# CE 388 – FUNDAMENTALS OF STEEL DESIGN
# SPRING TERM 2013-2014

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## CATALOGUE DESCRIPTION:

General concepts in design. Design methods, codes, safety, serviceability. Behavior of steel structures. Tension members, compression members, beams, beam-columns, types and behavior of connections in steel structures, bolted and welded connections.

## MATERIAL AND OBJECTIVE:

This course is one of the main courses in which design concepts will be introduced. The course will teach basic principles of design and fundamentals of steel structures. Students will utilise their knowledge of mechanics, strength of materials and structural analysis to design a structure using steel as a material.

## GRADING SYSTEM:

Homeworks, two term tests and a final exam will be given. In the exams students will be allowed to use some of the related standards and section tables. These documents should not be annotated.

## TENTATIVE GRADING POLICY:

| | |
|---|---|
| Homeworks | 5% |
| Term Tests | 45~55 % |
| Final | 40~50 % |

There will be only one make-up exam and it will be given just before the final exams. The make-up exam will cover all of the subjects in the course regardless of the exam missed.

Students should collect at least an average of 20 points out of 100 from two term tests to be eligible to take the final exam. Students who do not qualify for the final exam will be graded **NA** at the end of the semester.

**SELECTED REFERENCES:**

**GENERAL:**


1. Gaylord, E. H. and Stallmeyer, J. E. "Design of Steel Structures", Third Edition, McGraw Hill Inc., 1992

2. Yilmaz, Ç., and Akkas, N., "Analysis and Design of Steel Structures", ODTÜ.

3. Keyder, E., "Dolu Gövdeli Çelik Kirisler", ODTÜ

4. Keyder, E., Wasti, S.T., "Çelik Yapı Elemanları (Analiz ve Tasarım)", 2010.

5. McCormac, J.C., "Structural Steel Design ASD Method", Fourth Edition, Harper Collins, 1992.

6. Englekirk, R., "Steel Structures", John Wiley and Sons, 1994.

7. McCormac, J.C., "Structural Steel Design LRFD Method", Second Edition, Harper Collins, 1995

8. Salmon, C.G., and Johnson, J. E., "Steel Structures, Design and Behavior", Third Edition, Harper and Row Publishers, 1990

9. Segui, W. T., "LRFD Steel Design" , PWS Publishing Company, 1994


**CODES:**


1. Turkish Standards Institute, "Building Code for Steel Structures", TS648.

2. Turkish Standards Institute, "Design Loads for Buildings", TS498.

3. Turkish Government Ministry of Reconstruction and Resettlement Earthquake Research Institute, "Specifications for Structures to be Built in Disaster Areas", 2007.

4. Eurocode 3, "Design of Steel Structures", ENV 1993-1-1 Part 1.1: General Rules and Rules for Buildings, CEN Brussels, 1992.

5. American Institute of Steel Construction. "Manual of Steel Construction, Allowable Stress Design", Ninth Edition, AISC, 1989.

6. American Institute of Steel Construction. "Manual of Steel Construction, Load and Resistance Factor Design", Volume1, Second Edition, AISC, 1995.

**COURSE OUTLINE:**

**General concepts in design and properties of steel**
- Principles of design
- Mechanical properties of steel
- Structural steels available

**Design loads and steel design formats**
- Load specifications and codes
- Allowable stress design
- Limit state design (LRFD)
- Factors of safety

**Tension members**
- Introduction and types of tension members
- Net area and effect of staggered holes on net area
- Problems in design

**Compression members**
- Introduction and historical review
- Column strength
- Column theories for inelastic buckling
- Design specifications
- Determination of the effective length of columns in frames and trusses
- Shear force and built up columns
- Diagonal and batten design in built up columns

**Design of flexural members**
- Simple bending
- Biaxial bending
- Shear stresses in beams
- Local buckling and compact sections
- Torsion in open and closed thin-walled sections
- Lateral buckling

**Combined bending and compression**
- Maximum strength of beam columns
- Interaction equations
- Working stress design criteria
- Design procedures and examples-working stress method

**Fasteners and connections**

*Fastened connections*
- Types of connections and their behavior
- Allowable stresses for fasteners
- Fasteners acting in axial tension, combined shear and tension

*Welded connections*
- Types of welds
- Allowable stresses
- Welded connections-allowable stress design

## SPRING SEMESTER 2013-2014

| Week | Date | Month | Lecture |
|---|---|---|---|
| **1** | 17/18** | February | Introduction |
| | 21* | February | General Concepts |
| **2** | 24/25** | February | Tension Members |
| | 28* | February | Tension Members |
| **3** | 3/4** | March | Tension Members |
| | 7* | March | Compression Members |
| **4** | 10/11** | March | Compression Members |
| | 14* | March | Compression Members |
| **5** | 17/18** | March | Compression Members |
| | 21* | March | Compression Members |
| **6** | 24/25** | March | Comp. Members (Built-up) |
| | 28* | March | Comp. Members (Built-up) |
| **7** | 31/1** | March | Comp. Members (Built-up) |
| | 4* | April | Beams |
| **8** | 7/8** | April | Beams |
| | 11* | April | Beams |
| **9** | 14/15** | April | Beams |
| | 18* | April | Beams |
| **10** | 21/22** | April | Beams |
| | 25* | April | Beam Columns |
| **11** | 28/29** | April | Beam Columns |
| | 2* | May | Beam Columns |
| **12** | 5/6** | May | Bolted Connections |
| | 9* | May | Bolted Connections |
| **13** | 12/13** | May | Bolted Connections |
| | 16* | May | Welded Connections |
| **14** | 23* | May | Welded Connections |