ECON 504/STAT 604: Advanced Economic Statistics

Date: Fall 2011
Time: TTh 10:50 – 12:05
Location: Baker Hall 271
Course Text: Casella, G., Berger, R.L., 2002. *Statistical Inference*, 2nd ed.. Duxbury, Pacific Grove, CA.

Instructor:

Prof. John A. Dobelman
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Duncan Hall 2100: 713 348 5681
Office Hours: By appointment.

Course Website:

www.stat.rice.edu/~dobelman (see courses)
We will also be using Owl-Space.

Teaching Assistant (TA):

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Baker Hall 237
Office Hours: By appointment

Sponsored Message Regarding Student Responsibility

The Committee on Examinations and Standing has asked that we reiterate the responsibilities of the student to comply with deadlines affecting their status and standing. Essentially this means that you need to be aware of the deadlines for which you alone are responsible (i.e., not your advisor, etc.). This data is maintained at registrar.rice.edu/calendars. Applicable deadlines for this semester are also summarized here.

Other Recommended Titles

Textbook

Students are expected to have purchased their required texts during the first week of class. If the text is available at the "Rice" bookstore, and the student elects to purchase the book elsewhere, and this elsewhere-obtained book is not in hand, the student is nonetheless responsible for all assignments and readings. Rice University is generally not able to provide copies of these texts for your use.

Course Description:

This course is designed to provide an overview of advanced mathematical statistics for economics, political science and management. Background in a calculus-based statistics course is assumed. Topics include random variables, distributions, transformations, moment generating functions, common families of distributions, independence, sampling distributions, the basics of estimation theory, hypothesis testing and Bayesian inference.

Course Content: Chapters 1 – 12 of text and possible special topics. Topics/chapters include

1. Probability Theory. Set Theory. Probability Theory. Conditional Probability and Independence. Random Variables. Distribution Functions. Density and Mass Functions.

2. Transformations and Expectations. Distribution of Functions of a Random Variable. Expected Values. Moments and Moment Generating Functions. Differentiating Under an Integral Sign.

3. Common Families of Distributions. Introductions. Discrete Distributions. Continuous Distributions. Exponential Families. Locations and Scale Families. Inequalities and Identities.

4. Multiple Random Variables. Joint and Marginal Distributions. Conditional Distributions and Independence. Bivariate Transformations. Hierarchical Models and Mixture Distributions. Covariance and Correlation. Multivariate Distributions. Inequalities.

5. Properties of a Random Sample. Basic Concepts of Random Samples. Sums of Random Variables from a Random Sample. Sampling for the Normal Distribution. Order Statistics. Convergence Concepts. Generating a Random Sample.

6. Principles of Data Reduction. Introduction. The Sufficiency Principle. The Likelihood Principle. The Equivariance Principle.

7. Point Estimation. Introduction. Methods of Finding Estimators. Methods of Evaluating Estimators.

8. Hypothesis Testing. Introduction. Methods of Finding Tests. Methods of Evaluating Test.

9. Interval Estimation. Introduction. Methods of Finding Interval Estimators. Methods of Evaluating Interval Estimators.

10. Asymptotic Evaluations. Point Estimation. Robustness. Hypothesis Testing. Interval Estimation.

11. Analysis of Variance and Regression. Introduction. One-way Analysis of Variance. Simple Linear Regression.

12. Regression Models. Introduction. Regression with Errors in Variables. Logistic Regression. Robust Regression.

Grading:
Grading for this course will consist of homework exercises from the text (25%), a midterm examination (35%), a final examination (35%), and 5% course participation.

Assignment Submission and Late policy

All assignments must be submitted in class on the date due as hard copy to the instructor or his designee. The instructors/TA will not be able to print out e-mailed or online-only assignment submissions. Late papers will in general not be accepted without a university approved excuse. A 20% penalty for HW turned in by next class may be applied; no credit for submissions later than this, although you might be able to negotiate with the grader.

Examinations

Exams will usually be closed-book and closed-notes, except that a single piece of paper "cheat-sheet" is permitted. Calculators are permitted, under pledged conditions; NO INTERNET is permitted. Usually a computer is not required.

Final Examination

Final examinations will be conducted in accordance with the registrar's policy on such exams. The final is expected to be based on material covered since the mid-term exam, but which will necessarily be cumulative!

Attendance:

Students are expected to attend class. Much material is presented in class which might not otherwise be in texts, notes, etc. Attendance will be reflected in the Class Participation portion of the course grade. Although we plan on keeping the course website up to date, if a student misses a class, then he/she is responsible for keeping up with the course material and finding out if any exams, quizzes, or homeworks have been assigned or scheduled. Similarly, important due date changes might sometimes be made in class to your benefit which might not be immediately posted on Owl-Space.

Laptops and Other Portable Electronic Devices (PED).

Unless so requested by the instructors, please do not use these devices during class. From time to time the instructors may ask a student to look something up, but in most cases this is not necessary. The student will be asked to put away their PED's if they are taken out in class.

Software

Although this is a mathematically-oriented course, which could theoretically provide for no calculations whatsoever, such an approach today is unrealistic. Many problems you will be solving would benefit from numerical likelihood calculations, inversions, bootstrapping, numerical integration/optimization, etc., if only to check theoretical results.

It is impossible to perform statistical/quantitative data analysis today without some sort of computer software, and it is expected that the student will become proficient with one or more statistical software packages. The most widely used data analysis software in the real world today is Microsoft Excel, and its capabilities are impressive. However, more specialized software is sometimes needed, such as Matlab, R, S-Plus, SAS, Resampling Stats, SPSS, Stata, StatTools, StatExact, Lisrel, @Risk, Maple, Mathematica, C-Plex, SQL, etc. Of these, R has become the choice of many because of its ease of use and low cost (FREE!) Download information for some of these packages is available on the course website(s).

One can also program most statistical procedures in a "high-level" programming language such as Java, C++, FORTRAN, VB, etc., along with specialized add-in routine libraries, but these require a lot of work to code and debug. Additionally, you will find that most corporate employers will not be paying for the nice software that is available for you here on campus. Consequently, to enhance your value to your future employer, we suggest that you become proficient in Excel, R and SQL/SAS. Note that a good word processor will also be required in order to prepare reports and presentations; Microsoft Word, OpenSource, LaTeX, etc., are candidates for use in preparing these documents, although the use of LaTeX in the business world is sparse.

Rice Honor Code:

Before enrolling in this course, you must understand and agree to abide by the Honor System in place at Rice University which protects the academic integrity of all coursework. All students (including graduate students) at Rice are bound by the Rice Honor Code. The Honor Code is a unique feature at Rice, one that is valued highly, and is of profound importance. New students should familiarize themselves with the Honor Code before starting classes. Honor Code violations are very serious, and can lead to dismissal from the University. Suspected violations will be processed in accordance with applicable procedures; see http://honor.rice.edu.

Examinations, if held, are conducted under pledged conditions. Proper recitation and use of the Honor Pledge on examinations will be enforced. Note that the use of prior years' and other solutions to pledged exercises is considered UNAUTHORIZED AID and is not permitted under the Rice Honor code.

If homework and individual assignments/projects may be worked on with other class members, each student must submit their own work for credit. Homeworks should be submitted by each person, but you should indicate with whom you worked when applicable. No direct copying is allowed. Group projects and assignments may be submitted by the group, per submission requirements above.

Disabilities:

Any student with a documented disability needing academic adjustments or accommodations is requested to speak with me during the first two weeks of class. All discussions will remain confidential. Students with disabilities should also contact Disability Support Services in the Ley Student Center. Further information is available at http://dss.rice.edu/.