SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title: APPLIED MECHANICS

Code No.: MCH *i\%*

Program: MECHANICAL (O O t U....\t> «i

Semester: TWO

Date: JUNE, 1987

Author: W. Jenkins

X

New Revision

APPROVED _____ Chairperson Date

CALENDAR DESCRIPTION

APPLIED MECHANICS	MCH 111
Course Name	Course Number

PHILOSOPHY/GOALS;

This is the second basic course necessary for understanding the ensuing major subject courses in the Mechanical Programs.

METHOD OF ASSESSMENT (GRADING METHOD):

This course will cover chapter 9-13 inclusive in Introduction to Mechanics, by Levinson.

You will be tested on chapter 9 and 10 two weeks after completion of these chapters.

You will be tested *on* chapters 11 and 12 two weeks after completion of these chapters.

The final test will be administered after completion of chapter 13.

The marking system will be "A", "B", "C" , and "X"$_r$ and tests will be grade on logical solution, layout, sketches and tidiness.

TEXTBOOK (S):

Introduction to Mechanics - Levinson

REFERENCE BOOKS

Applied Mechanics, Brown - Prentice-Hall

Applied Engineering Mechanics, Jensen & Chenoweth - McGraw-Hill

APPLIED MECHANICS

MCH 111

TOPIC NO.	PERIODS	TOPIC DESCRIPTION
1	12	Motion Speed, velocity and acceleration Distance and displacement Notation Uniformly accelerated bodies Falling bodies Projectiles
2	12	Rotational Motion Angular displacement (radians) Angular velocity and acceleration Relationship between linear and angular motion Moment of inertia of bodies Radius of gyration Kinetic energy of rotation Torque Angular momentum
3	12	Force & Motion Newton's Second Law Accelerating forces - horizontal & vertical motion
4	14	Work, Energy and Power Definitions, units, measurements Concepts of work Work done by constant and variable forces Forms of energy - potential and kinetic Conservation of energy
5	10	Impulse and Momentum Linear impulse Linear momentum Conservation of momentum Impact

Course based on two periods of theory and two periods of lab.

MCH 110-4

UNIT #1 - Kinematics of Particles

General Objective;

The student will be able to solve varied problems dealing with the Kinematics of Particles.

Specific Objectives:

1. To be able to define rectilinear or tanslational motion.
2. To be able to define curvilinear.
3. To be able to define plane motion.
4. To be able to define distance.
5. To be able to define displacement(s).
6. To be able to define speed.
7. To be able to define velocity (v).
8. To be able to distinguish between absolute velocity and relative velocity.
9. To be able to define uniform motion.
10. To be able to define acceleration (a).
11. To be able to define uniformly accelerated motion.
12. To be able to state the equation v = u + at
13. To be able to state the equation $^{s}2$ = u + 1/2 at
14. To be able to state the equation v = u + 2as ~
15. To be able to define the term normal acceleration = \? r
16. Using the above specific objectives the student will solve correctly the following problems in the textbook: Qu. 9-1, 2, 3, 6, 7, 13, 14, 15, 22, 23, 24, 25, 28, 32, 35, 39, 40, 42, 46, 47, 48, 49.

UNIT #2 - Kinematics of Rigid Bodies

General Objectives:

The student will be able to solve varied problems dealing with the Kinematics of Rigid Bodies.

Specific Objectives:

1. To be able to differentiate between a particle and a body.
2. To be able to define a machine.
3. To be able to define a mechanism.
4. To be able to define rectilinear translation.
5. To be able to define rotation.
6. To be able to define angular displacement (A).

t

7. To be able to define angular distance.
8. To be able to define angular velocity ( )*
9. To be able to define angular acceleratin ( ).
10 To be able to state the relationship S = Ar.
11 To be able to state the relationship v =
12 To be able to state the relationship a =
13 To be able to recall the formula normal acceleration An
To be able to state the formula: normal acceleration An = w
14 Using the above specific objectives the student will correctly
15 solve the following problems in the textbook: Qu. 10-1, 2, 4, 5, 7, 10, 12, 13, 14, 15, 16, 17, 18, 19 25, 27, 46, 51, 55

UNIT #3 - Kinetics

General Objective:

The student will be able to solve varied problems dealing with kinetics

Specific Objectives:

1. To be able to state the Second Law of Motion.
2. To be able to define the term slug.
3. To be able to recall vector addition.
4. To be able to draw free-body diagrams for force systems.
5. To be able to recall that the friction force = the co-efficient of friction x the normal force.
6. TO be able to define the term Inertia force.
7. TO be able to define the term dynamic equilibrium.
8. To be able to define the term centrifugal force.
9. TO be able to define the term centripetal force.
10 TO be able to obtain the term Moment of Inertia.
11 TO be able to define the Radius of Gyration for rotating bodies
12 TO be able to obtain referred Moments of Inertia.
13 TO be able to define the term Inertia Torque.
14 Using the above specific objectives, the student will solve correctly the following problems from the textbook: Qu. 11-2, 3, 4, 11, 12, 13, 14, 19, 21, 22, 23, 24, 26, 27, 28, 29, 30, 31, 32, 33, 34, 39, 40, 45, 46, 48, 49, 53, 54, 63, 64, 65.

UNIT #4 - Work/ Energy and Power

General Objectives;

The student will be able to solve varied problems dealing with Work//Energy and Power.

Specific Objectives;

1. To be able to define the term work,
2. To be able to identify positive and negative work,
3. To be able to calculate work from a work diagram,
4. To be able to define spring stiffness or soring modulus.
5. To be able to define strain energy of spring,
6. To be able to calculate the energy stored in a spring,
7. To be able to define the work done by Torque and Couple,
8. To be able to define the term Potential Energy,
9. To be able to define the term Kinetic Energy.
10. To be able to state the formula for Potential Energy,
11. To be able to state the formula for Kinetic Energy.
12. To be able to state the formula for Kinetic Energy (linear),
13. Using the above specific objectives the student will solve correctly the following problems from the textbook: Qu. 12-4, 6, 11, 12, 13, 14, 18, 20, 24, 27, 28, 29, 34, 36, 37, 38, 40, 42, 43 44, 49, 50, 60, 62.

UNIT #5 - Impulse and Momentum

General Objective;

The student will be able to solve varied problems dealing with impulse and momentum.

Specific Objectives:

1. To be able to state the formula: impulse = P t
2. To be able to state the formula: momentum = m v
3. To be able to state the formula: angular impulse = T t
4. To be able to state the formula: momentum = I w.
5. To be able to recall Newton's third law of motion.
6. To be able to state the law of conservation of momentum.
7. To be able to state the law of conservation of angular momentum.
8. To be able to define the co-efficient of restitution,
9. Using the above specific objectives the student will solve correctly the following problems from the textbook: Ou. 13-4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 18, 20, 21, 22, 23, 25, 26, 27, 20, 30, 32, 33, 35, 42, 43.