WINONA STATE UNIVERSITY

COLLEGE OF SCIENCE AND ENGINEERING

DEPARTMENT OF MATHEMATICS AND STATISTICS

**Course Outline – STAT 305**

**Title:** Biometry

**Number of Credits:** 3

**Catalog Description:** Introduction to statistics and quality control concepts and techniques. Topics include graphical techniques, descriptive statistics, probability distributions, hypothesis testing, control charts, process capability studies, and additional topics in total quality management. Prerequisite: MATH 212 – Calculus I. Note: Credit will not be given for both STAT 210 and STAT 303.

**Possible Textbooks:**

* *Foundations and Applications of Statistics,* Pruim, 1st edition, 2011, AMS

**Topics Covered:**

1. Overview of Statistical Methods in Engineering
2. Descriptive statistics
   1. Graphs for univariate and bivariate data
   2. Measures of central tendency
   3. Measures of variability
   4. Measures of relative standing
3. Introductory probability
4. Important distributions
   1. Binomial and Poisson distributions
   2. Normal distribution
5. Sampling distributions
6. Estimation
   1. Point estimation and desirable properties
   2. Interval estimation
7. Common hypothesis testing situations and interval estimates
   1. One sample proportion
   2. One sample test of the mean
   3. Two sample test of the mean - independent samples
   4. Two sample test of the mean - dependent samples
8. Introduction to control charts
9. Statistical basis
10. Types of charts
    1. X-Bar
    2. Rand S
    3. C and P
11. Introduction to process capability analysis
    1. Graphical
    2. Process capability ratios
12. Overview of Design of Experiments
13. Simple linear regression

**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 work.

**Minnesota Transfer Curriculum:** None

**MnSCU Learning Outcomes:**

* This course will promote a student’s ability to collect the right data to answer a question in engineering design or solve a problem in manufacturing processes.
* This course will promote a student’s ability to apply the best testing methods to collected data for the purpose of gaining information and making inferences.
* This course will promote a student’s ability to interpret the results of statistical tests.
* This course will promote a student’s ability to obtain overview knowledge of engineering / analytical tools including statistical process control and design of experiments.

**Possible Computer Software:**

* JMP
* Minitab
* R

**Last Revised:** Fall 2012 by the Statistics Subgroup.