

BUDT 801: APPLIED REGRESSION MODELS

INSTRUCTOR:

Prof. Wolfgang Jank
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Office Hours: *You are welcome to drop by whenever I'm around!*

TEXTBOOK/SOFTWARE

“Applied Regression Analysis, Linear Models, and Related Methods”
by John Fox, Sage Publications, 1997

“An R and S-Plus Companion to Applied Regression”
by John Fox, Sage Publications, 2002

COURSE OBJECTIVES

The main *direct* course objectives are

1. To learn about a wide variety of regression techniques; to understand when to use what technique; to understand the limitations of a particular technique;
2. To generate a basic understanding of the methodological principles underlying these regression techniques in order to become a critical user;
3. To learn the powerful statistical software R; and to implement these regression techniques using this software;

The main *indirect* course objectives are

1. To improve students' oral presentation skills in an academic environment;
2. To expose students to scholarly papers of their field;
3. To jump-start students' research in the form of producing scholarly papers and presentations;

STUDENT DELIVERABLES

1. **STUDENT PRESENTATIONS:** Every class period one (or more) student(s) will give a short presentation on a selected method presented in the textbook. This presentation will involve the methodological aspects of a particular method. Student presentations will be about 20-30 minutes long. Students who are not presenting will also be required to prepare carefully in order to contribute to the class discussion. The goals of this deliverable are a) to strengthen oral presentation skills (especially of technical topics); and b) to improve the learning process via initial self-study followed by class discussion.
2. **WEEKLY HOMEWORKS:** Every week a short homework will be assigned. This homework assignment will focus entirely on a) learning the software R and b) implementing regression methods using that software and c) interpreting the software output. The goals of this deliverable are to build solid software skills in one of the most powerful statistical software packages.
3. **END-OF-SEMESTER PAPER:** Every student will prepare a paper on a selected topic. Topics and data for the topics should be obtained together with faculty from the student's field. The final paper should consist of 10 to 15 pages (11pt, double-spaced, 1 inch margin). Papers have to be consistent with academic standards and have to include introduction, positioning, description of the analytical technique(s) used, and presentation and discussion of the results. A list of references is also required. The goal of this deliverable is to obtain a starting point for a student's research paper.
4. **END-OF-SEMESTER POSTER PRESENTATION:** The final papers will be presented in a poster presentation during the last week of class. Poster presentations will be held concurrently, in a "bazaar-type" format. Presentations should be made in PowerPoint and the posters should be arranged on a suitable poster background.

ACADEMIC INTEGRITY

You must scrupulously abide by the University's Code of Academic Integrity (see <http://www.inform.umd.edu/CampusInfo/Departments/JPO/AcInteg/>). Among other things, the Code prohibits students from cheating on exams, plagiarizing papers, and submitting fabricated documents.

The University of Maryland Honor Pledge reads:

“I pledge on my honor that I have not given or received any unauthorized assistance on this assignment/examination.”

Unless you are specifically advised to the contrary, this pledge statement should be handwritten and signed on the front cover of all documents submitted for evaluation in this course.

GRADING POLICY

Your final grade for the course is based on your performance outlined above. The weights given to each of these components are as follows. Part of the evaluation process will be based on peer-evaluation from your classmates.

Student Presentations	20%
Weekly Homework	50%
End-of-Semester Paper	15%
End-of-Semester Presentation	15%

ABOUT THE INSTRUCTOR

Prof. Jank is Assistant Professor of Management Science and Statistics. He earned his Ph.D. in Statistics from the University of Florida, Gainesville, and holds a Master's degree from the Technical University of Aachen, Germany. Prof. Jank's research centers on stochastic optimization, spatial modeling, online auctions, electronic commerce, data mining and decision-making under uncertainty in general. Prof. Jank has been involved in a variety of consulting projects including projects from academia, the government and the private sector.

Week	Date	Topic	Chapter reading	Student Presentation
1	08/31	Introduction	1 through 3	None
2	09/07	Linear Least Squares Regression	5	Matrix Model and Derivation of Least Squares Estimate (Ch.9.1 and 9.2)
3	09/14	Statistical Inference for Regression	6	Model Assumptions and Least-Squares Properties (Ch. 9.1 and 9.3.1 and 9.3.2)
4	09/21	Dummy Variables and Interactions	7	Maximum Likelihood Estimation (Ch. 9.3.3)
5	09/28	Analysis of Variance	8	Statistical Inference (Ch. 9.4.1 and 9.4.2)
6	10/05	Unusual Data and Violation of Model Assumptions	11 and 12	Hat Values and Residuals (Ch. 11.8)
7	10/12	Collinearity and Principal Components	13	Principal Components (Ch. 13.1.1)
8	10/19	Time Series	14.1	Generalized Least Squares (Ch. 14.1.1)
9	10/26	<i>No Class (INFORMS)</i>		
10	11/02	Nonparametric Regression	14.3	Nonlinear Least Squares and Newton-Raphson (Ch. 14.2.3)
11	11/09	Logit and Probit Models	15	Estimating the Logit Model (Ch. 15.1.5)
12	11/16	Bootstrapping	16	TBD

13	11/23	<i>Linear and Nonlinear Mixed Models</i>	<i>Handout/Paper</i>	TBD
14	11/30	<i>Hierarchical Models and Bayesian Regression</i>	<i>Handout/Paper</i>	TBD
15	12/07	Student Poster Presentations	-	-