

CE 473
Steel Structures

Department of Civil Engineering
King Saud University

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| <p>Course Description: CE 473: Steel Structures (Required for a BSCE degree)</p> | <p>Introduction to types of steels, advantages of steel structures and the concept of LRFD approach. Strength and design of tension members, bolted and welded connections. Analysis and design of roof trusses. Strength and design of columns, beams and beam-columns. Analysis and design of frame structures. As well as design of bolted and welded connection, splices, and column base plate. All designs are according to the LRFD – AISC specifications. 3 (3,1,0)</p> |
| <p>Prerequisite</p> | <p>CE 302 (Mechanics of Materials), CE 361 (Structural Analysis I), CE 461 (Structural analysis II), Prerequisite by Topics:</p> <ol style="list-style-type: none"> 1. Understanding behavior and properties of steel material. 2. Calculation of different type of loads on structures 3. Determination of internal forces in determinate beams, frames and trusses. 4. Determination of deflections for beams under given gravity loading 5. Solution of statically indeterminate structures using moment distribution 6. Understanding specified material properties for design |
| <p>Course learning Objectives</p> | <p>Students completing this course successfully will be able to</p> <ol style="list-style-type: none"> 1. Understand the advantages and disadvantages of steel Structures. 2. Understand the main concept of LRFD approach, and the related factors that affect the design. 3. Determine the factored strength of different steel members, beams, columns and connections. 4. Compute the different factored loads on a steel structure, and analyze it under different load combinations. 5. Design critical sections within the constraints of code design criteria of safety, serviceability and economy using fundamental principles as well as design aids. 6. Work out all stages involved in designing different elements in typical steel structures, and to present the work involved in a professional way. 7. Understand different requirements and constrains involved in other disciplines. 8. Use updated commercial structural steel design software, as well as developing computer spreadsheets to facilitate the design process. 9. Continue to follow up any developments and changes that occur to the related codes. |
| <p>Topics Covered</p> | <ol style="list-style-type: none"> 1. Introduction to Steel structures. 2. Concept of LRFD approach. 3. Strength and design of Bolted and welded tension members. 4. Design concentric bolted and welded connections. |

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| | <ol style="list-style-type: none"> 5. Strength and design of axially loaded columns. 6. Strength and design of beams. 7. Strength and design of Beam-columns. 8. Design of typical shear and moment connections. 9. Design of base plates 10. Design of splices. |
| Class/ tutorial Schedule | Class is held three times per week in 50-minute lecture sessions. There is also a 50-minute weekly tutorial associated with this course. |
| Computer Applications | Computer spreadsheets are encouraged for developing design aids and carrying out systematic steps of design. Commercial and educational structural steel design software can be used during the course. |
| Projects | A project of analyzing and designing a typical steel industrial structure is offered for students during the course. |
| Contribution of Course to Meeting the Professional Component | <ol style="list-style-type: none"> 1. Students use latest codes, design manual for designing structural systems within appropriate constraints including satisfying design criteria. 2. Students recognize the role of professional societies in developing codes and standards and updating current knowledge. |
| Relationship of Course to Program Outcomes | <ol style="list-style-type: none"> 1. Students apply algebra, elementary calculus, and principles of mechanics. 2. Students design structural systems and recognize the interaction with non-structural components 3. Students recognize their role with an engineering team carrying other aspects of design and the interaction of decisions made by various architectural and engineering teams. 4. Students are encouraged to consider alternative systems and parameters to achieve the project goals. 5. Students recognize the ethical and professional responsibility in achieving safe and economical design, and the impact of their design on the well-being of the society. 6. Students develop the background to communicate effectively because the course stresses fundamental principles behind code provisions. 7. Students recognize the need for technical updating on a continuing basis because the course stresses the changing nature of technology, materials, codes and specifications. 8. Students recognize the importance of reading and understanding technical contents in English in order to achieve life-long learning and be able to carryout their responsibilities. 9. Students recognize the important role of computers in facilitating analysis and design of structural members and systems. |
| Textbook(s) and/or Other Required Material | <ol style="list-style-type: none"> 1- "Structural Steel Design, LRFD Method", Jack C. McCormac, James Nelson, 2003 by Pearson Education International. 2- Manual of Steel Construction, LRFD, volume 1 and 2, Metric |

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| | Conversion of the second Edition, 1999, AISC. |
| Prepared by | Dr. Shehab Mourad, Prof. Dr. Salah Alsayed, |
| Date of Preparation | Feb., 28 th , 2006 |

Grade Distribution

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| Mid term exams | 30% |
| Lecture attendance and project | 10% |
| Assignments, quizzes and attendance | 10% |
| Final exam | 50% |

Mid Term Exams

I – 7th Week

II- 13th Week