Purpose

Lord Kelvin (William Thomson, 1824-1907) wrote: "... [W]hen you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind." Government administration has become increasingly technical and quantitatively oriented; the public administrator no longer lives by politics alone. Government agencies must build complex infrastructures, treat clients with uniform procedures, issue benefit checks in a timely and accurate manner, apply systematic personnel standards, and create intricate budgets. All of these processes involve quantitative records.

The inability to apply statistical methods leaves a public administrator dependent on co-workers who do know these methods, leaves him or her vulnerable to efforts to mislead him or her statistically, and may impede his or her potential for successful performance and advancement. The techniques that will be taught in this course can be applied readily to nearly every work environment. You may find yourself recognized as a much more valuable employee if you master the statistical techniques of this course and make an effort to demonstrate them at your workplace.

Eligibility

This course is designed for students who have been admitted to study in the M.P.A. Program. As a requirement for enrollment in POLS 7600, students are expected to have a facility for college algebra (e.g., equations, functions, and graphs). Students who lack this facility should defer their participation in POLS 7600, and, in the meantime, take an undergraduate course in college algebra.
Learning Objectives

- Understand the needs and opportunities for using quantitative analyses in public management.
- Be able to understand and interpret tables and graphs that summarize raw data, and to prepare tables and graphs summarizing raw data.
- Know methods and formulas for calculating probabilities.
- Be able to test hypotheses and use methods of statistical inference.
- Calculate measures of association between two variables.
- Understand how the foregoing skills can be used to enhance the quality of decision-making in the public sector.

Course Requirements

1. READING AND HOMEWORK

   - The textbook for this course, which is available at the bookstore, is:
     

   - Purchase a Casio fx-260 calculator. Use it for your homework, during class, and during examinations. **Other calculators are unauthorized and unacceptable, and you will use them entirely at your own risk; you may not disturb the class or me on account of your use of an unauthorized calculator.**

     You should read and study the book as assigned on the accompanying schedule of assignments.

     For each chapter, a number of problems have been assigned for a written homework assignment. In doing calculations, avoid excessive rounding within the problem, because rounding errors compound. Try to carry at least three significant digits at every step.
At the beginning of the class session, I will accept submissions of homework assignments from members of the class who would like to submit them. If you choose to submit your assignment, make a photocopy for your files; otherwise, you won't have your assignment to refer to during the class. I will peruse homework and assess a score (usually 0, ½, 1, or 1½). Show all necessary steps in obtaining a solution to a problem; no credit will be given for answers that appear out of thin air. I will return homework assignments with comments and score. Late homework, however, will not receive a score. The accumulated scores will be used to reduce the weight of your examinations, and you'll receive an "A+" for these scores. The reduction will be distributed proportionately between the midterm and final examinations.

A few words about plagiarism: Don't do it. I encourage students to study together and to discuss homework solutions together. But you may not copy from each other in writing up your assignments. Your written solutions and statements must be your own work, not a copy of someone else's. Plagiarism can cause you to fail this course. If you don't understand this rule, don't experiment: Give me a call and we'll talk about it in detail.

2. EXAMINATIONS

There will be two examinations during the semester. The midterm examination will be administered on Monday, February 22, and Wednesday, February 24. This examination will account for 30% of your grade. The final examination will be administered on Monday, May 2, and Wednesday, May 4. This examination will account for 45% of your grade. Your calculator can calculate mean, standard deviation, and other statistics; you can use this feature to check your work, but you will still have to calculate statistics yourself and show all work.

3. APPLICATION PAPER

An application paper that identifies a problem in public administration and offers a useful, complete, and logical solution based on statistical methods presented in this course will be due on or before Monday, April 18. Be sure to select one or more substantial statistical methods from the textbook and lectures that you will use for your analysis. Show all work, including formulas and computation tables. Note that your instructor will look with the most favor on papers whose statistical computations are done in the student’s own hand, in the manner of the homework assignments;
if the computer (e.g., SPSS) has done the computations and created
the printout, the instructor will look less favorably or even
unfavorably on the paper. Materials taken from other sources must
be cited.

The paper will count as 25% of your course grade. Do not place
your paper into a folder or report cover; just staple. Please
submit two copies of your paper.

4. PLAGIARISM AND CHEATING

Plagiarism may result in a reduced grade, with a failing grade
being possible, for the course for all students who seek to receive
credit for the paper. If you do not thoroughly understand the
definition of plagiarism, then consult the APA style manual and/or
solicit assistance from your instructor. The integrity code of the
University of North Georgia--"On my honor, I will not lie, cheat,
steal, plagiarize, evade the truth, or tolerate those who
do"--reflects the university's commitment to academic integrity.
The "Academic Integrity Policy" (2015-2016 Undergraduate Bulletin, at
http://ung.catalog.acalog.com/content.php?catoid=19&navoid=461#Academic_Integ
rity_Policy ; see also the Student Handbook) and the "Academic and
Professional Integrity Policy" (described in the 2015-2016
rofessional_Integrity_Policy ) are incorporated herein by reference.
Please note that in this course, as in all others at UNG, plagiaris
and other forms of cheating are expressly prohibited. Any student who commits plagiarism or cheating may receive a
reduced grade, which may involve a failing grade, and his or her
matriculation in the M.P.A. Program may be terminated by the
M.P.A. Advisory Committee. A report of the incident will be
provided to the university's Academic Integrity Council. The
council and the vice president for academic affairs may take
additional action, which may include a formal reprimand,
probation, suspension, or expulsion.¹

¹ If you would like to read a discussion of the rationale for
the rules about plagiarism, you are welcome to read my essay that
is accessible on the Internet at http://faculty.UNG.edu/bfriedman/Studies/plgrm.htm .
5. ATTENDANCE

Attendance is compulsory. You are considered responsible for being attentive to lectures and class discussions, for taking notes, and for being aware of the content of all class announcements. Please take note of the university's policy on "Class Attendance" (2015-2016 Undergraduate Bulletin, at http://ung.catalog.acalog.com/content.php?catoid=19&navoid=461#Class_Attendance) which is incorporated herein by reference.

Do not bring to class items that will emit audible signals, such as cell phones and watches that announce the top of the hour.

6. COURSE GRADES

Your instructor uses the conventional grading scale: 90-100%, A; 80-89%, B; 70-79%, C; 60-69%, D; below 60%, F.

Course grades are available on BANNER within about two days of the end of final examinations. Except in emergency situations, please do not request grades by telephone, E-mail, or similar method.

7. INCORPORATION OF OTHER CONTROLLING AUTHORITY

The contents of the following are incorporated by reference:


- The supplementary information that appears on the Web page at this URL address:

  http://ung.edu/academic-affairs/policies-and-guidelines/supplemental-syllabus.php

8. ACCESSIBILITY STATEMENT

If you need this document in another format, please contact Andrew Eade by E-mail (andrew.eade@UNG.edu) or by telephone (706-864-1628).
Schedule of Assignments

(Note: We will not cover "t" tests in this course. Where problems refer, or seem to refer by implication, to "t" tests, it is never necessary for you to apply "t" tests in completing your homework assignments. Use the normal distribution instead.)

<table>
<thead>
<tr>
<th>Day</th>
<th>Date</th>
<th>Topic</th>
<th>Reading</th>
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<tbody>
<tr>
<td>M</td>
<td>Jan. 11</td>
<td>Introduction</td>
<td>Ch. 1</td>
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<tr>
<td>W</td>
<td>Jan. 13</td>
<td>Frequency Distributions</td>
<td>Ch. 4</td>
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<tr>
<td></td>
<td></td>
<td>Measures of Central Tendency</td>
<td>Ch. 5(pp. 91-98)</td>
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<td></td>
<td></td>
<td>Prob. 4.1 (do a histogram, not a frequency polygon), 4.3, 5.1, 5.2, 5.4, 5.5, 5.7 (optional), 5.10</td>
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<td>M</td>
<td>Jan. 18</td>
<td>No Class – M. L. King Day</td>
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<tr>
<td>W</td>
<td>Jan. 20</td>
<td>Measures of Dispersion</td>
<td>Ch. 6(pp. 109-113)</td>
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<td>Prob. 6.1, 6.2, 6.4, 6.8</td>
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<tr>
<td>M</td>
<td>Jan. 25</td>
<td>Measures of Dispersion</td>
<td>Ch. 6(pp. 113-118)</td>
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<td>Prob. 6.3 (problem should say, &quot;Skewness = +2.46&quot;), 6.5, 6.7</td>
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<tr>
<td>W</td>
<td>Jan. 27</td>
<td>Normal Distribution</td>
<td>Ch. 7</td>
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<td>Prob. 7.1, 7.9</td>
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<tr>
<td>M</td>
<td>Feb. 1</td>
<td>Binomial Probability Distribution</td>
<td>Ch. 8</td>
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<td>Prob. 8.1, 8.2, 8.3, 8.5</td>
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<td>W</td>
<td>Feb. 3</td>
<td>Binomial Probability Distribution</td>
<td>Ch. 8</td>
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<td>Prob. 8.4, 8.7</td>
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<tr>
<td>M</td>
<td>Feb. 8</td>
<td>Special Probability Distributions</td>
<td>Ch. 9 (pp. 159-162)</td>
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<td>Prob. 9.2, 9.10</td>
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<td>W</td>
<td>Feb. 10</td>
<td>Measurement</td>
<td>Ch. 2</td>
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<td>Prob. 2.1, 2.2, 2.3, 2.4, 2.5</td>
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<td>Date</td>
<td>Topic</td>
<td>Chapters</td>
<td>Prob. Numbers</td>
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<td>M Feb. 15</td>
<td>Research Design</td>
<td>Ch. 3</td>
<td>Prob. 3.1</td>
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<tr>
<td>W Feb. 17</td>
<td>Inference</td>
<td>Ch. 10</td>
<td>(Note: You will not need to learn about or apply the t distribution in this or the subsequent chapters.) Prob. 10.1, 10.2, 10.4, 10.7</td>
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<tr>
<td>M Feb. 22</td>
<td>MIDTERM EXAMINATION – Part 1</td>
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<td>W Feb. 24</td>
<td>MIDTERM EXAMINATION – Part 2 (5:30-7:15 p.m.)</td>
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<td>M Feb. 29</td>
<td>Inference</td>
<td>Ch. 10</td>
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<td>Hypothesis Testing</td>
<td>Ch. 11</td>
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<td>Prob. 10.9, 11.1, 11.2 (Do not use the t distribution; assume that the normal distribution applies.)</td>
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<tr>
<td>W Mar.  2</td>
<td>Hypothesis Testing</td>
<td>Ch. 11</td>
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<td>Prob. 11.3, 11.7 (Do not use the t distribution; assume that the normal distribution applies.)</td>
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<tr>
<td>M Mar.  7</td>
<td>Estimating Population</td>
<td>Ch. 12</td>
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<td>Proportions</td>
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<td>Prob. 12.1, 12.2, 12.5, 12.6, 12.7, 12.9</td>
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<td>(Assume that the normal distribution applies.)</td>
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<tr>
<td>W Mar.  9</td>
<td>Testing the Difference</td>
<td>Ch. 13</td>
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<td>Between Two Groups</td>
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<td>Prob. 13.1, 13.4, 13.5 (Assume that the normal distribution applies.)</td>
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<tr>
<td>MW Mar. 14, 16</td>
<td>No Class – Spring Break</td>
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<td>M Mar. 21</td>
<td>Contingency Tables</td>
<td>Ch. 14</td>
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<td>Prob. 14.1, 14.3, 14.4, 14.10</td>
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<tr>
<td>W Mar. 23</td>
<td>Chi-Square</td>
<td>Ch. 15 (pp. 258-264)</td>
<td>Compute ( \chi^2 ) for these problems: Prob. 15.1, 15.3</td>
</tr>
<tr>
<td>M Mar. 28</td>
<td>Measures of Association</td>
<td>Ch. 15 (pp. 269-279)</td>
<td>Prob. 15.2, 15.7; also, Prob. 15.10 (calculate lambda instead of gamma for Prob. 16.10)</td>
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</table>
QUESTIONS THAT MAY APPEAR ON THE M.P.A. COMPREHENSIVE EXAMINATION

1. What are measures of central tendency? measures of dispersion?

2. What is a Bernoulli process?
3. What is a Z score?

4. Why are social-science variables so difficult to measure? Explain validity and reliability.

5. What are the “levels of measurement”?

6. Compare and contrast the experimental design and the quasi-experimental design. Why are social scientists more likely than natural scientists to use the quasi-experimental design?

7. What is the purpose of “inferential statistics”?

8. How do the standard deviation of the population and the standard error of the mean compare in terms of size? Why?

9. What is a Type 1 error? How much risk of a Type 1 error is a social scientist willing to endure?

10. In the methodology for chi-square, what does “expected value” mean? If the expected values and observed values are very close to each other, what conclusion is supported?

11. In measures of association like gamma and r, what does a measure of +1 tell us? a measure of 0? a measure of -1?

12. What is a concordant pair of observations? a discordant pair?

13. Explain “proportional reduction in error.” Name two statistical measures that report the PRE.

14. Explain these terms: control, physical control, statistical control.

15. Why is simple linear regression also known as “least-squares” regression?

16. If gamma or r is equal to +1, does this prove that X causes Y? Why or why not?

17. A social scientist wants to forecast values of Y based on a time series. He does a regression and extrapolates through the forecast horizon. Is this methodology sound? Explain.

18. Identify and define the four components of a time series.
19. In a multiple linear regression, there is a partial slope, $b_{14 \cdot 235}$. What does that represent, specifically?

Vocabulary
- Operational definition
- Indicator
- Theory
- Hypothesis
- Working hypothesis
- Spurious relationship
- Homoscedasticity