

**SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY  
SAULT STE MARIE, ON**



**COURSE OUTLINE**

**Course Title: INTRODUCTORY STATISTICS**

**Code No., MTH 256-4 (MTH209/210)    Semester: III**

**Program: PULP & PAPER/WATER RESOURCES/  
ENVIRONMENTAL ENGINEERING**

**Author: Subhash Verma, P.Eng**

**Date: July 1998**

**Previous Outline Date: August 1996**

**Approved: \_\_\_\_\_**

**Dean**

**ate**

**Total Credits: 4**

**Prerequisite(s): MTH 120**

**Length of Course: 16 wks**

**Total Credit Hours: 64**

**Copyright © 1997 The Sault College of Applied Arts & Technology**  
*Reproduction of this document by any means, in whole or in part, without the prior written permission of The Sault College of Applied Arts & Technology is prohibited. For additional information, please contact Kitty DeRosario, Dean, School of Trades & Technology Studies, (705) 759-2554, Ext. 642.*

## I. COURSE DESCRIPTION:

This course will help the student to develop an understanding of statistical techniques and procedures by solving statistical problems. The student will be able to carry out basic statistical tasks and better understand the use of statistics in industry. An introduction to Minitab software will help the student make use of the computer to complete statistical problems.

## n. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

(Generic Skills Learning Outcomes placement on the course outline will be determined and communicated at a later date.)

Upon successful completion of this course the student will demonstrate the ability to:

## 1) Frequency Distribution and Graphs

Potential Elements of the Performance:

- State a definition of statistics.
- Differentiate between the two major fields of statistics:
  - Descriptive Statistics
  - Inferal Statistics
- Construct and analyze various graphical representations of data including the histogram, bar graph, fi'equency polygon, circle graph
- Use such terms as fi'equency, class mark, relative fi'equency, data array, sample, population, class limits

## 2) Measures of Central Tendency

Potential Elements of the Performance:

- Use summation notation, 2.
- Use measures of central tendency to explain and use the mean, median and mode for both grouped and ungrouped data.

n. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE  
(Continued)

3) Measures of Dispersion

Potential Elements of the Performance:

- Name the measures of absolute dispersion, relative dispersion and symmetry
- Compute such measures as the range, the average deviation and the standard deviation
- Compute the measure of relative dispersion including coefficient of variation, percentile and z-score
- Interpret standard deviation
- Compute coefficient of skewness and discuss symmetry of a distribution

4) Probability

Potential Elements of the Performance:

- Define probability and understand how to find it
- Define the terms sample space, outcome and event
- Use factorial notation
- Find the number of outcomes of an experiment using counting rules, including permutations and combinations

5) Rules of Probability

Potential Elements of the Performance:

- Distinguish the terms probability and empirical probability
- Use the addition rule to determine the probability of either event A, event B or both happening simultaneously
- Determine whether particular events are mutually exclusive or inclusive
- Determine the conditional probability when events A and B are dependent events
- Apply the multiplication rule for determining the joint probability of independent events

IL LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE  
(Continued)

6) Discrete Probability Distributions

Potential Elements of the Performance:

- Describe what a random variable is and explain the difference between a discrete random variable and a continuous random variable
- Describe what is meant by a probability formula
- Write the binomial probability formula and know how and when to apply it
- Write the Poisson probability formula and know how and when to apply it

7) Normal Distribution

Potential Elements of the Performance:-

- Identify the properties of normal and standard normal distribution
- Find the area under the standard normal distribution
- Find the probabilities for a normally distributed variable by transforming it into a standard normal variable
- Find the corresponding data value for a specific probability/percentage
- Use the normal approximation to compute probabilities for a binomial variable

8) Sampling Distribution

Potential Elements of the Performance:

- Define a random sample and how it is obtained
- Form a sampling distribution for small populations ( $N < 6$ )
- Calculate  $\bar{J}$  and  $\sigma_{\bar{J}}$  from the sampling distribution
- Write the Central Limit Theorem and apply it to practical problems

n, LEARNEVG OUTCOMES AND ELEMENTS OF THE PERFORMANCE  
(Continued)

9) Estimation

Potential Elements of the Performance:

- State the difference between a point estimate and an interval estimate
- Provide a point estimate for  $\mu$ ,  $\sigma$  and  $p$
- Provide an interval estimate for  $\mu$ ,  $\sigma$  and  $p$
- Estimate the required sample size for a predetermined sampling error

10) Linear Outcomes and Elements of the Performance

Potential Elements of the Performance:

Explain what is meant by linear regression

Define such words as independent variable, dependent variable, linear and non-linear relationship, slope and y-intercept of a straight line

Find and write the estimated regression equation using two variables

State whether a linear relationship exists between two variables, using correlation analysis and determine the strength of the relationship

Determine the standard error of estimate

Transform non-linear equations into linear equations

**m. TOPICS:**

1. Frequency Distribution and Graphs

- 1.0 Introduction
- 1.1 Collecting Data
- 1.2 Data Array
- 1.3 Frequency Distribution
- 1.4 Graphical Techniques

m. TOPICS (Continued):

Measures of Central Tendency

- 2.0 Introduction
- 2.1 Measures of Central Tendency
- 2.2 Symmetry and Skewness

Measures of Dispersion

- 3.0 Introduction
- 3.1 Absolute Measures of Dispersion
- 3.2 Interpretation of the Standard Deviation  
Chebyshev's Theorem
- 3.3 Relative Measures of Variation
- 3.4 Symmetry/Skewness

Probability

- 4.0 Introduction
- 4.1 Definition of Probability
- 4.2 Counting Rules
- 4.3 Mathematical Odds
- 4.5 Combinations and dependent and independent events

Rules of Probability

- 5.0 Introduction
- 5.1 Probability Rules

ni. TOPICS (Continued):

Discrete Probability Distributions

- 6.0 Introduction
- 6.1 Random Variables
- 6.2 Binomial Distribution
- 6.3 Poisson Distribution
- 6.4 Parameters of Binomial Distribution
- 6.5 Poisson Approximation to Binomial

Normal Distribution

- 7.0 Introduction
- 7.1 Normal Curve
- 7.2 Area Under the Curve
- 7.3 Standard Normal Curve
- 7.4 Approximating the Binomial Distribution using the Normal Distribution

8. Sampling Distribution

- 8.0 Introduction
- 8.1 Selecting a Random Sample
- 8.2 Sampling Distribution of the Means
- 8.3 The Central Limit theorem

Estimation

- 9.0 Introduction
- 9.1 Point Estimates
- 9.2 Interval Estimates
- 9.3 Determination of Sample Size

m. TOPICS (**Continued**):

10. Linear Regression and Correlation Analysis

- 10.0 Introduction
- 10.1 Scatter Diagram
- 10.2 Coefficient of Correlation
- 10.3 The Linear Regression Equation
- 10.4 Standard Error of Estimate
- 10.5 Interval Estimate for Prediction
- 10.6 Coefficient of Determination
- 10.7 Non-Linear Equations

**IV. REQUIRED RESOURCES/TEXTS/MATERIALS:**

Elementary Statistics, 1997, 3<sup>rd</sup> edition, A. Bluman (McGraw Hill)

Course Manual, 1998, S. Verma, Sault College, Sault Ste. Marie, Ontario

Minitab Handbook, Ryan I. Joiner, 3<sup>rd</sup> edition, Duxbury Press, Belmont, California

**V. EVALUATION PROCESS/GRADING SYSTEM**

**The student's final mark for this course will be based on the following:**

<b>MiniTab Lab Work</b>	<b>30%</b>
<b>Mid Term Test</b>	<b>20%</b>
<b>End Term Tests</b>	<b>30%</b>
<b>Quiz</b>	<b>20%</b>

**Grades reported on your transcript are based on an average of test scores on the following basis:**

<b>A+</b>	<b>90 - 100%</b>
<b>A</b>	<b>80 - 89%</b>
<b>B</b>	<b>70 - 79%</b>
<b>C</b>	<b>60 - 69%</b>



EVALUATION PROCESS/GRADING SYSTEM (Continued):

A term test will be held at the end of each major segment of the course.

**All** tests are scheduled in advance. Hence, attendance is mandatory. Unexcused absence from a test will result in a mark of zero for that test. A student may be prevented from attending a test by illness or bereavement. Upon return to classes, the student must see the instructor at the end of the first class attended to arrange a time and place for a make up test. In addition, if the absence is due to illness, the student must present a note from the student's doctor or from the College nurse.

VI. SPECIAL NOTES:

- Special Needs  
If you are a student with special needs (eg. physical limitations, visual impairments, hearing impairments, learning disabilities), you are encouraged to discuss required accommodations with the instructor and/or contact the Special Needs Office, Room E1204, Ext. 493, 717, 491 so that support services can be arranged for you.
- Retention of Course Outlines  
It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other post-secondary institutions.
- Substitute Course Information is available at the Registrar's Office.

Vn. **PRIOR LEARNING ASSESSMENT**

Students who wish to apply for advanced credit in the course should consult the instructor.

