MENG233 – Rigid Body Dynamics

Eastern Mediterranean University
Faculty of Engineering

Department:
Mechanical Engineering

Program Name: Mechanical Engineering	**Program Code:** 23

Course Code:	**Course Title:**	**Credits:**	**Year/Semester:**
MENG233	Rigid body dynamics	4 Cr	2018-2019 Fall

☒ Area Core
☐ Area Elective
☐ Service Course
☐ University Elective
☐ Compulsory (offered by other academic units)

Prerequisite(s): MENG231 or CIVL211

Catalog Description:
The course covers:
Kinematics and Kinetics of Particles and Rigid Bodies.
Energy Methods.
Impulse and Momentum.
Un-Damped Vibration of Single and Two-Degree of Freedom Systems.

Instructor Name:	**Office no:**	**Office Tel:**
Assoc. Prof. Dr. Qasim Zeeshan	ME141	0392 630 1361

Course Web Page:
https://staff.emu.edu.tr/qasimzeeshan/en

Textbook(s):
- R. C. Hibbeler, Engineering Mechanics – Dynamics, 10th. Edition.
- Ferdinand P. Beer E. Russel Johnston, Jr. and Phillip J. Cornwell, Vector Mechanics for Engineers - Dynamics, 9th. Edition in SI units, Mc Graw Hill.

Indicative Basic Reading List :

Topics Covered and Class Schedule:
(4 hours of lectures, 1 hour of tutorial and 1 hour of lab work per week)

Weeks 1-4 Kinematics of particles
Week 5 Kinetics of particles (Force and Acceleration)
Week 6 Kinetics of particles (Work and Energy)
Weeks 7 Kinetics of particles (Impulse and Momentum)
Weeks 8-9 **Midterm Examination**
Week 10 Plane Kinematics of Rigid Bodies
Week 11 Plane Kinetics of Rigid Bodies (Force and Acceleration)
Week 12 Plane Kinetics of Rigid Bodies (Work and Energy)
Week 13 Plane Kinetics of Rigid Bodies (Impulse and Momentum)
Week 14 Vibrations
Week 15 **Final Examination**

Lecture and Tutorial Learning Outcome	Student Outcomes	Performed Assessments and Percentage
• Understand the principles of Newton's laws and their application to the real life physical problems that require knowledge of the relationship between force and motion. • Ability to draw free body diagrams • Understand and use the vector concepts to describe the motion of particles and rigid bodies • Understand the concepts of kinetic, potential and mechanical energies. • Understand the concepts of work, energy, power and mechanical efficiency • Develop the analytical skills needed to systematically formulate, solve, and analyze a wide range of dynamics problems. • Develop equations of motion for simple systems of particles and rigid bodies • Model dynamics problems consisting of mechanical systems composed of rigid components.	**a, h, e**	HWs: 5% Essay: 5% Project: 5% Quizzes: 5% Midterm Exam: 30% Final Examination: 40%

Lab. Experiment Title and Lab. Equipment Used	Lab Learning Outcome	Student Outcomes	Performed Assessments and Percentage
• Conservation of Momentum • Measurement of Static and Kinetic Coefficients of Friction	1. Develop equations of motion for simple systems of particles and rigid bodies	**b**	Lab Works and Lab Attendance 10%

Student Outcomes

☒	a) Ability to apply mathematics, science and engineering principles.
☒	b) Ability to design and conduct experiments, analyze and interpret data.
☐	c) Ability to design a system, component, or process to meet desired needs.
☐	d) Ability to function on multidisciplinary teams.
☒	e) Ability to identify, formulate and solve engineering problems.
☐	f) Understanding of professional and ethical responsibility.
☐	g) Ability to communicate effectively.
☒	h) The broad education necessary to understand the impact of engineering solutions in a global and societal context.
☐	i) Recognition of the need for and an ability to engage in life-long learning.
☐	j) Knowledge of contemporary issues.
☐	k) Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

Contribution of Course to Criterion 5

Credit Hours for:

Mathematics & Basic Science : 0

Engineering Sciences and Design : 4

General Education : 0

Important Notes:

University rules and regulations are applied to this course. For details, please see http://mevzuat.emu.edu.tr

1. **"NG" Nil Grade/ Failing from Absenteeism:** Students who do not comply with the required level attendance and/or not fulfilling the requirements for the evaluation of the course are given the "NG" grade by the Instructor of the Course based on the criteria determined by the Faculty/School Academic Council. Students are informed about the criteria for receiving the "NG" grade by the related course instructor at the beginning of the semester. "NG" grade is included in the computation of GPA and CGPA.
2. Student attendance is monitored and assessed by the course instructor. A student who fails to meet the requirements of a course or who is absent more than the limit specified by the Faculty or School is considered to be unsuccessful in that course.
3. Students who do not attend any of the above assessment activities (such as mid-term exam, lab exam, homework, design project report etc.) will be given NG (Nil Grade).
4. Late Submissions of the Assignments, Lab Reports and Project will be graded as zero.

MAKE–UP EXAM:

1. There is no make-up or resit for the Quiz and Labs.
2. A student who fails to sit for an examination for a valid reason is given a make-up exam. Within three working days after the examination, students who wish to take a make-up must submit a **written statement** to the course instructor explaining the reason(s) for his/her request.
3. Eligibility to take a **Make-Up Exam**:
   a. Student must contact the Instructor immediately within "**three working days**" after the examination when (s)he has missed the mid-term exam or final exam and to discuss with the faculty about the date and time to take the make-up exam.
   b. Student must secure a "**Make-Up Exam Form**" from the department Office or from instructor website & fill-out the Form. For each Make-Up Exam, please use separate Form.
   c. Student must secure the approval from the instructor for taking the Make-Up Exam.
   d. Failure to take the Make-Up Exam at the agreed date and time will lead to a "NG" Grade for the Make-Up Exam, midterm or final.