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**FACULTY OF ENGINEERING**

**CIVIL ENGINEERING DEPARTMENT**

**COURSE OUTLINE**

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| **Course Unit Title** | | Design of Steel Structures | | |
| **Course Unit Code** | | CE 484 | | |
| **Type of Course Unit** | | Compulsory | | |
| **Level of Course Unit** | | 1 | | |
| **National Credits** | | 4 | | |
| **Number of ECTS Credits Allocated** | | 6 | | |
| **Theoretical (hour/week)** | | 4 | | |
| **Practice (hour/week)** | | - | | |
| **Laboratory (hour/week)** | | - | | |
| **Year of Study** | | 4 | | |
| **Semester when the course unit is delivered** | | 1 | | |
| **Course Coordinator** | | Kabir Sadeghi | | |
| **Name of Lecturer (s)** | | Kabir Sadeghi | | |
| **Name of Assistant (s)** | | - | | |
| **Mode of Delivery** | | Face to Face; Formal Lectures | | |
| **Language of Instruction** | | English | | |
| **Prerequisites and co-requisites** | | Strength of Materials (CE224) | | |
| **Recommended Optional Programme Components** | | Background of statics and strength of materials | | |
| **Objectives of the Course:**  The main objectives of this course are to engage students in the discovery of steel structural elements design principles and to provide them with theory and applications in a clear, understandable presentation. | | | | |
| **Learning Outcomes** | | | | |
| **When this course has been completed the student should be able to** | | | **Assessment** | |
| 1 | A Get familiar and understand conceptually topics of steel structural elements design. | | 1, 2, 5 | |
| 2 | Apply the methods of solving steel structural elements design problems that leads to the first insights into the rudiments of related fields in structural engineering sciences. | | 1, 2, 3 | |
| 3 | Analyze the steel structural elements design problems in two dimensions and three dimensions according to acceptable rules, regulation and ACI structural codes. | | 1, 2, 3 | |
| 4 | Apply the different methods of steel structural elements design due to applied loads. | | 1, 2, 3 | |
| 5 | Apply and integrate the basic steel structural elements design including different types of beams, columns slabs, material properties and the principles of engineering sciences into working practical knowledge. | | 1, 2, 3, 5 | |
| Assessment Methods: 1. Written Exam 2. Assignment 3. Project/Report 4.Presentation 5. Lab. Work | | | | |
| **Course’s Contribution to Program** | | | | |
|  |  | | | **CL** |
| 1 | Ability to relate and apply fundamental sciences to learning the essential civil engineering concepts and theories of different branches. | | | 4 |
| 2 | Ability to understand the derivation of these concepts and theories by relating them to the real-life engineering cases within the related civil engineering branch. | | | 4 |
| 3 | Ability to define clearly and analyze the engineering problems by applying the introduced civil engineering concepts and theories of the related branch. | | | 4 |
| 4 | Ability to use decision-making skills and perform design calculations correctly for the solution of the defined problem/project by applying the introduced theories of the related civil engineering branch. | | | 4 |
| 5 | Ability to understand and carry out the practical applications of learned civil engineering concepts and theories on site and/or laboratory. | | | 5 |
| 6 | Ability to use software packages for the analysis and/or the design of the defined civil engineering problems/projects. | | | 3 |
| 7 | Ability to manage time and resources effectively and efficiently while carrying out civil engineering projects. | | | 4 |
| 8 | Ability to participate in team-works in a harmonized manner for the solution of the targeted problem. | | | 4 |
| 9 | Ability to write technical reports and/or to carry out presentations on the studied engineering project using the modern techniques and facilities. | | | 4 |
| 10 | Ability to carry out and finalize a civil engineering study/project by showing professional ethics. | | | 5 |
| CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5:Very High) | | | | |

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| **Course Contents** | | | | | | | | | |
| **Week** | **Chapter** |  | | | | | | **Exams** | |
| 1 | Chapter 1 | Introduction to Steel Structures Design | | | | | |  | |
| 2 | Chapter 2 | Design Loads (Dead, Live, Wind, Snow and Earthquake Loads), Codes and Safety | | | | | |  | |
| 3 | Chapter 3 | Behaviour and Mechanical Properties of Structural Steel.  General Concepts in Design for ASD, PD and LRFD Methods | | | | | |  | |
| 4 | Chapter 4 | Tension Members: Strength, Effective Area, Staggered Bolts; and Design of tension members | | | | | |  | |
| 5 | Chapters 5, 6 | Review of Geometric Properties of Sections. Beams: Shear Strength, Deflections, Design of Steel Beams for Shear and Torsion.  Beams: Elastic and Plastic Moments, Strength of Compact Shapes, Strength of Non-compact Shapes and Design of Steel Beams in Flexure | | | | | |  | |
| 6 | Chapter 6 | Secondary Design Considerations (Web Buckling and Crippling) | | | | | |  | |
| 7 | Chapter 7 | Compression Members: Column Theory, Strength, Local Stability, Effective Length, Buckling and Design of Slender Columns | | | | | |  | |
| 8 | Chapter 8 | Design of Slender Laced and Battened Columns | | | | | | Midterm | |
| 9 | Chapter 9 | Beam-Columns: Moment Amplification, Design of Members in Braced and in Un-braced Frames | | | | | |  | |
| 10 | Chapter 10 | Connections: Weld, Welded Connections, Splices and Design | | | | | |  | |
| 11 | Chapter 10 | Connections: Weld, Welded Connections, Splices and Design | | | | | |  | |
| 12 | Chapter 11 | Simple Connections: Bolts, Bolted Connections and Design | | | | | |  | |
| 13 | Chapter 12 | Columns Base Plates Design | | | | | |  | |
| 14 | Chapter 13 | Composite Construction and Design | | | | | |  | |
| 15 |  | Homework and Assessment Practices. | | | | | | Final | |
| **Recommended Sources**  **Textbook:**  1. Steel Structures Design, 1st Edition, By; Kabir Sadeghi, Near East University Press Centre, 2015.  2. Structural Steel Design, ASD Method, J. McCormac, 4th and 5th edition, Published by Harper Collins Publishers.  3. Welded Structures Design, By Blodget, Published by Linkon Arc Welding, USA.  **Supplementary Material (s**):  4. Structural Steel Designer’s Handbook, Roger L. Brockenbrough and Frederick S. Merritt, Third Edition, McGraw-Hill, Inc, 1999.  5. Steel Construction Manual, American Institute of Steel Construction (AISC), 14th Edition, 2011 (ISBN 1-56424-060-6)  6. Design Examples, American Institute of Steel Construction (AISC), 14th Edition, 2011.  7. Steel Design, William T. Segui, Cengage Learning, 5th Edition, 2013 (ISBN-10: 1-111-57600-9, ISBN-13: 978-1-111-57600-4)  8. Limit State Design in Structural Steel, M.R. Shiyekar, Published by PHI Learning Private Limited Book Company, 2011.  9. Gaylord, E.H., Gaylord, N.C., and Stallmeyer, J.E., “Design of Steel Structures”, 3rd edition, McGraw-Hill Publications, 1992 | | | | | | | | |  | | **Final Examination** |
| **Assessment** | | | | | | | | |
| Attendance& Assignment | | | 10 |  | | | | |
| Midterm Exam (Written) | | | 35% |  | | | | |
| Quiz (Written) | | | - |  | | | | |
| Final Exam (Written) | | | 55% |  | | | | |
| Total | | | 100% |  | | | | |
| **ECTS Allocated Based on the Student Workload** | | | | | | | | |
| **Activities** | | | | | **Number** | **Duration**  **(hour)** | **Total**  **Workload(hour)** | |
| Course duration in class (including the Exam week) | | | | | 15 | 4 | 60 | |
| Tutorials | | | | | 2 | 2 | 4 | |
| Assignments | | | | | 2 | 3 | 6 | |
| Project/Presentation/Report Writing | | | | | 2 | 12 | 24 | |
| E-learning Activities | | | | | 2 | 1 | 2 | |
| Quizzes | | | | | - | - | - | |
| Midterm Examination | | | | | 1 | 20 | 20 | |
| Final Examination | | | | | 1 | 25 | 25 | |
| Self-Study | | | | | 14 | 2 | 28 | |
| Total Workload | | | | | | | 165 | |
| Total Workload/30 (h) | | | | | | | 5.5 | |
| ECTS Credit of the Course | | | | | | | 5 | |