Math 484 – Regression and Forecasting

Course Description from Bulletin: Simple linear regression; multiple linear regression; least squares estimates of parameters; hypothesis testing and confidence intervals in linear regression models; testing of models, data analysis and appropriateness of models; linear time series models; moving average, autoregressive and/or ARIMA models; estimation, data analysis and forecasting with time series models; forecasting errors and confidence intervals.

Enrollment: Elective for undergraduate applied mathematics and other majors.

Textbook(s): Bowerman, B. L., O'Connell R. T., and Koehler A. B. *Forecasting, Time Series, and Regression*, Thomson Brooks/Cole, (2005), ISBN 978-0534409777.

Software: JMP 9

Prerequisites: MATH 474 Probability and Statistics, or MATH 476 Statistics, or consent of the instructor

Objectives:

1. Students will learn about the regression and forecasting models and their applications in various fields of science and engineering.
2. Students will be able to formulate real life problems using regression and forecasting models.
3. Students will be able to use relevant statistical tools for model evaluation, and thus choose the appropriate models for analysis.
4. Students will be able to use statistical software to estimate the models from real data, and draw conclusions and develop solutions from the estimated models.
5. Students will learn to communicate the statistical analyses of substantial data sets through explanatory text, tables and graphs.

Lecture schedule: 3 50 minutes (or 2 75 minutes) lectures per week

Course Outline:	Hours
Part I: Regression	
1. Simple Linear Regression,	4
2. Multiple linear regression and least square estimations,	6
3. Inference, Diagnostics, Transformations,	6
4. Variable selection, testing and appropriateness of models	2
5. Qualitative predictors,	1
6. Logistic regression,	3
7. Nonlinear regression.	2
Part II: Forecasting	
1. Linear time series regression,	3
2. Moving average models,	2
3. ARIMA models,	5
4. Estimation of models, forecasting errors and inference,	2
5. Transfer function models.	2

Assessment:	Homework	10-30%
	Project	10-30%
	Tests	20-40%
	Final Exam	30-50%

Syllabus prepared by: Lulu Kang, Andre Adler, and Fred Hickernell
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