





APPLIED STATISTICS

PPE 345

COURSE NAME

COURSE NUMBER

**I. COURSE DESCRIPTION:**

**Applied Statistics is a problem-solving course in which the software program "MINITAB" is used. The course provides the student with an opportunity to become more familiar with the application of statistics in research methods and statistical process control. Most of the Problems are or can be applied directly to the student's main field of study. In addition, many student will be able to apply what they learn in this course to the manipulation of data collected while doing their technical project.**

**H. 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) Probability Distribution

Potential Elements of the Performance:

- Compute the probabilities in a binomial probability distribution
- Use the table of area for the standard normal probability curve to determine probabilities for a normal distribution
- Compute the probabilities using Poisson's probability distribution
- Approximate binomial distribution using normal distribution

## 2) Estimation

Potential Elements of the Performance:

- Compute the mean and standard deviation of sampling distribution
- Compute interval estimates using Z tables
- Understand when and how to use t-distribution
- Construct interval estimate of population percentages
- Determine appropriate sample size

**H. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE  
(Continued)**

## 3) Hypothesis Testing

Potential Elements of the Performance:

- State the null and alternate hypothesis in a mathematical manner and also in a sentence
- Analyze data and reject or accept  $H_0$
- Identify the two errors that can be made using sample data to accept or reject  $H_0$
- Use the correct statistical analysis for a given set of data

## 4) Regression and Transformations

Potential Elements of the Performance:

- Calculate the regression line for the parameters, determine the residuals, and analyze these residuals for simple relationships
- Apply the same technique to data, using multiple regression
- Transform the data, using simple transformations and polynomials

## 5) Chi-Square and Contingency Tables

Potential Elements of the Performance:

- Present chi-square tests which provide the basis for testing whether more than two populations can be considered as equal
- Develop contingency tables of given data, and subject this data to chi-squares
- Analyze expected frequencies, and determine perform goodness of fit test

**H. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE  
(Continued)**

## 6) Analysis of Variance

Potential Elements of the Performance:

- Explain the purpose of analysis of variance
- Read the value of F from table
- Analyze several sample means using single Factor Analysis of Variance
- Set up ANOVA tables, determine F and subject to this value to critical analysis

## 7) Quality Control

Potential Elements of the Performance:

- Explain the purpose of statistical process/quality control
- Construct  $\bar{x}$ -average and Range chart
- Determine if the process is out of control

**HL TOPICS:**

## 1. Probability Distributions (Review)

- 1.1 Probability rules
- 1.2 Binomial distribution
- 1.3 Normal distribution
- 1.4 Poisson's distribution
- 1.5 Approximation to binomial

## 2. Estimation (Review)

- 2.1 Sampling distribution
- 2.2 Point estimate and interval estimate
- 2.3 Z-interval and t-interval
- 2.4 Sample size

**HI. TOPICS (Continued)**

3. Hypothesis Testing (One-Sample)
  - 3.1 Steps in hypothesis testing
  - 3.2 Z-tests
  - 3.3 t-tests
4. Hypothesis Testing (Two-Sample)
  - 4.1 Paired data
  - 4.2 Independent samples
  - 4.3 Testing regression coefficients
5. Hypothesis Testing (Proportions)
  - 5.1 Single-sample
  - 5.2 Two-sample
6. Chi-Square Analysis
  - 6.1 An overview
  - 6.2 Goodness of fit
  - 6.3 Contingency tables
7. Analysis of Variance
  - 7.1 Assumptions
  - 7.2 Procedure
  - 7.3 One way ANOVA
8. Statistical Process Control
  - 8.1 Process variation
  - 8.2 Control chart
  - 8.3 Constructing control chart
  - 8.4 X-bar control chart
  - 8.5 R-control chart
  - 8.6 Process capability

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## IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Minitab Software - student version

Statistics Text from MTH 256 - "Elementary Statistics" by Bluman, 3<sup>rd</sup> ed. McGraw-Hill (1997)

Course Manual by S. Verma

## V. EVALUATION PROCESS/GRADING SYSTEM

90% - A+

Mid Term - 30

80% - A

Lab Work - 30

70% - B

Final Test - 40

60% - C

Based on the following:

Tests (including a mid-term)

Assignments &amp; Quizzes

Theory 50%

Minitab 50%

Applied Statistics is a continuation of MTH 256. The student is introduced to hypothesis testing, multiple regression, chi-square, analysis of variance and process control. In addition to a hand calculator, MINITAB software is extensively used to do statistical analysis.

**ATTENDANCE:** It is expected that all students at this level will have regular Attendance (80%) of all theory classes and that any missed computer time will be made up by the student. Additional hours on the terminal will be required outside of those regularly scheduled.

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**VL 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
- Your instructor reserves the right to modify the course as he/she deems necessary to meet the needs of students.

**VH. PRIOR LEARNING ASSESSMENT**

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