PMAP 8121: Applied Research Methods and Statistics I
Fall 2015

CRN: 88633
Instructor: Jonathan R. Boyd
Office: AYSPS 333D
E-mail: jboyd12@gsu.edu
Office Hours: M & R 2:30p – 3:30p (other times easily by appointment)
Class Time: R 7:15p – 9:45p
Location: Classroom South 210

Course Objectives:
Students are expected to understand the following:

1. Run basic statistical analysis using SPSS software.
2. Calculate and interpret absolute, relative, and cumulative frequency distributions.
3. Calculate, interpret, and distinguish among column, row, and total percentages.
4. Calculate the gamma and chi-square statistics.
5. Demonstrate the direction and strength of relationships between ordinal-level variables, using both column percentages and the gamma statistic.
6. Control for one variable at a time to determine the direct effect of the independent variable on the dependent variable.
7. Determine when we can generalize a relationship from a sample to the population from which the sample was drawn using the chi-square statistic.
8. Develop hypotheses, choose appropriate statistics to test them, and describe the results correctly in a short research paper.
9. Calculate and interpret three measures of central tendency (the mode, the median, and the mean) and three measures of dispersion (the range, the variance, and the standard deviation).
10. Use the normal distribution table to calculate probabilities.
11. Understand the sampling distributions of the sample mean and sample proportion and explain how they provide the logic for hypothesis tests and confidence intervals.
12. Calculate, interpret, and explain hypothesis tests for means, proportions, differences of means, and differences of proportions.
13. Calculate, interpret, and explain confidence intervals for means, proportions, differences of means, and differences of proportions.
14. Use scatterplots and correlation coefficients to show the direction and strength of relationships between interval-level variables.
15. Interpret regression coefficients on interval-level and dummy independent variables in bivariate regression.
Course Description:
Applied Research Methods and Statistics 1 develops practical skills for summarizing, describing, and analyzing data to enable public policy makers to make better decisions. The first half of the course focuses on **descriptive statistics** (describing patterns in the sample of data that we actually have) and **inferential statistics** (drawing inferences from our sample to the population from which the sample was drawn) when we have a categorical dependent variable.

In the descriptive statistics section, we begin with **univariate** analysis (describing one variable at a time, e.g. what percentage of Americans think premarital sex is “always wrong”?), then move to **bivariate** analysis (describing the relationship between two variables, e.g., do men and women differ in their attitudes toward premarital sex?), and to **multivariate analysis** (describing the relationships among three or more variables, e.g., do men and women who are equally religious differ in their attitudes toward premarital sex?). The analysis of relationships looks at their **direction** (e.g., are men or women more likely to say that premarital sex is always wrong?) and their **strength** (e.g., how big is the male-female difference in beliefs?). We begin inferential statistics by assessing the **generalizability** of these relationships (e.g., if women are more disapproving of premarital sex than men in a sample of 500, can we conclude that women are more disapproving than men in the U.S. population?).

The major technique of the first half of the course is **cross-tabulation** or **contingency tables**. We work with a random sample of 1,000 respondents from the 2008 General Social Survey, which includes questions on a variety of controversial public questions, including government spending, confidence in public institutions, family values, sexuality, gender roles, race relations, gun control, and capital punishment. We begin by describing how people feel about these issues (univariate analysis). Next we look at how opinions differ among people and assess what personal characteristics (e.g., sex, age, education) seem to influence those opinions (bivariate analysis). Then we do some **causal modeling** – if people in the South are more disapproving of premarital sex than other Americans, is it because they are more religious or less educated? Does a Southern effect persist after controlling for the effects of religion and education? Finally, we learn how to perform a chi-square test to determine whether the patterns we see in our sample can be generalized to the broader population (inferential statistics).

In the second half of the semester, we focus on **means, proportions**, and **regression analysis** using a random sample of 1,000 federal personnel records, obtained from the U.S. Office of Personnel Management (OPM). We begin with univariate descriptions of grades, salaries, education, and experience levels of federal employees, using measures of central tendency (the mode, median, and mean) and measures of dispersion (the range, variance, and standard deviation). We then move from descriptive statistics (sample means and proportions) to the logic of inferential statistics (what conclusions can we draw about the population mean or proportion based on our sample?). We learn the **normal distribution**, and then look at two of
the most useful normal distributions — the **sampling distributions** of the sample mean and the sample proportion.

These sampling distributions provide the logical underpinnings of **inferential statistics** – ways to generalize from the sample to the population. **Hypothesis tests** frequently allow us to conclude the direction of relationships in the population (e.g., if men, on average, earn $12,000 more than women in a sample of 1,000 employees, can we be confident that men, on average, earn more than women in the federal service as a whole?). **Confidence intervals** allow us to draw conclusions about the direction and strength of relationships in the population (e.g., if men, on average, earn $12,000 more than women in a sample of 1,000 employees, how big is the average salary gap between men and women in the federal service as a whole?).

We then introduce the concepts of correlation and regression analysis, which you will learn in more depth in PMAP 8131. First, we look at scatterplots and correlation coefficients to get a sense of the direction and strength of relationships between two interval-level variables. Second, we look at the impact of the independent variables one at a time, using bivariate regression analysis to address such questions as whether salaries rise with education and men make more than women. We learn that the dependent variable is always interval level, but the independent variable can be either interval level (which produces a regression line) or dichotomous (which replicates a difference-of-means test).

**Course Work:**
You will complete two in-class examinations, a short research paper, weekly homework assignments that require time on the computer; and quizzes some weeks. The homework assignments using the SPSS computer package prepare you for the quizzes, paper, and examinations. Quizzes check your understanding of the concepts you’ve learned. A short paper assignment allows you to demonstrate that you have learned how to use statistics in reports: how to choose appropriate statistics to answer particular questions, how to interpret them, and how to write about statistics. The midterm and final examinations require both calculation and interpretation of statistics, while the paper emphasizes interpretation.

The class makes few expectations about your math background and existing computer skills and begins from a fairly elementary level. However, you are expected to put in the necessary hours to complete the **homework** and keep up with the pace of the class. Though the homework counts for only a small percentage of the final grade and will take **several hours each week**, it is essential for understanding the material and doing well on the quizzes, paper and examinations. There is very little reading in this class — the homework largely takes the place of the reading you do in most of your courses. Homework is graded merely as completed or not completed. Late homework receives half credit. Homework counts for 5 percent of your course grade. If you are worried at all about your grade, be sure to turn in all your homework on time.
Class **attendance** is not required, but it too is essential. This class builds steadily on material learned in previous class sessions. If you fall behind, by missing classes or not doing the homework, you will have difficulty catching up. I frequently give **quizzes** during the first 10 minutes of class. Quizzes count for 5 percent of the course grade. If you miss class, you will lose points on the quizzes.

Be sure to read through the new material before each class even if you don't understand it.

If you have trouble in the class, please take advantage of help that I or your fellow students can provide. I will be available for **office hours** every week and also available by appointment. I will plan to give extra **review sessions** before the midterm and final. **Group work** is strongly encouraged, particularly for the computer problems.

You may work together on the homework and in thinking through and doing the computer work for the paper assignments, but all written work must be your own. Standards of academic conduct are set forth in the University's **Student Handbook: Conduct and Policies: Academic Honesty**. See the webpage ([http://www2.gsu.edu/~wwdos/wordFilesEtc/2010-2011_Academic_Honesty_Policy_Only_April_16.pdf](http://www2.gsu.edu/~wwdos/wordFilesEtc/2010-2011_Academic_Honesty_Policy_Only_April_16.pdf)) for more details. By registering for this course, you acknowledge your awareness of the Academic Honesty code, and you are obliged to become familiar with your rights and responsibilities as defined by the code. Violations of the code will not be treated lightly, and disciplinary action will be taken should such violations occur. Please see me if you have any questions about the academic violations described in the academic honesty code, especially as they relate to particular requirements for this course.

**Attendance:**
I expect you to attend every class, though attendance is not strictly required. However, it would be extremely difficult to do well in this course without attending nearly every class session. Please let me know if you will be unable to attend a class session. Under Georgia State policies, I am required to inform the administration when a student stops attending class.

**Make-Up Examinations:**
In general, make-up exams will be allowed only under emergency circumstance.

**Course Resources:**
The **PMAP 8121 lecture notes** are posted on the Brightspace class site.

Those interested in more technical and rigorous explanations of concepts should consider buying a text required in similar courses or checking an appropriate book out from the library. All texts cover fairly similar material, but they vary in their rigor, examples, applications, etc. The main
problem you will run into is that different books use somewhat different words and symbols to represent the same concepts.

Norusis, *SPSS Guide to Data Analysis*, is on sale for several classes at the campus bookstore. It provides a more detailed explanation of SPSS (complete with pictures) and of some statistics. While the lecture notes instructions on how to perform SPSS are reasonably detailed and clear, this book can provide a more general context for those who are interested.

**SPSS** (also sometimes called **PASW** Statistics) is available at most computer labs on campus and on all GRA computers. You can also access SPSS remotely from an off-campus computer through the GSU Virtual Computer Lab (instructions to access are here: [http://technology.gsu.edu/technology-services/it-services/labs-and-classrooms/virtual-computing/](http://technology.gsu.edu/technology-services/it-services/labs-and-classrooms/virtual-computing/)). Some of you may find that it is more convenient to buy the student version of SPSS, which costs about $100. Graduate research assistants can apparently get a discount on the software from IS&T.

The class **Brightspace** page will contain back-up copies of the syllabus and lecture notes, some SPSS data sets for homework and the paper assignment, old midterm and final exams, and a gradebook.

**Grading:**

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<th>Component</th>
<th>Percentage</th>
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<tr>
<td>Midterm examination</td>
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<td>Research paper</td>
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<td>Final examination</td>
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<td>Homework and Quizzes</td>
<td>10%</td>
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**Other Important Dates:**

- 08/28/15 – last day to drop course (without a W on transcript); tuition & fees due
- 10/13/15 – last day to withdraw from course

**Respect:**

Cell phones should be off before class begins. Treat your colleagues and the instructor with respect, sensitivity, and openness to new ideas. Distractive practices, such as tardy entrances, leaving the room while class is in session, ringing and vibrating cell phones, excessively conversing with other students, leaving to get food, eating food, and conducting activities unrelated to class discussions are considered inappropriate behavior.

**Email:**

I will regularly send class updates and information via email. Students are expected to regularly check accounts for course information.
**Disability Statement:**
Students who wish to request accommodation for a disability may do so by registering with the Office of Disability Services. Students may only be accommodated upon issuance by the Office of Disability Services of a signed Accommodation Plan and are responsible for providing a copy of that plan to instructors of all classes in which accommodations are sought.

**Course Assessment Statement:**
Your constructive assessment of this course plays an indispensable role in shaping education at Georgia State. Upon completing the course, please take time to fill out the online course evaluation.

**Tentative Course Schedule:**

**August 27**
- **Introduction to quantitative research and frequency distributions.**
  - Read Lecture Notes 1 BEFORE class.
  - Search the Internet for an interesting site on plagiarism. Many universities provide on-line tutorials and quizzes. Read the source and send me an email with the link by September 1.
  - Do computer assignment 1 for September 3.

**September 3**
- **Contingency table analysis: percentage differences and gamma.**
  - Read Lecture Notes 2.
  - Do computer assignment 2 for September 10.
  - Computer assignment 1 due.
  - Link to plagiarism site/quiz due.

**September 10**
- **Contingency table analysis: measures of association and introduction to control variables.**
  - Read Lecture Notes 3.
  - Do computer assignment 3 for September 17.
  - Computer assignment 2 due.
September 17  
**Contingency table analysis: using control variables.**

Read Lecture Notes 4.  
Do computer assignment 4.  
Computer assignment 3 due.

September 24  
**Inference in contingency tables: chi-square.**

Read Lecture Notes 5.  
Do computer assignment 5.  
Computer assignment 4 due.

October 1  
**Describing distributions: measures of central tendency and dispersion.**

Read Lecture Notes 6.  
Do computer assignment 6.

October 8  
**Review session and catch-up.**  
Computer assignment 5 due.

October 15  
**MIDTERM EXAMINATION**

October 22  
**The normal distribution and the sampling distributions for the sample mean and sample proportion.**

Read Lecture Notes 7 and 8  
Do computer assignment 7.  
Computer assignment 6 due.

October 29  
**The sampling distributions for the sample mean and sample proportion; introduction to the logic of the hypothesis test.**

Re-read Lecture Notes 8.  
Do computer assignment 8.  
Computer assignment 7 due.
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<tr>
<th>Date</th>
<th>Activity</th>
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<tr>
<td>November 5</td>
<td>The hypothesis tests for the population mean and proportion.</td>
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<td>Read Lecture Notes 9.</td>
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<td>Do computer assignment 9.</td>
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<td>Computer assignment 8 due.</td>
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<td><strong>PAPER ASSIGNMENT DUE NOVEMBER 5</strong></td>
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<td>November 12</td>
<td>The confidence interval for the population proportion.</td>
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<td>Read Lecture Notes 11.</td>
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<td>Do computer assignment 11.</td>
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<td>Computer assignment 9 due.</td>
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<tr>
<td>November 19</td>
<td><strong>Hypothesis tests and confidence intervals for differences of population means and proportions.</strong></td>
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<td>Read Lecture Notes 12.</td>
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<td>Do computer assignment 12.</td>
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<td>Computer assignment 11 due.</td>
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<td>November 26</td>
<td><strong>NO CLASS – THANKSGIVING HOLIDAY</strong></td>
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<td>December 3</td>
<td><strong>Relationships with interval-level dependent variables:</strong></td>
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<td>Scatterplots, correlation coefficients, and bivariate regression.</td>
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<td>Read Lecture Notes 13.</td>
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<td>Do computer assignment 13 for December 8.</td>
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<td>Computer assignment 12 due.</td>
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<td>TBD</td>
<td><strong>Voluntary review session</strong></td>
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<td>Computer assignment 13 due.</td>
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<td>December 10</td>
<td><strong>FINAL EXAMINATION – 7:00 p.m. – 9:30 p.m.</strong></td>
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*The syllabus provides a general plan for the course; deviations may be necessary.*