WINONA STATE UNIVERSITY

COLLEGE OF SCIENCE AND ENGINEERING

DEPARTMENT OF MATHEMATICS AND STATISTICS

**Course Outline – STAT 310**

**Title:** Intermediate Statistics

**Number of Credits:** 3

**Catalog Description:** A second course in statistics covering regression, measures of association, and analysis of variance. Interpretation of computer output and applications will be emphasized throughout. Prerequisites: STAT 110, STAT 210, STAT 303, STAT 305, PSY 231, or ECON 222. MEETS: Writing Intensive

**Possible Textbooks:**

* *Buntinas and Funk, Statistics for the Sciences, latest edition.*
* *Mendenhall and Sincich, Statistics for Engineering and the Sciences, latest edition.*
* *Moore and McCabe, Introduction to the Practice of Statistics, latest edition*

**Topics Covered:**

1. Types of Studies
2. Review of Descriptive Statistics
3. Review of Basic Statistical Inference
   1. Comparing two population means using dependent samples (paired t-test and CI)
   2. Comparing two population means using independent samples (two sample t-test and CI)
4. Comparing Several Population/Treatment Means
   1. One-way ANOVA
   2. Kruskal-Wallis (nonparametric alternative)
   3. Multiple comparison procedures (e.g., Tukey-Kramer and Dunnett's procedures)
   4. Two-Way ANOVA (including discussion of interaction)
   5. Randomized complete block design and analysis
5. Simple Linear Regression
   1. Correlation
   2. Simple linear regression: basic idea and model
   3. Inference for regression
   4. Checking model assumptions
6. Multiple Regression
   1. Basic idea and model
   2. Inference for multiple regression
   3. Checking model assumptions
   4. Model selection
7. Analysis of Covariance (ANCOVA)
8. Contingency Table Analysis
   1. Analysis of 2 X 2 Tables (Fisher's exact test, Mantel-Haenszel Test, McNemar's test)
   2. Analysis of r x c Tables
9. Logistic Regression
   1. Basic idea and model
   2. Inference for multiple regression
   3. Model selection
10. Repeated Measures Analysis
11. Tools for Summarizing Multiple Responses
    1. Graphical Methods
    2. Principal components and factor analysis

**Listing of Sections to be Covered:** Not applicable to this course, since there is no standard textbook. Chosen sections of any text should correspond to the topics outlined above.

**Remarks:** None.

**Approximate Pace of Coverage:** Not Applicable.

**Method of Instruction:** Methods may include lecture, case studies, discussion, group work, problem solving sessions, computer sessions, and discussion of computer output.

**Evaluation Procedure:** Assessments will vary in style and may include written exams, quizzes, homework assignments, and group projects.

**Minnesota Transfer Curriculum:** Writing Intensive

* Practice the processes and procedures for creating and completing successful writing in their fields.
* Understand the main features and uses of writing in their fields.
* Adapt their writing to the general expectations of readers in their field.
* Make use of technologies commonly used for research and writing in their fields.
* Learn the conventions of evidence, format, usage, and documentation in their fields.

**MnSCU Learning Outcomes:**

* This course will promote a student’s ability to identify research questions that may be answered using various statistical methods and to translate these questions into the appropriate analysis procedure.
* This course will promote a student’s ability to model and solve real-world problems, as well as understand the limitations of models in making predictions and drawing conclusions.
* This course will promote a student’s ability to recognize underlying model assumptions and employ methods for checking these assumptions.
* This course will promote a student’s ability to analyze data and summarize the results in a meaningful way.
* This course will promote a student’s ability to use appropriate technology to carry out analyses.

**Possible Computer Software:**

* JMP
* SPSS
* R

**Last Revised:** Spring 2014 by the Statistics Subgroup.