SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ON

COURSE OUTLINE

COURSE TITLE; Applied Mechanics

CODE NO. ; MCH 110 **SEMESTER;** One

PROGRAM; Mechanical and Aviation Technology

AUTHORS; W.J. Adolph and B. Prout

DATE; June, 1994 **PREVIOUS OUTLINE DATED;** 1993

APPROVED: %/(ILrAA&, <?<(-Olr-/U

DEAN DATE

COURSE NAME | COURSE NO.
APPLIED MECHANICS | **MCH 110**

TOTAL CREDITS: Four (4)

PREREQUISITE(S): None

I. PHILOSOPHY/GOALS:

This course provides the students of Technology the opportunity to explore and apply the principles of Statics. The principles learned are very important, as they are basis for other courses in Technology programs.

This course also encourages the development of group and individual problem solving skills, and the presentation of results in a style consistent with standard engineering practice

II, STUDENT PERFORMANCE OBJECTIVES (OUTCOMES);

Upon completion of this course the student will be able to:

1-0 Apply the equations of trigonometry and algebraic relationships to solve force vector problems.

1.1 Recall the simple trigonometric functions and apply to solve right triangles.

1.2 Recall and apply the Sine and Cosine Laws to solve unknowns in any triangle.

1.3 Recall relationships between S.I. (System Internationale) and Imperial System units of Mass, Force and Length and make conversions using skills of dimensional analysis.

2.0 Determine resultants and equilibrants by adding vector quantities and vector components.

2.1 Differentiate between vector and scalar quantities.

2.2 Determine the resultant of two vectors at right angles to each other by graphical and trigonometric methods.

2.3 Resolve vectors quantities into components.

II. PERFORMANCE OBJECTIVES (OUTCOMES), con't:

2.4 Determine the resultant of any number of vectors by graphical methods.

2.5 Determine the resultant of any number of vectors by method of components (analytical and/or graphical)*

2.6 Define "Moment of Force", and determine the Moment of Force about any point.

2.7 Determine the resultant Moment of Force for a system of moments.

2.8 Define "Couple" and analyze the effect of couples on a body.

3.0 Apply the "Three Conditions of Equilibrium" to determine unknown forces in various force systems.

3.1 Recall and apply Newton's Laws to determine the characteristics of forces acting between bodies in contact,

3.2 Recall and apply sign conventions used in analyzing FBD's (Free Body Diagrams).

3.3 Construct a FBD for parts (or whole) of mechanisms or structures.

3.4 Differentiate between externally applied loads and reactions.

3.5 Recall and apply the three conditions of equilibrium to FBD's and determine reactions.

3.6 Apply the principles of equilibrium to the solution of problems involving static pulley systems.

4.0 Use Methods of: "Joints", "Sections", "Members", and "Bow's Notation" to solve for internal forces in structures.

4.1 Recognize the difference between tension and compression in structural members (struts and ties).

4.2 Differentiate between "Trusses" and "Frames".

II. PERFORMANCE OBJECTIVES (OUTCOMES), con't:

4.3 Identify "No Load" members in trusses and frames.

4.4 Check for stability and static determinacy in structures.

4.5 Analyze forces at joints between members using the "Method of Joints".

4.6 Determine the force in selected members of a truss using the "Method of Sections".

4.7 Determine the forces in members of a frame using the "Method of Members".

4.8 Determine the forces in members of a truss using the method of "Bow's Notation".

5.0 Recall and apply the "Laws of Friction" in static situations.

5.1 Differentiate between "Static" and "Dynamic" friction.

5.2 Apply the Laws of Friction for dry surfaces, to determine forces in flat surface and belt situations.

5.3 Analyze situations to determine whether tipping or sliding will occur.

6.0 Locate centroids of areas.

6.1 Differentiate between "Centroid of Area" and "Center of Gravity".

6.2 Recalling the centroid for simple (common) shapes, determine the centroid for complex shapes.

6.3 Determine the centroid of an outline.

II. PERFORMANCE OBJECTIVES (OUTCOMES), con't;

7.0 GENERIC SKILLS

7.1 CI, Communicate, clarify, and respond to verbal instructions.

7.2 C6, Write documents and deliver presentations that report on results of experiments.

7.3 M2, Organize/classify data for the purpose of displaying tables.

7.4 M7, Solve problems accurately using mathematical strategies and necessary tools.

7.5 13, Treat other individuals with respect and act in a manner consistent with institutional and legislated policies.

Ill, TOPICS TO BE COVERED	**APPROXIMATE HOURS**
1.0 Introduction Mathematics of Mechanics Conversion of Units	8
2.0 Vector Analysis Forces, Vectors, and Resultants Moments and Couples	12
3.0 Eguilibrium Two-Dimensional Forces Systems	12
4.0 Structures and Members Force Analysis of Structures	12
5.0 Static Friction	8
6. 0 Centroids Determination of the Centroid of an Area Center of Gravity	8

IV, LEARNING ACTIVITIES/REQUIRED RESOURCES:

1.0 STUDENT ACTIVITIES

i) Participate in classroom lectures of principles and demonstrations of procedures.

ii) Review and study textbook theory and examples,

iii) Produce summary notes of theory and procedures.

iv) Working through a number and variety of practice problems, both as in class and homework exercises.

v) Completing and submitting assignments, either in class "problem set", or "take home" exercises.

vi) Completing laboratory exercise(s) designed to verify and illustrate theoretical principles.

vii) Attempting tests as administered throughout the term.

2.0 RESOURCES

i) Textbook : Applied Mechanics for Engineering Technology, 4th Edition, Prentice Hall, Keith M. Walker

ii) Regular classroom facilities.

iii) Lab Equipment for LAB AM-1.

V. EVALUATION METHODS; (INCLUDES ASSIGNMENTS, ATTENDANCE REQUIREMENTS, ETC.)

1.0 GRADING SYSTEM

There will be three major tests throughout the term. A minimum of one week notice will be provided for each test. Tests will be content organized in the following manner;

Test #1 ~ Units 1, 2
Test #2 — Units 3, 4
Test #3 — Units 5, 6

As part of the learning activities for each topic there will be problems and/or labs to complete. In this activity the student is encouraged to use all available resources in a team situation to solve problems.

Final grades will calculated in the following manner:

Tests	70%
Assignments, Problem Sets, Labs	30%

Numerical marks relate to grades according to the schedule below:

A+	90-100%
A	80-89%
B	70-79%
C	60-69%
R	less than 60%

2.0 ATTENDANCE

Although attendance records will not have a direct influence on your grades, you are encouraged to attend all theory classes. Students are responsible for all material reviewed and distributed in classes for which they are absent.

3.0 REWRITES

The policies for rewrites are the responsibility of the individual professor and will be issued as supplementary documentation.

V. EVALUATION METHODS, con't

4.0 LATE ASSIGNMENTS AND MISSED TESTS

The policies regarding late assignments and missed tests are the responsibility of the individual instructor, and will be issued as supplementary documentation.

VI. REQUIRED STUDENT RESOURCES:

i) Textbook:
Walker, Applied Mechanics for Engineering Technology. Fourth edition, Prentice Hall.

ii) Drawing and Note Taking Supplies: Quad ruled paper, pencils, pens, markers, eraser, scale, protractor, 3-ring binder, paper, calculator

VII. ADDITIONAL RESOURCE MATERIALS;

Refer to additional texts in the library. Students may wish to consult with the instructor for additional reference materials.

In the event that hand out materials are supplied by the instructor, students are responsible for the content knowledge.

VIII. SPECIAL NOTES

1/ Your instructor reserves the right to modify the course and course outline as deemed necessary to meet the needs of the students, or in the case of special circumstance.

2/ Students will special needs are encouraged to discuss their required accommodations in confidence with the instructor.

3/ Disruptive conduct of any kind is not acceptable, and will not be tolerated in lecture or lab periods.