| Course Description Form | |
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| **Course Code and Name** | CENG365 SIGNALS AND SYSTEMS (TECH.ELECT.) |
| **Course Semester** | 5 |
| **Catalog Content** | Introduction to analog and digital signal processing, a topic that forms an integral part of engineering systems in many diverse areas, including seismic data processing, communications, speech processing, image processing, defense electronics, consumer electronics, and consumer products. |
| **Textbook** | Signals and Systems (2nd Edition) by Alan V. Oppenheim  (Author), Alan S. Willsky  (Author), with S. Hamid (Author), Pearson, 1996 |
| **Supplementary Textbooks** | Schaum's Outline of Signals and Systems, 3rd Edition (Schaum's Outlines), McGraw-Hill Education, 2013<br><br>Computer Organization and Design MIPS Edition: The Hardware/Software Interface 5th Edition by David A. Patterson (Author), John L. Hennessy (Author),Morgan Kaufmann, 2013 |
| **Credit** | 6 |
| **Prerequisites of the Course** (Attendance Requirement) | There is no prerequisite or co-requisite for this course |
| **Type of the Course** | Elective |
| **Instruction Language** | English |
| **Course Objectives** | Presents and integrates the basic concepts for both continuous-time and discrete-time signals and systems. |
| **Course Learning Outcomes** | 1. Analog and digital signal processing<br>2. General information about modern communication and measurements<br>3. Basic concepts for continuous and discrete-time signals<br>4. Applications for current and future robots<br>5. Fourier transforms related to time and frequency |
| **Instruction Methods** | The mode of delivery of this course is Face to face. |
| **Weekly Schedule** | 1. INTRODUCTION: Definitions of signals and systems, classification, importance in engineering, applications examples.<br>2. BASIC CONCEPTS: Transformations, basic continuous and discrete-time signals<br>3. BASIC CONCEPTS: Continuous and discrete-time systems and properties<br>4. LTI SYSTEMS: Modeling, impulse response and concepts of convolution.<br>5. CONVOLUTION: Determination of systems responses by convolution summation or integral.<br>6. DIFFERENTIAL EQUATIONS: Classical or transform techniques for the analysis of continuous time LTI systems defined by differential equations.<br>7. DIFFERENCE EQUATIONS: Modeling of discrete-time LTI systems by difference equations and analysis techniques<br>8. FOURIER SERIES: Importance of Fourier series expansions and its use in system analysis.<br>9. FOURIER TRANSFORM: Application of Fourier transform technique in system analysis.<br>10.FOURIER TRANSFORM: Application of Fourier transform technique in system analysis.<br>11.FREQUENCY DOMAIN: Analysis of LTI systems in the frequency domain, modulation, sampling.<br>12. Z TRANSFORM: Introduction to the method of Z transform in the analysis and synthesis of discrete-time systems<br>13. TRANSFER FUNCTION: Representation of systems by transfer functions and their properties.<br>14. TRANSFER FUNCTION: Representation of systems by transfer functions and their properties. |

| Teaching and Learning Methods<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours: 3<br>Reading Activities<br>Internet browsing, library work<br>Designing and Implementing materials<br>Preparation of Midterm and Midterm Exam<br>Final Exam and Preparation for Final Exam | | |
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**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 2 | 60 |
| Assignment | 0 | 0 |
| Application | 0 | 0 |
| Projects | 0 | 0 |
| Practice | 0 | 0 |
| Quiz | 0 | 0 |
| Percent of In-term Studies (%) | 0 | 60 |
| Percentage of Final Exam to Total Score (%) | 0 | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course | 14 | 3 | 42 |
| Weekly Tutorial Hours | 0 | 0 | 0 |
| Reading Tasks | 8 | 4 | 32 |
| Studies | 9 | 4 | 36 |
| Material Design and | 12 | 1 | 12 |
| Report Preparing | 0 | 0 | 0 |
| Preparing a Presentation | 0 | 0 | 0 |
| Presentations | 0 | 0 | 0 |
| Midterm Exam and Preparation | 1 | 13 | 13 |
| Final Exam and Preparation for Final Exam | 1 | 15 | 15 |
| Other ( should be emphasized) | 0 | 0 | 0 |
| Total Workload | | | 150 |
| Total Workload / 25 | | | 6 |
| Course Credit (ECTS) | | | 6 |

**Contribution Level Between Course Learning Outcomes and Program Outcomes**

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 1 | Sufficient knowledge on mathematics, science and computer engineering; ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems | | | | | X |
| 2 | Ability to identify, define, formulate and solve complex engineering problems; ability to choose and apply appropriate analysis and modelling methods for these purposes | | | | | X |
| 3 | Ability to design a complex system, process, device, software, algorithm, or product under realistic constraints and circumstances to meet certain requirements; ability to apply modern design techniques for this purpose | | | | X | |

| No | Description | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 4 | Ability to choose, develop and use modern techniques and tools necessary for engineering applications; ability to effectively use computing technologies | | X | | | |
| 5 | Ability to design and implement systems or experiments to solve engineering problems, collect and interpret data to evaluate and analyze the results of solutions | | | X | | |
| 6 | Ability to work effectively in intradisciplinary and interdisciplinary teams or individually | | | X | | |
| 7 | Ability to efficiently prepare, evaluate and interpret reports | | | X | | |
| 8 | Ability to make presentations and conduct effective verbal and written communication in Turkish and English | | | X | | |
| 9 | Awareness of the necessity of lifelong learning; ability to access information, follow scientific and technological developments; ability to perpetually renew oneself | | X | | | |
| 10 | Awareness of professional and ethical responsibility, ability to act in accordance with ethical principles | | X | | | |
| 11 | Ability to apply knowledge on project management, risk management and change management | | X | | | |
| 12 | Awareness of entrepreneurship and innovation, ability to design and build sustainable systems | | | | | X |
| 13 | Ability to devise local and global solutions to contemporary issues considering the effects of engineering applications on health, environment and | X | | | | |
| 14 | Awareness of the legal consequences of engineering solutions | X | | | | |
| 15 | Ability to apply knowledge on software development process and documentation rules | | | X | | |
| 16 | Knowledge on standards used in engineering applications | | | | | X |
| 17 | Awareness of occupational health and security, information security and privacy | | X | | | |

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| **The Course's Lecturer(s) and Contact Information** | Computer Engineering Department Chair<br>bmbb@gazi.edu.tr |