

## MECHANICAL ENGINEERING PROGRAM

### ABET COURSE SYLLABUS

#### ME 212 Engineering Dynamics (3)

**Course Description:**  
(2013-15 Catalog)

Analysis of motions of particles and rigid bodies encountered in engineering. Velocity, acceleration, relative motion, work, energy, impulse, and momentum. Further development of mathematical modeling and problem solving. Vector mathematics where appropriate. 3 lectures.

**Prerequisite Courses:**

MATH 241, ME 211.

**Prerequisites by Topic:**

A course in statics and differential and integral calculus.

**Textbook:**  
(and/or other required material)

**Vector Mechanics for Engineers, Dynamics**, 10th Ed., by Beer, Johnston, and Cornwell, McGraw-Hill, c 2013

**References:**

**Course  
Coordinator/Instructor:**

Tom Mase, Professor of Mechanical Engineering

**Course Learning Outcomes:**

An understanding of displacement, velocity, and acceleration in both scalar and vector terms for rectilinear and curvilinear motion and the ability to apply these concepts to the motion of particles having variable acceleration.

An understanding of Newton's laws of motion and the ability to apply them to typical engineering problems of particle kinetics.

Ability to analyze rigid-body motion in two dimensions with both absolute- and relative-motion descriptions.

An understanding of the motion equations for rigid-body kinetics in plane motion.

Ability to identify and use work-energy and impulse-momentum principles in plane-motion problems.

Effectively communicate legible problem solutions to be understood by engineers in and out of their specific discipline.

Relationship of Course to MECHANICAL ENGINEERING Program Outcomes:												
<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>	<i>l</i>	<i>m</i>
<b>H</b>	<b>M</b>			<b>H</b>	<b>L</b>	<b>M</b>		<b>L</b>		<b>L</b>	<b>M</b>	

**Topics Covered:**

1. Kinematics of Particles
  - a) Rectilinear and angular motion
  - b) Plane curvilinear motion
  - c) Plane relative motion
2. Kinetics of Particles
  - a) Force-mass acceleration
  - b) Work and energy
  - c) Impulse and momentum
  - d) Systems of particles
3. Plane Kinematics of Rigid Bodies
  - a) Absolute motion
  - b) Relative motion
4. Plane Kinetics of Rigid Bodies
  - a) Force-mass-acceleration in translation, fixed-axis rotation, and plane motion
  - b) Work and energy
  - c) Impulse and momentum

**Laboratory Projects:**

None

**Class/Lab Schedule:**

**Contribution of Course to Meeting the Professional Component:**

- |   |                 |
|---|-----------------|
| (a) College-level mathematics and basic sciences: | 0 credits       |
| (b) Engineering Topics:<br>Design                 | 3 credits<br>no |
| (c) General Education:                            | 0 credits       |
| (d) Other:  | 0 credits       |

**Prepared by:**  
Tom Mase

**Date:**  
May 20, 2014