

İZMİR INSTITUTE OF TECHNOLOGY
DEPARTMENT OF MECHANICAL ENGINEERING
ME331 THEORY OF MACHINES I
FALL 2025-2026

COURSE INSTRUCTOR

Prof. Dr. Gökhan Kiper (Room: Z14, gokhankiper@iyte.edu.tr, 750 6777)

COURSE ASSISTANTS

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COURSE SCHEDULE

Wednesday 10:45 – 12:30 / Friday 13:30 – 14:15 @D14

ONLINE COURSE MEDIUM

İYTE LMS: <http://cloud-lms.iyte.edu.tr> ⇒ ME331

STRONGLY RECOMMENDED PREREQUISITES

MATH141 Basic Calculus I, MATH142 Calculus II, PHYS121 General Physics I, ME222 Dynamics, ME242 Applied Mathematics for Engineers (You cannot take ME331 if you have not ever taken ME222)

COURSE CONTENT

Detailed course content is in the second page.

TEXTBOOK

E. Söylemez, G. Kiper, Mechanisms, 6th Ed., 2025.

or E. Söylemez, Mechanisms, METU Press, 5th Ed., 2018.

Online version (English): <https://blog.metu.edu.tr/eresmech/mechanisms/>

Online version (Turkish): <https://blog.metu.edu.tr/eresmech/mekanizma-teknigi/>

REFERENCES

J. J. Uicker, G. R. Pennock, J. E. Shigley, Theory of Machines and Mechanisms, Oxford University Press, 4th Ed., 2010.

A. G. Erdman, G. N. Sandor, Mechanism Design: Analysis and Synthesis Volume I, Prentice-Hall, 4th Ed., 2001.

R. L. Norton, Design of Machinery: An Introduction to the Synthesis and Analysis of Mechanisms and Machines, McGraw-Hill, 5th Ed., 2011.

E. Söylemez, Örneklerle Mekanizma Tekniği, TMMOB Makina Mühendisler Odası, 2020.

Many other machine theory books are available with call numbers starting TJ175 in the library.

COMPUTER SESSIONS

There will be 4 computer sessions (see the schedule on 2nd page). Attendance to these sessions is compulsory.

QUIZZES and EXAMINATIONS

5 quizzes will be applied throughout the semester. There will be a Midterm and a Final Examination. Make-up quizzes/examination are offered for the students who have a valid excuse approved by the department.

TENTATIVE GRADING

Attendance (%5) + Quizzes & Computer Sessions (%25) + Midterm Examination (%30) + Final Exam (%40)

ACADEMIC ETHICS

According to Personal Data Protection Law, sharing any kinds of lecture materials (handouts, homework/quiz/exam questions, etc.) with third parties, use them on the web, or publish them through any social network without written approval of our institution is strictly forbidden even after your graduation. All written submissions (homework assignments, exams, etc.) must reflect purely independent and individual efforts. All reference material (books, scientific papers, web sites, etc.) in these submissions should be properly cited. Academic dishonesty, including any form of cheating will not be tolerated and may result in failure of the course and/or formal disciplinary proceedings that may lead to suspension. Cheating includes but is not limited to such acts as offering or receiving unpermitted assistance in the exams, using any type of unauthorized written material during the exams, handing in any part or all of someone else's work as your own, copying from an internet source. Plagiarism is a specific form of cheating. It means using someone else's work without giving credit and it is a form of literary theft.

ME331 TENTATIVE COURSE CONTENT - FALL 2025-2026

Color code	Theoretical lectures (30 hrs)	Computer Sessions (8 hrs)	Evaluation
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(In the computer sessions your files will be collected and evaluated)

Lecture	Date	Tentative Content	Section in printed book	Section in online book	Evaluation	Supplementary material	
1	Oct 1	Introduction	-	-	-		
2		Basic concepts and definitions	1.1-1.3	1.1-1.3	-		
3	Oct 3	Basic concepts and definitions (continued)			-		
4	Oct 8	Classification of mechanisms	1.10	2.7	Quiz 1	Exercise pdf	
5		Degree of freedom (dof) of mechanisms	1.4	2.1	-		
6	Oct 10	Constrained/Unconstrained mechanisms	1.5	2.2	-		
7	Oct 15	Examples on dof of mechanisms					
8		Kinematic inversion; Enumeration of mechanisms	1.6-1.8	2.3-2.5	-	Exercise pdf	
9	Oct 17	Kinematics of a particle and a rigid body	2.1.1-2.1.2	3.0-3.2	-		
10	Oct 22	Coincident points; Vector loop concept	2.1.3-2.1.4	3.3-3.4	Quiz 2		
11		Writing loop closure equations	2.1.4	3.4	-	Exercise pdf	
12	Oct 24						
13	Oct 31	Stepwise solution for the 4-bar mechanism	2.1.6	3.6	Quiz 3		
14	Nov 5	Computer session: Graphical solution for mechanisms with Geogebra	2.1.5	3.5	Comp. ses. 1	Youtube	
15							
16	Nov 7	Analytical solution of loop closure equations	2.1.6	3.6	-		
17	Nov 12	Computer session: 4-bar solution with Excel	2.1.8	3.8	Comp. ses. 2	Youtube (upto 1:05)	
18							
19	Nov 14	Analytical solution of loop closure equations	2.1.6	3.6	-	Exercise pdf	
20	Nov 19	Computer session: 4-bar solution with Excel - Using macros	Appendix II	Appendix II	Comp. ses. 3	Youtube (upto 1:05)	
21							
22	Nov 21	Iterative solution of loop closure equations	2.1.9	3.9	-		
23	Nov 26	Midterm Examination	-	-	-		
24							
25	Nov 28	Grasshof's theorem for the 4-bar mechanism	4.1, 4.1.1	7.1	-		
26	Dec 3	Dead center positions and transmission angle	4.1.2-4.1.3		-	Exercise pdf	
27		Velocity and acceleration analysis	2.2	4.1	-		
28	Dec 5	Velocity/acceleration analysis of mechanisms	2.3	4.2	-	Exercise pdf	
29	Dec 10						
30							
31	Dec 12				Quiz 4		
32	Dec 17	Excel application for velocity/acceleration analysis	-	-	Comp. ses. 4		
33							
34	Dec 19	Linear mechanical systems; Simple gear trains	3.1	5.0-5.1	-		
35	Dec 24	Planetary gear trains	3.2	5.2	-	Exercise pdf	
36							
37	Dec 26	Forces and couples; Forces in machinery	5.1	6.1	Quiz 5		
38	Dec 31	Static force analysis of mechanisms	5.2	6.2	-		
39							
40	Jan 2	Dynamic force analysis	5.3	6.3	-		
41	Jan 7	Dynamic force analysis of mechanisms	5.4	6.4	-	Exercise pdf	
42							