Instructor: Nancy Y. Augustine, PhD
nya@gwu.edu, MPA 601C

Office Hours: Tuesdays and Thursdays, 5:00 – 5:45
Also available by appointment most days of the week

Class meeting: Section 11: Tuesday, 6:10 – 8:00 pm Old Main 305
Section 10: Thursday, 6:10 – 8:00pm Phillips 217
January 12 – April 27, 2015

Lab: Teaching Assistant: Brian Cognato
Time: Tuesdays and Thursday, 8:10-10:00pm (includes office hours)
Location: Rome, B104

The textbook should be available at the university bookstore. You may also purchase or rent a hard or electronic, new or used copy from many other sources. The 8th edition may be a more affordable option; the differences between the editions are very limited.

Course Description
This course introduces students to research methods and basic statistical methods with an emphasis on applications to public policy and public administration decision-making.

Student Learning Outcomes
The overall objectives of the course are to provide students with a sound understanding of research design and implementation, quantitative data analysis, and interpretation of results.

By the end of the semester, you will be comfortable with many of the key concepts of statistics. You will be able to read and understand basic quantitative analysis, as well as conduct basic analysis yourself. Specifically, you will learn how to:

1. Recognize opportunities to turn concepts into data, and ideas into quantitative research.
2. Formulate research questions and testable hypotheses.
3. Read and interpret basic quantitative analysis related to questions in social science.
4. Perform simple computations in SPSS (a widely used statistical software).
5. Match statistical techniques to the analytical questions we want to ask.
6. Write a policy research report that summarizes the results of statistical analyses for a non-technical audience.

**Prerequisites**

There are no course prerequisites, but

- You will need a calculator that allows you to compute complex terms such as exponents and inverses. You should be able to purchase one for ten dollars or less.
- We will use many of the basic concepts of algebra. You will find algebra refreshers on Blackboard.

**Instructional Approach**

Learning statistics is not just studying formulas and manipulating data. This semester, we will add to your toolbox some techniques you can use to understand how the world works. We will do this by focusing on statistical literacy, reasoning, and thinking. You can think of statistical literacy, reasoning, and thinking as progressive levels of learning. From the simple to the complex, each level builds on the previous.

**Statistical literacy** involves understanding and using the vocabulary and tools of statistics. You come to know the terminology, recognize and understand statistical symbols, and interpret representations of data.

**Statistical reasoning** is how we use statistical ideas and make sense of statistical information. You connect one concept to another (such as center and spread) or combine ideas (such as data and probability). You understand and can explain statistical processes, and you can interpret statistical results.

**Statistical thinking** is understanding how and why we conduct statistical investigations. You recognize and understand the entire process, from developing a research question and stating a hypothesis to conducting analysis, interpreting results, and discussing implications. You recognize when and how to use each of the statistical techniques, as well as the appropriate use of inference.

I strongly believe in exploring new pedagogies for the benefit of students; accordingly, I am likely to try out new approaches in this class and will keep you informed (and seek your feedback on the approaches) as we proceed.

We will use a “flipped classroom” model to enhance your learning. You will study and acquire a basic understanding of the material before class, allowing us to use class time to work out the more difficult concepts, fill in any missing intuition, and focus on applications.

You will begin each learning unit by acquiring new knowledge before class.

- Download and go through the study guide to help you prepare for the readiness assessment.
- Read and study the assigned chapter in the textbook; focus your preparation on material covered by the study questions and practice problems. Pay attention to the examples; these will help you to understand why and when we would engage in each technique.
• Watch the weekly prerecorded lectures, posted on Blackboard. Download, follow along, and take notes on the pdfs. In the prerecorded lectures, I go over the material presented in the chapter. I will also take up additional topics that the textbook does not address.

• Complete the weekly readiness assessment before class. The assessment allows me to gauge how well individual students are preparing for class, and also detect trouble spots for the class as a whole. Preparation for the assessment focusses your study time on knowledge acquisition. If you are having trouble with the material and do poorly on the assessment, you should review the material again and take the assessment a second time. I will use the higher of the two scores.

During **class time**, we will focus on applying your new knowledge in public policy and public administration. We will also evaluate statistical claims we encounter in the news and other sources.

**After class**, you will complete problems sets. Problem sets consist of a mix of written answers, manual computations, and SPSS work. The problem sets build on our material covered during class, focusing on more advanced knowledge application and evaluation of statistical claims.

**Classroom Policies, and Communication**

**I see my role as a combination lecturer and facilitator.** I will spend part of class time conveying information to you. But deeper learning takes places when students themselves make the connections, apply concepts, discuss implications, ask questions, and consider options. I use a variety of techniques to make that happen.

**I see your role as an active contributor to the learning process.** You will have opportunities to participate through in-class discussions and group activities. Read the assigned materials before class, each week, take notes, and be prepared to discuss and apply.

**Attendance in class is required**, but I realize that this might not always be possible. Let me know a few days before class when you know that you will be absent.

**I use Blackboard extensively.** Please check it regularly. I will use the Announcements and the discussion board (see next paragraph) for non-time sensitive notices, new materials, and discussion.

**I have set up a discussion board** for your questions and comments about class. Start a new thread or respond to somebody else's. I will post answers for the benefit of everyone in the class. If you need to contact me about something personal, email is fine.

Many days of the week, I am in **my office on campus**. You are welcome to stop by any time that my door is open. If you want to come at a specific time, make an appointment or come during office hours.

**Laptops and similar devices are allowed, with conditions.** In fact, I expect to try out a teaching technique that requires you to bring an internet-enabled device, such as a smart phone or tablet. I want you to be able to consult the textbook during class, if you have an electronic version. From time to time our discussions warrant looking something up on the internet. At the same time, technology can be a distraction to you, to the students around you, and to me. When you are engaged with your device, you create a dead zone. You may use your devices, but only for activities that contribute to the learning experience. When using a device, you are tacitly promising that you are using it for class-related purposes. If you are not able to make such a commitment, do not use these devices in class.

**Submissions received up to 24 hours late (unexcused) will receive no more than half credit. No unexcused late submissions are accepted more than 24 hours late.**
**Lab Sessions**
Lab time will be used primarily for instruction in SPSS, as well as assistance on the final report and assignments that use SPSS. You are also welcome to ask for help with the concepts that we discuss in class. Brian Cognato will be in the lab for walk-in help on Tuesdays and Thursday until 9:00pm or as long as students continue to need assistance (up until 10:00pm).

SPSS is installed on the computers in the lab. SPSS can also be found in Government Hall, Monroe Hall, and in some other computer labs across campus. You can also get access to SPSS off campus, free of charge, through the GWU cloud.

Although SPSS is a widely used statistical software, it is not the same one used in the econometrics course (PPPA 6013). The idea is to give you exposure to different types of software. Once you learn the logic of one, it is much easier to learn the logic of others.

**Grading and Assignments**
In this course, you will learn to manipulate data and compute statistics using SPSS; and gain the ability to interpret statistical information in both technical and non-technical language. You will demonstrate these abilities through assessments, problem sets, a final report, and exams.

**Readiness assessments: (100 points or 10%)**
The assessment consists of five questions, chosen at random. Take the assessment after you have downloaded and consulted the study questions / practice problems, read and studied the assigned chapter in the textbook, and watched the prerecorded lectures. If you are having trouble with the material and do poorly on the assessment, you should review the material again and take the assessment a second time. I will use the higher of the two scores. Complete the assessment on Blackboard by 11:59pm of the night before your section meets. Ten assessments, 10 points each.

**Problem sets (200 points or 20%)**
Problem sets consist of a mix of written answers, manual computations, and SPSS work. Submit through Blackboard by 11:59pm on Saturday following class.

**Final report (300 points or 30%)**
The final report allows you to demonstrate that you have learned the basics of statistical analysis. This includes generating and interpreting relevant statistics. You will submit a brief proposal early in the semester that I will review and approve to make sure you have a feasible research question and hypothesis.

I encourage you to work through the methods with other students, but you must run your own analysis and write your own report. Submit through Blackboard (as one document) by 11:59pm on Tuesday, April 28, 2014.

**Exams (400 points or 40%)**
A mid-term and final (20% each) will ask you to work problems and answer questions that bridge problem sets and in-class material. The final is cumulative only in the sense that early topics provide the foundation for later topics. Two exams are 200 points each.
• Midterm: The midterm is open book / open note, but you must not give or receive help from anyone. You may take the exam – through Blackboard - during any 3-hour window from **6:00pm on Tuesday, March 3** and finishing by **11:59pm on Thursday, March 5**.

• Final: The final is open book / open note, but you must not give or receive help from anyone. You take the exam – through Blackboard – during any 3-hour window of your choosing from **6:00pm on Tuesday, May 5 through 11:59pm on Thursday, May 7**.

---

**Grading Scale (Based on percentage)**

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>92.5+</td>
<td>A</td>
<td>Excellent and exceptional work for a graduate student. Work at this level is unusually thorough, well-reasoned, creative, methodologically sophisticated, and well written. Work is of exceptional professional quality.</td>
</tr>
<tr>
<td>90.0 – 92.4</td>
<td>A-</td>
<td>Very Good: Very strong work for a graduate student. Shows signs of creativity and a strong understanding of appropriate analytical approaches, is thorough and well-reasoned, and meets professional standards.</td>
</tr>
<tr>
<td>87.0 - 89.9</td>
<td>B+</td>
<td>Good: Sound work for a graduate student; well-reasoned and thorough, without serious analytical shortcomings. This grade indicates the student has fully accomplished the basic objectives of this graduate course.</td>
</tr>
<tr>
<td>82.5 – 86.9</td>
<td>B</td>
<td>Adequate: Competent work for a graduate student with some evident weaknesses. Demonstrates competency in the key course objectives but the understanding or application of some important issues is less than complete.</td>
</tr>
<tr>
<td>80.0 – 82.4</td>
<td>B-</td>
<td>Borderline: Weak work for a graduate student but meets minimal expectations in the course. Understanding of key issues in incomplete. (A B-average in all courses is not sufficient to sustain graduate status in good standing.)</td>
</tr>
<tr>
<td>77.0 - 79.9</td>
<td>C+</td>
<td>Deficient: Inadequate work for a graduate student; rarely meets minimal expectations for the course. Work is poorly developed or flawed by numerous errors and misunderstandings of important issues.</td>
</tr>
<tr>
<td>72.5 – 76.9</td>
<td>C</td>
<td>Deficient – see above</td>
</tr>
<tr>
<td>70.0 – 72.4</td>
<td>C-</td>
<td>Deficient – see above</td>
</tr>
<tr>
<td>Less than 70.0</td>
<td>F</td>
<td>Unacceptable: Work fails to meet minimal expectations or course credit for a graduate student. Performance has consistently failed to meet minimum course requirements. Weaknesses and limitations are pervasive.</td>
</tr>
</tbody>
</table>
Not Getting It?

You know about my office hours and weekly lab sessions. Whether you need more practice, more explanation, or both, many additional resources are readily available to you.

More online: There are some great resources on the internet. The approach to the material differs across disciplines, but you might find an alternative perspective to be helpful. Stick with a reputable, academic site. I am a big fan of www.khanacademy.org.

Additional problems in the book: In the back of the book, you will find answers to odd-numbered computational problems.

Classmates: Blackboard contains everyone’s email under “COMMUNICATION.” Find at least two study partners for the class. I encourage you to work together, as long as you do your own work.

Other Books that You Might Find Helpful: You can probably find used copies of older textbooks that may be stronger on intuition, or that approaches the material in a way that resonates better with you. One option is E. Berman, Essential Statistics for Public Managers and Policy Analysts, CQ Press. I am also a big fan of Answering Questions with Statistics by Robert Szafran, Sage Publications. I can suggest other titles, depending on your needs.

Source: causeweb.org
## Summary course schedule (Tuesdays and Thursdays):

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Complete assessment by 11:59p</th>
<th>Class meeting</th>
<th>Problem sets due by 11:59pm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>Introduction</td>
<td>---</td>
<td>Jan 13 (Tu)</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Jan 15 (Th)</td>
<td></td>
</tr>
<tr>
<td>Week 2</td>
<td>Measurement</td>
<td>Jan 19 (M)</td>
<td>Jan 20 (Tu)</td>
<td>Jan 24 (Sa)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Jan 21 (W)</td>
<td>Jan 22 (Th)</td>
<td></td>
</tr>
<tr>
<td>Week 3</td>
<td>Causality and Dummy Variables</td>
<td>Jan 26 (M)</td>
<td>Jan 27 (Tu)</td>
<td>Jan 31 (Sa)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Jan 28 (W)</td>
<td>Jan 29 (Th)</td>
<td></td>
</tr>
<tr>
<td>Week 4</td>
<td>Descriptive Statistics</td>
<td>Feb 2 (M)</td>
<td>Feb 3 (Tu)</td>
<td>Feb 7 (Sa)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Feb 4 (W)</td>
<td>Feb 5 (Th)</td>
<td></td>
</tr>
<tr>
<td>Week 5</td>
<td>The Normal Distribution</td>
<td>Feb 9 (M)</td>
<td>Feb 10 (Tu)</td>
<td>Feb 14 (Sa)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Feb 11 (W)</td>
<td>Feb 12 (Th)</td>
<td></td>
</tr>
<tr>
<td>Week 6</td>
<td>Estimating Population Parameters</td>
<td>Feb 16 (M)</td>
<td>Feb 17 (Tu)</td>
<td>Feb 21 (Sa)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Feb 18 (W)</td>
<td>Feb 19 (Th)</td>
<td></td>
</tr>
<tr>
<td>Week 7</td>
<td>Hypothesis Testing</td>
<td>Feb 23 (M)</td>
<td>Feb 24 (Tu)</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Feb 25 (W)</td>
<td>Feb 26 (Th)</td>
<td></td>
</tr>
<tr>
<td>Week 8</td>
<td>MIDTERM: opens 6:00pm on Tuesday, March 3, closes 11:59pm on Thursday, March 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SPRING BREAK: Mar 9 – 13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week 9</td>
<td>Contingency Tables</td>
<td>---</td>
<td>Mar 17 (Tu)</td>
<td>Mar 21 (Sa)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mar 19 (Th)</td>
<td></td>
</tr>
<tr>
<td>Week 10</td>
<td>Testing the Difference between Groups and Counts</td>
<td>Mar 23 (M)</td>
<td>Mar 24 (Tu)</td>
<td>Mar 28 (Sa)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mar 25 (W)</td>
<td>Mar 26 (Th)</td>
<td></td>
</tr>
<tr>
<td>Week 11</td>
<td>Introduction to Regression Analysis</td>
<td>Mar 30 (Tu)</td>
<td>Mar 31 (Tu)</td>
<td>Apr 4 (Sa)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Apr 1 (W)</td>
<td>Apr 2 (Th)</td>
<td></td>
</tr>
<tr>
<td>Week 12</td>
<td>Multiple Regression</td>
<td>Apr 6 (M)</td>
<td>Apr 7 (Tu)</td>
<td>Apr 11 (Sa)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Apr 8 (W)</td>
<td>Apr 9 (Th)</td>
<td></td>
</tr>
<tr>
<td>Week 13</td>
<td>Experiments</td>
<td>Apr 13 (M)</td>
<td>Apr 14 (Tu)</td>
<td>Apr 18 (Sa)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Apr 15 (W)</td>
<td>Apr 16 (Th)</td>
<td></td>
</tr>
<tr>
<td>Week 14</td>
<td>Wrap-up and Review</td>
<td>---</td>
<td>Apr 21 (Tu)</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Apr 23 (Th)</td>
<td></td>
</tr>
</tbody>
</table>

Final report due Tuesday, April 28 by 11:59pm

FINAL: opens 6:00pm on Tuesday, May 5, closes 11:59pm on Thursday, May 7
# DETAILED CLASS SCHEDULE

## Week 1 – Introduction (Jan 13 / 15)

<table>
<thead>
<tr>
<th>By the end of this unit, you will be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Plan your time to meet the requirements of this course.</td>
</tr>
<tr>
<td>- Take first steps to observe and explain what's going on around us, and do it in a way that allows us to apply the techniques of statistical analysis.</td>
</tr>
<tr>
<td>- Define and apply some of the basic terms of statistics.</td>
</tr>
</tbody>
</table>

**Before class**

**Study**

- chap 1, Statistics and Public and Nonprofit Administration; p3 - 7, skim the rest

**View**

- No prerecorded lectures for this week.

**Complete by the night before class**

- No readiness assessment for this week.

**After class**

**Complete and submit by Saturday**

- No problem sets are assigned for this week.

## Week 2 – Measurement (Jan 20 / 22)

<table>
<thead>
<tr>
<th>By the end of this unit, you will be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Define and apply additional basic terms of statistics</td>
</tr>
<tr>
<td>- Specify (define) a variable to operationalize a given social science phenomenon</td>
</tr>
<tr>
<td>- Distinguish between a variable and a constant.</td>
</tr>
<tr>
<td>- Distinguish the types of measures.</td>
</tr>
<tr>
<td>- Characterize measurement quality by defining and using the concepts of measurement reliability and validity (including face, consensual, correlational and predictive).</td>
</tr>
<tr>
<td>- Identify the level of measurement of a variable, based on a description or definition.</td>
</tr>
<tr>
<td>- Convert an interval variable to ordinal or nominal.</td>
</tr>
</tbody>
</table>

**Before class**

**Study**

- chap 2, Measurement; p 14 – 29

**View**

- Prerecorded lectures, posted on Blackboard in the folder for this unit. |
- Study guide to help you prepare for the readiness assessment.  

**Complete by the night before class**

- Complete the readiness assessment for this week, posted on Blackboard in the folder for this unit. Due by 11:59m on the night before your section meets.

**After class**

**Complete and submit by Saturday**

- Complete the problem set for this week, posted on Blackboard in the folder for this unit. Submit through Blackboard by 11:59m on Saturday.
### Week 3 – Causality and Dummy Variables (Jan 27 / 29)

<table>
<thead>
<tr>
<th>By the end of this unit, you will be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Differentiate a concept, conceptual definition, and an operational definition.</td>
</tr>
<tr>
<td>• Apply the distinction between concepts, conceptual definitions and operational definitions; if I give you one, you should be able to come up with plausible examples of the other two.</td>
</tr>
<tr>
<td>• Hypothesize a relationship (positive, negative, or non-directional) between an independent variable and a dependent variable.</td>
</tr>
<tr>
<td>• Write a hypothesis related to a given theory, and propose a theory that may be supported or refuted by a given hypothesis.</td>
</tr>
<tr>
<td>• Given a (research) hypothesis, write the null hypothesis.</td>
</tr>
<tr>
<td>• Define and apply the four criteria for causality.</td>
</tr>
<tr>
<td>• Explain why correlation or association does not imply causation.</td>
</tr>
<tr>
<td>• Recognize when you need to create a dummy and explain how you would do it</td>
</tr>
<tr>
<td>• Create one or more dummy variables using SPSS.</td>
</tr>
</tbody>
</table>

### Before class

**Study**

- chap 3, Research Design; p42 – 53 (top)
  - The discussion of models, theories, and assumptions in the book is more complicated than it needs to be. We will focus on the relationship between hypotheses and theories.
- Additional material posted on Blackboard on dummy variables

**View**

- Prerecorded lectures, posted on Blackboard in the folder for this unit.
- Study guide to help you prepare for the readiness assessment.

### Complete by the night before class

- Complete the readiness assessment for this week, posted on Blackboard in the folder for this unit. Due by 11:59m on the night before your section meets.

### After class

**Complete and submit by Saturday**

- Complete the problem set for this week, posted on Blackboard in the folder for this unit. Submit through Blackboard by 11:59m on Saturday.

### Week 4 – Descriptive Statistics (Feb 3 / 5)

<table>
<thead>
<tr>
<th>By the end of this unit, you will be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Summarize data graphically and numerically, recognizing which techniques to use for variables of the different levels of measurement.</td>
</tr>
<tr>
<td>• Read and interpret graphic and numeric summaries of data.</td>
</tr>
<tr>
<td>• Calculate, interpret, and know when to use measures of central tendency (mean, median, and mode), position (percentiles), dispersion (range, interquartile deviation), and the standard deviation.</td>
</tr>
<tr>
<td>• Recognize and interpret skew.</td>
</tr>
<tr>
<td>• Recognize the shape of a frequency distribution.</td>
</tr>
</tbody>
</table>
### Before class

**Study**
- chap 4, Frequency Distributions
- chap 5, Measures of Central Tendency
- chap 6, Measures of Dispersion

**View**
- Prerecorded lectures, posted on Blackboard in the folder for this unit.
- Study guide to help you prepare for the readiness assessment.

**Complete by the night before class**
- Complete the readiness assessment for this week, posted on Blackboard in the folder for this unit. **Due by 11:59m on the night before your section meets.**

### After class

**Complete and submit by Saturday**
- Complete the problem set for this week, posted on Blackboard in the folder for this unit. **Submit through Blackboard by 11:59m on Saturday.**

### Week 5 – The Normal Distribution and Sampling (Feb 10 / 12)

**By the end of this unit, you will be able to:**
- List the key characteristics of the normal distribution.
- Recognize setups (questions and scenarios) that call for calculation of a Z score.
- Given the mean and standard deviation of a normal distribution, calculate a Z score, and then (as needed) look up the corresponding probabilities in the normal table in response to the following setups:
  - Find the probability of a specific score (of a randomly selected individual).
  - Find the relative standing (percentile or number of standard deviations) of a specific score.
  - Find the percentage of individuals between two values.
  - Find the score that corresponds to a specified percentile.
- Recognize the setups that call for creation of an index or scale variable.
- Given Z scores (or the mean and standard deviation of normally distributed variables), create an index or scale variable.
- Given a setup, identify the sampling strategy being used.
- Assess whether a given sampling strategy will achieve a random sample.

### Before class

**Study**
- chap 7, The Normal Probability Distribution
  - Additional material on sampling strategies will be posted on Blackboard

**View**
- Prerecorded lectures, posted on Blackboard in the folder for this unit.
- Study guide to help you prepare for the readiness assessment.

**Complete by the night before class**
- Complete the readiness assessment for this week, posted on Blackboard in the folder for this unit. **Due by 11:59m on the night before your section meets.**
<table>
<thead>
<tr>
<th>After class</th>
<th>Complete and submit by Saturday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Complete the problem set for this week, posted on Blackboard in the folder for this unit. <strong>Submit through Blackboard by 11:59m on Saturday.</strong></td>
</tr>
</tbody>
</table>

### Week 6 – Estimating population parameters (means and proportions) (Feb 17 / 19)

#### By the end of this unit, you will be able to:
- Define and describe the relationships among sample, statistic, population, parameter, and the sampling distribution.
- Recognize when you should construct a confidence interval.
- Calculate and interpret the standard error of a sample statistic (mean or proportion), when I give you the sample size and the standard deviation or standard error.
- Estimate population parameters by constructing and interpreting the 95% confidence interval of a population parameter (mean or proportion), when I give you a point estimate (sample mean or sample proportion), standard deviation or standard error, and a confidence level.
- Explain why confidence intervals may miss the true population parameter.
- Calculate the probability that a population parameter equals a stated value, given a sample statistic, standard deviation or standard error, and a confidence level.
- Name and apply factors that influence the size of the margin of error and confidence interval.
- Calculate the sample size needed to reach a target margin of error, given the standard deviation, and a confidence level.
- Explain the importance of the Central Limit Theorem, and what it allows us to do.

#### Before class | Study
- chap 10, Introduction to Inference
- chap 11, Hypothesis Testing, p195-197 ("Determining Sample Size")
- chap 12, Estimating Population Proportions

### View
- Prerecorded lectures, posted on Blackboard in the folder for this unit.
- Study guide to help you prepare for the readiness assessment.

#### Complete by the night before class
- Complete the readiness assessment for this week, posted on Blackboard in the folder for this unit. **Due by 11:59m on the night before your section meets.**

#### After class | Complete and submit by Saturday
- Complete the problem set for this week, posted on Blackboard in the folder for this unit. **Submit through Blackboard by 11:59m on Saturday.**
**Week 7 – Hypothesis Testing (Feb 24 / 26)**

**By the end of this unit, you will be able to:**

- Name and apply the factors that influence the probability of rejecting the null hypothesis.
- Explain the difference between the p-value and alpha, and use both correctly in a hypothesis test.
- Test whether a sample (one variable) hits some benchmark:
  - Recognize when you should conduct a hypothesis test.
  - Recognize whether the setup calls for a one-tailed or two-tailed test.
  - Write the null and alternative hypotheses in symbols and words.
  - Calculate the appropriate test statistic, given the needed standard error.
  - Compare the test statistic to the critical value and interpret results.
- Interpret a p-value, including a finding that it is "small" or "large."
- Explain the difference between Type I and Type II errors and describe the steps you can take to minimize these errors.

**Before class**

**Study**

- chap 11, Hypothesis Testing (excluding the section we covered last week).

**View**

- Prerecorded lectures, posted on Blackboard in the folder for this unit.
- Study guide to help you prepare for the readiness assessment.

**Complete by the night before class**

- Complete the readiness assessment for this week, posted on Blackboard in the folder for this unit. **Due by 11:59m on the night before your section meets.**

**After class**

**Complete and submit by Saturday**

- *No problem sets are assigned for this week.*

---

**Week 8 – midterm**

The midterm is open book / open note, but you must not give or receive help from anyone. You take the exam – through Blackboard - during any 3-hour window of your choosing from **6:00 on Tuesday, March 3 through 11:59pm on Thursday, March 5.**

**SPRING BREAK: Mar 9 – 13**

**Week 9 - Contingency Tables (Mar 17 / 19)**

**By the end of this unit, you will be able to:**

- Recognize when you should construct percentage distributions or a contingency table.
- Calculate and interpret percentage distributions for nominal and ordinal variables.
- Construct and interpret a contingency table that displays the association between two categorical (nominal and/or ordinal) variables.
- Characterize association.
### Before class

**Study**
- chap 14, Construction and Analysis of Contingency Tables

**View**
- Prerecorded lectures, posted on Blackboard in the folder for this unit.
- Study guide to help you prepare for the readiness assessment.

**Complete by the night before class**
- No readiness assessment is assigned for this week.

### After class

**Complete and submit by Saturday**
- Complete the problem set for this week, posted on Blackboard in the folder for this unit. **Submit through Blackboard by 11:59m on Saturday.**

### Week 10 – Testing the difference between groups and counts (Mar 24 /26)

**By the end of this unit, you will be able to:**
- Test for significant association between a dichotomous (nominal) variable and a quantitative variable, and between two categorical variables:
  - Recognize when you should conduct an independent samples t-test, dependent samples t-test, or chi square test for independence.
  - Write the null and alternative hypotheses in symbols and words.
  - Calculate the appropriate test statistic, given the needed standard error.
  - Compare the test statistic to the critical value and interpret results.
- Characterize association by answering the four key questions.

### Before class

**Study**
- chap 13, Testing the Difference between Groups
- chap 15, Aids for the Interpretation of Contingency Tables

**View**
- Prerecorded lectures, posted on Blackboard in the folder for this unit.
- Study guide to help you prepare for the readiness assessment.

**Complete by the night before class**
- Complete the readiness assessment for this week, posted on Blackboard in the folder for this unit. **Due by 11:59m on the night before your section meets.**

### After class

**Complete and submit by Saturday**
- Complete the problem set for this week, posted on Blackboard in the folder for this unit. **Submit through Blackboard by 11:59m on Saturday.**
### Week 11 – Introduction to Regression Analysis (Mar 31 / Apr 2)

**By the end of this unit, you will be able to:**

- Control for a third variable in contingency table analysis.
- Given a regression equation
  - Interpret the constant and the coefficient
  - Predict the value of an outcome given a specific value of the independent variables
- Test for significant association between two interval variables:
  - Recognize when you should run a regression.
  - Write the null and alternative hypotheses in symbols and words.
  - Using SPSS, calculate the appropriate test statistic.
  - Compare the test statistic to the critical value and interpret results.
- Characterize association by answering the four key questions.
- Create (using SPSS) and interpret a scatterplot.
- Given a scatterplot, identify patterns such as positive and negative associations, non-linear patterns and outliers.

**Before class**

**Study**

- chap 16, Statistical Control Table Analysis
- chap 17, Introduction to Regression Analysis

**View**

- Prerecorded lectures, posted on Blackboard in the folder for this unit.
- Study guide to help you prepare for the readiness assessment.

**Complete by the night before class**

- Complete the readiness assessment for this week, posted on Blackboard in the folder for this unit. **Due by 11:59m on the night before your section meets.**

**After class**

**Complete and submit by Saturday**

- Complete the problem set for this week, posted on Blackboard in the folder for this unit. **Submit through Blackboard by 11:59m on Saturday.**

### Week 12 – Multiple regression (Apr 7 / 9)

**By the end of this unit, you will be able to:**

- Recognize when the appropriate response to a question entails running a regression.
- Given a regression equation
  - Interpret the constant and the coefficient
  - Predict the value of an outcome given a specific value of the independent variable
- Test whether a coefficient is significant, given data
  - Write the null and alternative hypotheses in symbols and words
  - Calculate the appropriate test statistic, using SPSS.
  - Read and interpret results
- Interpret $r^2$ as distinct from $r$. 
### Before class

<table>
<thead>
<tr>
<th>Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>- chap 20, Multiple Regression</td>
</tr>
<tr>
<td>- chap 21, Regression Output and Data Management</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>View</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Prerecorded lectures, posted on Blackboard in the folder for this unit.</td>
</tr>
<tr>
<td>- Study guide to help you prepare for the readiness assessment.</td>
</tr>
</tbody>
</table>

### Complete by the night before class

| Complete the readiness assessment for this week, posted on Blackboard in the folder for this unit. **Due by 11:59m on the night before your section meets.** |

### After class

<table>
<thead>
<tr>
<th>Complete and submit by Saturday</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Complete the problem set for this week, posted on Blackboard in the folder for this unit. <strong>Submit through Blackboard by 11:59m on Saturday.</strong></td>
</tr>
</tbody>
</table>

---

### Week 13 – Experiments (Apr 14 / 16)

**By the end of this unit, you will be able to:**

- Define and apply (to a given setup) the concept of generalizability (more commonly known as "external validity") and internal validity.
- Define and apply the four criteria for causality to a given setup
- Identify and discuss the elements of experimental and quasi-experimental design; we will keep our discussion fairly simple.
- Explain why experimental design is generally preferred over quasi-experimental design, and why it is often hard to achieve.
- In a given scenario,
  - Identify subjects, factors and treatments
  - Discuss which elements of experimental design are missing, if any.
  - Propose modifications to the study design to get it closer to a true experiment.
  - Identify the threats to internal validity, and explain why those threats signify a weaker study design.
- Differentiate between random selection and random assignment.

---

### Before class

<table>
<thead>
<tr>
<th>Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>- chap 3, Research Design; start at the top of page 53</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>View</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Prerecorded lectures, posted on Blackboard in the folder for this unit.</td>
</tr>
<tr>
<td>- Study guide to help you prepare for the readiness assessment.</td>
</tr>
</tbody>
</table>

### Complete by the night before class

| Complete the readiness assessment for this week, posted on Blackboard in the folder for this unit. **Due by 11:59m on the night before your section meets.** |

### After class

<table>
<thead>
<tr>
<th>Complete and submit by Saturday</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Complete the problem set for this week, posted on Blackboard in the folder for this unit. <strong>Submit through Blackboard by 11:59m on Saturday.</strong></td>
</tr>
</tbody>
</table>
Final report due – Tuesday, April 28 at 11:59pm

Final exam:
The final is open book / open note, but you must not give or receive help from anyone. You take the exam – through Blackboard - during any 3-hour window of your choosing from 6:00pm on Tuesday, May 5 through 11:59pm on Thursday, May 7.

UNIVERSITY AND CLASS POLICIES
Trachtenberg School of Public Policy and Public Administration Policies

The Syllabus: This syllabus is your guide to the course. If any questions arise, please check the syllabus before contacting the TA or me. Sound educational practice requires flexibility and I may revise content during the semester.

Late or Missed Class: I assume that students are absent from class for legitimate reasons (e.g., work, religious holidays). If you are late or absent from class, it is your responsibility to obtain all announcements, assignments, and handouts from Blackboard or from your classmates.

Submission of Written Work Products Outside of the Classroom: It is your responsibility to ensure that I receive your assignment on time. I will acknowledge email submissions as soon as practical.

Collaboration on Assignments: The statistical work for the LABS can be conducted in groups; however, you are expected to write up your answers individually.

Submission of Written Work Products after Due Date: All work must be submitted by the assigned due date in order to receive full credit. Unexcused late submissions will receive no more than half credit during the first 24 hours. No credit will be given for unexcused late submissions received more than 24 hours late.

Academic Honesty: All examinations and other graded work products are to be completed in conformance with the George Washington University Code of Academic Integrity (see http://www.gwu.edu/~ntegrity/code.html). Note especially the definition of plagiarism: “intentionally representing the words, ideas, or sequence of ideas of another as one’s own in any academic exercise; failure to attribute any of the following: quotations, paraphrases, or borrowed information.” You may also wish to consult the Office of Student Judicial Services web page (http://gwired.gwu.edu/osis/Policies/) for more information about standards for conduct as well as your rights as a student.

Incompletes: You must consult with me to obtain an incomplete no later than the last day of classes in the semester. At that time, we will both sign the CCAS contract for incompletes and submit a copy to the School Director. Please consult the TSPPPA Student Handbook or visit http://www.gwu.edu/~ccas/faculty/files/Incomplete_Polio.pdf for the complete CCAS policy on incompletes.

Changing Grades after Completion of Course: No changes can be made in grades after the conclusion of the semester, other than in cases of clerical error.

Accommodation for Students with Disabilities: If you need extra time on exams or assignments due to a disability, let me know in the first week of class. Any student who may need an accommodation based on the potential impact of a disability should also contact the Disability Support Services office at 202-994-8250 in the Marvin Center, Suite 242, to establish eligibility and to coordinate reasonable accommodations. For additional information please refer to: http://gwired.gwu.edu/dss/

University Counseling Center: The University Counseling Center (UCC), 202-994-5300, offers 24/7 assistance and referral to address students’ personal, social, career, and study skills problems. Services for students include: crisis and emergency mental health consultations; confidential assessment, counseling services (individual and small group), and referrals. http://gwired.gwu.edu/counsel/CounselingServices/AcademicSupportServices.

Security: In the case of an emergency, if at all possible, the class should shelter in place. If the building that the class is in is affected, follow the evacuation procedures for the building. After evacuation, seek shelter at a predetermined rendezvous location.