Fall 2014
EconS 510 & Stat 511
Statistics for Economists

Course Outline

Instructor

Ron Mittelhammer
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Office Hours:
By appointment

Time and Place

T,Th 7:45 a.m. Hulbert 27

TA

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Prerequisites:

Basic knowledge of univariate and multivariate calculus and matrix algebra

Readings:

- Mittelhammer, Ron C., Mathematical Statistics for Economics and Business, Springer-Verlag, New York, 1996
- Articles from the literature will be assigned regularly throughout the semester.

Course Learning Objectives:

General Learning Objective

- For the student to become familiar with, understand, and apply probability and mathematical statistics concepts underlying the techniques of statistical inference on which statistical and econometric analyses of economic data are based.

Specific Learning Objectives

- Learn fundamental mathematical and statistical principles underlying econometric methods;
- Learn to state, interpret, and assess the assumptions required for appropriate use and interpretation of estimators and estimation results;
- Learn how to derive statistical properties of random variables, functions of random variables, and functions of sample data;
- Learn the characteristics of basic families of probability distributions, including the appropriate problem contexts for such families to be used as part of the specification of statistical or econometric models;
- Learn the basic concepts of asymptotic statistical behavior; Learn the appropriate metrics with which to judge the efficacy of estimation methods;
- Learn the basic properties of the least squares estimator in the general linear model context and estimation issues that arise when basic assumptions underlying the model are violated.

Lecture Topics:

- Probability: Classical probability, probability as the limit of empirical frequencies, subjective probability, the axiomatic approach to probability, independence, random variables, univariate probability distribution and density functions, cumulative distribution functions, multivariate distribution and density functions, multivariate cumulative distribution functions, marginal distribution and density functions, conditional distribution and density functions.
- Mathematical Expectation: Expected value of random variable, some useful properties of expectation operator, moments, variance and Chebyshev's theorem, moment-generating functions, product moments, moments of linear combinations of random variables, conditional expectation, double expectation theorem.
- Specific Density Functions and Moments: Gamma, exponential, chi-square, normal, beta, uniform, Bernoulli, binomial, Poisson, hypergeometric, and the exponential class of densities.
- Sampling Distributions: Random samples, statistics, central limit theorems, probability limits, mean square convergence, laws of large numbers, limiting distributions, asymptotic distributions, the chi-square distribution and its relation to the normal distribution, the t-distribution and its relation to the normal and chi-square distributions, the F distribution and its to relation the chi-square distribution.
- Functions of Random Variables and Their Probability Distributions: The distribution function technique, the transformation of variables technique, the moment-generating function technique, characteristic function technique.
- Point Estimation: Unbiasedness, minimum variance, Cramer-Rao lower bound, consistency, relative efficiency, sufficiency, completeness and minimality of sufficient statistics, Rao-Blackwell and Lehmann-Scheffe theorems, method of maximum likelihood, method of moments, asymptotic properties of estimators.

- The Linear Statistical Model--Basics: Assumptions of General Linear Model, properties of ordinary least squares estimator, the normality assumption, properties of maximum likelihood estimator, the effect of assumption violations.

Grading:

Mechanics

- Weekly Takehome Quizzes (TEAM EFFORT-defined in a subsequent section)
- 1 Midterm Exam (solo effort)
- 1 Final Exam (covering last half of course material-solo effort)
- Electronic Chapter Quizzes (solo effort)
- Final Grade = (.3 Final Exam + .3 Midterm Exam + .3 Average Homework Grade +.1 Quizzes)

Philosophy Underlying Grading

A rigorous midterm and final examination, weekly graded homework assignments, and online graded tests of terminology and concepts are used to ensure that the learning goals are being met and that students are prepared for the statistics component of written core exam in quantitative methods. The grade assigned in the class should reflect a student's potential for passing the statistics component of the Quantitative Methods core exam.

With regard to the grading standards, a B signifies that the student understands some of the topics but will likely require additional review and study to pass the core. A grade of A indicates that the student should be able to pass the statistics portion of the written exam with only a moderate amount of refreshing of the material prior to taking the examination. Additional detail is as follows:

- A: Exceptional mastery of the course. Excellent comprehension of all lecture topics.
- A-: Mastery of the course. Good comprehension of the topics, with only a limited number of deficiencies.
- B+: Command of the course. Comprehension of topics is sufficient to allow the student to understand most statistical issues encompassed by the topics, but with a notable number of deficiencies.
- B: Limited understanding of the topics. Less than satisfactory comprehension for a student to be reasonably functional with fundamental statistical concepts underlying econometric methods.
- B-: Minimally acceptable performance in the course. Comprehension must improve substantially for the student to achieve a functional competence in the topics.
- C+ to C-: Unsatisfactory performance in the course. Substantial deficiencies in understanding topics. Substantial additional effort required to achieve functional competence in the topics.
- D or below: Complete lack of understanding of topics, requiring complete restudy of the entire topic sequence.

TEAM EFFORT on Weekly Homeworks:

By the second week of class, all students will choose to be on a study team which will consist of no less than three students and no more than four (exceptions to these numbers may be granted in case total student enrollment in the class requires it).

Each of the homeworks submitted by a team will represent the collective views of the team members regarding the correct approach and correct answers to the questions asked. Team members are encouraged to work out answers to questions before team meetings, and are free to discuss potential answers to questions with other Team members. It is expected that all team members contribute equal effort to completing the homeworks.

All members of the Team who have actually contributed to the completion of the homework will sign the answer sheet submitted by the team, and all members of the Team will receive whatever grade is assigned to the homework. Each Team is allowed to submit only one response to each homework - no dissenting opinion or alternative answers will be accepted. In the event that one or more team members did not contribute to the completion of the homework, they will not sign the homework, and they will be assigned a zero grade for the homework.

Examination Procedures:

Both the Midterm and Final examinations are to be taken in class by students individually-no consultation with other Team members is allowed. Exams are open book and open notes, and calculators are allowed and encouraged so that arithmetic mistakes can be minimized.

Disability Statement:

Reasonable accommodations are available for students with a documented disability. If you have a disability and may need accommodations to fully participate in this class, please visit the Disability Resource Center (DRC). All accommodations MUST be approved through the DRC (Washington Building, Room 217). Please stop by or call 509-335-3417 to make an appointment with a disability specialist http://www.drc.wsu.edu.

WSU's Academic Integrity Statement*

"As an institution of higher education, Washington State University is committed to principles of truth and academic honesty. All members of the University community share the responsibility for maintaining and supporting these principles. When a student enrolls in Washington State University, the student assumes an obligation to pursue academic endeavors in a manner consistent with the standards of academic integrity adopted by the University. To maintain the academic integrity of the community, the University cannot tolerate acts of academic dishonesty including any forms of cheating, plagiarism, or fabrication. Washington State University reserves the right and the power to discipline or to exclude students who engage in academic dishonesty."
*Can be found on page 136 of current WSU Spokane Student Handbook.

Academic Integrity Statement and link to WSU's policy

www.conduct.wsu.edu/default.asp?PageID=343
www.wsulibs.wsu.edu/plagiarism/main.html

WSU Safety Procedures

http://safetyplan.wsu.edu
http://oem.wsu.edu/emergencies
http://alert.wsu.edu