SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE: INTRODUCTION TO TECHNOLOGY I

CODE NO.:   TEC 100

PROGRAM: General Arts & Science - Pre-Engineering

SEMESTER: One

DATE: <u>May 1988</u>

AUTHOR: G. DISANO

NEW: X   *REVISION:*

APPROVED • **^d̸t̸** ̸̸̸̸̸̸̸̸

^c^/o^

Date

INTRODUCTION TO TECHNOLOGY I   TEC 100
   Course Name   *Course Number*

PHILOSOPHY/GOALS: This course will introduce the student to a
                  number of concepts that form the foundation
   for an understanding of many technology programs. The
   student will be given a review of the basic ideas of
   technical physics and then exposed to the fundamentals of
   applied mechanics and an introduction to BASIC programming.
   The course will allow the student an opportunity to view a
   number of technology programming activities.

METHOD OF ASSESSMENT (GRADING METHOD):

             See attached sheet: GRADE REQUIREMENTS

TEXTBOOK(S): BASIC TECHNICAL PHYSICS
          by Paul E. Tippens

OBJECTIVES:

             See attached sheets: SPECIFIC OBJECTIVES

TEClOO

Introduction to Technology I

(General Arts & Science - Pre-Engineering)

Your final grade in TEClOO will be determined on the basis of four tests to be administered during the semester. Each test will examine your knowledge of a number of topics and will be administered within a week of completing those topics. The topics covered in each of the four tests are as follows:

Test #1————Topic Number I

Test #2——Topic Number II 1 & 2

Test #3———Topic Number II 2 & 3

Test #4———Topic Number III

The four tests are of equal weight (i.e. each of the four tests is worth 25% of your final grade). As a result, provided you have received a passing grade in each of the four tests, your final grade will simply be an average of your four test results. In order to obtain your letter grades the following percentage-letter grade equivalents will be used:

A+   90% - 100% (Consistently outstanding achievement)

A   76% - 89% (Outstanding achievement)

B   ' 66% - 75% (Consistently above average achievement)

C   . 55% - 65% (Satisfactory or acceptable achievement)

X or R   0% - 54% (Incomplete or Repeat)

If your final average is below 55%, or if you have received a failing grade in one or more of the four tests, whether you receive an X (Incomplete) or an R (Repeat) grade is entirely up to the instructor's discretion. The decision will be based upon your final average (e.g. 32% would result in an 'R' grade while 50% might result in an 'X' grade); your attendance during the semester; your attitude while in the classroom; your perceived level of effort during the semester; etc..

In any case, should you find yourself with an X grade at the end of the semester, in order to upgrade your mark to a passing grade you will be required to write a make-up examination covering the entire course content. Should you receive a passing grade on the make-up examination (55% or higher) your grade will be upgraded. The best you can do after receiving an X grade as a result of a failing average is a C! If you were required to write the make-up exam as a result of having failed one test you may substitute the examination result for this test result.

Prior to administering any test, you will be notified a full week in advance. Should you for any reason not be able to be in attendance on a day for which a test has been scheduled it is your responsibility to notify the instructor prior to the test! If your reasons are acceptable a date will be set during which you may write a substitute test for the one you have missed.

G. Disano, May 1988

COURSE OUTLINE

TEC100

INTRODUCTION TO TECHNOLOGY I

Suggested Text: <u>BASIC TECHNICAL PHYSICS</u>
                 by Paul E. Tippens

TOPIC NO.	*PERIODS*	*TOPIC DESCRIPTION*	*REFERENCE*

<u>Review of Basic Concepts of Technical Physics</u>

	5	<u>Technical Measurement</u>	Chapter 2

- scientific notation
- systems of units
- base quantities and base units
- S.I. prefixes and their abbreviations
- derived quantities and derived units
- conversion of units of measure
- the distinction between mass and weight
- standard gravitational acceleration
- unit analysis
- measuring instruments

	4	<u>Forces</u>	Chapters 3 & 4

- vector and scalar quantities
- the addition of vectors
- forces
- Newton's first law of motion
- Newton's second law of motion
- Newton's third law of motion

	5	<u>Temperature, Heat and Expansion</u>	Chapters 13 & 14

- temperature and thermal energy
- the measurement of temperature
- absolute zero
- temperature scales
- linear expansion
- quantity of heat
- change of phase
- heat transfer

	4	<u>The Gas Laws and Thermodynamics</u>	Chapter 15

- Boyle's law
- Charles' law
- Gay-Lussac's law
- the general gas law
- heat and work

- program format
        - the END statement
        - line numbers
- BASIC commands
  \   - the RUN command
          - the LIST command
          - the SAVE command
          - the OLD, NEW & SCRATCH commands
          - the UNSAVE command
          - the EDIT command
          - the HELP command
          - the DELETE command
- providing program data
          - the ASSIGNMENT statement
          - variable names
          - the INPUT statement
          - the READ and DATA statements
- documentation
          - the PRINT statement
          - the REM statement
          - the exclamationvpoint

Tour of the Computer Engineering Technology
classrooms, laboratories and activities

G. Disano, May 1988

<u>T6ur ot the Architectural Technology classrooms,</u>
<u>drafting rooms and activities</u>

II   <u>Fundamentals of Applied Mechanics</u>

1   6   <u>Force Systems - Statics</u>   Chapters 3, 4 & 5

                 - the 'free-body' diagram
                 - the resultant of two or more forces
                 - the 'moment' of a force
                 - the principle of moments
                 - solution of equilibrium problems
                 - centre of gravity

2   6   <u>Accelerated Motion - Dynamics</u>   Chapter 6

                 - speed and velocity
                 - uniformly accelerated motion
                 - gravity & freely falling bodies
                 - 'normal' acceleration

3   6   <u>Work, Energy and Power</u>   Chapter 8

                 - the concept of work
                 - energy
                 - potential energy
                 - kinetic energy
                 - conservation of energy
                 - power
                 - efficiency

      <u>Tour of the Mechanical Engineering Technology</u>
      <u>classrooms, laboratories and activities</u>

      <u>Tour of the Machine Shop classrooms, shops</u>
      <u>and activities</u>

III   <u>IntroducfSpn to BASIC Programming</u>

1   3   <u>Introduction to Computers</u>   Chapter 1 VAX BAS

                 - What, is a computer?
                 - 'logging in'
                 - the PR^i;!' statement
                        - th^ comma
                        - the "semi-colon
                 - mistakes   x
                 - 'logging off

Topic Number I   <u>Review of Basic Concepts of Technical Physics</u>

Sub-Topic Number 1   <u>Technical Measurement</u>

The student will be able to:

- write measurements, both large and small/ in
  scientific notation.

- name the three systems of units.

- state the three 'base quantities' from which all
  other quantities are derived and name the units
  for each of the base quantities along with their
  proper abbreviations in each of **the three systsma** .
  of units.

- list the S.I. prefixes along with their proper
  abbreviations and state the mathematical meaning
  of each.

- explain what is meant by a 'derived quantity'
  and list several examples of derived quantities
  along with their proper abbreviations,

- convert units of measurement from one system of
  units to another given the appropriate conversion
  factors.

- define 'mass' and 'weight' and fexplain the
  distinction between the two.

- describe what is meant by 'standard gravitational
  acceleration' and state the value for the
  acceleration due to gravity in each of the three
  systems of measure.

- state the two rules of unit analysis.

Sub-Topic Number 2   <u>Forces</u>

The student will be able to:

- define 'scalar quantities' and 'vector quantities'
  and list several examples of each.

- determine the sum of two or more vector quantities,

- state a definition of a 'force' and list several
  types of forces including examples of each type.

- write a verbal statement of 'Newton's first law of
  motion'.

- write both a verbal statement and a mathematical statement (an equation) of 'Newton's second law of motion.

- write a verbal statement of 'Newton's third law of motion.

Sub-Topic Number 3   Temperature, Heat & Expansion

The student will be able to:

- define 'temperature' and 'heat' and explain the difference between the two concepts.

- describe how a simple mercury-in-glass thermometer may be calibrated.

- expain what is meant by the term 'absolute zero',

- list the three most common tetnperatut'e scales and the values of the boiling point for water, the freezing point for water and absolute zero on each of the three scales.

- convert temperature readings on any one of the four scales into readings on any of the other three scales.

- solve problems involving linear expansion and contraction as a function of temperature.

- explain what is meant by the terms 'sensible heat' and 'latent heat'.

- explain what is meant by a change of phase.

- explain what is meant by the terms 'latent heat of fusion' and 'latent heat of vapourization'.

- list and describe the three forms of heat transfer.

Sub-Topic Number 4   Gas Laws and Thermodynamics

The student will be able to:

- write a verbal statement and a mathematical statement of 'Boyle's law'.

- write a verbal statement and a mathematical statement of 'Charles' law'.

- write a verbal statement and a mathematical statement of 'Gay-Lussac's law'.

- write a mathematical statement of the 'general gas law'.

- explain what is meant by the terms 'gauge pressure' and 'absolute pressure'.

- explain what is meant by the term 'atmospheric pressure'.

- list several expressions for the value of standard atmospheric pressure.

- solve problems involving changes in temperature, pressure and volume of a confined gas.

- write a verbal statement of the 'First Law of Thermodynamics'.

- write a verbal statement of the 'Second Law of Thermodynamics''.

- explain how the laws of thermodynamics place 14mitatioris on the efficiency of heat engines.

Topic Number II   <u>Fundamentals of Applied Mechanics</u>

Sub-Topic Number 1   <u>Force Systems - Statics</u>

The student will be able to:

- draw the 'free-body' diagram for an object being acted upon by a static system of forces.

- determine the 'resultant' of two or more forces acting upon an object.

- explain what is meant by the 'moment' of a force and solve simple problems involving 'moment' or 'torque' produced by a force.

- write a statement of the 'principle of moments'.

- solve simple problems involving 'rotational equilibrium'.

- explain what is meant by the term 'centre of gravity' of an object.

Sub-Topic Number 2   <u>Accelerated Motion - Dynamics</u>

The student will be able to:

- write definitions for 'speed' and 'velocity' and state the difference between the two terms.

- list the 4 equations describing uniformly accelerated motion.

- solve simple problems involving uniformly accelerated motion.

- solve simple problems involving freely falling bodies.

- explain what is meant by the term 'normal acceleration' and recall the equation for normal acceleration.

- solve simple problems involving normal acceleration,

Sub-Topic Number 3   <u>Work, Energy and Power</u>

The student will be able to:

- explain what is meant by 'work' and state the equation used to calculate work.

- write a definition of 'energy'.

- write a definition of and state the equation used to determine 'gravitational potential energy'.

- write a definition of and state the equation used to determine 'kinetic energy'.

- solve problems involving gravitational potential energy and kinetic energy,

- write a statement of the 'law of conservation of energy'.

- write a definition of and state the equation used to determine 'power'.

- explain what is meant by 'power' and state the equation used to calculate power.

- explain what is meant by 'efficiency' and state the equation used to calculate efficiency.

- solve simple problems involving power and efficiency of mechanisms and systems,.

Topic Number II^I   <u>Introduction to BASIC Programming</u>

Sub-Topic Number 1   <u>Introduction to Computers</u>

'^The student will be able to:

-describe in simple terms what a computer is.

- 'log into' the computer.

- make use of the 'PRINT' statement and know the effects on this statement of using the comma and the semi-colon.

- correct mistakes.

- 'log off of the computer.

Sub-Topic Number 2   <u>Writing Simple Programs</u>

The student will be\able to:

- write simple prograhis using proper program format.

- use a number of fundamental BASIC commands including the followingr; RUN, LIST, SAVE, OLD, NEW, SCRATCH, UNSAVE, EDIT, HELP,& E^ELETE. .

-Vprovide data for programs using the 'ASSIGNMENT'
  statements, 'INPUT' statements and 'READ/DATA'
  statements.   \

- list the rules for proper choice of 'variable
  names'.

- provide docvimentation in simple programs using
  'PRINT' statements, 'REM' statements and the
  'exclamation mark'.

                              Go Disano, May 1988