**Columbia University**

**Calculus-Based Introduction to Statistics**

**Statistics UN1201 section 002**

**702 Hamilton, T/Th 8:40-9:55am**

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| Instructor: Joyce Robbins  Email: [jtr13@columbia.edu](mailto:jtr13@columbia.edu)  Tel: 212-853-1391 | Fall 2017  Office hours: Wed., 11:30am-1:00pm  603 Watson Hall: 612 W. 115th St. |

**Course description**

This introductory course is designed for students who desire a strong grounding in statistical concepts, and has a greater degree of mathematical rigor than STAT W1101. Topics include: graphical and numerical summaries of data; the normal distribution, probability, random variables, and sampling distributions; estimation and hypothesis testing for means and proportions; comparing two populations; two-way contingency tables; introduction to linear regression. This course serves as the pre-requisite for ECON W3412.

**Resources and readings**

Required text:

Devore, Jay L. 2016. *Probability and Statistics for Engineering and the Sciences*. 9th edition. ISBN:9781305251809

**Grading procedures**

Grades will be determined as follows:

Homework 180 points (9 x 20 points)

Class problem 20 points (will be explained in class)

Test #1 200 points

Test #2 200 points

Final 400 points

**Grading scale**

(Final averages will be determined by dividing total points by 100 and rounding to the nearest integer. Do not rely on any averages that appear in CourseWorks since they may not be accurate for various reasons.)

98 or more A+ 77 - 79 C+

93 - 97 A 73 - 76 C

90 - 92 A- 70 - 72 C-

87 - 89 B+ 60 - 69 D

83 - 86 B 59 and below F

80 - 82 B-

**Class policies**

**Homework**

Unless otherwise indicated, assignments must be submitted on CourseWorks as a **single pdf file** -- TurboScan or similar phone apps can be used for this purpose.

Homework will be due most Tuesdays, beginning on Sept. 19 (see schedule below).

Homework must be submitted by 11:59pm on the due date for full credit. Late assignments will only be accepted for the **first 24 hours after the assignment is due, and 4 points will be deducted. After this 24 hour period, CourseWorks will no longer accept homework submissions**.

If you submit more than one assignment, the last one will be counted.

Be sure that homework is clearly labeled and legible.

You are encouraged to discuss homework problems with your classmates, but all work submitted must be your own. If multiple students turn in identical solutions, all of them will receive a zero.

**Academic Integrity:** Plagiarism or any other breach of academic integrity will not be tolerated and will result in disciplinary action. For more information please refer to the *The Columbia University Undergraduate Guide to Academic Integrity*:

http://www.college.columbia.edu/academics/academicintegrity

**Tests:** Tests, including the final, are cumulative, with a greater emphasis on newer material. Allowable materials include pens, pencils, erasers, a hand-held calculator, and a single (two-sided) 8.5” x 11” sheet of original handwritten notes for the first two tests, and two sheets (each two-sided) for the final. *Make-up tests will only be administered in cases of documented emergencies.*

**Getting help**

There are numerous opportunities to get assistance with the class material:

1. Ask questions during class.

2. Ask questions after class (I will stay after every class if students have questions.)

3. Attend a Statistics Help Room session where Statistics Ph.D. answer questions for students in introductory level statistics classes. Hours and locations are posted here: <http://stat.columbia.edu/help-room/>

4. Discuss the material with classmates in person or on Piazza. Instructions on how to join will be provided on CourseWorks.

**Class schedule**

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| Week | Date | Topics | Textbook |
| 1 | Tues 9/5  Thurs 9/7 | Graphical summaries of data  Numerical summaries of data | 1.1-1.2  1.3-1.4 |
| 2 | Tues 9/12  Thurs 9/14 | Probability  Discrete random variables | 2.1-2.3, 2.5  3.1-3.2 |
| 3 | Tues 9/19\*  Thurs 9/21 | Expected values  **No class** *(Rosh Hashanah)* | 3.3 |
| 4 | Tues 9/26\*  Thurs 9/28 | Binomial and related distributions  Continuous random variables | 3.4-3.6  4.1-4.2 |
| 5 | Tues 10/3\*  Thurs 10/5 | Normal and other continuous distributions  The sampling distribution of a mean | 4.3-4.5  5.3-5.5 |
| 6 | Tues 10/10  Thurs 10/12 | **Test #1**  Point estimation | 6.1-6.2 |
| 7 | Tues 10/17\*  Thurs 10/19 | Confidence intervals  Confidence intervals for means and proportions | 7.1  7.2-7.3 |
| 8 | Tues 10/24\*  Thurs 10/26 | Hypothesis testing  Hypothesis tests for means | 8.1  8.2-8.3 |
| 9 | Tues 10/31\*  Thurs 11/2 | Hypothesis tests for proportions  Comparing two means | 8.4-8.5  9.1-9.3 |
| 10 | Tues 11/7  Thurs 11/9 | **No classes (Columbia-wide)** (*Election Day*)  **Test #2** | 9.4 |
| 11 | Tues 11/14  Thurs 11/16 | Comparing two proportions  Conditional probability | 2.4-2.5 |
| 12 | Tues 11/2\*  Thurs 11/23 | Joint probability distribution  **No classes (Columbia-wide)** (*Thanksgiving*) | 5.1-5.2 |
| 13 | Tues 11/28\*  Thurs 11/30 | Inference in two-way tables  Correlation | 14.3  5.2, 12.5 |
| 14 | Tues 12/5\*  Thurs 12/7 | The simple linear regression model  Regression with transformed variables | 12.1-12.2  13.1, 13.2 |

\* = homework due