

**COURSE SYLLABUS: MNGT 8400**  
**Advanced Quantitative Methods for Management I**

**Professor:** Dr. Amit Mitra; Office: 419 Lowder; Phone: 4-4833; E-mail: [mitraam@auburn.edu](mailto:mitraam@auburn.edu)

**Office Hours:** T, Th: 3:30 – 5:30 pm; others by appointment.

**Prerequisites:** STAT 7000 or equivalent

**Course Description:** The course exposes the student to an applied course in Linear Regression Analysis. Students will be treated to the theoretical underpinnings of an advanced course in linear statistical models with an emphasis on applications.

Some general objectives of the course follow:

- Understand the concepts, assumptions, and methodology associated with linear regression analysis.
- Be able to apply the concepts to problem-solving in an applied situation.
- Be able to interpret the results of regression analysis.
- Be able to identify appropriate applications of analyses and inferences in the context of linear regression analysis.
- Develop regression models using data.

**Required Text:** Applied Linear Statistical Models, 5<sup>th</sup> Edition, Kutner, Nachtsheim, Neter, and Li, 2005, McGraw-Hill/Irwin.

**Computing Software:** Minitab, SPSS

**Requirements and Weights:**

Exam 1	15%
Exam 2	15%
Exam 3	15%
Final Exam (Comprehensive)	20%
Lab	10%
Homework Assignments/Quizzes	15%
Project	10%

**Policies:**

All assignments are due by the date indicated in class. Late assignments cannot be accepted. Make-up examinations for tests are available only in extreme circumstances (i.e. hospitalization).

Unannounced pop quizzes (5-10 minutes) may be given and cannot be made up.

Submitted homework must be in neat/legible form and include appropriate computer outputs/graphs to validate your answers.

Project must be typed and include appropriate computer outputs/graphs to validate answers.

**Academic Honesty:** All portions of the Auburn University student academic honesty code (Title XII) found in the AU Office of Provost website will apply to university courses. All academic honesty violations or alleged violations of the SGA Code of Laws will be reported to the Office of the Provost, which will then refer the case to the Academic Honesty Committee.

**Class Procedures:**

- Turn-off all wireless communications devices in class. Do not make or receive calls during class. Further, making or receiving calls during an exam will be viewed as an Academic Honesty violation.
- The instructor has the discretion to modify course content and assignment/test dates.

**Special Accommodations for Students with Disabilities:** Students who need special accommodations, as provided for by the American With Disabilities Act, should make an appointment as soon as possible with the faculty member to discuss their Accommodation Memo. It is essential that the faculty member be aware of necessary accommodations at the beginning of the course. The student must bring a copy of his/her Accommodation Letter and an Instructor Verification Form to the meeting. If the student does not have these forms but needs special accommodations, he/she should contact the Program for Students with Disabilities, 1288 Haley Center, 334-844-2096 (V/TT).

## COURSE CONTENT

- Chapter 1: Linear Regression with One Predictor Variable:  
Model, least squares criterion, residuals, assumptions, estimation and prediction.
- Chapter 2: Inferences in Regression and Correlation Analysis:  
Sampling distributions, confidence intervals, prediction intervals, confidence bands, ANOVA approach to regression, correlation coefficient.
- Exam 1: Chapters 1 and 2
- Chapter 3: Diagnostics and Remedial Measures:  
Predictors and residuals, semi-studentized residuals, violation of assumptions, tests involving residuals, test for lack of fit, transformations.
- Chapter 4: Simultaneous Inferences and Other Topics in Regression Analysis:  
Joint estimation, Bonferroni confidence intervals, regression through origin, effects of measurement error.
- Chapter 5: Matrix Approach to Simple Linear Regression Analysis:  
Model formation using matrices, basic matrix manipulation, estimation of model parameters.
- Exam 2: Chapters 3, 4, and 5
- Chapter 6: Multiple Regression I:  
More than one predictor, quantitative and qualitative predictors, non-linear models, inferences on model parameters, confidence and prediction intervals, diagnostics and remedial measures.
- Chapter 7: Multiple Regression II:  
Extra sum of squares, decomposition of SSR/SSE, tests for several parameters, partial F-test, standardized regression model, multicollinearity and its effects.
- Exam 3: Chapters 6 and 7

- Chapter 8: Regression Models for Quantitative and Qualitative Predictors:  
Polynomial regression, second and higher order models, hierarchical approach, interaction terms, qualitative predictors, use of indicator variables, interactions between quantitative and qualitative predictors.
- Chapter 9: Building the Regression Model I: Model Selection and Validation:  
Model building process, data preparation, model refinement and selection,  $R^2$  and  $R^2$  adjusted,  $C_p$  criterion, best subsets method, stepwise regression, forward selection, backward elimination method, model validation.
- Chapter 10: Building the Regression Model II: Diagnostics outliers in the Y-space, studentized residuals, deleted residuals, studentized deleted residuals, outliers in the X-space, leverage, Cook's distance, influential observations.
- Final Examination (Comprehensive with emphasis on latter chapters not covered in previous examinations) – May 2, 2014, 12 noon – 2:30 pm.