 21e: T-tests (and practice) Graded Activity #21bcd: Hypothesis test & Confidence Intervals	Read 8.2: 17, 19, 21, 23, 25 Read 8.4: 45, 47, 51, 53
Week 14 11/26 – 11/30	Review hypothesis testing Activity #22: Test for proportions Activity #23: Independent Samples t-test theory	 Read 8.3: 35, 37, 39 Read 9.1: 1
Week 15 12/3 - 12/7	Activity #24: Independent Samples t-test Extra Credit Activity #24a Activity #25: Dependent Samples t-test Review for final exam	Read 9.2: 21, 23c, 25, 27 Read 9.3: 39, 41
Final Exam	Scheduled for: _____	