

**İZMİR INSTITUTE OF TECHNOLOGY**  
**DEPARTMENT OF MECHANICAL ENGINEERING**  
**ME331 THEORY OF MACHINES I**  
**FALL 2024-2025**

**COURSE INSTRUCTOR**

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

**COURSE ASSISTANTS**

Mr. Fırat Kara (Room: Z31 – Mechatronics Laboratory, [firatkara@iyte.edu.tr](mailto:firatkara@iyte.edu.tr), 750 6752)

Ms. Merve Özkahya (Room: Z31 – Mechatronics Laboratory, [merveozkahya@iyte.edu.tr](mailto:merveozkahya@iyte.edu.tr), 750 6752)

Mr. Murat Demirel (Room: Z31 – Mechatronics Laboratory, [muratdemirel@iyte.edu.tr](mailto:muratdemirel@iyte.edu.tr), 750 6752)

**COURSE SCHEDULE**

Monday 10:45 – 12:30 / Wednesday 11:45 – 12:30 @D14

**ONLINE COURSE MEDIUM**

Microsoft Teams – team code: ek1h527

**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 presented in the second page.

**TEXTBOOK**

E. Söylemez, Mechanisms, METU Press, 5<sup>th</sup> Edition, 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, 4<sup>th</sup> Edition, 2010.

A. G. Erdman, G. N. Sandor, Mechanism Design: Analysis and Synthesis Volume I, Prentice-Hall, 4<sup>th</sup> Edition, 2001.

R. L. Norton, Design of Machinery: An Introduction to the Synthesis and Analysis of Mechanisms and Machines, McGraw-Hill, 5<sup>th</sup> Edition, 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 2<sup>nd</sup> 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 2024-2025**

Color code	Theoretical lectures (30 hrs)	Computer Sessions (8 hrs)	Evaluation
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(files created by you in the computer sessions will be collected and evaluated)

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