Mathematics 107 - Introduction to Probability and Statistics
Fall 2008

Instructor: Kevin D. Yeomans **Office:** 120A Pierce Hall

Text and materials: Elementary Statistics, 6th ed., Allan G. Bluman
Math 107 Notebook
Calculator (TI-83 or 83 PLUS, TI-84 or 84 PLUS recommended)

Course Content: Visual displays of data, measures of central tendency and variability, classification of data, counting, probability, Chebyshev's Theorem, normal distribution, binomial distribution, Central Limit Theorem, hypergeometric distribution, Poisson distribution, Confidence Intervals, Hypothesis testing (means, proportions, variances), Simple linear regression and correlation, Analysis of Variance (one way), Chi-Square Tests (Goodness-of-fit, Contingency Tables), Nonparametric methods (Wilcoxon [for independent and dependent samples], Kruskal-Wallis, Spearman's). Emphasis is on inference.

Goals:

1. Cognitive: At the end of this course students should be able to:
   (1) Categorize a data set.
   (2) Correctly work various simple probability problems.
   (3) Articulate the role of functions in statistics.
   (4) Describe major misuses of statistics.
   (5) Recognize several distributions and characterize them.
   (6) Analyze interval data for which statistical tests involving means, proportions, medians, rankings, and variances are the parameters.
   (7) Interpret relationships in bivariate data.
   (8) Discuss the difference between parametric and nonparametric statistics in relation to inherent assumptions of the general statistical model.
   (9) Recognize and explain the limitations of statistics.
   (10) Interpret the role of statistics in analyzing data and in inference.
   (11) Use a computer and/or a calculator for appropriate statistical tests.
   (12) Interpret statistical findings in relation to the situation from which the data was drawn.
   (13) Describe the experimental nature of mathematical statistics.
   (14) Draw inferences using the vocabulary of statistics.
2. Affective:
   (1) Students may choose to use suggested organizational guidelines, study skills and test-taking approaches.
   (2) Students will perform six experiments, using appropriate statistical techniques.
   (3) Group work for the experiments will enable students to coordinate with others while completing a project and will enable students to develop problem-solving strategies.

The general goals for students taking this course are: (a) begin to be good consumers of information through gaining knowledge about statistics, (b) become more focused on learning processes as they learn and apply study skills, and (c) stay active in the learning process thus integrating cognitive and affective goals.

Responsibilities:

Each **student** has the following responsibilities:

1. Come prepared and on time to every class.
2. Complete all work on time with proper thought.
3. Consider that it is not always the fault of the instructor if the student doesn't understand the material.
4. Treat the instructor and peers with respect.
5. Ask questions. Asking questions is a sign of maturity, not ignorance, as long as the student thinks clearly before asking.
6. Understand that the instructor is not trying to "nit pick" when grading and remember that grading is the responsibility of the instructor.

The **instructor** has the following responsibilities:

1. Come prepared to every class.
2. Design each class so students can accomplish the cognitive objectives listed in the syllabus.
3. Provide appropriate tips for studying and study materials as seem appropriate.
4. Create a mutually respectful classroom environment.
5. Return tests and experiments in a timely manner so that students will know their grades.
6. Grading, as far as possible, to be consistent and impersonal even though students might not agree with the decisions concerning partial credit.

Organizational Guidelines for students:

(1) As soon as you get your syllabi from all your courses, put all important dates on a single calendar, clearly labeled.

(2) You should stay current in your subjects by setting aside 8 to 9 hours per week to study each subject. You may need more time in some subjects. Spread this time out over the week. Marathon studying, especially in mathematics, does not work well!

(3) Plan ahead so that you get enough sleep before a test or you will not be able to think clearly and logically.

(4) Take advantage of the available outside help for this course. Schedule at least one SI session per week.

(5) Plan ahead for your experiments (and other projects and papers). Working with others requires scheduling far in advance of the due date.

(6) Have needed supplies for each course. For Math 107 you will need a notebook for class notes, notes from the text, and homework; a calculator; a text book and a notebook; and, of course, pens and pencils.

(7) Follow each syllabus carefully. For Math 107, your homework is listed for each class meeting. Reading the chapter before coming to class will help your understanding of the material.

Grading: Student grades are determined by their performance on five tests, six experiments, and the final exam.

		A, A-:	900 points and above
5 Tests	500	B+,B, B-:	800-899 points
6 Experiments @ 50	300	C+, C, C-:	700-799 points
Final Exam	200	D+, D	600-699 points
TOTAL	1000	F	below 600 points

Tests: Tests will be given **at 2:00 p.m.** on **September 19, October 10, October 31, November 14, and December 5.** Each test will cover the topics listed for that test on the attached outline. There are no practice tests or additional problems outside of those in the text and notebook. Formulas will be provided. Each student will need a calculator. **Students are expected to take all tests at the scheduled times.** Any emergencies will be handled on an individual basis and must be documented. Any student needing special accommodations must communicate these needs and make arrangements at least two class periods in advance of any test. The final exam will be given at the time scheduled by the registrar and will include material selected from the entire course.

Experiments: There will be six experiments, with students working in groups of two or three. Example experiments are provided in the notebook for this course. Each student is expected to participate in a somewhat "equal" manner. A signed form of individual contributions must accompany each experiment (See the Notebook). No experiment will be accepted after class time on the due date. An individual's grade is based on the individual's contribution, the group's write-up, the statistical analysis used, the experimental procedure outlined and followed, and creativity including originality and neatness.

Homework: Class time will be used to enrich topics in statistics but will not be used to summarize information from the text. It is each student's responsibility to read the textbook and make appropriate notes. Homework problems will not be collected but are to benefit the student. Each student should work most of the problems assigned in the text and in the notebook. Example problems will be worked in class, one for each major concept. Basic problems and concepts for which the student is responsible are included in the notebook for this course. To do well, the average student will need to study about 3 hours outside of class for every class meeting or around 8 to 9 hours per week. Preparing and executing experiments, studying and reviewing for tests will require more time.

Office Hours: Office hours will be announced by the instructor. Students should use this time to come by and ask specific questions related to this course. In addition, students may email, privately or on the Math 107 class conference.

Outside Help: In addition to office hours, students are encouraged to use the following:

There is a class conference, Math 107 Fall 2008. Students should have the class conference on their desktops and should consult this conference frequently for announcements about office hours, SI sessions, tutoring, etc. Students may pose individual questions on the class conference.

There will be SI leaders for Math 107. Our SI student leaders will schedule review sessions each week. These sessions are optional, however each student is encouraged to pick one of the times per week and attend regularly. Even though these sessions are optional, students who attend SI sessions generally do better in the courses for which there are SI leaders. Student tutors are available in the Math Tutoring Center (schedule to be posted as soon as it is finalized).

Study groups organized by students are highly recommended. The meetings should be scheduled weekly and should be part of a regular weekly routine.

Finally, there are valuable resources on http://mathcenter.oxford.emory.edu to include notes and video tutorials.

Attendance Policy: You are expected to attend all classes since you are responsible for work covered in class. Each instructor will determine his/her own attendance policy. Emergencies and verifications are at the discretion of the professor.

HONOR CODE: THE HONOR CODE APPLIES TO ALL WORK SUBMITTED FOR CREDIT POINTS TOWARD YOUR GRADE. ALL SUCH WORK WILL BE PLEDGED TO BE YOURS AND YOURS ALONE. YOU PLEDGE THAT WITH YOUR SIGNATURE.

Topics and homework assignments

PART 1 for Test 1:

8/27 (Wed.) **Introduction to Statistics**

Chapter 1: Make study notes on the types of data (pp 6-9); on the types of sampling (pp 10-12), on an experimental design; begin a list of "misuses" of statistics; record stories from history (class notes); summary on pp 24-25; p. 26: 7, 8, 9, 11, 12, 13, 17, 19, 21-29

9/3 (Wed.) **Introduction to Statistics, Jerome Cardan**

Chapter 2: Make study notes on categorical frequency distributions (class tally, frequency, percent), group frequency distributions (class limits, class boundaries [use of ".5"], tally frequency, cumulative frequency), grouped frequency distribution rules (pp 38-39). Be able to create a frequency histogram and a relative frequency histogram. Be able to create a display using stem and leaf; p. 44: 11, 17 (draw a frequency histogram); p. 58: 7; p. 79: 15, 17; p. 88: 21; p. 91: 26

9/3 (Wed.) **Descriptive Statistics**

Chapter 3: see p. 107-108 distributions p. 109, p. 123, p. 125, p. 127; p. 110: 1, 9, 11, 31; p. 129: 5, 15, 33, 35, 43, 46; p. 157: 7, 9, 10, 11, 15, 18; p. 164: 14
Find the smallest integer value, x, such that x is an outlier of the following data set: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, x. Use both definitions and compare.

9/5 (Fri.) and 9/8 (Mon.) **Laws of Probability and Counting**

Chapter 4, p. 219 rules; p. 185: 9, 12, 13, 14, 15, 17, 21, 23, 25; p. 193: 3, 5, 7, 9, 11, 13, 17, 19, 23, 24, 25; p. 209: 3, 7, 12, 15, 23, 25, 29, 31, 33, 35, 39, 41, 43, 47; p. 220: 1 – 51 odd; p. 226: 1, 3, 5, 7, 9, 11; summary p. 227-228; p. 229: 3, 5, 7, 9, 11, 13, 15, 19, 21, 23, 25, 27, 31, 35, 37, 39, 41; p. 231: 18 – 47 odd

9/10 (Wed.) **No Class**

9/15 (Mon.) **Bayes' Theorem, birthday problem, game of craps**

Appendix B-2, p. A-9; A-12: 1, 3, 5, 7, 9, 11; p. 233: 3

9/17 (Wed.) **Review for Test 1**

Notebook notes and problems, p. 2-10.

9/19 (Fri.) **Test 1**

PART 2 for Test 2:

9/22 (Mon.) **Probability Distributions**

Chapter 5, Sections 5-2, 5-3, 5.4: p. 244: 1, 7, 9, 11, 12-18, 19, 23, 25 (make a probability graph and a probability histogram); p. 253: 1, 5, 7, 11, 15, 17, 20; p. 263: 1, 3, 5, 9, 11, 13, 15, 19, 21, 23, 25

9/24 (Wed.) and 9/29 (Mon.) **More Probability Distributions (Binomial, Poisson, Hypergeometric)**

Chapter 5, Section 5-5: p. 276: 1, 3, 5, 9, 11, 13, 15, 17, 19; p. 279: 1, 3, 7, 9, 13, 17,19,21, 23, 25, 27, 29, 31; p. 281: 11, 13, 16, 17, 18, 19, 21, 22, 24, 25, 27, 29, 31

10/1 (Wed.) **Normal Distribution**

Chapter 6, Sections 6-2, 6-3, 6-4: Normal Distribution p. 289; p. 302: 1-49 odd; p. 316: 3, 5, 9, 13, 15, 17, 19, 21, 23, 27, 33, 35, 38, 41

10/6 (Mon.) **Central Limit Theorem, Normal Approximation to the Binomial**

Chapter 6, Sections 6-5, 6-6: Central Limit Theorem p. 324; p. 329: 9, 11, 13, 15, 17, 19, 21; p. 337: 1, 3, 5; p. 339: 3, 5, 7, 9, 13, 15, 16; p. 341: 1-34 (for more problems, if you need them)

10/8 (Wed.) **Review for test 2**

Notebook notes and problems, p.11-16.

10/10 (Fri.) **Test 2**

PART 3 for Test 3:

10/15 (Wed.) **Confidence Intervals**

Chapter 7: p. 358:1, 3, 5, 9, 11, 13, 17, 21, 23, 25; know the characteristics of the student t distribution; p. 366: 1, 3, 5, 7, 11, 13 15, 19; p. 374:3, 5, 7, 9, 11, 13, 15, 17, 19; p. 385:1, 3, 5, 7, 9, 11; p. 387: 12-23

10/20 (Mon.) **Hypothesis Testing**

Chapter 8, Sections 8-1, 8-2, 8-3: know the five step hypothesis testing procedure, the two types of errors (p. 397); Read section 8.2 slowly and carefully! Make notes. p. 404: 1-13; p. 414:1, 3, 5, 7, 9, 13, 14, 15, 17, 19, 25

10/22 (Wed.) and 10/27 (Mon.)

Hypothesis Testing

Chapter 8, Sections 8-4, 8-5, 8-7, 8-8, Read pg 451-452: p. 426: 1, 2, 3, 5, 7, 9, 11, 13, 15, 19; p. 434: 1-4, 5, 7, 11, 13, 15, 17, 19; p. 453: 1, 3, 5, 7; p. 455: 1, 3, 5, 7, 9, 19; Not Section 8-6; p. 458: 15, 17, 21, 23, 25, 33

10/29 (Wed.) **Review for Test 3**

Notebook notes and problems, p.17-24. Also history p. 62-66.

10/31 (Fri.) **Test 3**

PART 4 for Test 4:

11/3 (Mon.) and 11/5 (Wed.) **Inferences from Two Samples**

Chapter 9: F-distribution p. 477; p. 471: 5, 7, 9, 11, 13, 15, 17, 19, 21; p. 483: 7, 9, 13, 19; p. 492: 1, 3, 7, 9, 13; p. 506: 3, 5, 7, 9; p. 514: 1, 3, 5, 9, 11, 13, 17; p. 519: 1, 9, 13; p. 521:14, 15, 16, 22, 26, 27, 29.

11/10 (Mon.) **Correlation and Regression**

Chapter 10, 10-2, 10-3, 10-4 and parts of 10-5, p. 575 summary: p. 542: 13, 17, 19, 25; p. 551: 13, 17, 19, 25; p. 577: 1, 3, 5, 7; answer problems/questions, p. 578: 1-21.

11/12 (Wed.) **Review for Test 4**

Notebook notes and problems, p. 17-24, p. 25-31, history p. 67-70.

11/14 (Fri.) **Test 4**

PART 5 for Test 5:

11/17 (Mon.) **Chi Square Models**

Chapter 11: Characteristics of the Chi Square function pp 378-379; p. 593: 5, 7, 9, 11, 13, 15; p. 605: 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31; p. 613: 1, 3, 5, 7, 9; p. 615: 11, 13, 15, 17, 19.

11/19 (Wed.) **ANOVA**

Chapter 12, Sections 12-2, 12-3: p. 634: p. 1-7, 9, 17, 19; p. 652: 1, 5; p. 654: 15, 16.

11/24 (Mon.) **Wilcoxon Rank Sum and Kruskal-Wallis tests**

Chapter 13, Sections 13-2, 13-4, 13-6: p. 674: 5, 7, 9; p. 685: 1, 11; p. 700: 3, 5, 8; p. 702: 17, 19, 20, 21.

12/1 (Mon.) **Spearman's correlation**

Chapter 13, Section 13-7: Table L on p 779 gives the critical values; procedure summarized on page 690; p. 695: 5, 7, 9; p. 700: 10, 11.

12/3 (Wed.) **Review for Test 5**

Notebook notes and problems, p. 32-46.

12/5 (Fri.) **Test 5**

12/8 (Mon.) **Review for Final**

Oxford College of Emory University – Fall 2008

Math 110AX - Calculus I with PreCalculus

MWF 9:35 to 10:25 & Th 1:00 to 2:15 – Seney 209

Instructor: Kevin D. Yeomans **Phone:** 4-4657

Office: Pierce Hall, 120A **Email:** kevin.yeomans@emory.edu

Office Hours: I will usually be available anytime on Tuesday or Thursday during the day. My door is usually open, but you may always make an appointment to ensure that I'm available to assist you.

Text: James Stewart, *Essential Calculus: Early Transcendentals*.

Course Description: Math 110AX is the first part of a two-semester sequence that integrates precalculus into Calculus I with early transcendental functions. Either Math 110AX or its companion course Math 110A can be taken as a prerequisite to Math 110B, the terminal course in this sequence. Math 110AX meets more frequently than Math 110A, spending the extra time to strengthen students' mathematical backgrounds.

Content for Math 110AX (and Math 110A)

Review of algebra; functions; trigonometric, logarithmic, and exponential functions. Calculus topics include limits, continuity, definition of derivative, differentiation, extrema, Intermediate Value Theorem, Mean Value Theorem, graphing polynomial and rational functions, optimization problems.

Content for Math 110B

Review of inverse trigonometric functions and differentiation, and graphing. New topics include implicit differentiation, logarithmic differentiation, related rates, graphing vertical tangents, logarithmic and exponential graphs, sums and sigma notation, induction, antiderivatives, the Fundamental Theorem of Calculus, definite integral, area, volume, separable differentiable equations, substitution

Course Goals: Upon *successful* completion of Math 110AX and Math 110B, you will:

1. Understand conceptually limits and their relationship to the graph of a function.
2. Understand conceptually the derivative and its relationship to the graph of a function and to the concept of "rate of change".
3. Understand conceptually the definite integral and its relationship to area and volume.
4. Be able to calculate derivatives, evaluate limits, and compute integrals (both definite and indefinite).
5. Be well-prepared for Math 112.

Calculators: You will not be allowed to use calculators on any quizzes or exams.

Grading: Your grade is determined by your performance on homework, quizzes/projects, tests, and a *comprehensive* final exam. All tests will be administered on Thursday mornings throughout the semester.

Homework	50 points
Quizzes/Projects	150 points
5 Tests	500 points
Final	200 points
Total	900 points

Maximum grade cuts are as follows: 90% - A, 80% - B, 70% - C, 60% - D. Plus/minus grades may be assigned for percentages near the maximum grade cuts. **You must pass the final in order to pass the course.**

Homework: Completion of the daily homework assignments is critical to your success in this course and an excellent preparation for the quizzes. Some homework may be assigned and collected for a grade during the semester.

Quizzes/Projects: An undetermined number of quizzes will be given throughout the semester. Quizzes will usually not be announced ahead of time. The bottom 10% of your quiz grades will be dropped. The average of all of the remaining quizzes (and any projects assigned) will be used to determine how many of the 150 points for quizzes/projects you earn toward your overall grade. For example, if you had an average of 90% on your quizzes and projects, then you would receive 135 points toward your final grade. There is no provision for making up a quiz. You will receive a zero on any missed quiz. Grades on projects are treated identically to those on quizzes, except that project grades may not be dropped.

Tests: Five tests will be given on Thursday mornings and the dates for the exams are listed in the course calendar. You are expected to be present for all scheduled exams. Any conflicts should be brought to my attention as soon as possible. If you have a legitimate reason for missing an exam as determined by me, then you must take the exam prior to the regularly scheduled date. If taking the exam early is not possible, then you may be required to take a make-up exam that will be more difficult to offset the additional time given for study. You must provide written documentation in advance of any special accommodations required for testing. This includes additional time or other needs.

"Good Style": All necessary work must be correctly shown in a clear and organized fashion for full credit. Organization and clarity of thought are essential to mathematical thinking. Therefore, points will be deducted for a lack of organization, illegible or sloppy work, and the inappropriate use of mathematical symbols, even if answers found are correct. You will be provided examples of what is considered "acceptably clear and organized work". The goal is for you to solve problems in "good style", unaided by books, notes, tutors, or calculators – and to understand the reasoning behind the solution method.

Class Attendance: You are responsible for all material covered in class and any changes to the syllabus that may be announced.

Religious Holiday Observance: Any conflicts between the course schedule and religious holy days are to be negotiated in advance with me.

Tutoring and Review Sessions: Paul Oser, the Math Center Director, is available for free, individual tutoring in the Math Center in Pierce Hall from 3-6 PM Mondays through Thursdays. Student tutors will also be available in the evenings and on Sundays. The schedule will be forthcoming. You are encouraged to do your homework in this area, where help is available as needed. Some of the student tutors, working in close conjunction with the coordinator for this course, will also hold review sessions in the evenings before the tests. These are to your benefit to attend.

The Math Center Online: You can will find tutorial videos, notes, and practice exercises – specifically created for Math 110AX at http://mathcenter.oxford.emory.edu. I encourage you to utilize this resource.

Learnlink: There is a class conference on Learnlink. Announcements from any instructor or tutor in the course will be posted there. You can ask questions and make requests of a general nature on this conference. Individual concerns should be sent directly to me.

Course Calendar (Subject to Change)

Date	Topic	Notes
Aug 27	Exponents & Order of Operations	
Aug 28	Diagnostic Exam	
Aug 29	Radical Expressions & Rational Exponents	
Sept 1	**No Class**	**Labor Day**
Sept 3	Polynomial Arithmetic & Factoring	**Drop/Add Ends**
Sept 4	Solving Linear Equations & Quadratics by Factoring	
Sept 5	Completing the Square, Quadratic Formula, Quadratic Forms	
Sept 8	Solving Polynomials by Factoring & Equations with Radicals	
Sept 10	Functions: Evaluation, Interval Notation, Domain & Range	
Sept 11	Inverse Functions & Combining Functions, Composition	
Sept 12	Graphing Linear Functions & Absolute Value Functions	
Sept 15	Transformations of Functions	
Sept 17	Distance, Midpoints, Circles & Semi-Circles	
Sept 18	Parabolas (Horizontal & Vertical)	**Test 1**
Sept 19	Rational Functions, Limits, "Holes" & Cancelling Factors	
Sept 22	Properties of Limits	
Sept 24	Piecewise Functions & One-Sided Limits	
Sept 25	Infinite Limits & Vertical Asymptotes	
Sept 26	Products & Quotients of Rational Functions	
Sept 29	Sums & Differences of Rational Functions	
Oct 1	Limits Involving Radicals, Conjugates & Absolute Value	
Oct 2	Continuity & Continuous Functions	
Oct 3	Unit Circle & Trigonometric Function Definitions	
Oct 6	Triangle Trigonometry, Angles & Rotations	
Oct 8	Trigonometric Identities	
Oct 9	Solving Trigonometric Equations	
Oct 10	Graphing Trigonometric Functions	**Test 2**
Oct 13	**No Class**	**Mid-semester Break**
Oct 15	Graphing Trigonometric Functions	
Oct 16	Limits/Continuity of Trigonometric Functions, Squeeze Theorem	
Oct 17	Intermediate Value Theorem	**Last Day to Receive W**
Oct 20	Slope & Equations of Lines	
Oct 22	Definition of Derivative, Slope of Tangent Line, Intervals of Increase/Decrease	
Oct 23	Using Definition to find Derivatives	
Oct 24	Tangent & Normal Lines to Graph of a Function	
Oct 27	Exponential Functions & Their Graphs, Limits at Infinity	
Oct 29	Logarithms & Their Graphs	
Oct 30	Properties of Logarithms	**Test 3**
Oct 31	Solving Logarithmic Equations	
Nov 3	Solving Logarithmic Equations	
Nov 5	Differentiation of Exponential, Logarithmic, Sine and Cosine Functions	
Nov 6	Sum/Differences, Constant Multiple, Power Rule	
Nov 7	Product Rule	
Nov 10	Quotient Rule	
Nov 12	Chain Rule	
Nov 13	Combining Differentiation Rules	**Test 4**
Nov 14	Continuity/Differentiability of Functions	
Nov 17	Mean Value Theorem	
Nov 19	Extrema on an Interval	
Nov 20	Optimization	
Nov 21	Optimization	
Nov 24	Graphing Polynomials, Second Derivatives & Concavity	
Nov 26	**No Class**	**Thanksgiving**
Dec 1	Graphing Polynomials, Second Derivatives & Concavity	
Dec 3	Catch-up & Review	
Dec 4	Graphing Rational Functions	**Test 2**
Dec 5	Graphing Rational Functions	
Dec 8	Final Review	**Last Day of Class**