ECTS Info Package

Türkçe

Syllabus (ME 231)

Basic information

Course title:	Statics
Course code:	ME 231
Lecturer:	Assist. Prof. Saeed LOTFAN
ECTS credits:	5
GTU credits:	3 ()
Year, Semester:	2, Fall
Level of course:	First Cycle (Undergraduate)
Type of course:	Compulsory
Language of instruction:	English
Mode of delivery:	Face to face
Pre- and co-requisites:	none
Professional practice:	No
Purpose of the course:	This course teaches fundamental engineering science and mathematical principles required for a proper understanding of mechanics. Students will learn to use vector methods and free body diagram development as tools to logically approach and solve engineering mechanics problems. In this course the student will develop engineering problem solving methods through fundamental introductory topics in mechanics including: particle and rigid body equilibrium in 2D and 3D force systems, appropriate support reactions, moments of forces, equivalent systems, distributed forces, center of gravity, trusses, frames, internal forces (including shear and bending moment diagrams), moment of inertia, parallel axis theorem, mass moment of inertia. Upon completion of this course students are expected to understand how to analyze practical engineering structures under force and moment systems and have a strong foundation of the engineering mechanics principles and methods needed for both use as qualified engineers and for secondary courses in mechanics.

Learning outcomes

Upon successful completion of this course, students will be able to:

1. Be able to solve problems which require the ability to analyze systems of forces in static equilibrium.

    Contribution to Program Outcomes
    1. Ability to identify, formulate and solve complex engineering problems; ability to select and apply appropriate analysis and modeling methods for this purpose.
    2. Ability to select and use modern techniques and tools necessary for the analysis and solution of complex problems encountered in engineering practice; ability to use information technologies effectively.
    3. An ability to design and conduct experiments, collect data, analyze and interpret results for the study of complex engineering problems or discipline-specific research topics.
    4. Analytical thinking ability, ability to transform ideas into practice, ability to design, ability to think in three dimensions.

    Method of assessment
    1. Written exam
    2. Homework assignment

2. Posses ability to work professionally in both thermal and mechanical systems areas including the design and realization of such systems.

    Contribution to Program Outcomes
    1. Ability to identify, formulate and solve complex engineering problems; ability to select and apply appropriate analysis and modeling methods for this purpose.
    2. Ability to select and use modern techniques and tools necessary for the analysis and solution of complex problems encountered in engineering practice; ability to use information technologies effectively.
    3. An ability to design and conduct experiments, collect data, analyze and interpret results for the study of complex engineering problems or discipline-specific research topics.
    4. Information about the effects of engineering practices on health, environment and safety in universal and social dimensions and the problems of the age reflected in the field of engineering; awareness of the legal consequences of engineering solutions.
    5. Analytical thinking ability, ability to transform ideas into practice, ability to design, ability to think in three dimensions.
    6. The ability to work professionally by preparing and managing projects in the fields of mechanical, thermal systems or automatic control.

    Method of assessment
    1. Written exam
    2. Homework assignment

3. To become skillful with the mathematical and graphical techniques of vector analysis in mechanical engineering.

    Contribution to Program Outcomes

1. Ability to identify, formulate and solve complex engineering problems; ability to select and apply appropriate analysis and modeling methods for this purpose.
2. Ability to select and use modern techniques and tools necessary for the analysis and solution of complex problems encountered in engineering practice; ability to use information technologies effectively.
3. An ability to design and conduct experiments, collect data, analyze and interpret results for the study of complex engineering problems or discipline-specific research topics.
4. Analytical thinking ability, ability to transform ideas into practice, ability to design, ability to think in three dimensions.

Method of assessment

1. Written exam
2. Homework assignment

Contents

Week 1: Introduction, Syllabus, Review, Units. Fundamental Principles, Newton's Laws / Force Vectors

Week 2: Cartesian Vectors and their addition and subtraction, Position Vectors / Force Vectors

Week 3: Equilibrium of a Particle / Force System Resultants 1

Week 4: Force System Resultants 2 / Equilibrium of Rigid Body in 2D

Week 5: Equilibrium of Rigid Body in 3D / Structural Analysis

Week 6: Frames and Machines / Internal Forces

Week 7: Midterm-1,
Internal Forces, Shear and Moment Equations and Diagrams

Week 8: Cables / Friction

Week 9: Applications of Friction / Center of Gravity and Centroids

Week 10: Fuild Statics / Moments of Inertia

Week 11: Max and Min moments / Mass moments of Inertia

Week 12: Midterm-2,
Mass moments of Inertia

Week 13: Virtual Work

Week 14: Solving Review Problems

Week 15*: Review

Week 16*: Final Exam

Textbooks and materials:	R. C. Hibbeler, Engineering Mechanics Statics, Thirteenth Edition, Pearson Prentice Hall. [ISBN-10: 0132915545]
Recommended readings:	1. Beer, Johnston, Cornwell, Sanghi; Vector Mechanics for Engineers: Statics and Dynamics, 10th Edition, McGraw Hill. 2. Anthony Bedford and Wallace Fowler, Engineering Mechanics, Statics and Dynamics, 3rd Edition, Prentice Hall, 2002 (or later editions) 3. Boresi, A.P., and Schmidt, R.J., Engineering Mechanics: Statics and Dynamics, Brooks/Cole Publishing Company, Boston, 2001. 4. Hibbeler, R.C., Engineering Mechanics: Statics and Dynamics, Eigth Edition, Prentice-Hall, Inc., New Jersey, 1998. 5. McGill, D.J., and King, W.W., Engineering Mechanics: Statics and Dynamics, Third Edition, PWS Publishing Company, Boston, 1995. 6. Merriam, J.L., and Kraige, L.G., Engineering Mechanics: Statics and Dynamics, Fourth Edition, John Wiley & Sons, Inc., New York, 1997. 7. Pytel, A., and Kiusalaas, J., Engineering Mechanics: Statics and Dynamics, Second Edition, Brooks/Cole Publishing Company, Boston, 1999. 8. Riley, W.F., and Sturges, L.D., Engineering Mechanics: Statics and Dynamics, Second Edition, John Wiley & Sons, Inc., New York, 1996.

* Between 15th and 16th weeks is there a free week for students to prepare for final exam.

Assessment

Method of assessment	Week number	Weight (%)
Mid-terms:	7, 12	40
Other in-term studies:	-	-
Project:	14	10
Homework:	1-14	10
Quiz:	1-14	10
Final exam:	16	30
	Total weight:	100 (%)

Workload

Activity	Duration (Hours per week)	Total number of weeks	Total hours in term
Courses (Face-to-face teaching):	3	14	42
Own studies outside class:	4	14	56
Practice, Recitation:	-	-	-
Homework:	-	-	-
Term project:	-	-	-
Term project presentation:	-	-	-
Quiz:	-	-	-
Own study for mid-term exam:	8	2	16
Mid-term:	2	2	4
Personal studies for final exam:	7	1	7
Final exam:	-	-	-
		Total workload:	125
		Total ECTS credits:	5*

* ECTS credit is calculated by dividing total workload by 25.

(1 ECTS = 25 work hours)

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Fall 2024

ME 231 Statics

General information:	2-2-0 = 3 GTU credits, 5 ECTS credits, Th: 09:30-12:20, (Face-to-Face at Harita Amfi 1)
Instructor:	Assist. Prof. Saeed LOTFAN H2 123, slotfan@gtu.edu.tr, (262) 605 26 58
Teaching assistants:	Dr. İlke ALGÜL H2 Z34, ilkees@gtu.edu.tr, (262) 605 27 99 Arş. Gör. Eref Bedirhan AKSOY H2 Z34, bedirhanaksoy@gtu.edu.tr, (262) 605 27 99
Office hours:	Th: 14:00-17:00
Textbooks:	• Hibbeler, R. C., "Engineering Mechanics Statics", Thirteenth Edition, Pearson Prentice Hall. [ISBN-10: 0132915545] • Beer, F.P., Johnston, E.R., "Vector Mechanics for Engineering Statics", McGraw-Hill International Book Company • Meriam, J. L., Kraige, L. G., "Engineering Mechanics, Statics", John Wiley&Sons Inc.
Catalog description:	The main purpose of this course is to provide the student with a clear and thorough presentation of the theory and application of engineering mechanics.
Prerequisite:	-
Course type:	This course is required for all Mechanical Engineering students.
Integrity statement:	All students are expected to act with civility, academic and personal integrity, respect others' dignity, rights, and property; and help create and maintain an environment in which all can succeed through the fruits of their own efforts.
Grading:	Midterms 25% each Homeworks, Project and Quizzes 20% Final exam 30% a. Students who fail to meet the 70% attendance requirement in the course fail with an NA grade; they are not entitled to take the final exam. b. A student who fails to achieve at least 30% success in the weighted average of midterm exam and quizzes evaluations during the term will fail with a VF grade; they are not entitled to take the final exam. c. Students whose success in the final exam is below 25/100 are considered to have failed the course with an FF grade, regardless of their other studies. d. Not failing the items a, b and c above does not mean to have succeeded in the course; for students who meet the minimum requirements stated in these articles, course grade evaluation is made separately in the [FF-AA] range.

Topics covered and Schedule:

Week	Date	Topic	
1	Sep. 26	Introduction, Syllabus, Review, Units. Fundamental Principles, Newton's Laws / Force Vectors	
2	Oct. 3	Cartesian Vectors and their addition and subtraction, Position Vectors / Force Vectors	
3	Oct. 10	Equilibrium of a Particle / Force System Resultants 1	
4	Oct. 17	Force System Resultants 1 / Equilibrium of Rigid Body in 2D	
5	Oct. 24	Equilibrium of Rigid Body in 3D / Structural Analysis	
6	Oct. 31	Frames and Machines / Internal Forces	
7	Nov. 7	Internal Forces, Shear and Moment Equations and Diagrams	M1
8	Nov. 14	Cables / Friction	
9	Nov. 21	Applications of Friction / Center of Gravity and Centroids	
10	Nov. 28	Fuild Statics / Moments of Inertia	
11	Dec. 5	Max and Min moments / Mass moments of Inertia	
12	Dec. 12	Mass moments of Inertia	M2
13	Dec. 19	Virtual Work	
14	Dec. 26	Solving Review Problems	
15	Jan. 2	Review	
16	Jan. 9	Final Exam	F

GEBZE TECHNICAL UNIVERSITY

Fall 2023
ME 231 Statics

General information:	2-2-0 = 3 GTU credits, 5 ECTS credits, Th: 09:30-12:20, (Face-to-Face at Elect- Z02)
Instructor:	Assist. Prof. Saeed LOTFAN H2 123, slotfan@gtu.edu.tr, (262) 605 26 58
Teaching assistants:	Muhammet Bilal İĞDİ H2 Z34, bilaligdi@gtu.edu.tr, (262) 605 27 99 Eda ÖZYILMAZ H2 Z16, eozyilmaz@gtu.edu.tr, (262) 605 27 89
Office hours:	Th: 14:00-17:00
Textbooks:	• Hibbeler, R. C., "Engineering Mechanics Statics", Thirteenth Edition, Pearson Prentice Hall. [ISBN-10: 0132915545] • Beer, F.P., Johnston, E.R., "Vector Mechanics for Engineering Statics", McGraw-Hill International Book Company • Meriam, J. L., Kraige, L. G., "Engineering Mechanics, Statics", John Wiley&Sons Inc.
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Course type:	This course is required for all Mechanical Engineering students.
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Week	Date	Topic	
1	Oct. 5	Introduction, Syllabus, Review, Units. Fundamental Principles, Newton's Laws / Force Vectors	
2	Oct. 12	Cartesian Vectors and their addition and subtraction, Position Vectors, Force Vectors	
3	Oct. 19	Equilibrium of a Particle, Free body diagrams, Coplanar force systems	
4	Oct. 26	Three-Dimensional Force Systems	
5	Nov. 2	Three-Dimensional Force Systems -Continue Moment of a Force (Vector)	
6	Nov. 9	Moment of a Force (Scalar), Cross Product	
7	Nov. 16	Internal Forces, Shear and Moment Equations and Diagrams	M1
8	Nov. 23	Relations Between Shear and Moment	
9	Nov. 30	Center of Gravity, Center of Mass and the Centroid of a Body	
10	Dec. 7	Equilibrium of a Rigid Body FBD's, Equations of Equilibrium Two- and Three-Force Members	
11	Dec. 14	3-D FBD's, Equilibrium Equations, Constrains and Statical Determinacy	
12	Dec. 21	Simple Trusses, The Method of Joints Sections	M2
13	Dec. 28	Zero-Force Members	
14	Jan. 4	Frames and Machines, Moments of Inertia for Areas	
15	Jan. 11	Review	
16	Jan. 18	Final Exam	F

GEBZE TECHNICAL UNIVERSITY

Fall 2022
ME 231 Statics

General information:	2-2-0 = 3 GTU credits, 5 ECTS credits, M: 13:30-16:20, (online and Elect- Amfi2)
Instructor:	Assist. Prof. Saeed LOTFAN H2 123, slotfan@gtu.edu.tr, (262) 605 26 58
Teaching assistants:	Onur Kaya H2 Z16, onur.kaya@gtu.edu.tr, (262) 605 27 89 Erdem Baydır H2 Z34, erdembaydir@gtu.edu.tr, (262) 605 2799
Office hours:	M: 9:00-12:00
Textbooks:	• Hibbeler, R. C., "Engineering Mechanics Statics", Thirteenth Edition, Pearson Prentice Hall. [ISBN-10: 0132915545] • Beer, F.P., Johnston, E.R., "Vector Mechanics for Engineering Statics", McGraw-Hill International Book Company • Meriam, J. L., Kraige, L. G., "Engineering Mechanics, Statics", John Wiley&Sons Inc.
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5		Three-Dimensional Force Systems -Continue Moment of a Force (Vector)	
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12		Simple Trusses, The Method of Joints Sections	M2
13		Zero-Force Members	
14		Frames and Machines, Moments of Inertia for Areas	
15		Review	
16		Final Exam	F