Course Name:
Dynamics

<table>
<thead>
<tr>
<th>Course Number: 20-012</th>
<th>Credit: 3</th>
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<tr>
<td>Program: Undergraduate</td>
<td>Course Type: Technical required</td>
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<tr>
<td>Prerequisite: Statics</td>
<td>Corequisite: -</td>
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Course Description (Objectives):
The main objective of this course is to develop the capacity to predict the effects of force and motion when analyzing an engineering problem. In fact, Dynamics is that branch of mechanics which deals with the motion of bodies under the action of forces. The study of dynamics in engineering usually follows the study of statics, which deals with the effects of forces on bodies at rest. Dynamics has two distinct parts: *kinematics*, which is the study of motion without reference to the forces which cause motion, and *kinetics*, which relates the action of forces on bodies to their resulting motions. A thorough comprehension of dynamics will provide one of the most useful and powerful tools for analysis in engineering.

Course Content (outline):

- **Introduction to Dynamics**
  History and Modern Applications, Basic Concepts, Newton’s Laws, Units, Gravitation, Dimensions.

- **Kinematics of Particles**
  Introduction, Rectilinear Motion, Plane Curvilinear Motion, Space Curvilinear Motion, Relative Motion (Translating Axes), Constrained Motion of Connected Particles.

- **Kinetics of Particles**

- **Plane Kinematics of Rigid Bodies**
  Introduction, Instantaneous Center of Zero Velocity, Motion Relative to Rotating Axes.

- **Plane Kinetics of Rigid Bodies**

- **Vibration and Time Response**
Introduction, Free Vibration of Particles, Forced Vibration of Particles, Vibration of Rigid Bodies.

References: