College: Engineering Department: Civil Engineering

Course Title : Engineering Mechanics II (Dynamics)

Course No : 0901204

Credit Hours : 3 C.H.

Semester: 2020/2021

About The Course

Course Title : Engineering Mechanics II (Dynamics) Class : 1
Course No : 0901402
Credit Hours : 3C.H. Lecture Room: 202
Obligatory / Optional : Obligatory
Text Book: Hibbeler Dynamics 14th edition, Pearson Publ.

The Instructor

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Course Description

Learn kinematics of particles: rectilinear continuous and erratic motion, general curvilinear motion; rectangular, normal-tangential and cylindrical components, absolute dependent motion of two particles and relative motion of two particles. Learn kinetics of particles: force-acceleration, Newton's Laws of Motion, equations of motion; rectangular, normal-tangential, and cylindrical coordinates. Learn kinetics of particles: work-energy; principle of work and energy, work of a force, conservative forces, potential energy, elastic potential energy, and kinetic energy, conservation of energy. Learn kinetics of particles: impulse-momentum; principle of linear impulse and momentum, principle of angular impulse and momentum, conservation of linear momentum of system of particles, impact. Learn planar kinematics of rigid bodies; rigid body motion, translation, rotation about fixed axis, absolute general motion, relative motion, instantaneous center.

Course Objectives

By the end of the course, you should be able to do the following:

- *Create mathematical models of dynamic systems (point mass and rigid bodies)*
- *Analyze the kinematics of point mass and rigid body systems.*
- *Determine the motion of point mass and rigid body systems in space and time.*

Learning Outcome

This course is an introduction to the dynamics and vibrations of lumped-parameter models of mechanical systems. Topics covered include kinematics and kinetics of a particle, work-energy concepts, virtual displacements and virtual work.

Analytical Thinking: This course will train the student to analyze and solve problems systematically. This will be a major effort for many of students, so they have to prepare to spend a lot of time on developing the skills every engineer is expected to have.

Course Outline and Time schedule

Week	Course Outline	
2/16	*Mathematical review and introduction*	*Chapter 12.1*
3/16	*Rectilinear Kinematics – continuous motion*	*Chapter 12.2*
4/16	*Rectilinear Kinematics – Erratic motion*	*Chapter 12.3*
5/16	*Rectilinear Kinematics - review*	
6/16	*Kinematics - General curvilinear motion, Rectangular components*	*Chapter 12.4 & 12.5*
7/16	***EXAM I Ch. 12***	***Review Chapters 12***

8/16	*Motion of a Projectile*	*Chapter 12.6*
9/16	*Kinematics of a particle: Normal-Tangential Components, Absolute dependent motion*	*Chapter 12.7* *Chapter 12.9*
10/16	*Kinetics of a particle : Newton's second low, Equations of motion: rectangular coordinates*	*Chapter 13.1 - 4*
11/16	*Equations of motion: normal and tangential coordinates*	*Chapter 13.5*
12/16	***EXAM II Ch. 12 & 13***	***Review Chapters 12 & 13***
13/16	*Kinetics of a particle : Work & Energy* *The work of a: force, variable force , constant force moving along a straight line, weight, spring force.*	*Chapter 14.1*
14/16	*Work of friction caused by sliding, conservative forces and potential energy*	*Chapter 14.3* *Chapter 14.5*
15/16	***FINAL EXAM***	

Presentation methods and techniques

Methods of teaching varied according to the type of text, student and situation. The following techniques are usually used:

1- Lecturing with active participations.

Involve the civil engineering students in asking some questions related to the target topic of the course.

2- Problem solving.

Encourage the students to solve the given assignments and submit them at the definite time,

3- Cooperative learning.

By enhancing the students studying in groups .

4- Discussion.

To discuss the results and the answers of the target problems.

5- Learning by activities.
To encourage the students to some group activity.

6- Connecting students with different sources of information.

Sources of information and Instructional Aids

- Computer softwear … power point
- Using weight board.

Assessment Strategy and its tools

The assigned syllabus is assessed and evaluated
Through: feed back and the skills that are acquired by the students
The tools:

- Assignments: 10%
- Attendance: 10%
- Term Tests: 20 +20%
- Final Examination: 40 %

Tool & Evaluation

Tests and attendance are permanent tools & assessment, in addition to the activity file which contains curricular and the co-curricular activities, research, report papers and the active participation of the student in the lecture.

The following table clarifies the organization of the assessment schedule:

Test	Date	Grade
First Exam		20
2nd Exam		20
Assignments and Attendance	Students should be notified about their marks	20
Final Exam		40

Activities and Instructional Assignment

1- Practical assignments to achieve the syllabus objectives.

2- Group Activity and demonstrations.

Regulations to maintain the teaching-Learning Process in the Lecture:

1- Regular attendance.

2- Respect of commencement and ending of the lecture time.

3- Positive relationship between student and teacher.

4- Commitment to present assignments on time.

5- High commitment during the lecture to avoid any kind of disturbance and distortion.

6. Allowed Absence percentages is (15%).

References :.

1.Companion Website. The Companion Website, located at www.prenhall.com/hibbeler. includes opportunities for practice and review including.

2.Dynamics, Twelfth Edition website is included inside the Dynamics Study Pack. To redeem the code and gain access to the site, go to www.prenhall.com/hibbeler and follow the directions on the access code card. Access can also be purchased directly from the site.

3. The United States Navy Blue Angels perform in an air show as part of San Francisco's Fleet Week celebration. ©Roger Ressmeyer/CORBIS. All Rights Reserved.

Syllabus Classification

Objectives	*Learning outcome*	*Assessment tools*
• ***Introduction*** Mathematical *review and introduction*	*To develop the student's skills in order to use* mathematical *equation.*	*By using solved problems. Power point and weight board.*
• ***Kinematics of a Particle***	• *To introduce the concepts of position, displacement, velocity, and acceleration.* •*To study particle motion along a straight line and represent this motion graphically.* •*To investigate particle motion a long a curved path using different coordinate systems.* •*To present an analysis of dependent motion of two particles.* •*To examine the principles of relative motion of two particles using translating axes.*	*By using solved problems. Power point and weight board.*

• ***Kinetics of a particle : Newton's second low, Equations of motion: rectangular coordinates***	• *To state Newton's Second Law of Motion and to define mass and weight.* • *To analyze the accelerated motion of a particle using the equation of motion with different coordinate systems.* • *To investigate central-force motion and apply it to problems in space mechanics.*	*By using solved problems.* *Power point and weight board.*
• ***Kinetics of a particle : Work & Energy*** ***The work of a: force, variable force , constant force moving along a straight line, weight, spring force***	• *To develop the principle of work and energy and apply it to solve problems that involve force, velocity, and displacement.* • *To study problems that involve power and efficiency.* •*To introduce the concept of a conservative force and apply the theorem of conservation of energy to solve kinetic problems.*	*By using solved problems.* *Power point and weight board.*