Alanya Alaaddin Keykubat University | Rafet Kayış Faculty of Engineering
Mechanical Engineering Department
2023-2024 Spring Semester

Syllabus

Code/Name	MEC 308 / Theory of Machines II
Type	Required
Credit/ECTS	5/5
Hour per Week	3 (3+0+0)
Level/Year	Undergraduate/3
Semester	Spring
Classroom	WWF | A203
Content	In the second part of the machine theory course, basic vibration theory, analytical dynamics concept, flywheels, brakes, and dynamometers are introduced. Free and forced vibration of single degree of freedom systems. Balancing of rotating machinery and linkages. Vibration control. 3D kinetics of a rigid body. Gyroscopic motion. Torque-free motion. Introduction to spatial kinematics.
Prerequisites	MEC 309 Theory of Machines I
Textbooks	***Primary*** Class Notes ***Supplementary*** DT Greenwood, Principles of Dynamics, Prentice Hall, 2nd Ed., 1988. RS Khurmi, Theory of Machines, Eurasia Publishing, 14th Ed., 2008. DJ Inman, Engineering Vibration, Pearson, 4th Ed., 2014. RC Hibbeler, Dynamics, Pearson, 14th Ed., 2016. JJ Uicker, GR Pennock, JE Shigley, Theory of Machines and Mechanisms, Oxford University Press, 4thEd., 2010.
Objectives	• To solve problems involving the 3D motion of rigid bodies • To calculate free and forced vibrations of mechanical systems • To analyze flywheel, brake, and dynamometer systems
Course Outcomes	In this course you will be able to: CO1 Calculate angular momentum of a rigid body in 3D CO2 Design rotating machinery and linkages CO3 Formulate motion of a gyroscope CO4 Solve basic vibration problems CO5 Inspect dynamic machine components

Weekly Schedule of Topics

W	Topic
1	Euler angles, rotations
2	General 3D motion
3	General 3D motion
4	Relative motion in 3D
5	Angular momentum
6	Euler equation of motion
7	Steady precession of a gyroscope
8	Torque-free motion
9	Undamped free and forced vibration

10	Damped free vibration
11	Fluctuation and energy, flywheel
12	Types of brakes, dynamometer
13	Balancing of rotating masses
14	Torsional vibration of rotors

Professional Contribution	Ability to develop mathematical models to solve dynamics of rigid and flexible bodies in 3D

Contribution to Program Outcomes*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	5	5	1	5	0	5	1	3	1	3	0
CO2	5	5	1	4	0	5	4	3	4	3	0
CO3	5	5	3	5	2	5	1	3	1	3	0
CO4	5	4	3	5	0	5	2	3	1	4	0
CO5	5	4	1	4	0	5	4	3	4	1	2

* Contribution Level | 0: None | 1: Very Low | 2: Low | 3: Medium | 4: High | 5: Very High

Special Conditions	Students work in groups for the presentations.
Requirements	Basic knowledge of a dynamic analysis software and Matlab
Course Policy	• Be in the class on time. • English should always be used to communicate with one another. • At least 70% attendance is required, otherwise a grade of **DZ** will be assigned. • You must be present in class for the presentations, otherwise you will not be graded for the presentation.
Cheating & Plagiarism	• Copying or letting someone copy your work on exams, assignments, or reports is cheating. • Cutting and pasting text, figures and tables from web sources or any other electronic source is plagiarism. • The consequence of academic dishonesty is to receive a grade of **FF** for the course.
Evaluation	Quizzes (2×10 pts.) 20% Midterm 30% Presentation 10% Final Exam 40% Total 100%
Rubric	A rubric will be announced prior to presentation sessions. The rubric has 2 main parts for the grading: technical assessment and writing or presentation performance.

Instructor

Name/Surname	Akın Oktav	Email	akin.oktav@alanya.edu.tr
Room	209	Office Hours	W 11.30-12.30 | F 13.30-14.30

Prepared by Akın Oktav on February 5th, 2024.