

STAT 252 - Statistical Inference for Management II

Fall 2015

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: Sharpe, N.R., *et al*, *Business Statistics*, 3rd ed., Pearson, 2015.

References: Groebner, D.F., *et al*, *Business Statistics A Decision-Making Approach*, 9th ed., Prentice Hall, 2007.

McClave, J.T., *et al*, *Statistics for Business and Economics*, 12th ed., Prentice-Hall, 2008.

Jaggia, S. and Kelly, A., *Business Statistics: Communicating With Numbers*, 2nd ed., McGraw-Hill, 2015.

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 or JMP (integrated into each topic below)	
B. TWO-SAMPLE INFERENCES	
1. Estimating differences between two population means	2
2. Hypothesis tests for two population means	2
3. Inferences based on paired data	1
4. Inference for two population proportions	1
C. CATEGORICAL DATA ANALYSIS	
1. Goodness-of-Fit Tests	1.5
2. Contingency Analysis	1.5
D. ANALYSIS OF VARIANCE	
1. One-way ANOVA	2.5
2. Multiple comparisons	1.5
E. SIMPLE LINEAR REGRESSION	
1. Linear regression model and least squares	2
2. Coefficients of determination and correlation	1
3. Inference for the slope	1
4. Using the model for estimation and prediction	1.5
5. Residual analysis: Model assumptions	1.5
6. Outliers, leverage, and influence	1
F. MULTIPLE LINEAR REGRESSION	
1. Multiple regression model and least squares	2
2. Multiple coefficient of determination and global F test	1
3. Inferences about individual coefficients	1.5
4. Using the model for estimation and prediction	1
5. Residuals, model assumptions, and transformation	1
6. Quadratic models and interaction models	1.5
7. Dummy variables	2
8. Test on subsets of parameters	2
9. Variable selection procedures	1
10. Multicollinearity	1
G. TIME SERIES ANALYSIS & FORECASTING	
1. Components of time series	1
2. Exponential smoothing	1
3. Measuring forecast accuracy: MAD and MSE	1.5
4. Forecasting trends	1
5. Seasonal regression models	1
6. Autocorrelation and the Durbin-Watson test	1.5
H. STATISTICAL QUALITY CONTROL	
1. Statistical control	2
2. Control charts for mean and range	1.5
3. Control charts for proportions	1.5
4. Process capability analysis, CP, CP _K	1

TOTAL 48

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.