| COURSE INFORMATION | | | | | |
|---|---|---|---|---|---|
| **Course Title** | *Code* | *Semester* | *L+P Hour* | *Credits* | *ECTS* |
| **SYSTEMS PROGRAMMING** | **CSE232** | **4** | **2 + 2** | **3** | **6** |

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| **Prerequisites** | CSE114 – FUNDAMENTALS OF COMPUTER PROGRAMMING |

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| **Language of Instruction** | English |
| **Course Level** | Bachelor's Degree (First Cycle Programs) |
| **Course Type** | Compulsory |
| **Course Coordinator** | |
| **Instructors** | Assist. Prof. Esin Onbaşıoğlu |
| **Assistants** | Gamze Uslu |
| **Goals** | The aim of this course is to provide students with knowledge and abilities to design system programs such as assemblers, linkers, loaders, macro-processors, editors, interpreters, compilers and operating systems using modern methodologies and to implement their design using modern development tools. |
| **Content** | Numbering system, basic computer hardware, assembly language programming, assemblers, relocation, linkers, loaders, macro processors, text editors, debuggers, formal specification of programming languages, introduction to compilers, interpreters, introduction to operating systems, Linux shell programming, term project. |

| **Course Learning Outcomes** | **Program Learning Outcomes** | **Teaching Methods** | **Assessment Methods** |
|---|---|---|---|
| 1) Adequate knowledge in system programs (assemblers, loaders, linkers, macro-processors, text editors, debuggers, interpreters, compilers, operating systems). | 1 | 1,4 | A,D |
| 2) Ability to use theoretical and applied information in these areas to design system software with realistic constraints. | 4 | 1,2,4 | A,B,D |
| 3) Ability to conduct experiments, gather data, analyze and interpret results for investigating solutions to real life applications with assembly language programming and Unix shell programming. | 4,5 | 1,3 | A,C |
| 4) Ability to devise, select, and use modern techniques and tools needed for the design and implementation of system programs. | 4 | 1,2,3,4 | A,B,D |

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|---|---|---|---|
| 5) Ability to work efficiently in intra-disciplinary teams and to work individually. | 6 | 3,4 | B,D |

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| **Teaching Methods:** | 1: Lecture, 2: Question-Answer, 3: Lab, 4: Case-study |
| **Assessment Methods:** | A: Testing, B: Experiment, C: Homework, D: Project |

**COURSE CONTENT**

| Week | Topics | Study Materials |
|---|---|---|
| 1 | Introduction (Numbering system, basic computer hardware, systems software, assembly language, addressing modes) | Textbook |
| 2 | Assembly Language Programming I (M6800 Instruction set, conditional instructions) | Textbook |
| 3 | Assembly Language Programming II (Loops, indexed addressing, subroutines) | Textbook |
| 4 | Assemblers | Textbook |
| 5 | Relocation and Loaders | Textbook |
| 6 | Linking | Textbook |
| 7 | MIDTERM EXAM I | Textbook |
| 8 | Macro-processors, C preprocessor | Textbook |
| 9 | Text editors and Debuggers | Textbook |
| 10 | Formal specification of programming languages and introduction to compilers | Textbook |
| 11 | Interpreters (parsing, symbol table, processing of statements), Shell programming | Textbook |
| 12 | MIDTERM EXAM II | Textbook |
| 13 | Introduction to operating systems I (user interface, I/O, Shell programming) | Textbook |
| 14 | Introduction to operating systems II (machine-independent functions, Shell programming) | Textbook |

**RECOMMENDED SOURCES**

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| **Textbook** | Lecture Notes: http://cse.yeditepe.edu.tr/coadsys/<br>Lab material: http://cse.yeditepe.edu.tr/coadsys/ |
| **Additional Resources** | W. Wray, J. Greenfield, R. Bannatyne, "Using Microprocessors and Microcomputers", Prentice-Hall<br>L. Beck, "System Software", Addison Wesley<br>D.H. Marcellus, "Systems Programming for Small Computers", Prentice Hall |

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| | A. Silberschatz, et al., "Operating System Concepts", Addison-Wesley |

| MATERIAL SHARING | |
|---|---|
| **Documents** | |
| **Assignments** | |
| **Exams** | |

| ASSESSMENT | | |
|---|---|---|
| **IN-TERM STUDIES** | **NUMBER** | **PERCENTAGE** |
| Mid-terms | 2 | 70 |
| Assignment | | |
| Lab Work | 10 | 15 |
| Term Project | 1 | 15 |
| **Total** | | **100** |
| **CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE** | | 35 |
| **CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE** | | 65 |
| **Total** | | **100** |

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| **COURSE CATEGORY** | Expertise/Field Courses |

| COURSE'S CONTRIBUTION TO PROGRAM | | | | | | | |
|---|---|---|---|---|---|---|---|
| No | Program Learning Outcomes | Contribution | | | | |
| | | 1 | 2 | 3 | 4 | 5 |
| 1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied information in these areas to model and solve engineering problems. | | | | | **X** |
| 2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose. | | x | | | |
| 3 | Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose. | | | x | | |
| 4 | Ability to devise, select, and use modern techniques and tools needed for engineering practice; ability to employ information technologies effectively. | | | | | **X** |

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|---|---|---|---|---|---|---|
| 5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating engineering problems. | | | | | **X** |
| 6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually. | | | | | **X** |
| 7 | Ability to communicate effectively both orally and in writing; knowledge of a minimum of one foreign language. | | x | | | |
| 8 | Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself. | | x | | | |
| 9 | Awareness of professional and ethical responsibility. | | | x | | |
| 10 | Information about business life practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | x | | | | |
| 11 | Knowledge about contemporary issues and the global and societal effects of engineering practices on health, environment, and safety; awareness of the legal consequences of engineering solutions. | x | | | | |

| **ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION** | | | |
|---|---|---|---|
| Activities | Quantity | Duration (Hour) | Total Workload (Hour) |
| Course Duration (Excluding the exam weeks: 12x Total course hours) | 12 | 4 | 48 |
| Hours for off-the-classroom study (Pre-study, practice) | 10 | 3 | 30 |
| Midterm examination | 2 | 2 | 4 |
| Homework | 10 | 4 | 40 |
| Project | 1 | 25 | 25 |
| Final examination | 1 | 3 | 3 |
| **Total Work Load** | | | 150 |
| **Total Work Load / 25 (h)** | | | 6.0 |
| **ECTS Credit of the Course** | | | 6 |