

## **Mathematics 107Q - Introduction to Probability and Statistics**

Spring, 2012 - Dr. Edward R. Bailey; Dr. Fang Chen

Text and materials: *Elementary Statistics*, 11<sup>th</sup> ed., Mario F. Triola;  
Calculator (TI-83, TI-83 PLUS, TI-84 or TI-84 PLUS required)

Course Content: Visual displays of data, measures of central tendency and of 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 samples], Kruskal Wallis, Spearman's rho). 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 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 experiments and analyze the results by using appropriate statistical techniques.
  - 3) INQ Group work for experiments will enable students to coordinate with others while completing a project and will enable students to develop problem-solving strategies.

Student work submitted as part of this course may be reviewed by Oxford College and Emory College faculty and staff for the purposes of improving instruction and enhancing Emory education.

The general goals for students taking this course are:

Students should: (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) to be 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) 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) Have needed supplies for each course. For Math 107 you will need a notebook for class notes and homework; a calculator; a textbook and notes as available from the class Blackboard site; and, of course, pens and pencils.
- (6) Follow each syllabus carefully. For Math 107, your homework will be posted on the Blackboard site. Reading the indicated section(s) before coming to class will help your understanding of the material.

Documentation from the University Disability Office requesting special accommodations should be presented to your instructor as soon as possible. No special accommodation can be arranged prior to the verification of proper documentation.

Grading:

Grades will be determined by student performance on 4 tests, 5 assignments and a comprehensive final exam, as follows:

4 tests @ 100	400
5 experiments @60	300
Final exam	<u>300</u>
Total	1000

In general,

A, A-: 90% and above

B+, B, B-: 80 – 89%

C+, C, C-: 70 – 79%

D+, D: 60 – 69%

F: below 60%

Exact cut-off scores for plus and minus will be determined by the distribution of totals for all students.

Tests and Final Exam:

Tests will be given during class time on the dates indicated on the attached listing of topics. There are no practice tests or additional problems outside those in the text and formal notes. Formulas will be provided and your calculator may be used for appropriate portions of tests, experiments, and the final exam. You are expected to take tests at the scheduled times. Any emergencies will be handled on an individual basis and must be documented. **No make-up test will be given after the testing time and date.** The final exam will include material selected from the entire course. The final exam will be given at the time designated on the final exam schedule, no exceptions.

INQ Group Assignments:

There will be five group assignments, with students working in groups of two or three. Within the group, each student is expected to work as a group member on each aspect of each assignment and to participate in a somewhat “equal” manner. A signed form of individual contributions must accompany each experiment. **No assignment will be accepted after class time on the due date.**

An individual’s grade is based on: the individual’s contribution and work within the group, the group’s write-up, the statistical analysis used, the experimental procedure outlined and followed, creativity including originality and neatness, clarity of work on problems, completeness of ideas on written responses, and correctness of work.

Bonus/Extra Credit:

In general, there will be 10 bonus points on each test so that each test will provide the opportunity for students to earn up to 110 points (out of 100) per test. There may be occasion for additional extra credit during the semester. Any such opportunity will be agreed upon by all the instructors for this course.

### Homework:

Class time will be used to enrich topics in statistics but will not be used to merely summarize information from the text. It is each student's responsibility to read the appropriate sections of 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 formal typed notes. Example problems will be worked in class, one for each major concept. However, there is little or no class time for working through homework problems. Basic problems and concepts for which the student is responsible are included in the formal typed notes for this course, available on the class Blackboard site.

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 group assignments, studying and reviewing for tests will require more time.

### Office Hours/Outside Help:

**Office hours** will be announced by your instructor. Students should use this time to come by and ask specific questions related to this course and/or homework problems. In addition, students may email your instructors privately.

There is a **Blackboard course site**, *Math\_OX 107 Introduction to Probability and Statistics – Spring 2012*. Students should consult this Blackboard site frequently for announcements about office hours, SI sessions, tutoring, formal notes, class notes, outlines for tests, etc.

Our **SI** (Supplemental Instructor) 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. Students who attend SI sessions generally do better in the courses for which there are SI leaders. Student tutors are available in the Math Center in Pierce Hall. Help is always available from 3:00 until 6:00, Monday through Thursday afternoons. A schedule is posted in the Math Center providing additional opportunities for help.

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

### Attendance Policy:

You are expected to attend all classes since you are responsible for work covered in class. Tests will not be given after the test day (listed on this syllabus), the student will not have the opportunity to make up that test. Emergencies and verifications are at the discretion of the professor. Arrangements related to grading because of an absence from a test are at the discretion of the professor. Absences from tests must have appropriate documentation.

**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. THE CONTRIBUTION SHEET WITH EACH OF YOUR GROUP ASSIGNMENTS PROVIDES YOUR INDIVIDUAL WORK WITHIN THE GROUP STRUCTURE.**

## Topics

### PART 1 for Test 1: Counting and Probability

1/18 (Wed.)	Introduction to Statistics, Jerome Cardan, the famous birthday problem
1/20 (Fri.)	Counting, Section 4.7
1/23, 1/25 (Mon., Wed.)	Laws of Probability, Sections 4.2, 4.3, 4.4, 4.5, 4.8
1/27 (Fri.)	Probability - Birthday problem revisited, Game of Craps <b>Assignment 1 announced, due 2/6</b>
1/30, 2/1, 2/3 (Mon. – Fri.)	Discrete Distributions, Sections 5.2, 5.3, 5.4, 5.5
2/6 (Mon.)	Review for Test 1 <b>Assignment 1 due on 2/6</b>
<b>2/8 (Wed.)</b>	<b>Test 1</b>

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PART 2 for Test 2: Descriptive Statistics, Normal Distribution, Proportions

2/10, 2/13 (Fri., Mon.)	Introduction to Statistics; Histograms Chapter 1 and Sections 2.2, 2.3, 2.5
2/15 (Wed.)	Descriptive Statistics, Sections 3.2, 3.3 <b>Assignment 2 announced, due 2/22</b>
2/17, 2/20 (Fri., Mon.)	Normal Distribution, Central Limit Theorem, Sections 6.1, 6.2, 6.3, 6.4, 6.5
2/22 (Wed.)	Normal Approximation to the Binomial, Section 6.6 <b>Assignment 2 due on 2/22</b>
2/24 (Fri.)	Confidence Intervals, Proportions, Section 7.2 <b>Assignment 3 announced, due 3/2</b>
2/27 (Mon.)	Hypothesis Testing, Theory Section 8.2, <b>MUST READ BEFORE CLASS</b>
2/29 (Wed.)	Hypothesis Testing, one sample proportions Section 8.3
3/2 (Fri.)	Hypothesis Testing, two sample proportions Section 9.2 <b>Assignment 3 due on 3/2</b>
3/5 (Mon.)	Review for Test 2
<b>3/7 (Wed.)</b>	<b>Test 2</b>

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PART 3 for Test 3: Chi Square Models and About Means

3/9, 3/19 (Fri., Mon.)	Chi Square Models Sections 11.2, 11.3
<b>3/12 – 3/16</b>	<b>Spring Break</b>
3/21 (Wed.)	Confidence Intervals, Means, Sections 7.3, 7.4
3/23, 3/26 (Fri., Mon.)	Hypothesis Testing, one sample means Sections 8.4, 8.5 <b>Assignment 4 announced on 3/23, due 4/2</b>
3/28, 3/30 (Wed., Fri.)	Hypothesis Testing, two sample means Sections 9.3, 9.4, 9.5
4/2 (Mon.)	ANOVA Section 12.2 <b>Assignment 4 due on 4/2</b>
4/4 (Wed.)	Review for Test 3
<b>4/6 (Fri.)</b>	<b>Good Friday</b>
<b>4/9 (Mon.)</b>	<b>Test 3</b>

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Part 4 for Test 4: Other Statistical Tests

4/11, 4/13 (Wed., Fri.)	Regression, Sections 10.2, 10.3 <b>Assignment 5 announced on 4/11, due 4/20</b>
4/16, 4/18 (Mon., Wed.)	Kruskal Wallis, Wilcoxon, Section 13.5, 13.4
4/20 (Fri.)	Spearman rho, Section 13.6 <b>Assignment 5 due on 4/20</b>
4/23 (Mon.)	Review for Test 4
<b>4/25 (Wed.)</b>	<b>Test 4</b>

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4/27, 4/30 (Fri., Mon.)      Wrap-up, review for final, evaluation