

APSTA-UE 10-001: STATISTICAL MYSTERIES AND HOW TO SOLVE THEM

CLASS LOCATION AND TIME

GLOBAL CENTER FOR ACADEMIC AND SPIRITUAL LIFE (GCASL) 371

CLASS TIME: TUES-THURS 12:30-1:45

LAB SECTION: THURS 2:00-3:00

CONTACT INFORMATION

PROFESSORS: JENNIFER HILL AND PETER HALPIN

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OFFICE HOURS: TBD

TEACHING ASSISTANT: TBD

CATALOGUE DESCRIPTION

This quantitative and statistical reasoning course equips students with statistical literacy and competency for survival in a big data world. The course introduces basic concepts in probability, research design, and predictive statistics. The class format differs from traditional introductory statistics courses in that only a small percentage of class time will be traditional lecture. Material will be conveyed through video clips, case studies, puzzle solving, predictive competitions, debates, and group discussions. The course assumes a working knowledge of high school algebra.

PREREQUISITES

High school algebra (see sample questions below)

LEARNING OBJECTIVES

Students should be able to

- Identify the cognitive pitfalls associated with numeracy
- Critically assess the statistical content of newspaper articles describing empirical research
- Apply basic concepts in probability and research design
- Develop hypothesis about the world and describe a research study design that could be used to address it
- Implement basic statistical summaries, graphical and numeric explorations, and predictions using user-friendly statistical software and explain the output
- Develop writing and presentation skills for quantitative research through class projects.

COURSE FORMAT

This course meets for 1.25 hours, twice a week, plus a 1 hour recitation. Roughly half of class time each week will be spent in supervised and interactive group or individual activities.

COURSE GRADING

The grade for this course will be determined as follows:

- 20% quizzes on the reading material for that week
- 30% weekly in-class problem solving
- 20% take-home final
- 20% individual assignment

- 10% class/group participation

The in-class problem sets are designed to give students practice with the analytical tools introduced in class. The individual assignment will allow each student to become a critical appraiser of the statistical “evidence” distributed by mass media. The group project is designed to give students experience analyzing real data and summarizing their conclusions. The individual assignment and group project reports need to be typed (in word processor) and should be professional in appearance.

REQUIRED TEXT (a partial reading list is acceptable)

We will use the textbook **Intro Stats** by DeVeaux, Velleman, and Bock (published by Pearson, 2005) as our primary text but will supplement this on occasion with readings to provide background for class activities. These additional readings will be posted on the NYU Classes site for the class under Resources.

COURSE OUTLINE AND REQUIRED READINGS

- 1. Categorical Data**
Stats pp. 2-11, 14-27
- 2. Quantitative Data, Central tendency and spread**
Stats, pp. 26-49, 57-69
- 3. Randomness and Sampling**
Stats, pp. 219-247
- 4. Experiments versus Observational Studies**
Stats, pp. 251-267
- 5. Randomness and probability**
Stats, pp. 279-290, 294-309
- 6. Sampling distributions and CLT**
Stats, pp. 314-325, 335-338
- 7. Drawing conclusions using means**
Stats, pp. 355-370, 453-472
- 8. Drawing conclusions using proportions**
Stats, pp. 372-385, 390-405
- 9. Comparing means to make decisions**
Stats, pp. 478-496
- 10. Scatter plots and correlation to display and summarize information**
Stats, pp. 116-132
- 11. Linear regression as description**
Stats, pp. 141-177
- 12. Linear regression for prediction**
Stats, pp. 559-581
- 13. Cautionary tales** (Data Snooping, Inappropriately Inferring Causation, Publication Bias)
TBD
- 14. Poster session to present project results**

ACADEMIC INTEGRITY:

All students are responsible for understanding and complying with the NYU Steinhardt Statement on Academic Integrity. A copy is available at: http://steinhardt.nyu.edu/policies/academic_integrity.

STUDENTS WITH DISABILITIES:

Students with physical or learning disabilities are required to register with the Moses Center for Students with Disabilities, 726 Broadway, 2nd Floor, (212-998-4980 and online at <http://www.nyu.edu/csd>) and are required to present a letter from the Center to the instructor at the start of the semester in order to be considered for appropriate accommodation.

DEADLINES AND POLICY ON LATE ASSIGNMENTS:

Papers are due on the dates and at the times listed on them or announced in class. In other words, if a paper is due at 4:55 p.m., that means 4:55 p.m., not 4:56 p.m. Barring serious illness or family emergency (both require documentation), *late assignments will be reduced by 5 points for each 24-hour period* for which they are turned in after the deadline. For example, a paper turned in 4 hours late with a grade of 95 would be marked down to a 90. If turned in the following day the same assignment would be worth 85 points. Exceptions are granted only in extreme circumstances and require written documentation. Examples of exceptional circumstances include a learning disability (documented by NYU in the form of a written letter from the Center for Students with Disabilities) or hospitalization. Changing topics for an assignment, poor time management, and procrastination *do not count as exceptional circumstances*.

SELF-EVALUATION OF COMFORT LEVEL WITH ALGEBRA AND BASIC MATH:

Basic math skills, including a comfort level with simple algebraic manipulations that are typically taught in middle or high school in the U.S., are a pre-requisite for this course. To be successful in this course, these skills will need to be readily available to you as you answer questions and perform activities both inside and outside of class. We provide here a sample set of questions to help you evaluate whether you are up to speed with relevant concepts. If some of these problems are difficult you will need to find a way to rebuild these skills before taking this (or any other) statistics class. We provide links to resources afterwards that can help you to learn these important concepts.

Self-evaluation of Math Skills

1. Calculate the following sums

(a)

$$\frac{1}{4} + \frac{2}{5} =$$

(b)

$$\frac{3x}{5} - \frac{2}{5} =$$

2. Calculate the following products

(a)

$$\frac{1}{4} * \frac{2}{5} =$$

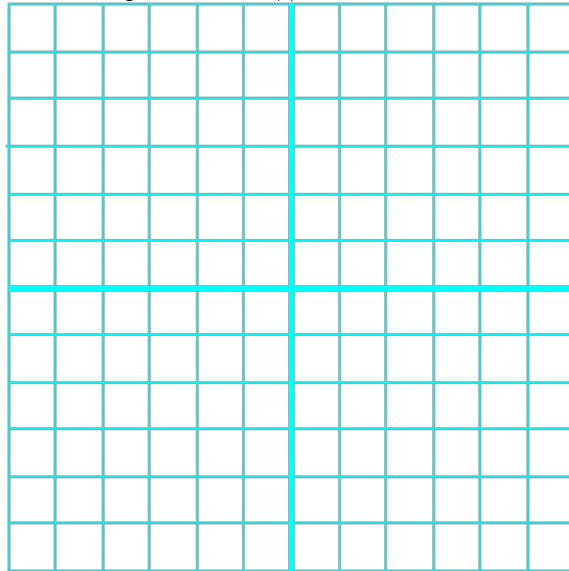
(b)

$$\frac{x}{4} * \frac{2}{5} =$$

3. Calculate $12x/-3$

4. What is 15% of 20?

5. What is 150% of 20?
6. Express $\frac{4}{9}$ as a percentage.
7. Solve for x
- $3x + 5 = 23$
 - $x^2 + 13 = 77$
 - $\frac{x-30}{10} = 2$
8. The following questions refer to the coordinate plane displayed in Figure 1
- Plot (2,5)
 - Draw the line with equation $1 + 2x$
 - Does the point from (a) fall on this line?



The internet is full of free resources for improving math skills. Two in particular are <http://www.sosmath.com/algebra/algebra.html> and www.khanacademy.org.