

Alanya Alaaddin Keykubat University | Rafet Kayış Faculty of Engineering  
**Mechanical Engineering Department**  
 2021-2022 Fall Semester

**Syllabus**

<b>Code/Name</b>	MEC 309 / Theory of Machines I
<b>Type</b>	Required
<b>Credit/ECTS</b>	5/5
<b>Hour per Week</b>	3 (3+0+0)
<b>Level/Year</b>	Undergraduate/3
<b>Semester</b>	Fall
<b>Classroom</b>	M M Th   D105 D105 A003
<b>Content</b>	In the first part of the machine theory course, basic concepts of mechanisms are introduced. Kinematic chains, mechanisms, and machines. Degrees of freedom of mechanisms. Position, velocity, and acceleration analysis of mechanisms. Instant center of rotation method. Mobility analysis. Static force analysis of mechanisms. Graphical and analytical methods for dynamic analysis of planar linkages. Four-bar linkage.
<b>Prerequisites</b>	MEC 203 Dynamics
<b>Textbooks</b>	<p><b>Primary</b>                      JJ Uicker, GR Pennock, JE Shigley, Theory of Machines and Mechanisms, Oxford University Press, 4th Ed., 2010.</p> <p><b>Supplementary</b>                      RS Khurmi, JK Gupta, Theory of Machines, Eurasia Publishing, 14th Ed., 2008.                      RL Norton, Design of Machinery, McGraw-Hill, 5th Ed., 2011.                      D Myszk, Machines and Mechanism, 4th Ed., Prentice Hall, 2012.                      E Söylemez, Mechanisms, METU Press, 6th Ed., 2018.</p>
<b>Objectives</b>	<ul style="list-style-type: none"> <li>• To analyze kinematics of planar mechanisms</li> <li>• To analyze applied and constraint forces acting on mechanisms</li> <li>• To assess the dynamic forces for systems that are not in equilibrium</li> </ul>
<b>Course Outcomes</b>	In this course you will be able to: C01 Identify basic concepts of mechanisms C02 Interpret the kinematic chains and mechanisms C03 Compute the position, velocity, and acceleration of mechanisms C04 Solve the mobility of mechanisms C05 Analyze four-bar linkage C06 Evaluate dynamics of planar linkages using analytical methods

**Weekly Schedule of Topics**

W	Topic
1	Kinematics; degree of freedom concept
2	Mechanism terminology; mobility; links and joints
3	Vector equations; commonly used mechanisms
4	Position analysis; position of a mechanism
5	Position analysis; closed-form position equations
6	Velocity analysis; velocity of a link
7	Velocity analysis; relative velocity method; locating instant centers
8	Acceleration analysis; acceleration of a link; relative acceleration method

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9	Coriolis acceleration; acceleration polygon
10	Mechanism design; timing charts
11	Static equilibrium; static forces; Coulomb friction forces in machines
12	Force members; force polygons
13	Dynamic forces in machine members; inertial force and torque
14	Dynamic force analysis; inertial force; inertial torque

**Professional Contribution**

Ability to design, classify, and compare mechanisms

**Contribution to Program Outcomes\***

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	4	3	0	4	0	4	2	2	0	3	2
CO2	5	5	1	4	1	4	2	2	0	3	3
CO3	5	5	0	4	0	4	3	0	0	4	1
CO4	4	5	2	4	0	3	1	0	0	2	0
CO5	5	5	1	5	0	5	4	2	0	5	0
CO6	4	5	0	4	0	5	2	3	0	5	4

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

**Special Conditions**

- Students work in groups for presentation and assignment.
- The consequence of violation of the attendance rule is to receive a grade of **NA**.

**Requirements**

Basic knowledge of a dynamic analysis software

**Course Policy**

1. You must attend at least 70% of the sessions including add-drop period.
2. Be in the class on time.
3. English should always be used to communicate with one another.
4. Mobile phone should be switched off and put away during the class.
5. You cannot talk to your friends during class no matter what the subject is.

**Cheating & Plagiarism**

- Copying or letting someone to copy your work on exams, assignments, or reports is cheating.
- Cutting and pasting text, figures and tables from the web sources or any other electronic source is plagiarism.
- The consequence of academic dishonesty is to receive a grade of **F** for the course.

**Evaluation**

Midterm Exam	30%
Presentation	10%
Assignment	10%
<u>Final Exam</u>	<u>50%</u>
Total	100%

**Rubric**

A rubric will be announced prior to presentation sessions. The rubric has 2 main parts for the grading: technical assessment (50%) and writing or presentation performance (50%)

**Instructor**

Name/Surname	Akin Oktav	Email	akin.oktav@alanya.edu.tr
Room	209	Office Hours	Th 16.00-17.00   F 16.00-17.00

Prepared by Akin Oktav on August 25, 2021