

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY  
SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title: APPLIED STATISTICS  
Code No. PPE 345-4  
Program: WATER RESOURCES/PULP AND PAPER ENGINEERING TECHNOLOGY  
Semester: FIVE  
Date: MAY 1988  
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New:

Revision: X

APPROVED:

vK—Swt—●  
Chairperson

/QiiQcis/- -a/yy  
Date

APPLIED STATISTICS

PPE 345-4

Course Name

Course Number

Prerequisite: MTH 255

PHILOSOPHY/GOALS:

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 mainframe computer. Most of the problems are or can be applied directly to the student's main field of study. In addition, many students will be able to apply what they learn in this course to the manipulation of data collected while doing their technical project.

METHOD OF ASSESSMENT (GRADING METHOD):

90%	A+
80%	A
70%	B
60%	C

		Approx. Weight
Based on the following:	Tests (including a mid-term)	)
	Assignments & Quizzes	) 90%
	SPC Test	10%

Applied Statistics is a continuation of MTH 255. The student is introduced to hypothesis testing, multiple regression, chi-square and analysis of variance. In addition to calculations done using a hand calculator, extensive work using MINITAB software program is required.

A number of assignments are required (approximately 15-20) of which certain ones are to be submitted for marking. These assignments contribute to the term work. A mid-term test, as well as additional short tests and quizzes complete the evaluation.

The following outline is keyed to MINITAB Handbook, 2nd Edition, and uses any standard statistics text as a supplement.

Approximately 10 hours will be spent on the study of Statistical Process Control (SPC). This section will be tested by a single test near the end of the semester.

Students will have the option to write a final to achieve a "C" grade or raise their grade. The final mark will be 50% of the overall grade, while the term work will account for the remaining 50%. A student having selected the option will have his/her grade based on the above and may, in fact, lower their final grade by doing poorly on the final.

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.

TEXTBOOKS;

Minitab Student Handbook, 2nd Edition. Ryan, Jorner, Ryan, Duxbury Press (1985)

Statistics Text from MTH 255 - Statistics & Probability in Modern Life, 3rd Edition. Newmark, Saunders (1982)

SPC Notes from Instructor (OCAPT #2, #3, #4, #5, #7, #9, #10, #11, #12)

APPLIED STATISTICS (PPE 345-4)

## COURSE OUTLINE:

1. Introductory MINITAB commands including MEAN, MEDIA, STANDARD DEVIATION, etc.
2. Plotting data, including log plots
3. Manipulation of data using MINITAB commands such as OMIT, CHOOSE, PICK, JOIN, SAVE, etc.
4. Confidence intervals for  $\bar{x}$ .
5. Test of hypotheses for  $JUL^*$
6. Comparing two means, paired t-test TWOS.
7. Application to simple hydraulic problems.
8. Analysis of chemical data.
9. Correlation and simple, regression, fitting a straight line.
10. Multiple regression, interpreting residuals.
11. Transformations.
12. Analyses of variance using AOVO.
13. CHI-SQUARE TESTS AND CONTINGENCY TABLES.
14. Additional problems using combination of the above.
15. Statistical Process Control - including control charts,  $(\bar{X} + R)$  histograms, percentage out of specification, capability concept, p-chart, interpretation of control charts.

Minitab Chapters (RJR)  
5,6,7,8,9,10,11,12

Newmark Chapters  
6,10,12,13,14

**OBJECTIVES**Analysis of Variance

1. To analyze several sample means using Single Factor Analysis of Variance.
2. To set up ANOVA tables, determine  $F_{exp}$  and subject this value to critical analysis.
3. To analyze data using two-way analysis of variance.

Chi-Square and Contingency Tables

1. To present chi-square tests which provide the basis for testing whether more than two populations can be considered as equal.
2. To develop contingency tables of given data, and subject this data to chi-square.
3. To analyze expected frequencies, and determine  $\chi^2_{exp}$ , and subject this value to critical analysis.

Correlation, Regression and Transformations

1. To determine if there is a relationship between two parameters.
2. To calculate the value of  $r$ , and determine the reliability of this value.
3. To calculate the regression line for the parameters, determine the residuals, and analyze these residuals for simple relationships.
4. To apply the same technique to data, using multiple regression.
5. To transform the data, using simple transformations and polynomials.

Hypothesis testing

1. To state the null and alternate hypothesis in a mathematical manner and also in a sentence.
2. To analyze data and reject or accept  $H_0$ .
3. To identify the two errors that can be made using sample data to accept or reject  $H_0$ .
4. To use the correct statistical analysis for a given set of data.