

## SYLLABUS AND COURSE POLICIES

**Instructor:**

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Office hours: TBD

**Course Web Page:**

<http://campus.georgetown.edu>

**Lectures:**

Monday – Thursday    10:45 AM – 1:25 PM    Reiss 282

Class time will consist of a combination of lecture, discussion, question and answer, problem solving and computer work using the statistical software Minitab.

**Attendance will contribute 10% to your overall course score**

**Required Electronic Text**

The '*Probability and Statistics*' course from [acrobatiq.com](http://acrobatiq.com).  
Linked from the course Blackboard page.

**Good Reference (but definitely not required):**

*Statistics: The Art and Science of Learning from Data*, **2nd or 3rd edition**,  
Agresti and Franklin.

**Prerequisite:**

Basic Algebra.

## OVERVIEW

Does eating fat cause cancer? Does vitamin C prevent colds? Can you predict someone's University grades from their SAT scores? Are the smoking habits of parents and their children related?

Statistics can help us answer all these questions. Broadly speaking, Statistics is a set of methods that help us collect, organize and interpret data. We use these tools to uncover relationships between variables, to make predictions and to discover causal mechanisms.

The way introductory statistics courses are taught has changed tremendously in the last 10 years. Instead of tedious arithmetic calculations, we will emphasize:

- graphical analysis of data,
- simple but powerful concepts that do not require difficult mathematical manipulations, and
- interpretation of computer output.

The four main topics that we will learn in this class are:

*Exploratory Data Analysis:* A data set consists of a collection of measurements. How can we organize them and describe them? How can we gain insight by exploring the data visually.

*Experimental Design:* A newspaper article reports that according to a recent study, people who eat lots of oat bran have fewer heart attacks. How was this study designed? Was it designed in a way that we can conclude from it that eating oat bran actually prevents heart attacks?

In general, when can we be sure that when the results of a study show that two phenomena are associated, that one actually “causes” the other?

*Statistical Inference:* It is rarely feasible to measure everyone in the population. At best, we can draw random sample from the population. How can we make inferences about the population based on the sample? polls do this everyday. How do they do it?

*Probability:* Probability is a mathematical description of randomness, and provides us with the formalisms that allow us to draw inferences from samples to populations. In addition, the study of probability theory provides new perspectives, methodologies, models and intuitions to aid in the analysis and solution of real world problems.

## COURSE OBJECTIVES

A student who has successfully completed the course should be able to:

1. Articulate an **appreciation for the diverse application of statistics** and its **relevance** to his/her life and field of study.
2. Demonstrate **conceptual understanding of fundamental statistical ideas** such as variability, distribution, association, causation, sampling, experimentation, confidence, and significance.
3. Show introductory level **practical ability** to choose, generate and properly interpret appropriate descriptive and inferential methods.
4. Appropriately choose and correctly apply some elementary probability models.
5. Exhibit **critical thinking about statistics** (e.g., to demonstrate the ability to assess the 'validity' of statistical arguments in the popular press and scholarly publications; to show the ability to assess the relative 'fit' of statistical models to real-world studies).
6. Demonstrate the ability to **effectively communicate statistical ideas** (and thus be able to knowledgeably participate in modern social debates).
7. Demonstrate introductory level experience with using **statistical software** to perform data analysis.

## CLASS HANDOUTS

- For every lecture there will be a handout that we will work through.
- Copies of the handouts will be posted on the course BB page.
- The *completed* handouts (handouts + class notes) will not be available.

## HOMEWORK

- Homework will be posted on the course Blackboard page every Tuesday and Thursday and will be due the following Thursday and Tuesday, respectively.
- The purpose of these assignments is to help you learn the material.
- **Assignments are due at the beginning of class.**
  - Assignments turned in after 11:00 and before 1:25pm will be penalized 25 points.
  - No assignment will be accepted after 1:25 PM.
  - There will be **absolutely no exceptions** to this policy.
- You are allowed and even encouraged to discuss the assignments with each other, **but the work that you hand in must be your own.** This means that each student must perform all analyses on his/her own computer, and must independently write the analysis and interpretation.
- **In order to avoid misunderstanding, you should let us know when you work with a classmate on a HW assignment. Simply write "Worked with (name)" under your name.**
- **You should always show all of your work.** You will not receive credit for simply writing down a numerical answer, even if the calculations seem simple enough to do in your head. Showing the method of solution is as important as the correct answer.
- **Your worst homework grade will be dropped before computing your final grade** – this is meant to cover cases in which you are too ill, too busy, or too tired to complete the homework.
- **Solutions** will be available posted on the course BB page. *Read them* as they provide you with examples of what a complete answer should look like.
- **Final Comments about HW:**
  1. Warning: If you wait until the last minute to finish the assignment, you accept the risk that the computer or printer will fail or be unavailable.
  2. No homework can be accepted in electronic form.

## EXAMS

- There will be **two mid-term exam and a cumulative final exam.**
- The exam dates are as follows:
  - Exam1:** Wednesday, June 14, 2017 (tentative).
  - Exam2:** Tuesday, June 27, 2017 (tentative).
  - Final:** Thursday, July 6, 2017.

- Examinations will be closed-book and closed notes; however you may use one 8 1/2" by 11" sheet of paper (one-sided for the midterms and two-sided for the final exam) with whatever formulas, facts or explanations you find helpful. You will be required to bring your own calculator.
- **No make-up examinations** will be given. A student who misses an examination because of a medical reason must provide **documented** evidence of serious medical incapacitation to Oded Meyer. Other reasons for missing an examination must be discussed with **Oded BEFORE** the day of the examination. Each case will be considered on an individual basis. The overall course grade for a student who misses an examination with a valid reason will be based on that student's remaining course work. A student who misses an examination without a valid excuse will receive a zero grade for that examination.

### REGRADES

- Although I strive for consistency and accuracy in grading, mistakes can occur.
- I will gladly correct all errors in tabulation or overlooked material.
- All regrading requests (of HW and exams) must be accompanied by a **written statement** carefully highlighting and explaining the items you feel were misgraded.
- Regrades requests must be submitted **within 2 lectures** of when the assignment of exam is returned. No regrades will be considered after this time.

### COURSE GRADE

Homework average (after dropping lowest score)	15%
Attendance (one absence is allowed)	10%
2 midterm exams	20% each
Final Exam	35%

Once your course final score is calculated, letter grades will be assigned as follows:

**A:** 95–100   **A–:** 90–95   **B+:** 87–90   **B:** 83–87   **B–:** 80–83  
**C+:** 77–80   **C:** 73–77   **C–:** 70–73   **D+:** 67–70   **D:** 60–67   **F:** below 60.

### ACADEMIC INTEGRITY

Georgetown students are expected to follow the ethical guidelines and cheating and plagiarism policies (see <http://honorcouncil.georgetown.edu/system>)

**Cheating and/or plagiarism will not be tolerated.**

### HOW CAN YOU GET MINITAB 17?

- Minitab has only a PC version which can be downloaded from the UIS Software Webstore :

<http://georgetown.onthehub.com/WebStore/WelCome.aspx>

Once you login, choose the Math & Stat tab and then Minitab 17.

- If you are a Mac user (and cannot run windows using VMware Fusion or Parallels Desktop), you'll be able to use Minitab using UIS's virtual lab. Detailed instructions on how to do so are posted on the course Blackboard page (Course Documents section).
- Otherwise, several UIS controlled computer labs across campus have Minitab installed on the computers.

## TENTATIVE COURSE SCHEDULE

Dates	Topics
June 5-12	Understanding the “Big Picture” Examining Distributions (Graphs and numerical measures) Examining Relationships <ul style="list-style-type: none"> <li>• Analysis of two-way tables</li> <li>• Scatterplots, linear relationships, correlation and least squares regression</li> </ul> Association vs. Causation Gathering Good Data (sampling) Design of Experiments
<b>June 14 (Wednesday)</b>	<b>First Midterm (TENTATIVE)</b>
June 13-22	Basic Probability Principles Conditional Probability, Independence, Bayes’ Rule, and Probability Trees Discrete Random Variables Binomial Random Variable Continuous Random Variables The Normal Distribution Sampling Distributions and the Central Limit Theorem
<b>June 27 (Tuesday)</b>	<b>Second Midterm (TENTATIVE)</b>
June 26 – July 5	Point Estimation and Confidence Intervals The Logic of Hypothesis Testing Hypotheses Testing the Population Proportion Hypothesis for the Population Mean (Introducing the $t$ distribution) Comparing Two Means (independent samples) Matched Pairs One-Way ANOVA + Multiple comparisons Inference for Two-Way Tables (Chi-Square Test for Independence) Inference for Regression
No lecture Tuesday July 4	
<b>July 6 (Thursday)</b>	<b>Final Exam</b>