

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



COURSE OUTLINE

COURSE TITLE: Applied Mechanics - Dynamics

CODE NO. : MCH111 **SEMESTER:** TWO

PROGRAM: Aviation Technology - Flight

AUTHOR: Douglas McKinnon

DATE: May 2010 **PREVIOUS OUTLINE DATED:** Jan 2009

APPROVED: "B. Punch"

	CHAIR	DATE
TOTAL CREDITS:	4	
PREREQUISITE(S):	MCH110 and PHY125	
HOURS/WEEK:	6	

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I. COURSE DESCRIPTION:

This second course in mechanics, *Dynamics*, deals with chapters 10 to 15 inclusive, of the reference text by Walker. It provides an in-depth study of the physical concepts related to dynamics. The student will be: exposed to a number of concepts and equations related to planar and rotational motion; able to identify and quantify forces affecting motion; able to describe and quantify forces and units of measure, related to work, energy and power.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Upon successful completion of this course, the student will demonstrate the ability to:

- 1) in his or her own words write definitions for the concepts introduced;
- 2) answer questions requiring an understanding of the concepts presented;
- 3) respond to questions requiring extrapolation of the course content;
- 4) solve problems requiring an understanding of the course theory and content as described:

1. Kinematics of ParticlesPotential Elements of the Performance:

- a) Distance and Displacement
- b) Speed and Velocity
- c) Acceleration
- d) Uniformly Accelerated Motion
- e) Falling Bodies – the acceleration due to gravity
- f) Projectiles and Projectile Motion

2. Rotational MotionPotential Elements of the Performance:

- a) Angular Displacement (radians)
- b) Angular Velocity

- c) Angular Acceleration
- d) Angular Motion with uniform acceleration
- e) Relationship between Rectilinear Motion and Angular Motion
- f) Normal and Tangential Acceleration
- g) Total Angular Acceleration

3. **Kinetics: Forces and Motion**

Potential Elements of the Performance:

- a) Newton's Second Law of Motion
- b) Accelerating Forces – horizontal and vertical motion
- c) 'Dynamic Equilibrium' – the Linear Inertia Force
- d) 'Angular Dynamic Equilibrium' – the Angular Inertia Torque

4. **Work, Energy and Power**

Potential Elements of the Performance:

- a) the concept of *work*
- b) Work done by constant forces
- c) Work done by variable forces
- d) Energy
- e) Gravitational Potential Energy
- f) Kinetic Energy
- g) Conservation of Energy – Translational
- h) Moment of Inertia of bodies
- i) Kinetic Energy of Rotation
- j) Conservation of Energy – Angular
- k) Power
- l) Efficiency

5. **Impulse and Momentum**

Potential Elements of the Performance:

- a) Linear Impulse
- b) Linear Momentum
- c) Angular Impulse
- d) Angular Momentum
- e) Conservation of Momentum

III. TOPICS:

1. Kinematics of Particles: The Study of Motion
2. Rotational Motion
3. Kinetics: the Relationship between Forces and Motion
4. Work, Energy and Power
5. Impulse and Momentum

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Walker, Keith M., APPLIED MECHANICS FOR ENGINEERING TECHNOLOGY, 8th edition. Pearson Prentice-Hall Publishers, Upper Saddle River, New Jersey. 2008
ISBN-13: 978-0-13-172151-7

Scientific Calculator

V. EVALUATION PROCESS/GRADING SYSTEM:

Your final grade in MCH 111 will be determined on the basis of **five tests** and **any number of quizzes** administered during the semester. Each test and/or quiz will examine your knowledge of a number of topics and will be administered within one week of completing those topics.

The five tests are of equal weight (ie. each test is worth 20% of your final grade). As a result, **provided you have received a passing grade in each of the tests**, your final grade will simply be an average of your five test results.

Quizzes are intended to account for student attendance, that the student has a general understanding of the concepts being taught, and if assigned homework is being accomplished. **Quizzes can be administered without prior notice** and will be used to supplement a student's grade by +/- 2%.

Prior to administering any test you will be notified a full week in advance. Should you, for any reason (*within reason of course*), not be able to be in attendance on a day for which a test has been scheduled it is **your responsibility** to notify the professor **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.

In order to obtain your letter grade the following percentage-letter grade equivalents will be used:

The following semester grades will be assigned to students:

Grade	Definition	Grade Point Equivalent
A+	90 – 100%	4.00
A	80 – 89%	3.00
B	70 - 79%	2.00
C	60 - 69%	1.00
D	50 – 59%	0.00
F (Fail)	49% and below	
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in field /clinical placement or non-graded subject area.	

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U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.
NR	Grade not reported to Registrar's office.
W	Student has withdrawn from the course without academic penalty.

VI. SPECIAL NOTES:Attendance:

Sault College is committed to student success. There is a direct correlation between academic performance and class attendance; therefore, for the benefit of all its constituents, all students are encouraged to attend all of their scheduled learning and evaluation sessions. This implies arriving on time and remaining for the duration of the scheduled session. *<Optional: It is the departmental policy that once the classroom door has been closed, the learning process has begun. Late arrivers will not be granted admission to the room.>*

VII. COURSE OUTLINE ADDENDUM:

The provisions contained in the addendum located on the portal form part of this course outline.