**COURSE RECORD**

|  |  |
| --- | --- |
| Code | **CE 483** |
| Name | **Computer Programming in Structural Engineering** |
| Hour per week | 3 (3+0) |
| Credit | 3 |
| ECTS | 4 |
| Level/Year | Undergraduate/4 |
| Semester | Spring |
| Type | Elective |
| Location |  |
| Prerequisites | COMP 101, CE 383 |
| Special Conditions |  |
| Coordinator(s) | Asst. Prof. Dr. Abdullah Demir |
| Webpage |  |
| Content | Computer implementations for civil engineering problems are indispensable for engineers. In this inevitable situation, engineers should either develop their own computer programs or use commercial ones. In both, they should know how civil engineering analysis are implemented on computer. This course will encourage students to develop their own computer programs for solving basic engineering problems and complicated structural analysis. In addition, students will achieve the ability to penetrate the processes in commercial computer programs |
| Objectives | To improve of implementing general computer applications  To help for implementing computer applications for engineering problems.  To help for implementing computer applications for structural mechanics. |
| Learning Outcomes | LO1 To implement MATLAB programming language  LO2 To develop computer applications for engineering problems  LO3 To develop computer applications for structural mechanics  LO4 To comprehend how commercial structural analysis softwares works  LO5 To present and criticizing developed computer programming projects |
| Requirements | A laptop is required for students’ comfort.  MATLAB software will be supplied for personal usage. |
| Reading List | Finite Element Applications a practical guide to the FEM process, M. Okereke, S. Keates, Springer, 2018.  Elementary linear algebra and supplemental applications, H. Anton, C. Rorres, John Willey & Sons, 2014.  Numerical Methods for Engineerser, Steven C., Chapra. Raymond P., Canale., McGraw-Hill, 2009.  Structural and Stress Analysis, T.H.G. Megson, Elsevier, 2005.  Non-Linear Finite Element Analysis in Structural Mechanics, W. Rust, Springer, 2015. |
| Ethical Rules and Course Policy | -Food and beverages are not permitted in the class.  -Class attendance is strongly recommended and will count toward your participation grade.  - Copying or allowing someone to copy your work on an exam, homework, or in class assignment is cheating and will be punished. |

**LEARNING ACTIVITIES**

|  |  |  |
| --- | --- | --- |
| **Activities** | **Number** | **Weight (%)** |
| Lecture | 3 | 25% |
| Individual & Group Works | 8 | 50% |
| Presentations | 2 | 25% |
| Total | | 100 |

**ASSESSMENT**

|  |  |
| --- | --- |
| **Evaluation Criteria** | **Weight** (%) |
| Weekly Assignments or Projects | 70% |
| Midterm Project and Presentation | 10% |
| Final Project and Presentation | 20% |
| Total | 100% |

For a detailed description of grading policy and scale, please refer to the website https://goo.gl/HbPM2y section 28.

**COURSE LOAD**

|  |  |  |  |
| --- | --- | --- | --- |
| **Activity** | **Duration** (hour) | **Quantity** | **Work Load** (hour) |
| In class activities | 3 | 14 | 42 |
| Out-of-class study time | 2 | 14 | 28 |
| Weekly projects | 3 | 5 | 15 |
| Final project | 1 | 25 | 25 |
|  |  | **General Sum** | **110** |

**ECTS: 4** (Work Load/25-30)

**CONTRIBUTION TO PROGRAMME OUTCOMES\***

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 |
| LO1 | 4 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 3 |
| LO2 | 5 | 1 | 5 | 4 | 3 | 1 | 4 | 1 | 2 | 5 |
| LO3 | 5 | 1 | 5 | 4 | 3 | 1 | 4 | 1 | 2 | 5 |
| LO4 | 4 | 1 | 2 | 3 | 2 | 3 | 1 | 1 | 2 | 5 |
| LO5 | 4 | 1 | 2 | 2 | 5 | 1 | 4 | 1 | 3 | 4 |

\* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

**WEEKLY SCHEDULE**

|  |  |  |
| --- | --- | --- |
| **W** | **Topic** | **Outcomes** |
| 1 | Introduction to computer programming | LO1 |
| Activity: Lecture/Presentation |
| 2 | General information about MATLAB language | LO1 |
| Activity: Lecture/Presentation and applications on software |
| 3 | General information about MATLAB language | LO1 |
| Activity: Lecture/Presentation and applications on software |
| 4 | Programming for calculation of are and geometric center of regular and irregular geometric shapes | LO2 |
| Activity: Individual and group class work |
| 5 | Programming for definition of motion of a particle and optimization | LO2 |
| Activity: Individual and group class work |
| 6 | Programming for matrix operations and gauss elimination method | LO2 |
| Activity: Individual and group class work |
| 7 | Midterm project presentations | LO5 |
| Activity: Student presentations |
| 8 | Programming for analysis of truss system | LO3, LO4 |
| Activity: Individual and group class work |
| 9 | Programming for analysis of truss system | LO3, LO4 |
| Activity: Individual and group class work |
| 10 | Programming for analysis of beam-column systems | LO3, LO4 |
| Activity: Individual and group class work |
| 11 | Programming for analysis of beam-column systems | LO3, LO4 |
| Activity: Individual and group class work |
| 12 | Programming for nonlinear analysis | LO3, LO4 |
| Activity: Individual and group class work |
| 13 | Programming for nonlinear analysis | LO3, LO4 |
| Activity: Individual and group class work |
| 14 | Final project presentations | LO5 |
| Activity: Student presentations |

Prepared by Dr. Abdullah Demir

Date 01.13.2021