

I. COURSE DESCRIPTION:

Students will study statistical thinking. Topics include descriptive statistics including graphing, measures of central tendency and dispersion, probability sampling, estimation and regression analysis. Applied problems are solved. Students will also study basic aspects of cryptography, data compression, and error checking and recovery.

II. STUDENT PERFORMANCE OBJECTIVES:

The basic objectives are that the student develop an understanding of the methods studied, demonstrate a knowledge of the facts presented and show an ability to use these in the solution of problems. To accomplish these objectives, exercises are assigned. Test questions will be of near equal difficulty to questions assigned in the exercises. The level of competency demanded is the level required to obtain an overall passing average on the tests. The material to be covered is listed below.

III. TOPICS TO BE COVERED:

APPROXIMATE TIME FRAME

Statistics

24 periods

1. Variables and Graphs
2. Measures of Central Tendency and Dispersion
3. Elementary Probability Theory
4. Binomial, Normal, and Poisson Distributions
5. Elementary Sampling Theory
6. Statistical Estimation Theory
7. Statistical Decision Theory
8. Small Sampling Theory
9. The Chi Square Test
10. Curve Fitting and the Method of Least Squares
11. Correlation Theory

Cryptography

17 periods

1. Logarithms and Exponents
2. Modular Arithmetic
3. Factoring
4. Discrete Logarithms
5. Cryptography Fundamentals
6. One Way and Hash Functions
7. DES and Symmetric Keys
8. RSA and Public Keys
9. CAST
10. IDEA
11. DSA

III. TOPICS TO BE COVERED (continued):

Error Checking and Correction

4 periods

1. Parity
2. Vertical and Longitudinal Redundancy Checking
3. Cyclic Redundancy Checking
4. Checksums
5. Hamming Codes

Data Comparison

3 periods

1. Entropy Encoding
2. Source Encoding

IV. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

1. Statistics

a) Variables and Graphs – Chapter 1, pp. 1-10

Potential Elements of the Performance:

- Distinguish between inferential and descriptive statistics
- Distinguish between discrete and continuous variables
- Display data graphically

b) Measures of Central Tendency – Chapter 2, pp. 11-19

Potential Elements of the Performance:

- Identify and use various measures of central tendency and dispersion

c) Elementary Probability Theory – Chapter 3, pp. 20-31

Potential Elements of the Performance:

- Use basic rules of probability

d) Binomial, Normal, and Poisson Distributions – Chapter 4, pp. 32-37

Potential Elements of the Performance:

- Use various distributions to solve basic problems

e) Elementary Sampling Theory – Chapter 5, pp. 38-44

Potential Elements of the Performance:

- Understand basic sampling and distributions

**IV. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE
 (continued):**

f) Statistical Estimations Theory – Chapter 6, pp. 45-51

Potential Elements of the Performance:

- Use point estimates and confidence intervals

g) Statistical Decision Theory – Chapter 7, pp. 52-60

Potential Elements of the Performance:

- Conduct various tests of hypotheses

h) Small Sampling Theory – Chapter 8, pp. 61-68

Potential Elements of the Performance:

- Use techniques involving small samples

i) The Chi Square Test – Chapter 9, pp. 69-75

Potential Elements of the Performance:

- Use the Chi Square test

j) Curve Fitting and Least Squares – Chapter 19, pp. 76-84

Potential Elements of the Performance:

- Do basic curve fitting

k) Correlation Theory – Chapter 11, pp. 85-95

Potential Elements of the Performance:

- Determine correlation between sets of data

2. Cryptography

a) Logarithms and Exponents – Class notes

Potential Elements of the Performance:

- Use logarithms in problem solving
- Switch between logarithm and exponential form
- Change bases

b) Modular Arithmetic – Class notes

Potential Elements of the Performance:

- Use basic modular arithmetic

**IV. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE
(continued):**

c) Factoring – Class notes

Potential Elements of the Performance:

- Understand basic factoring

d) Discrete Logarithms – Class notes

Potential Elements of the Performance:

- Calculate discrete logarithms

e) Cryptography Fundamentals – Class notes

Potential Elements of the Performance:

- Understand some aspects of network security

f) One Way and Hash Functions – Class notes

Potential Elements of the Performance:

- Understand one-way functions
- Use simple hash functions

g) DES and Symmetric Keys – Class notes

Potential Elements of the Performance:

- Understand symmetric key protocol
- Understand DES algorithms

h) RSA Public Keys – Class notes

Potential Elements of the Performance:

- Understand public key protocols
- Understand RSA algorithm

i) CAST – Class notes

Potential Elements of the Performance:

- Understand CAST algorithm

j) IDEA – class notes

Potential Elements of the Performance:

- Understand IDEA algorithm

**IV. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE
(continued):**

k) DSA – Class notes

Potential Elements of the Performance:

- Understand DSA algorithm

3. Error Checking and Correction

a) Parity – Class notes

Potential Elements of the Performance:

- Understand parity checking

b) Vertical and Longitudinal Redundancy Checking – Class notes

Potential Elements of the Performance:

- Understand longitudinal and vertical redundancy checking

c) Cyclic Redundancy Checking – Class notes

Potential Elements of the Performance:

- Understand basic cyclic redundancy checking

d) Checksums – Class notes

Potential Elements of the Performance:

- Understand basic checksums

e) Hamming Codes – Class notes

Potential Elements of the Performance:

- Understand Hamming codes

4. Data Compression

a) Entropy Encoding – Class notes

Potential Elements of the Performance:

- Understand various techniques for lossless compression
- Understand basics of lossy compression

V. REQUIRED RESOURCES / TEXTS / MATERIALS:

1. Texts: Statistics: Schaum's Easy Outline, McGraw Hill
2. Calculator: (Recommended) SHARP Scientific Calculator EL-531G. *Note: The use of some kinds of calculators may be restricted during tests.*

VI. EVALUATION PROCESS/GRADING SYSTEM:**MAJOR ASSIGNMENTS AND TESTS**

While regular tests will normally be scheduled and announced beforehand, there may be an unannounced test on current work at any time. Such tests, at the discretion of the instructor, may be used for up to **30%** of the overall mark.

At the discretion of the instructor, there may be a mid-term exam and there may be a final exam, each of which can contribute up to **30%** of the overall mark.

The instructor will provide you with evaluation information for your class section. Tests may be scheduled out of regular class time.

ATTENDANCE

It is your responsibility to attend all classes during the semester. Research indicates there is a high correlation between attendance and student success.

If you are absent from class, it is your responsibility to find out what work was covered and assigned and to complete this work before the next class. Your absence indicates your acceptance of this responsibility.

Unexcused absence from a test may result in a mark of zero ("0"). Absence may be excused on compassionate grounds such as verified illness or bereavement. On return from an excused absence, you should ask your instructor to schedule the writing of a make-up test. Failure to do so will be considered as an unexcused absence.

VI. EVALUATION PROCESS/GRADING SYSTEM (continued):**METHOD OF ASSESSMENT (GRADING METHOD)**

<u>Grade</u>	<u>Definition</u>	<u>Grade Point Equivalent</u>
A+	Consistently outstanding (90% - 100%)	4.00
A	Outstanding achievement (80% - 89%)	3.75
B	Consistently above average achievement (70% - 79%)	3.00
C	Satisfactory or acceptable achievement in all areas subject to assessment (60% - 69%)	2.00
R	Repeat - The student has not achieved the objectives of the course, and the course must be repeated. (less than 60%)	0.00
CR	Credit exemption	
X	A temporary grade, limited to situations with extenuating circumstances, giving a student additional time to complete course requirements	

The method of calculating your weighted average will be defined by your instructor. Since grades are based upon averages, it follows that good marks in some tests can compensate for a failing mark in another test.

Make-Up Test (if applicable)

An "X" grade may be assigned at the end of the regular semester if you have met ALL of the following criteria:

- an overall average between 50% and 59% was achieved
- at least 50% of the tests were passed
- at least 80% of the scheduled classes were attended
- at least 80% of quizzes and assignments were submitted
- all of the topic tests were written

If you are assigned an "X" grade, you may convert it to a "C" grade by writing a make-up test on topics agreed to by the instructor. This test will be available at the time agreed to by your instructor.

At the end of the regular term, it is your responsibility to obtain your results from your instructor and, in the event of an "X" grade, to inquire when the make-up test will be available.

The score you receive on this make-up test will replace your original test score and be used to re-calculate your weighted average. If the re-calculated average is 60% or greater, a "C" grade will be assigned. If the re-calculated average is 59% or less, an "R" grade will be assigned.

VI. EVALUATION PROCESS/GRADING SYSTEM (Continued):**“R” and “X” Grades at the end of the Semester**

If an “X” grade is not cleared by the specified date, it will become an “R” grade. Except for extenuating circumstances, an “X” grade in Math will not be carried into the next semester.

“R” Grades during the Semester

A student with a failing grade and poor attendance (less than 80% attendance) may be given an “R” at any time during the semester.

VII. SPECIAL NOTES:

Students with special needs (e.g. physical limitations, visual impairments, hearing impairments, learning disabilities), are encouraged to discuss required accommodations with the professor and/or contact the Special Needs Office.

Advanced Standing

Students who have completed an equivalent post-secondary course must bring relevant documents to the Coordinator, Mathematics Department:

- a copy of course outline
- a copy of the transcript verifying successful completion of the equivalent course

Note: A copy of the transcript must be on file in the Registrar’s Office.

VIII. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in the course should consult the instructor or the Prior Learning Assessment Office (E2203).