PAI 721: Introduction to Statistics

Fall 2013
Section 1: T/Th 9:30 – 10:50 a.m., CH 017
Section 3: T/Th 2:00 – 3:20 p.m., Maxwell 110

Instructor: Leonard M. Lopoo
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  Office hours: Mondays from 10:00 a.m. – 11:00 a.m., Wednesdays from 11:00 a.m. – 12:00 p.m., and by appointment

Class materials are located on Blackboard (http://blackboard.syr.edu).

Teaching Assistant: Lincoln Groves
  Office hours: Fridays from 12:00-1:30 p.m. beginning September 13th.
  On the Fridays when homework is due, Lincoln will conduct a homework review.
  On other Fridays, Lincoln is available to answer your questions.

Required text:

It has been my experience that a single source is never enough to convey the necessary information adequately. It is too expensive to purchase a variety of textbooks for this class, but it may be worthwhile spending some time in the library reading other expositions on a particularly difficult topic.

Required software: SPSS version 21.0. Students may purchase a personal copy of the software from the SU Bookstore. For those of you who do not wish to purchase your own version, copies are located on the computers in the student clusters in the basement of Eggers.

Prerequisites:
A thorough understanding of high school algebra and geometry (content covered in the algebra and geometry reviews).

Course Objectives and Description
The primary objective of this course is to introduce material that will make you a better producer and consumer of descriptive and inferential statistical data. A critical producer/consumer understands the strengths and weaknesses of various statistical concepts and techniques as well as which to apply in a given situation. A critical/producer can then use this information as a foundation for recommendations. Students will also learn how to communicate these results to a variety of potential
audiences. Another important objective of the course is to help you become familiar with statistical software. Recent developments in statistical software allow analysts to develop a comprehensive understanding of their data and complete more sophisticated analyses in relatively little time. Further, much of the knowledge gained using one program can be transferred when using other packages. Finally, I will use a variety of data sets in the course both to increase your knowledge of the data sets available as well as to acquaint you with real data, which is usually a lot messier than the data used in textbook examples.

Most classes will consist of lectures with examples. Despite what you may have heard, this is not a mathematical statistics course. We will focus on “real world” applications of statistics, i.e., use examples similar to the ones you may come across once you leave graduate school. I will post my lecture notes for each chapter in the class folder on Blackboard. In the past, students have found it useful to have copies of the material that I will cover in class so they can concentrate on the content of the lectures. Feel free to bring these notes to class.

My goal in the lecture is to explain the fundamental or especially difficult material rather than walk through each section of the textbook. Students will also gain some insight into the material when working through the problem sets. Students should not, however, interpret the absence of a topic from lectures or problem sets (a topic that is, however, mentioned in the assigned readings) as unimportant information.

**Homework**

I will assign seven problem sets during the semester. Six will be graded (I will post solutions for the seventh). To allow students to plan ahead, *tentative* due dates are posted in this syllabus. Students will be given notice of the final deadline for each problem set at least one week in advance of the due date. Completed assignments should be deposited at the Center for Policy Research Front Desk (426 Eggers Hall) and signed in before the deadline. This process will simplify collection given the large number of students. I will not accept emailed assignments or assignments handed to me or Lincoln personally. There are no exceptions. Homework that is late will NOT be accepted. I will post solutions to the problem sets on Blackboard after the deadline.

Students are allowed to work in small groups to discuss the problems and develop solutions together. HOWEVER, each student must write-up the solutions that he/she submits independently. Failure to write-up your solutions independently will be considered a breach of the academic integrity policy.

**Disability Statement**

If you believe that you need accommodations for a disability, please contact the Office of Disability Services (ODS), [http://disabilityservices.syr.edu](http://disabilityservices.syr.edu), located in Room 309 of 804 University Avenue, or call (315) 443-4498 for an appointment to discuss your needs and the process for requesting accommodations. ODS is responsible for coordinating disability-related accommodations and will issue students with documented disabilities “Accommodation Authorization Letters,” as appropriate. Since accommodations may
require early planning and generally are not provided retroactively, please contact ODS as soon as possible.

**Academic Integrity Statement**
The Syracuse University Academic Integrity Policy holds students accountable for the integrity of the work they submit. Students should be familiar with the Policy and know that it is their responsibility to learn about instructor and general academic expectations with regard to proper citation of sources in written work. The policy also governs the integrity of work submitted in exams and assignments as well as the veracity of signatures on attendance sheets and other verifications of participation in class activities. Serious sanctions can result from academic dishonesty of any sort. For more information and the complete policy, see [http://supolicies.syr.edu/ethics/acad_integrity.htm](http://supolicies.syr.edu/ethics/acad_integrity.htm).

**Religious Observance**
SU’s religious observances policy, found at [http://supolicies.syr.edu/emp_ben/religious_observance.htm](http://supolicies.syr.edu/emp_ben/religious_observance.htm), recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holy days according to their tradition. Under the policy, students are provided an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance provided they notify their instructors before the end of the second week of classes. For fall and spring semesters, an online notification process is available through MySlice/Student Services/Enrollment/My Religious Observances from the first day of class until the end of the second week of class.

Any student who plans to miss an assignment or exam due to a religious observance and has made the appropriate notifications should see me within the first two weeks of class to make arrangements for making up this missed work.

**Make Up Work**
Students are expected to complete all assignments by the deadline. Other than the exception for religious observance noted above, make-up homework assignments and exams will not be given under any circumstances. Students who fail to turn in an assignment before the deadline or take an exam will receive a grade of zero for that course requirement.

**Computing**
Many of the homework assignments will be done on a computer using SPSS. Please do not simply hand in output from the SPSS program. Instead, please paste the relevant results into a word processor adding text to explain these results.

**Grading**
- Homework 25%
- Midterm 30%
- Final Exam 45%
Tentative Schedule

I. Descriptive Statistics
Topics: overview, measures of central tendency, measures of dispersion, standardization, density curves, the normal distribution
Reading: Chapter 1, skip pp. 65-68
Dates: August 27, 29, September 3, 5
Assignment 1 due: 12:00 p.m., September 6

II. Statistical Relationships
Topics: covariance, correlation, the geometry of a line, simple regression, lurking variables, influential points
Reading: Chapter 2
Dates: September 10, 12, 17, 19
Assignment 2 due: 12:00 p.m., September 20

III. Producing Data
Topics: sampling, bias, experimental design, randomization
Reading: Chapter 3, skim section 3.4
Dates: September 24, 26
Assignment 3 due: 12:00 p.m., September 27

IV. Probability
Topics: rules of probability, random variables, probability distributions, Law of Large Numbers
Reading: Chapter 4, skip pp. 297-303
Dates: October 1, 3, 8
Assignment 4: No deadline – solutions are posted.

***Midterm Exam: October 10 – covers chapters 1, 2, 3, and 4 only

V. Sampling Distribution
Topics: binomial setting, binomial distribution, sampling distribution, Central Limit Theorem
Reading: Chapter 5
Dates: October 15, 17, 22, 24
Assignment 5 due: 12:00 p.m., October 25

VI. Inference
Topics: confidence intervals, significance levels, hypothesis testing, p-values, Type I error, Type II error, power
Reading: Chapter 6
Dates: October 29, 31, November 5, 7, 12
Assignment 6 due 12:00 p.m., November 15
VII. Inference with Distributions
Topics: t-distribution, t-statistics, inference without knowing $\sigma$, standard error of a sample mean, t-test comparing means
Reading: Chapter 7, pp. 403-413 and pp. 432-445 only
Dates: November 14, 19

VIII. Simple Linear Regression
Topics: inference in simple linear regression, regression theory, coefficient of determination, standard error of the slope
Reading: Chapter 10, omit pp. 558-563.
Dates: November 21 and December 3
Assignment 7 due: 12:00 p.m., December 6

Review: December 5

***Final Exam: December 9, 2013 from 12:45-3:45 pm in the Heroy Geology Building Auditorium***