Course:  
Dynamics and Vibrations MX 0908242 (3 Cr. – Required course)  
Contact hours: 11-12, Su, Tu, Th

Instructor:  
Dr. Osama Al-Hababbeh  
Office:MEX 106, Ph.: 5355000 ext. 23031  
Email: o.hababbeh@ju.edu.jo

Course Website:  
http://eacademic.ju.edu.jo/o.hababbeh/Material/Forms/AllItems.aspx

Catalog Description:  
The course introduces students to the application of Newtonian mechanics in solving motion problems for particles, systems of particles and rigid bodies. Differential and integral relationships between displacement, velocity and acceleration are developed in the kinematics parts. The effect of force, energy and momentum on motion is described in the kinetics part. Mechanical vibration is also described as an application. The course is restricted to 2-D (planar) mechanisms.

Prerequisites by Course:  
- Statics and Strength of Material (0908241)

Prerequisites By Topic:  
The student should have good knowledge of Physics and engineering mathematics

Textbook:  

References:  
4. Lecture notes

Schedule & Duration:  
16 Weeks, 45 lectures (50 minutes each) plus exams.

Minimum Student Material:  
Textbook, class handouts, scientific calculator, and an access to a personal computer.

Minimum College Facilities:  
Classroom with whiteboard and projection display facilities, library.

Course Learning Outcomes and Relation to ABET Student Outcomes:  
Upon successful completion of this course, a student should:
1. Understand the concepts of displacement, velocity and acceleration for particles, systems of particles and rigid bodies. (a)
2. Identify and apply the differential and integral relationships between displacement, velocity and acceleration in various coordinate systems. (a)
3. Use laws of physics to solve motion problems of engineering interest including that of machine parts such as gears, pulleys, chains and spring-mass systems. (a, e)
4. Use the principles of impulse-momentum, work-energy, and conservation of energy in solving motion problems. (a, e)
5. Understand the concepts of power and efficiency. (e, h)
6. Understand one degree of freedom undamped and damped free vibrations. (c, e)

Mapping to Student Outcomes

<table>
<thead>
<tr>
<th>ABET SO</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
<th>f</th>
<th>g</th>
<th>h</th>
<th>i</th>
<th>j</th>
<th>k</th>
</tr>
</thead>
<tbody>
<tr>
<td>Will be measured</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Course Topics:

<table>
<thead>
<tr>
<th>#</th>
<th>Topic description</th>
<th>Chapter</th>
<th>Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kinematics of Particles</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Kinetics of Particles: Force and Acceleration</td>
<td>13</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Kinetics of Particles: Work and Energy</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>Kinetics of Particles: Impulse and Momentum</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Planar Kinematics of a Rigid Body</td>
<td>16</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Planar Kinetics of a Rigid Body</td>
<td>17, 18, 19</td>
<td>11</td>
</tr>
<tr>
<td>7</td>
<td>Vibrations</td>
<td>22</td>
<td>5</td>
</tr>
</tbody>
</table>

Contribution to Professional Component
The course develops the conceptual framework for analyzing the causes and effects of motion for a multitude of problems of engineering interest.

Ground Rules: Attendance is required and highly encouraged. To that end, attendance will be taken every lecture; Absence of more than 7 hours will result in the expulsion of the student from the course.

Assessments: Exams, Quizzes, and Assignments.

Grading policy:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>First Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Second Exam</td>
<td>30 %</td>
</tr>
<tr>
<td>Final Exam</td>
<td>50 %</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

Last Updated: Mar. 2017