DEPARTMENT OF MECHANICAL AND INDUSTRIAL ENGINEERING
MECHANICAL ENGINEERING PROGRAM, BSC.

Course Syllabus

1. **Course number and name**
   ME 211 Dynamics.
2. **Credits and contact hours**
   (3+0) 3 credit hours, 3 contact hours
3. **Course type**
   Blended Learning Course (2+1)

4. **Instructor's or course coordinator's name**
   Dr. Mohammad Bani-Khaled

5. **Textbook information**
   Hibbeler R., Engineering Mechanics: Dynamics in SI Units, 14th edition, 2016,
   ISBN-13: 978-1292088723

   a. **Other supplemental materials**
      Meriam J. , Kraige L. , Bolton J. , Engineering Mechanics: Dynamics, 8th edition
      , 2016, ISBN-13: 978-1119044819

6. **Specific course information**

   a. **Catalog description**
      Kinematics and kinetics of particles and rigid bodies. Work and energy, impulse
      and momentum; system of particles. An introduction to vibrations.

   b. **Prerequisites or co-requisites**
      Prerequisite: CE 221 Statics

   c. **The course is:**
      Required in Mechanical Engineering program

7. **Specific goals for the course**
   a. **Course outcomes:**
      After completion of the course, students are expected to be able to:
      1. Apply the laws of kinematics to particles and/or rigid bodies in straight-line and curvilinear motion.
      2. Use the kinetics of particles and/or rigid bodies to analyze the forces and the motion caused by them.
      3. Apply work-energy approach to solve problems involving potential and kinetic energies.
      4. Use the principles of momentum and angular momentum.

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b. **The following student outcomes are addressed by the course:**

SO-(a) an ability to apply knowledge of mathematics, science, and engineering .

SO-(e) an ability to identify, formulate, and solve engineering problems

SO-(pc-1) apply principles of engineering, basic science, and mathematics (including multivariate calculus and differential equations); to model, analyze, design, and realize physical systems, components or processes

1. **Learning Outcomes and their Alignment with Program Educational Objective (PEO's), Methods of Delivery, and Assessment Methods:**

Learning Outcomes	Program PEOs	Method of Delivery	Assessment Method
Course Outcomes			
CO-(1): Apply the laws of kinematics to particles and/or rigid bodies in straight-line and curvilinear motion.	-	Lectures (Example and Problems)	First Exam
CO-(2): Use the kinetics of particles and/or rigid bodies to analyze the forces and the motion caused by them.	-	Lectures (Example and Problems)	First Exam
CO-(3): Apply work-energy approach to solve problems involving potential and kinetic energies.	-	Lectures (Example and Problems)	Second Exam
CO-(4): Use the principles of momentum and angular momentum.			Second Exam
Student Outcomes			
SO-(a) an ability to apply knowledge of mathematics, science, and engineering .	2	Lectures (Example and Problems)	First Exam
SO-(e) an ability to identify, formulate, and solve engineering problems		Lectures (Example and Problems)	Second Exam
SO-(pc-1) apply principles of engineering, basic science, and mathematics (including multivariate calculus and differential equations); to model, analyze, design, and realize physical systems, components or processes		Lectures (Example and Problems)	Final Exam

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2. Weekly Teaching Plan

Week No.	Lecture	Topic	Method of Delivery
1	Sun (9-10)	12.2 Rectilinear Kinematics: Continuous Motion	Lecture
	Tue (9-10)	12.4 General Curvilinear Motion	Lecture
	Thu (9-10)	12.5 Curvilinear Motion: Rectangular Components	Lecture
2	Sun (9-10)	12.6 Motion of a Projectile	Lecture
	Tue (9-10)	12.7 Curvilinear Motion: Normal and Tangential Components	Lecture
	Thu (9-10)	13.1 Newton's Second Law of Motion	Lecture
3	Sun (9-10)	13.2 The Equation of Motion	Lecture
	Tue (9-10)	13.3 Equation of Motion for a System of Particles	Lecture
	Thu (9-10)	13.4 Equations of Motion: Rectangular Coordinates	Lecture
4	Sun (9-10)	13.5 Equations of Motion: Normal and Tangential Coordinates	Lecture
	Tue (9-10)	14.1 The Work of a Force	Lecture
	Thu (9-10)	14.2 Principle of Work and Energy	Lecture
5	Sun (9-10)	14.3 Principle of Work and Energy for a System of Particles	Lecture
	Tue (9-10)	14.4 Power and Efficiency	Lecture
	Thu (9-10)	14.5 Conservative Forces and Potential Energy	Lecture
6	Sun (9-10)	FIRST EXAM	Lecture
	Tue (9-10)	15.1 Principle of Linear Impulse and Momentum	Lecture
	Thu (9-10)	15.2 Principle of Linear Impulse and Momentum for a System of Particles	Lecture

7	Sun (9-10)	**15.3 Conservation of Linear Momentum for a System of Particles**	Lecture
	Tue (9-10)	**15.4 Impact**	Lecture
	Thu (9-10)	**15.5 Angular Momentum**	Lecture
8	Sun (9-10)	**16.1 Planar Rigid-Body Motion**	Lecture
	Tue (9-10)	**16.2 Translation**	Lecture
	Thu (9-10)	**16.3 Rotation about a Fixed Axis**	Lecture
9	Sun (9-10)	**16.4 Absolute Motion Analysis**	Lecture
	Tue (9-10)	**16.5 Relative-Motion Analysis: Velocity**	Lecture
	Thu (9-10)	**17.1 Mass Moment of Inertia**	Lecture
10	Sun (9-10)	**17.2 Planar Kinetic Equations of Motion**	Lecture
	Tue (9-10)	**17.3 Equations of Motion: Translation**	Lecture
	Thu (9-10)	**17.4 Equations of Motion: Rotation about a Fixed Axis**	Lecture
11	Sun (9-10)	SECOND EXAM	Lecture
	Tue (9-10)	**18.1 Kinetic Energy**	Lecture
	Thu (9-10)	**18.2 The Work of a Force**	Lecture
12	Sun (9-10)	**18.3 The Work of a Couple Moment**	Lecture
	Tue (9-10)	**18.4 Principle of Work and Energy**	Lecture
	Thu (9-10)	**19.1 Linear and Angular Momentum**	Lecture
13	Sun (9-10)	**19.2 Principle of Impulse and Momentum**	Lecture
	Tue (9-10)	**19.3 Conservation of Momentum**	Lecture

	Thu (9-10)	**20.1 Rotation About a Fixed Point**	Lecture
14	Sun (9-10)	**20.3 General Motion**	Lecture
	Tue (9-10)	**21.2 Angular Momentum**	Lecture
	Thu (9-10)	**21.3 Kinetic Energy**	Lecture
15	Sun (9-10)	revision	Lecture
	Tue (9-10)	revision	Lecture
	Thu (9-10)	FINAL EXAM	Lecture

3. Grade Distribution:

Assessment	Grade	Week No.
- Midterm Exam	30%	7th Week
-Assignments (Reports /Quizzes/ Seminar / Tutorials/ Home works ….)	20%	1-16th Week
- Final Examination	50%	16th Week

Note: Make-up exams will be offered for valid reasons. It may be different from regular exams in content and format.