

STAT 252 - Statistical Inference for Management II

Winter 2008

1. Catalog Description

STAT 252 Statistical Inference for Management II (5) GEB B1

Small-sample confidence intervals and hypothesis tests. Introduction to ANOVA, regression, correlation, multiple regression, time series, and forecasting. Statistical quality control. Enumerative data analysis. Statistical software used throughout course. 5 lectures. Prerequisite: STAT 251 with a minimum grade of C-.

2. Required Background and/or Experience

C- or better in Stat 251.

3. Expected Outcomes

The student should:

- a. Know the principles of good experimental design and good data collection, and understand the consequences of poor experimental design and poor data collection.

The course covers the following statistical analyses:

- large-sample inference for population means and proportions (from STAT 251)
- small-sample inference for population means
- one-way analysis of variance with multiple comparison procedures
- simple and multiple linear regression
- time series analysis and forecasting
- statistical quality control
- analysis of categorical data using tests for goodness-of-fit and independence

For each of the statistical analyses above, the student should be able to:

- b. Decide which statistical analysis is appropriate for a given situation.
- c. Know the assumptions of each analysis method and assess their validity for given data.
- d. Use statistics software and (where appropriate) hand calculation to perform each analysis.
- e. Understand analysis results and interpret their meaning in the specific context of the data.

4. Text and References

Text: Groebner, D.F., *et al*, Business Statistics A Decision-Making Approach, 7th ed., Prentice Hall, Upper Saddle River, New Jersey, 2007.

References: Anderson, D.R., *et al*, *Statistics for Business and Economics*, 10th ed., South-Western College Publishing, Cincinnati, OH, 2005.

McClave, J.T., *et al*, *Statistics for Business and Economics*, 10th ed., Prentice-Hall, Upper Saddle River, NJ, 2008.

Bowerman, B.L. and O'Connell, R.T., *Business Statistics in Practice*, 3^d ed., McGraw-Hill, 2003

5. Minimum Student Materials

None.

6. Minimum University Facilities

Chalkboards for class use. Overhead projectors. "Smart" classroom facilities. Computer lab facilities for student use in preparing assignments.

7. Expanded Description of Content and Method

CONTENT	LECTURES
A. USE OF MINITAB (integrated into each topic below)	
B. TWO-SAMPLE INFERENCES (Chapter 10)	
1. Estimating differences between two population means (10.1)	2
2. Hypothesis tests for two population means (10.2)	2
3. Inferences based on paired data (10.3)	1
4. Inference for two population proportions (10.4)	1
C. CATEGORICAL DATA ANALYSIS (Chapter 13)	
1. Goodness-of-Fit Tests (13.1)	1.5
2. Contingency Analysis (13.2)	1.5
D. ANALYSIS OF VARIANCE (Chapter 12)	
1. One-way ANOVA (12.1)	2.5
2. Multiple comparisons (12.1)	1.5
E. SIMPLE LINEAR REGRESSION (Chapter 14)	
1. Linear regression model and least squares (14.2)	2
2. Coefficients of determination and correlation (14.1, 14.2)	1
3. Inference for the slope (14.2)	1
4. Using the model for estimation and prediction (14.3)	1.5
5. Residual analysis: Model assumptions (14.3)	1.5
6. Outliers, leverage, and influence (not in text, see references)	1
F. MULTIPLE LINEAR REGRESSION (Chapter 15)	
1. Multiple regression model and least squares (15.1)	2
2. Multiple coefficient of determination and global F test (15.1)	1
3. Inferences about individual coefficients (15.1)	1.5
4. Using the model for estimation and prediction (15.1)	1
5. Residuals, model assumptions, and transformation (15.1, 15.5)	1
6. Quadratic models and interaction models (15.3)	1.5
7. Dummy variables (15.2)	2
8. Test on subsets of parameters (Appendix R)	2
9. Variable selection procedures (15.4)	1
10. Multicollinearity (15.1 and references)	1
G. TIME SERIES ANALYSIS & FORECASTING (Chapter 16)	
1. Components of time series (16.1)	1
2. Exponential smoothing (16.3)	1
3. Measuring forecast accuracy: MAD and MSE (16.2)	1.5
4. Forecasting trends (16.2)	1
5. Seasonal regression models (16.2)	1
6. Autocorrelation and the Durbin-Watson test (16.2)	1.5
H. STATISTICAL QUALITY CONTROL (Chapter 18)	
1. Statistical control (18.1, 18.2)	2
2. Control charts for mean and range (18.2)	1.5
3. Control charts for proportions (18.2)	1.5
4. Process capability analysis, CP, CP _K (not in text, see references)	1

METHOD

Largely lecture with chalkboard, transparency, and computer illustration of methods and problems, class discussion and supervised work.

8. Method of Evaluating Outcome

Problem assignments, scheduled tests, student projects, and a final examination.