COURSE CATALOG

| Course Code: CE 201 | | | | Course Name: Strength of Materials I | | | |
|---|---|---|---|---|---|---|---|
| Semester | T + P + L | Credits | ECTS | Language of Instruction | Course Type | Instruction Methods | Prequisite(s) |
| 3 | 3 + 1 + 0 | 3 | 7 | English | Required (D1) | Lecture | CE 102 Statics |
| Course Objectives | | | Stress. Strain. Mechanical properties of materials: Stress-strain diagrams, Hooke's Law, strain energy. Axial load: Saint Venant's principles, statically determinate and indeterminate systems, thermal stresses. Torsion: Circular and non-circular shafts, thin-walled tubes, inelastic torsion. Bending: Symmetric and asymmetric bending, curved beams, inelastic bending. Transverse shear: Shear stresses in beams, shear center, thin walled members. | | | | |
| Topics Covered | | | Definition. Fundamental principles. Classification. The state of stress and the stress tensor. Strains. Constitutive equations. Hooke's laws. Energy. Fatigue. Strength theories. Internal effects and diagrams. Normal force, statically determinate and indeterminate systems. Thermal effects. Examples. Shear force. Computation of riveted joints. Torsion of circular shafts. Torsion of non-circular shafts. Torsion of thin-walled members of open cross section and thin tabular members. Membrane Analogy. Moments of inertia of plane areas. Symmetric and asymmetric bending, curved beams, inelastic bending. Combined sections. Transverse shear: Shear stresses in beams, shear center, thin walled members. | | | | |
| Learning Outcomes of the Course | | | After completing this course students should gain:<br>1-An ability to apply knowledge of mathematics, science and engineering, [1,2,6,9,13]<br>2- An ability to design a system, component, or process to meet desired needs, [1,2]<br>3-An ability to identify, formulate and solve engineering problems, [2,14]<br>4- An ability to use the techniques, skills and modern engineering tools necessary for engineering practice, [2,10,13,14].<br>*[Note that the numbers in between the brackets address the bullet numbers in the program outcomes list.]* | | | | |
| ISCED Category of the Course | | | 52 Mühendislik | | | | |
| Textbook | | | R.C.Hibbeler, Mechanics of Materials, Prentice Hall, 2008, 7th edition. | | | | |
| Recommended Sources | | | 1. Mustafa İnan, Cisimlerin Mukavemeti, İTÜ Vakfı, 1988.<br>2. Esin İnan, Cisimlerin Mukavemeti-Problem Kitabı, İTÜ, 1978.<br>3. Hilmi Demiray, Mukavemet, Çağlayan Kitapevi, 1968<br>4. Henry W. Haslach, Jr. and Ron Armstrong, Deformable Bodies and Their Material Behavior, Wiley 2004.<br>5. J.M. Gere, S.P. Timoshenko, Mechanics of Materials, Chapman and Hall,1991. | | | | |

WEEKLY SCHEDULE

| Week | Theoretical Topic | Applied / Laboratory Topics |
|---|---|---|
| 1 | Definition. Fundamental principles | |
| 2 | The state of stress and the stress tensor | |
| 3 | Strains. Constitutive equations. Hooke's laws. | |
| 4 | Energy. Fatigue. Strength theories | |
| 5 | Internal effects and diagrams. | |
| 6 | Normal force, statically determinate and indeterminate problems for normal force. Thermal effects. | |
| 7 | Examples. Shear force. Computation of riveted joints | |
| 8 | Torsion of circular shafts. Torsion of non-circular shafts. | |
| 9 | Torsion of thin-walled members of open cross section and thin tabular members. | |
| 10 | Membrane Analogy. Moments of inertia of plane areas | |
| 11 | Symmetric and asymmetric bending, curved beams, inelastic bending. | |
| 12 | Combined sections. Transverse shear: Shear stresses in beams, | |
| 13 | Shear center, thin walled members. | |
| 14 | Review and examples. | |

COURSE ASSESSMENT POLICY

| | Activities | Number | Contribution (%) |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Studies throughout the term | Quiz | 3 | 05 |
| | Term Homework/ Project | | |
| | Reports | - | - |
| | Graduation Thesis/ Project | - | - |
| | Seminar | - | - |
| | Homework | 5 | 10 |
| | Presentations | - | - |
| | Midterm Exams | 2 | 35 |
| | Project | | |
| | Laboratory | - | - |
| | Other (attendance) | 14 | 10 |
| FINAL EXAM | | 1 | 40 |
| Total | | | 100 |

CONTRIBUTION OF THE COURSE TO CIVIL ENGINEERING PROGRAM OUTCOMES

| | Program Outcomes | 1 | 2 | 3 |
|---|---|---|---|---|
| 1 | The ability to apply knowledge of mathematics, science, and engineering | | | X |
| 2 | The ability to identify, formulate, and solve engineering problems | | | X |
| 3 | The ability to design a system or component to meet desired needs with realistic constraints such as economic, environmental, social, ethical, health and safety, manufacturability and sustainability | | | X |
| 4 | The ability to analyze and interpret data | | | X |
| 5 | The ability to design and conduct experiments and apply experimental results to improve processes | | | X |
| 6 | The ability to convey technical material through oral presentations and written papers/reports | | | X |
| 7 | The ability to function within multidisciplinary teams | | X | |
| 8 | The understanding of professional and ethical responsibilities | | | X |
| 9 | The understanding of the impact of engineering on society | | X | |
| 10 | The understanding of the necessity to engage in life-long learning | | X | |
| 11 | The understanding of management and leadership principles and techniques | | X | |
| 12 | The appreciation of the role of research in civil engineering problems | | X | |
| 13 | A knowledge of contemporary issues in civil engineering | | X | |
| 14 | The ability to use modern engineering techniques, skills, and tools | | X | |
| 15 | The ability to understand and explain basic concepts in management, business, and leadership | | | X |
| 16 | A commitment to quality, punctuality and continuous improvement | | | X |

Contribution Level: 1 low, 2 medium, 3 high

ECTS-WORKLOAD TABLE

| ACTIVITIES | Number | Duration (Hour) | Workload(Hour) |
|---|---|---|---|
| Lecture Time | 14 | 3 | 42 |
| Final Exam (Including Preparation Time) | 1 | 18 | 18 |
| Quiz | 3 | 3 | 9 |
| Term Homework / Project | - | - | - |
| Reports | - | - | - |
| Graduation Thesis/Project | - | - | - |
| Seminar | - | - | - |
| Study Time Outside the Class | 14 | 4 | 56 |
| Homework | 5 | 6 | 30 |
| Presentations | - | - | - |
| Midterm Exams (Including Preparation Time) | 2 | 10 | 20 |
| Project | - | - | - |
| Laboratory | - | - | - |
| Total Workload | | | 175 |
| ECTS Credits of the Course (Total Workload / 25) | | | 7 |

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| Last update on<br>19.01.2014 | Coordinator / PREPARED BY<br>Esin İnan | APPROVED BY<br>Esin İnan |