SAULT COLLEGE *OF APPLIED ARTS S TECHNOLOGY*

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE: INTRODUCTION TO TECHNOLOGY II

CODE NO.: TEC120

PROGRAM: General Arts & Science - Pre-Engineering

SEMESTER: Two

DATE: May 1988

AUTHOR: G, DISANO

NEW: X *REVISION:*

APPROVED

Chairperson U *Date*

INTRODUCTION TO TECHNOLOGY II   TEC 120

  Course *Name*   Course *Number*

PHtLOSOPHY/COALS: This course is a continuation of the first semester course and introduces the student to a number of additional concepts which should prove to be valuable to the future technology student. The course consists of an introduction to the fundamentals of fluid mechanics and electrical theory and some additional BASIC programming. In addition, the student will be given the opportunity to visit and observe a n\amber of technology programming activities.

METHOD OF *ASSESSMENT* (GRADfNG METHOD):

      See attached sheet: GRM3E REQUIREMENTS

TEXTBOOKfS); BASIC TECHNICAL PHYSICS'
        by Paul E. Tippens

OBJECTfVES:

      See attached sheets: SPECIFIC OBJECTIVES

<u>GRADE REQUIREMENTS</u>

TEC120

INTRODUCTION TO TECHNOLOGY II

(General Arts & Science - Pre-Engineering)

Your final grade in TEC120 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, <u>provided you have received a passing grade in each of the four tests</u>, your final average 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% (<u>Consistently</u> outstanding achievement)

A . 76% - 89% (Outstanding achievement)

B : 66% - 75% (<u>Consistently</u> 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% <u>would</u> result in an 'R' grade while 50% <u>might</u> 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 tind 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 <u>examination</u> 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 <u>one</u> 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 <u>your</u> responsibility to notify the instructor <u>prior</u> 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

TEC120

INTRODUCTION TO TECHNOLOGY II

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

TOPIC **no.**	*PERIODS*	*TOPIC DESCRIPTION*	*REFERENCE*

I   <u>Fundamentals of Fluid Mechanics</u>

1   10   <u>Introduction - Fluids at Rest</u>   Chapter 12

                  - What is a fluid?
                  - two types of fluids - liquids & gases
                  - characteristics of fluids
                  - density
                  - pressure
                  - pressure in a fluid
                  - Pascal's law
                  - gauge pressure & absolute pressure
                  - pressure measuring devices
                  - the hydraulic press
                  - Archimedes' principle

2   6   <u>Fluids in Motion</u>   Chapter 12

                  - flow rates
                  - continuity of flow
                  - pressure & velocity - Bernoulli's equation
                  •*• the venturi

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

II   <u>Introduction to Electrical Theory</u>

1   4   <u>Electrostatics</u>   Chapter 16

                  - atomic structure
                  - the copper atom
                  - insulators and conductors
                  - Coulomb's law

2   9   <u>Direct Current</u>   Chapter 17

- What is electric current?
- the direction of electric current
- electromotive force
- resistance
- S.I. units of current/ voltage & resistance
- Ohm's law
- electric power
- resistQrs in series
- resistors in parallel

3   5   <u>Alternating Currents</u>   Chapters 18 & 19

- magnetism & magnetic fields
- induced electric currents
- alternating current

<u>Tour of the Electrical Engineering Technology</u>
<u>classrooms^ laboratories and activities</u>

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

III   <u>Additional Concepts in BASIC Programming</u>

1   8   <u>Numbers/ Variables & Operations</u>   Chapter 3 VAX BA:

- large and small numbers
- string variables
- arithmetic operations
        - exponentiation
        - square root
        - complicated expressions

2   8   <u>Program Control</u>   Chapter 4 VAX BAS

- the GOTO statement
- the IF...THEN statement
- logical operators

<u>Tour of the Robotics classroom, laboratories</u>
<u>and activities</u>

<u>Tour of the N.C. Machining classroom, shop</u>
<u>and activities</u>

<u>Tour of the C.A.D. classroom, drafting room</u>
<u>and activities</u>

G. Disano, May 1988

Topic Number I   Fvmdamentals of Fluid Mechanics

Sub-Topic Number 1   Introduction - Fluids at Rest

The student will be able to:

- define what is meant by a 'fluid'.

- differentiate between the two classes of fluids -
  'liquids' and 'gases' and give several examples
  of each.

- list the characteristics of fluids (liquids and
  gases) and solids.

- write a definition of and state the equation
  for the concept of 'density'.

- state the equation for 'pressure'.

- state the equation for pressure in a fluid as
  a function of density and depth.

- write a verbal statement of 'Pascal's law'.

- explain what is meant by 'gauge pressure' and
  'absolute pressure' and state the relationship
  between the two.

- list several pressure measuring devices including
  the 'barometer', the 'manometer' and the 'Bourdon
  tube' and describe briefly their principles of
  operation.

- describe briefly and solve simple problems
  involving the 'hydraulic press'.

- write a verbal statement of 'Archimedes' principle'

Sub-Topic Number 2   Fluids in Motion

The student will be able to:

- solve simple problems involving 'flow rates' of
  liquids flowing through pipes.

- write both a verbal statement and a mathematical
  statement of the 'continuity of flow' principle.

- write a verbal statement of 'Bernoulli's equation'
  and explain the relationship between pressure and
  velocity in a flowing fluid.

- briefly describe the principle of operation of the
  'venturi'.

Topic Number II   Introduction to Electrical Theory

Sub-Topic Number 1   Electrostatics

The student will be able to:

- describe briefly the 'Bohr model' of the atom,

- state the charge possessed by each of the three
  major components of the atom, namely, the proton,
  the neutron and the electron.

- draw a sketch of the Bohr model of the copper atom
  and explain why copper is such a good conductor of
  electrons.

- explain what is meant by the terms 'insulator' and
  'conductor' and list several examples of each.

- write a verbal statement of 'Coulomb's law'.

Sub-Topic Number 2   Direct Current

The student will be able to;

- describe what an 'electric current' is.

- state the direction of flow of 'electron current'
  and 'conventional current' and explain the reasons
  for the existence of two "types" of electric current
  in the text books and in the field.

- explain what is meant by 'electromotive force'.

- explain what is meant by 'resistance'.

- state the units of 'current', 'voltage' and
  'resistance' and the proper S.I. abbreviations
  for each.

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

- solve simple problems involving Ohm's law.

- state the equations, for calculating electric power.

- calculate the equivalent resistance of a number of
  resistors in 'series'.

- calculate the equivalent resistance of a number of
  resistors in 'parallel'.

Sub-Topic Number 3   Alternating Current

The student will be able to:

- state the law of attraction and repulsion of
  magnetic poles.

- draw a sketch of the 'magnetic field' produced by
  a single bar magnet.

- list the characteristics of 'magnetic lines of force'.

- draw a sketch of the magnetic field between two adjacent opposite poles of two bar magnets and explain the force of attraction between the poles.

- draw a sketch of the magnetic field between two adjacent like poles of two bar magnets and explain the force of repulsion between the poles.

- draw a sketch of the magnetic field around a straight current carrying conductor.

- write a statement of the 'right hand rule for a straight current carrying conductor'.

- draw a sketch of the magnetic field around a current carrying 'solenoid'.

- write a statement of the 'right hand rule for a current carrying solenoid'.

- describe how a current may be 'induced' in a conductor cutting across lines of magnetic 'flux'.

- describe what is meant by an 'alternating current'.

Topic Number III   <u>Additional Concepts in BASIC Programming</u>

Sub-Topic Number 1   <u>Numbers^ Variables & Operations</u>

The student will be able to:

- write both large and small numbers in 'E-notation'.

- write simple programs using 'string variables'.

- state the 'order of operation' of arithmetic expressions in a BASIC program.

- write simple programs involving 'exponentiation', 'square roots' and complicated expressions making use of the order of operation.

Sub-Topic Number 2   <u>Program Control</u>

The student will be able to:

- write simple programs involving the 'GOTO' statement,

- write simple BASIC programs having decision making capabilities using 'IF.,.THEN' statements along with 'logical operators'.

G. Disano, May 1988