

**Math 107Q - Introduction to probability and statistics**  
**Oxford College of Emory University**  
**Spring 2014**

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## **Required text and technology**

- *Elementary Statistics*, 11th or 12th ed., Mario F. Triola.
- Calculator (TI-83, TI-83 PLUS, TI-84 or TI-84 PLUS recommended).
- [Blackboard](#).

## **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:
  - (a) Categorize a data set;
  - (b) Correctly work various simple probability problems;
  - (c) Articulate the role of functions in statistics;
  - (d) Describe major misuses of statistics,
  - (e) Recognize several distributions and characterize them;
  - (f) Analyze interval data for which statistical tests involving means, proportions, medians, rankings, and variances are the parameters;
  - (g) Interpret relationships in bivariate data;
  - (h) Discuss the difference between parametric and nonparametric statistics in relation to inherent assumptions of the general statistical model;
  - (i) Recognize and explain the limitations of statistics;
  - (j) Interpret the role of statistics in analyzing data and in inference;

- (k) Use a calculator for appropriate statistical tests;
- (l) Interpret statistical findings in relation to the situation from which the data was drawn,
- (m) Describe the experimental nature of mathematical statistics,
- (n) Draw inferences using the vocabulary of statistics.

2. Affective:

- (a) Students may choose to use suggested organizational guidelines, study skills and test-taking approaches.
- (b) Students will perform experiments and analyze the results by using appropriate statistical techniques.
- (c) Students will have the opportunity to react to articles (readings) related to statistical methods.
- (d) Group work for 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: 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.

## Responsibilities

Each **student** has the following responsibilities:

1. Come prepared and on time to every class.
2. Treat the instructor and peers with respect.
3. Ask questions. Asking questions is a sign of maturity, not ignorance, as long as the student thinks clearly before asking.

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 assignments in a timely manner so that students will know their grades.
6. Grading, as far as possible, to be consistent and impersonal.

## Grading

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

5 tests @ 100	500
5 INQ Projects	300
Final	200
Total	1000

Maximum grade cuts are as follows:

A	B	C	D	F
900 – 1000	800 – 899	700 – 799	600 – 699	0 – 599

Plus/minus grades may be assigned for percentages near the maximum grade cuts. Also, the instructors reserve the right to amend, append, or otherwise make changes to the plan for the course.

## Tests and Final Exam

Tests will be given during class time on the following dates (see also attached listing of topics):

- ★ Friday, February 7th 2014.
- ★ Wednesday, February 26th 2014.
- ★ Monday, March 24th 2014.
- ★ Wednesday, April 9th 2014
- ★ Wednesday, April 23rd 2014.

Each test will cover the topics listed for that test on the attached outline. 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.

## Ways of inquiry

There will be four group assignments, with students working in groups with varying sizes but ranging from two to four people. **Individual work will receive a zero.** Within the group, each student is expected to work as a group member on each aspect of each assignment (experiment, set of problems, and/or article(s)) 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.

- ★ Assignment 1: Friday, January 31st 2014.
- ★ Assignment 2: Friday, February 21st 2014.
- ★ Assignment 3: Friday, March 7th 2014
- ★ Assignment 4: Friday, March 28th 2014.
- ★ Assignment 5: Friday, April 18th 2014.

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.

## 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 conference.

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. You may need more time in some subjects. Spread this time out over the week. Marathon studying, especially in mathematics, does not work well!

## Office Hours/Outside Help

The student should plan to take advantage of the available outside help for this course:

**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 instructors privately or post questions on the Math 107 class conference.

**There is a class conference on Blackboard.** Students should consult this conference frequently for announcements about office hours, SI sessions, tutoring, homework assignments, formal notes, class notes, outlines for tests, etc. Students may pose individual questions on the class conference.

Our **SI** (Supplemental Instruction) 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 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 of Oxford College applies to all work submitted for credit in this course. To receive credit for work submitted you must place your name on it. By placing your name on such work, you pledge that the work has been done in accordance with the given instructions and that you have witnessed no Honor Code violations in the conduct of the assignment.

## Disclaimer

*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.*

**List of topics (12th edition)**  
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**PART 1 for Test 1: Counting and Probability**

1. Introduction to Statistics, Jerome Cardan, the famous birthday problem
2. Counting, Section 4.6
3. Laws of Probability, Sections 4.2, 4.3; 4.4, 4.5, 4.8
4. Probability: Birthday problem, Game of Craps
5. Discrete Distributions, Sections 5.2; 5.3, 5.4; 5.5

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

6. Introduction to Statistics and Histograms, Chapter 1 and Sections 2.4, 2.2, 2.3
7. Descriptive Statistics, Sections 3.2, 3.3
8. Normal Distribution and Central Limit Theorem, Sections 6.1, 6.2, 6.3, 6.4, 6.5
9. Normal Approximation to the Binomial, Section 6.7

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**PART 3 for Test 3: Hypothesis Testing: Proportions**

10. Confidence Intervals: Proportions, Section 7.2
11. Hypothesis Testing: Theory, Section 8.2 (MUST READ BEFORE CLASS)
12. Hypothesis Testing: one sample proportions, Section 8.3
13. Hypothesis Testing: two sample proportions, Section 9.2
14. Chi Square Models, Sections 11.2, 11.3

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**PART 4 for Test 4: Hypothesis Testing: Means**

15. Confidence Intervals: Means, Sections 7.3
16. Hypothesis Testing: one sample means, Sections 8.4
17. Hypothesis Testing: two sample means, Sections 9.3, 9.4, 9.5

18. Wilcoxon, Section 13.4

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**Part 5 for Test 5: Other Statistical Tests**

19. ANOVA Section 12.2
20. Regression, Sections 10.2, 10.3
21. Spearman rho, Section 13.6
22. Kruskal Wallis, Section 13.5

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23. Wrap-up, review, evaluation

Final exams will be given according to the college schedule.

# Proposed Calendar (12th edition)

## Math 107Q Spring 2014

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
<div>Jan 13th</div>	Jan 14th	Jan 15th <b>1</b>  §Slides  Introduction to Statistics	Jan 16th	Jan 17th <b>2</b>  § 4.6  Counting
Jan 20th  <i>No class Martin Luther King Jr. holiday</i>	Jan 21st	Jan 22nd <b>3</b>  § 4.2, 4.3  Laws of Probability	Jan 23rd	Jan 24th <b>4</b>  § 4.4, 4.5, 4.8  Bayes' Theorem
Jan 27th <b>5</b>  § INQ Discussion  Birthday problem, Game of Craps	Jan 28th	Jan 29th <b>6</b>  § 5.2  Discrete Distributions	Jan 30th	Jan 31st <b>7</b>  Assignment 1 due  § 5.3, 5.4  Discrete Distributions (cont.)
<div>Feb 3rd</div> <b>8</b>  § 5.5  Discrete Distributions (cont.)	Feb 4th	Feb 5th <b>9</b>  Review Test 1	Feb 6th	Feb 7th  <b>Test 1</b>



MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Feb 10th <b>10</b>  <u>Chapter 1</u> <u>§2.4, 2.2, 2.3</u>  Introduction to Statistics; Histograms	Feb 11th	Feb 12th <b>11</b>  § 3.2  Descriptive Statistics	Feb 13th	Feb 14th <b>12</b>  § 3.2  Descriptive Statistics (cont.)
Feb 17th <b>13</b>  § 6.1, 6.2  Normal Distribution	Feb 18th	Feb 19th <b>14</b>  § 6.3, 6.4, 6.5  Central Limit Theorem	Feb 20th	Feb 21st <b>15</b>  <b>Assignment 2 due</b>  § 6.7  Normal Approximation to the Binomial
Feb 24th <b>16</b>  Review Test 2	Feb 25th	Feb 26th  <b>Test 2</b>	Feb 27th	Feb 28th <b>17</b>  § INQ Discussion  Misuses of statistics
<div>Mar 3rd</div> <b>18</b>  § 7.2  Confidence Intervals, Proportions	Mar 4th	Mar 5th <b>19</b>  § 8.2  <b>READ BEFORE CLASS</b> Hypothesis Testing	Mar 6th	Mar 7th <b>20</b>  <b>Assignment 3 due</b> <b>Last day to withdraw</b>  § 8.3  Hypothesis Testing, one sample proportions
Mar 10th  <i>Spring Break</i>	Mar 11th  <i>Spring Break</i>	Mar 12th  <i>Spring Break</i>	Mar 13th  <i>Spring Break</i>	Mar 14th  <i>Spring Break</i>

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Mar 17th <b>21</b>  § 9.2  Hypothesis Testing, two sample proportions	Mar 18th	Mar 19th <b>22</b>  § 11.2, 11.3  Chi Square Models	Mar 20th	Mar 21st <b>23</b>  Review Test 3
Mar 24th  <b>Test 3</b>	Mar 25th	Mar 26th <b>24</b>  § 7.3  Confidence Intervals, Means	Mar 27th	Mar 28th <b>25</b>  <b>Assignment 4 due</b>  § 8.4  Hypothesis Testing, one sample means
Mar 31st <b>26</b>  § 9.3, 9.4, 9.5  Hypothesis Testing, two sample means	<div>Apr 1st</div>	Apr 2nd <b>27</b>  § 9.3, 9.4, 9.5  Hypothesis Testing, two sample means (cont.)	Apr 3rd	Apr 4th <b>28</b>  <b>Assignment 5 plan approval deadline</b>  <b>Freshmen withdrawal</b>  § 13.4  Wilcoxon
Apr 7th <b>29</b>  Review Test 4	Apr 8th	Apr 9th  <b>Test 4</b>	Apr 10th	Apr 11th <b>30</b>  § 12.2  ANOVA
Apr 14th <b>31</b>  § 13.5, 13.4  Kruskal Wallis, Wilcoxon	Apr 15th	Apr 16th <b>32</b>  § 10.2  Regression	Apr 17th	Apr 18th <b>33</b>  <b>Assignment 5 due</b>  § 10.3, 13.6  Regression Spearman rho

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Apr 21st <b>34</b>  Review Test 5	Apr 22nd	Apr 23rd  <b>Test 5</b>	Apr 24th	Apr 25th <b>35</b>  Wrap-up
Apr 28th <b>36</b>  <b>Last day of classes</b>  Review & Evaluation	Apr 29th  <i>Reading Day</i>	Apr 30th	May 1st	May 2nd