# Statics

Course Code:

ME 241

Course Period:

Autumn

Course Type:

Core

Credits:

3

Theoric:

3

Practice:

0

Laboratory Hour:

0

ECTS:

6

Prerequisite Courses:

Physics I [1]
Course Language:

English

Courses given by:

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Course Objectives:

To teach students fundamental knowledge of mechanics of stationary systems and structures and educate them to apply this knowledge in the solution of engineering problems.

Course Content:

Principles of mechanics. Fundamental vector algebra. Classification and equivalence of force systems. Rigid body equilibrium. Center of gravity. Analysis of structures, trusses, beams, cables and chains. Friction. Principles of virtual work and minimum potential energy.

Course Methodology:

1: Lecture, 3: Homework

Course Evaluation Methods:

A: Midterm and final exam, C: Homework

| Learning Outcomes | Program Outcomes | Teaching Methods | Assessment Methods |
|---|---|---|---|
| 1. Knowledge of static force systems, statical indeterminacy and the geometric properties of structural elements (centroid, moment of inertia). | 1 | 1, 3 | A, C |
| 1. Ability to solve engineering problems related to equilibrium of stationary mechanical systems. | 2, 3 | 1, 3 | A, C |

| COURSE CONTENT | | |
|---|---|---|
| **Week** | **Topics** | **Study Materials** |
| 1 | Introduction to mechanics, force | Textbook |
| 2 | Vectors in mechanics, particle equilibrium | Textbook |
| 3 | Review: C.O.G. and centroid | Textbook |
| 4 | Moment of a force, equivalency | Textbook |
| 5 | Resultant of force systems | Textbook |
| 6 | Rigid body equilibrium (planar) | Textbook |
| 7 | Rigid body equilibrium (spatial) | Textbook |
| 8 | Structural analysis: trusses | Textbook |

| | | |
|---|---|---|
| 9 | Structural analysis: frames & machines | Textbook |
| 10 | Internal forces (stress) in bodies | Textbook |
| 11 | Effect of dry friction | Textbook |
| 12 | Friction in mating parts | Textbook |
| 13 | Work & energy | Textbook |
| 14 | Moment of inertia | Textbook |

| **RECOMMENDED SOURCES** | |
|---|---|
| **Textbook** | Beer and Johnston, Vector Mechanics for Engineers: Statics, 7th ed, McGraw Hill, 2002. |
| **Additional Resources** | Anthony Bedford, Engineering mechanics statics, Prentice Hall, 2002 |

| **MATERIAL SHARING** | |
|---|---|
| **Documents** | Syllabus |
| **Assignments** | Homework assignments |
| **Exams** | Exams |

| **ASSESSMENT** | | |
|---|---|---|
| **IN-TERM STUDIES** | **NUMBER** | **PERCENTAGE** |
| Midterms | 2 | 25 |
| Homeworks | 8-10 | 20 |
| **Total** | | **70** |
| **CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE** | | 30 |
| **CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE** | | 70 |
| **Total** | | **100** |

| **COURSE'S CONTRIBUTION TO PROGRAM** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| No | Program Learning Outcomes | | Contribution | | | | | |
| | | NA | 1 | 2 | 3 | 4 | 5 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | **X** | | | | | | |
| 2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose. | **X** | | | | | | |
| 3 | Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose. | **X** | | | | | | |
| 4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | **X** | | | | | | |
| 5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions. | **X** | | | | | | |
| 6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually. | **X** | | | | | | |
| 7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions. | **X** | | | | | | |
| 8 | Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself. | **X** | | | | | | |
| 9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice. | **X** | | | | | | |
| 10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development. | **X** | | | | | | |

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|---|---|---|---|---|---|---|---|---|
| 11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions. | **X** | | | | | | |
| 12 | Ability to work professionally in both thermal and mechanical systems areas, including design and realization. | **X** | | | | | | |
| 13 | Ability to verify and validate numerical solutions to engineering problems. | **X** | | | | | | |

| **ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION** | | | |
|---|---|---|---|
| Activities | Quantity | Duration (Hour) | Total Workload (Hour) |
| Course Duration (Including the exam week: 16x Total course hours) | 16 | 4 | 64 |
| Hours for off-the-classroom study (Pre-study, practice) | 16 | 4 | 64 |
| Mid-terms | 2 | 4 | 8 |
| Final examination | 1 | 8 | 8 |
| **Total Work Load** | | | 144 |
| **Total Work Load / 25 (h)** | | | 5.76 |
| **ECTS Credit of the Course** | | | 6 |