# Gazi Üniversitesi
# Mühendislik Fakültesi
# Elektrik-Elektronik Mühendisliği
# Lisans Programları
# AKTS Bilgi Paketi

# %30 İngilizce Program

| SINIF | Dersin Kodu | Dersin Adı | Ders Saati | | Kredi | AKTS |
|---|---|---|---|---|---|---|
| | | | T* | U** | | |
| 1.SINIF GÜZ DÖNEMİ | EEE101 | Intro. To Electrical-Electronics Eng. | 1 | 0 | 1 | 2 |
| | EEE103 | Computer Programming | 3 | 2 | 4 | 6 |
| | EEE105 | Material Science | 3 | 0 | 3 | 5 |
| | FIZ103 | Fizik I | 4 | 0 | 4 | 6 |
| | MATH 101 | Mathematics I | 4 | 0 | 4 | 6 |
| | ENG103 | Advance English I | 3 | 0 | 3 | 3 |
| | TAR101 | Atatürk İlk. ve İnk. Tarihi - I | 2 | 0 | 2 | 2 |
| | | **TOPLAM** | | | **21** | **30** |
| | | | | | | |
| 1.SINIF BAHAR DÖNEMİ | EEE104 | Logic Circuit Design | 3 | 0 | 3 | 5 |
| | EEE106 | Logic Circuit Design Laboratory | 0 | 2 | 1 | 2 |
| | PHYS104 | Physics II | 4 | 0 | 4 | 6 |
| | FIZ156 | Fizik Lab | 0 | 2 | 1 | 2 |
| | MAT102 | Matematik II | 4 | 0 | 4 | 6 |
| | MAT198 | Lineer Cebir | 3 | 0 | 3 | 4 |
| | ENG104 | Advance English II | 3 | 0 | 3 | 3 |
| | TAR102 | Atatürk İlk. ve İnk. Tarihi - II | 2 | 0 | 2 | 2 |
| | | **TOPLAM** | | | **21** | **30** |
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| 2.SINIF GÜZ DÖNEMİ | EEE201 | Enginering Mathematics | 3 | 0 | 3 | 6 |
| | EEE209 | Probability and Statistics | 3 | 0 | 3 | 5 |
| | EEE221(*) | Circuit Theory I | 4 | 0 | 4 | 7 |
| | EEE221(*) | Circuit Theory Laboratory I | 0 | 2 | 1 | 2 |
| | ENG203 | Academic English I | 3 | 0 | 3 | 3 |
| | MAT 201 | Diferansiyel Denklemler | 2 | 2 | 3 | 5 |
| | TÜR101 | Türk Dili I | 2 | 0 | 2 | 2 |
| | | **TOPLAM** | | | **19** | **30** |
| 2.SINIF BAHAR DÖNEMİ | EEE212 | Analog Electronics I | 4 | 0 | 4 | 6 |
| | EEE214 | Analog Electronics Laboratory I | 0 | 2 | 1 | 2 |
| | EEE222 | Circuit Theory II | 4 | 0 | 4 | 6 |
| | EEE224 | Circuit Theory Laboratory II | 0 | 2 | 1 | 2 |
| | EEE252 | Electromagnetic Field Theory | 4 | 0 | 4 | 5 |
| | ENG204 | Academic English II | 3 | 0 | 3 | 3 |
| | MATH296 | Complex Analysis | 3 | 0 | 3 | 4 |
| | TÜR102 | Türk Dili II | 2 | 0 | 2 | 2 |
| | | **TOPLAM** | | | **22** | **30** |
| 3.SINIF GÜZ DÖNEMİ | EEE301 | Seminar | 1 | 0 | 1 | 2 |
| | EEE311 | Analog Electronics II | 4 | 0 | 4 | 6 |
| | EEE313 | Analog Electronics Laboratory II | 0 | 2 | 1 | 2 |
| | EEE321 | Signals and Systems | 3 | 0 | 3 | 6 |
| | EEE331 | Foundations of Energys Systems | 3 | 0 | 3 | 5 |
| | EEE351 | Electromagnetic Waves | 3 | 0 | 3 | 5 |
| | AD | Alan Dışı Seçmeli - I | 2 | 0 | 2 | 2 |
| | EEM 200 | Staj I | | | 0 | 2 |
| | | **TOPLAM** | | | **17** | **30** |
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|---|---|---|---|---|---|---|
| **3.SINIF BAHAR DÖNEMİ** | EEE304 | Microprocessors | 3 | 0 | 4 | 5 |
| | EEE306 | Microprocessors Laboratory | 0 | 2 | 1 | 2 |
| | EEE308 | Numerical Analysis | 3 | 0 | 0 | 4 |
| | EEE326 | Control Systems I | 3 | 0 | 3 | 6 |
| | EEE336 | Electromech. Energy Conv. Sys. | 4 | 0 | 4 | 6 |
| | MOS | Mesleki/Teknik Olmayan Seçmeli | 3 | 0 | 3 | 3 |
| | AD | Alan Dışı Seçmeli - II | 2 | 0 | 2 | 2 |
| | EEE392 (**) | Project Management (**) | 1 | 0 | 1 | 2 |
| | | **TOPLAM** | | | **18** | **30** |
| **4.SINIF GÜZ DÖNEMİ** | EEE491 (*) (**) | EE Engineering Design I | 3 | 2 | 4 | 6 |
| | | Technical Elective | 3 | 2 | 4 | 7 |
| | | Technical Elective | 3 | 2 | 3 | 7 |
| | | Technical Elective | 3 | 0 | 3 | 6 |
| | ISG401 | İş Sağlığı ve Güvenliği I | 2 | 0 | 2 | 2 |
| | EEM300 | Staj II | | 0 | 0 | 2 |
| | | **TOPLAM** | | | **16** | **30** |
| | | | | | | |
| **4.SINIF BAHAR DÖNEMİ** | EEE492 (*) (**) | EE Engineering Design II | 2 | 4 | 4 | 4 |
| | | Technical Elective | 3 | 0 | 3 | 6 |
| | | Technical Elective | 3 | 0 | 3 | 6 |
| | | Technical Elective | 3 | 0 | 3 | 6 |
| | | Technical Elective | 3 | 0 | 3 | 6 |
| | ISG402 | İş Sağlığı ve Güvenliği II | 2 | 0 | 2 | 2 |
| | | **TOPLAM** | | | **18** | **30** |
| | | | | | | |

* Her dönem açılabilen ders

** Özel Değerlendirmeli ders

# %100 İngilizce Program

| SINIF | Dersin Kodu | Dersin Adı | Ders Saati | | Kredi | AKTS |
|---|---|---|---|---|---|---|
| | | | T | U | | |
| 1.SINIF GÜZ DÖNEMİ | EEE101 | Intro. To Electrical-Electronics Eng. | 1 | 0 | 1 | 2 |
| | EEE103 | Computer Programming | 3 | 2 | 4 | 6 |
| | EEE105 | Material Science | 3 | 0 | 3 | 5 |
| | PHYS103 | Physics I | 4 | 0 | 4 | 6 |
| | MATH101 | Mathematics I | 4 | 0 | 4 | 6 |
| | ENG103 | Advanced English I | 3 | 0 | 3 | 3 |
| | TAR101 | Atatürk İlk. ve İnk. Tarihi - I | 2 | 0 | 2 | 2 |
| | | **TOPLAM** | | | **21** | **30** |
| 1.SINIF BAHAR DÖNEMİ | EEE104 | Logic Circuit Design | 3 | 0 | 3 | 5 |
| | EEE106 | Logic Circuit Design Laboratory | 0 | 2 | 1 | 2 |
| | PHYS104 | Physics II | 4 | 0 | 4 | 6 |
| | PHYS156 | Physics Lab. | 0 | 2 | 1 | 2 |
| | MATH102 | Mathematics II | 4 | 0 | 4 | 6 |
| | MATH198 | Linear Algebra | 3 | 0 | 3 | 4 |
| | ENG104 | Advanced English II | 3 | 0 | 3 | 3 |
| | TAR102 | Atatürk İlk. ve İnk. Tarihi - II | 2 | 0 | 2 | 2 |
| | | **TOPLAM** | | | **21** | **30** |
| 2.SINIF GÜZ DÖNEMİ | EEE201 | Enginering Mathematics | 3 | 0 | 3 | 6 |
| | EEE209 | Probability and Statistics | 3 | 0 | 3 | 5 |
| | EEE221 (*) | Circuit Theory I | 4 | 0 | 4 | 7 |
| | EEE223 | Circuit Theory Laboratory I | 0 | 2 | 1 | 2 |
| | ENG203 | Academic English I | 3 | 0 | 3 | 3 |
| | MATH201 | Differential Equations | 2 | 2 | 3 | 5 |
| | TÜR201 | Türk Dili I | 2 | 0 | 2 | 2 |
| | | **TOPLAM** | | | **19** | **30** |
| | | | | | | |
| 2.SINIF BAHAR DÖNEMİ | EEE212 | Analog Electronics I | 4 | 0 | 4 | 6 |
| | EEE214 | Analog Electronics Laboratory I | 0 | 2 | 1 | 2 |
| | EEE222 | Circuit Theory II | 4 | 0 | 4 | 6 |
| | EEE224 | Circuit Theory Laboratory II | 0 | 2 | 1 | 2 |
| | EEE252 | Electromagnetic Field Theory | 4 | 0 | 4 | 5 |
| | ENG204 | Academic English II | 3 | 0 | 3 | 3 |
| | MATH 296 | Complex Analysis | 3 | 0 | 3 | 4 |
| | TÜR202 | Türk Dili II | 2 | 0 | 2 | 2 |
| | | **TOPLAM** | | | **22** | **30** |
| 3.SINIF GÜZ DÖNEMİ | EEE301 | Seminar | 1 | 0 | 1 | 2 |
| | EEE311 | Analog Electronics II | 4 | 0 | 4 | 6 |
| | EEE313 | Analog Electronics Laboratory II | 0 | 2 | 1 | 2 |
| | EEE321 | Signals and Systems | 3 | 0 | 3 | 6 |
| | EEE331 | Foundations of Energys Systems | 3 | 0 | 3 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | EEE351 | Electromagnetic Waves | 3 | 0 | 3 | 5 |
| | ADS | Alan Dışı Seçmeli I | 2 | 0 | 2 | 2 |
| | EEM200 | Staj I | | | 0 | 2 |
| | | **TOPLAM** | | | **17** | **30** |
| **3.SINIF BAHAR DÖNEMİ** | EEE304 | Microprocessors | 3 | 0 | 3 | 5 |
| | EEE306 | Microprocessors Laboratory | 0 | 2 | 1 | 2 |
| | EEE308 | Numerical Analysis | 3 | 0 | 3 | 4 |
| | EEE326 | Control Systems I | 3 | 0 | 3 | 6 |
| | EEE336 | Electromech. Energy Conv. Sys. | 4 | 0 | 4 | 6 |
| | ETE | Engineering Technical Elective | 3 | 0 | 3 | 3 |
| | ADS | Alan Dışı Seçmeli II | 2 | 0 | 2 | 2 |
| | EEE392 | Project Management (**) | 1 | 0 | 1 | 2 |
| | | **TOPLAM** | | | **20** | **30** |
| **4.SINIF GÜZ DÖNEMİ** | EEE491 (*) (**) | EE Engineering Design I | 3 | 2 | 4 | 6 |
| | | Technical Elective | 3 | 2 | 4 | 7 |
| | | Technical Elective | 3 | 2 | 4 | 7 |
| | | Technical Elective | 3 | 0 | 3 | 6 |
| | OSH401 | Occupational Safety and Health I | 2 | 0 | 2 | 2 |
| | EEM300 | Staj II | | 0 | 0 | 2 |
| | | **TOPLAM** | | | **17** | **30** |
| **4.SINIF BAHAR DÖNEMİ** | EEE492 (*) (**) | EE Engineering Design II | 2 | 4 | 4 | 4 |
| | | Technical Elective | 3 | 0 | 3 | 6 |
| | | Technical Elective | 3 | 0 | 3 | 6 |
| | | Technical Elective | 3 | 0 | 3 | 6 |
| | | Technical Elective | 3 | 0 | 3 | 6 |
| | OSH 402 | Occupational Safety and Health II | 2 | 0 | 2 | 2 |
| | | **TOPLAM** | | | **18** | **30** |

* Her dönem açılabilen ders
** Özel Değerlendirmeli ders

| TECHNICAL ELECTİVE PACKAGES | | T | U | Kr | AKTS |
|---|---|---|---|---|---|
| **ELECTRONICS (4 required + 3 technical electives)** | | | | | |
| EEE411 | Digital Electronics | 3 | 2 | 4 | 7 |
| EEE412 | Large Scale Integrated Circuit Design | 3 | 0 | 3 | 6 |
| EEE414 | Optoelectronics | 3 | 0 | 3 | 6 |
| EEE419 | Communication Electronics | 3 | 0 | 3 | 6 |
| **CONTROL (4 required + 3 technical electives)** | | | | | |
| EEE421 | Digital Signal Processing | 3 | 0 | 3 | 6 |
| EEE423 | Industrial Control | 3 | 0 | 3 | 6 |
| EEE424 | Discrete Time Control Systems | 3 | 0 | 3 | 6 |
| EEE426 | Nonlinear Control Systems | 3 | 0 | 3 | 6 |
| **POWER ELECTRONICS (4 required + 3 technical electives)** | | | | | |
| EEE423 | Industrial Control | 3 | 0 | 3 | 6 |
| EEE431 | Power Electronics I | 3 | 0 | 3 | 6 |
| EEE432 | Power Electronics II | 3 | 2 | 4 | 7 |
| EEE434 | Electrical Motors and Drives | 3 | 2 | 4 | 7 |
| **COMMUNICATION (4 required + 3 technical electives)** | | | | | |
| EEE421 | Digital Signal Processing | 3 | 0 | 3 | 6 |
| EEE441 | Communication Systems I | 3 | **2** | **4** | **7** |
| EEE442 | Communication Systems II | 3 | 2 | 4 | 7 |
| EEE444 | Digital Communication | 3 | 0 | 3 | 6 |
| **MICROWAVE AND ANTENNAS (4 required + 3 technical electives)** | | | | | |
| EEE441 | Communication Systems I | 3 | 2 | 4 | 7 |
| EEE451 | Microwave Techniques I | 3 | 2 | 4 | 7 |
| EEE454 | Antennas | 3 | 2 | 4 | 7 |
| EEE456 | Electromagnetic Modelling | 3 | 0 | 3 | 6 |
| **BIOMEDICAL (3 required + 4 technical electives)** | | | | | |
| EEE421 | Digital Signal Processing | 3 | 0 | 3 | 6 |
| EEE461 | Intro. to Biomedical Engineering | 3 | 2 | 4 | 7 |
| EEE462 | Medical Imaging Systems | 3 | 0 | 3 | 6 |
| **POWER SYSTEMS AND HIGH VOLTAGE TECHNOLOGY (4 required + 3 technical electives)** | | | | | |
| EEE471 | Power System Analysis I | 3 | 0 | 3 | 6 |
| EEE472 | Power System Analysis II | 3 | 0 | 3 | 6 |
| EEE475 | Energy Distribution I | 3 | 0 | 3 | 6 |
| EEE478 | High Voltage Techniques | 3 | 2 | 4 | 7 |
| **COMPUTERS (4 required + 3 technical electives)** | | | | | |
| EEE421 | Digital Signal Processing | 3 | 0 | 3 | 6 |
| EEE481 | Computer Architecture | 3 | 0 | 3 | 6 |
| EEE482 | Data Structures | 3 | 0 | 3 | 6 |
| EEE484 | Intro. To Computer Networks | 3 | 2 | 4 | 7 |
| **TECHNICAL ELECTIVES** | | | | | |
| EEE401 | Electronic Measurement and Instrumentation | 3 | 0 | 3 | 6 |
| EEE415 | Avionics System Design | 3 | 0 | 3 | 6 |

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| EEE413 | Semiconductor Circuit Technology | 3 | 0 | 3 | 6 |
| EEE446 | Introduction to Cyriptography | 3 | 0 | 3 | 6 |
| EEE448 | Random Processes | 3 | 0 | 3 | 6 |
| EEE452 | Microwave Techniques II | 3 | 0 | 3 | 6 |
| EEE453 | Radio Wave Propogation | 3 | 0 | 3 | 6 |
| EEE458 | Radio Frequency Electronic Circuits | 3 | 0 | 3 | 6 |
| EEE463 | Biological Signal Processing | 3 | 0 | 3 | 6 |
| EEE464 | Biological Signals and Detection Methods | 3 | 0 | 3 | 6 |
| EEE473 | Lighting Techniques | 3 | 2 | 4 | 7 |
| EEE476 | Energy Distibution II | 3 | 0 | 3 | 6 |
| EEE485 | Intro. to Artificial Intelligence | 3 | 0 | 3 | 6 |
| EEE474 | Renewable En. Systems | 3 | 0 | 3 | 6 |

# COURSE FORMS

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE101 INTRODUCTION TO ELECTRICAL-ELECTRONICS ENGINEERING |
| **Course Semester** | 1 |
| **Catalog Content** | General information about the main areas, historical development and contributing scinetists of Electrical and Electronics Engineering (EEE), Tools and methods used in the field. Interaction between EEE and other sciences and engineerings. Engineering ethics. Knowledge transfer from experienced engineers. |
| **Textbook** | 1. Introduction to Electrical and Computer Engineering, Upper Saddle River: Prentice Hall, 2003. |
| **Supplementary Textbooks** | 2. "Elektrik ve Bilgisayar Mühendisliğine Giriş", Nobel Yayınları, 2013 |
| **Credit** | 2 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | - |
| **Type of the Course** | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | Introducing the Electrical and Electronics Engineering to new students. |
| **Course Learning Outcomes** | Students who succeed this course:<br>1. know basic principles and various areas of EEE<br>2. know engineering ethic concept |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 1. About the Department of EEE<br>2. About the Laboratories<br>3. What is an Engineer, and EEE?<br>4. What is electric energy?<br>5. Department course packages: Microvawe and Antennas option course package<br>6. Department course packages: Electronics option course package<br>7. Department course packages: Control option course package<br>8. Department course packages: Computer option course package<br>9. Department course packages: Telecommunications option course package<br>10. Department course packages: Power Electronics option course package<br>11. Department course packages: High Voltage option course package<br>12. Department course packages: Biomedical option course package<br>13. Engineering and Ethics<br>14. Components used in EEE |

**Teaching and Learning Methods**

*(These are examples. Please fill which activities you use in the course)*

Weekly theoretical course hours
Internet browsing, library work
Preparation of Midterm and Midterm Exam
Final Exam and Preparation for Final Exam

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 2 | 100 |
| Assignment | | |
| Application | | |
| Term Project | | |
| Practice | | |
| Quiz | | |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 1 | 14 |
| Weekly Tutorial Hours | - | - | - |
| Reading Tasks | | | |
| Internet and library search | 4 | 2 | 8 |
| Material Design and Implementation | | | |
| Term Project Preparation | | | |
| Preparing a Presentation | | | |
| Presentations | | | |
| Midterm Exam and Preperation for Midterm Exam | 3 | 4 | 12 |
| Final Exam and Preperation for Final Exam | 4 | 4 | 16 |

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|---|---|---|---|---|
| Other (Quizzez and preparation for quizzes) | | | | |
| Total Workload | | | | 50 |
| Total Workload / 25 | | | | 2 |
| Course Credit (ECTS) | | | | 2 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | X | | | | |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | X | | | | |
| CO3 | 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 | | | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | X | | | | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | X | | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | X | | | |
| CO8 | 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 | | | |
| CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | | | X | | |
| CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century | | | X | | |

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| | | reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | | | | |
| **The Course's Lecturer(s) and Contact Information** | 1. Doç. Dr. Ertuğrul AKSOY (ertugrulaksoy@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE103 Computer Programming |
| **Course Semester** | 1 |
| **Catalog Content** | Problem solving by computer, algorithms and flow charts. Introduction to computer software/hardware and programming languages. Variable definitions, operators, decisions, loops, arrays, modular programming, pointers and dynamic memory usage. |
| **Textbook** | "C How to Program", P.Deitel, H.Deitel - Prentice Hall,8th Edition, 2015 |
| **Supplementary Textbooks** | "Programlamaya Giriş ve Algoritmalar" S. Çelikkol,2011 |
| **Credit** | 6 |
| **Prerequisites of the Course**<br><br>**( Attendance Requirements)** | - |
| **Type of the Course** | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | Aims to provide the fundamental algorithm implementation and programming skills necessary for Electrical and Electronics engineers, to use the algorithms for solving fundamental mathematical problems, and implementation of these algorithms by using C/C++ programming language. |
| **Course Learning Outcomes** | Students who succeed this course:<br><br>1- Know algorithm concept,<br>2- Know variable types and operators,<br>3- Know decision expressions and creating loops,<br>4- Know functions,<br>5- Know arrays and using pointers,<br>6- Know how to use Dynamic memory<br>**7-** Know structures. |
| **Instruction Methods** | Face to face expression, Applied expression, Question-Answer |
| **Weekly Schedule** | 1. Writing and Compiling a c Program, Program Development Phases, Algorithms<br>2. Introduction to C Language<br>3. Structured program development in C<br>4. C program kontrol<br>5. C functions<br>6. C arrays<br>7. C pointers<br>8. C characters and strings<br>9. C formatted input/output<br>10. C structures, unions<br>11. C file processing<br>12. C data structures<br>13. C preprocessor |

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|---|---|
| | 14. Final exam |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours<br>Weekly applied course hours<br>Reading Activities<br>Internet browsing, library work<br>Preparation of Midterm and Midterm Exam<br>Final Exam and Preparation for Final Exam |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 1 | 50 |
| Assignment | - | - |
| Application | 1 | 50 |
| Projects | - | - |
| Practice | - | - |
| Quiz | - | - |
| Percent of In-term Studies (%) | - | 60 |
| Percentage of Final Exam to Total Score (%) | - | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | 14 | 2 | 28 |
| Reading Tasks | 14 | 1 | 14 |
| Studies | 14 | 1 | 14 |
| Material Design and Implementation | - | - | - |
| Report Preparing | - | - | - |
| Preparing a Presentation | - | - | - |
| Presentations | - | - | - |
| Midterm Exam and Preperation for Midterm Exam | 1 | 25 | 25 |

| | | | | |
|---|---|---|---|---|
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |
| Other ( should be emphasized) | - | - | - |
| Total Workload | | | 143 |
| Total Workload / 25 | | | 5,72 |
| Course Credit (ECTS) | | | 6 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledgein these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | X | | |
| CO3 | 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 | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | | X |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | | | | | X |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | | X | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | X | | | |
| CO8 | 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 | |
| CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | | X | | | |
| CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | X | | | |
| **The Course's Lecturer(s) and Contact Informations** | 2. Assoc. Prof. Dr. Fırat HARDALAÇ (firat@gazi.edu.tr)<br>3. Assoc. Prof. Dr. Hasan Şakir BİLGE (bilge@gazi.edu.tr)<br>4. Dr. Uğurhan KUTBAY (ukutbay@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE104 LOGIC CIRCUIT DESIGN |
| **Course Semester** | 2 |
| **Catalog Content** | Introduction to digital systems. Number systems. Boole Cebri. Numerical logic gates. Simplification of Boolean functions. Combinational logic. Circuit design with flip-flops and flip-flops. Counters |
| **Textbook** | Digital Design, M. Morris Mano, Prentice-Hall, Inc., 2012 |
| **Supplementary Textbooks** | • Systems Design, V. T. Rhyne, Prentice-Hall, Inc.<br>• Digital Foundamentals, Thomas L. Floyed, A. Bell & Howell Company.<br>• Principles of Digital Design, Daniel D. Gajski, Prentice-Hall, Inc. |
| **Credit** | 5 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | (Attendance is required) |
| **Type of the Course** | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | The aim of this course for students is to learn digital design principles, digital logic gates, design of combinational logic and circuits, circuit design with flip-flops, and flip-flops, circuit design with counters. |
| **Course Learning Outcomes** | Students who succeed this course:<br>1. Comprehend importance of digital systems in application and the computer architecture<br>2. Comprehend the number systems and binary arithmetic operations<br>3. Comprehend the basic theorems and axioms of boole algebra<br>4. Comprehend the operations of the basic logic gates<br>5. Gain experience on the realization of the boole algebra functions with basic logic circuits<br>6. Comprehend structures of the basic storage elements<br>7. Comprehend operation of the different type counters and to gain experience on the design<br>8. Gain experience of the design of the combinational and sequential networks |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 1. Introduction to computers and digital systems,<br>2. Binary Systems<br>3. Boolean Algebra<br>4. Logic Gates<br>5. Simplification of Boolean Functions<br>6. The Map Method, Don't Care Conditions.<br>7. The tabulation method, determination of prime<br>8. Combinational Logic, Design procedure, |

| | |
|---|---|
| | 9. Adders, Subtractors, Code Conversion, Analysis Procedure.<br>10. Multilevel NAND circuits, multilevel NOR circuits, Exclusive-OR functions.<br>11. Combinational Logic with MSI and LSI<br>12. Decoders and encoders, multiplexer, read-only memory (ROM), programmable logic array (PLA).<br>13. Synchronous Sequential Logic: Flip-flops, triggering of flip-flops, analysis of clocked sequential circuits. State reduction and assignment.<br>14. Synchronous Sequential Logic: Flip-flop excitation tables, design procedure, design of counters, design with state implements. |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours<br>Internet browsing, library work<br>Preparation of Midterm and Midterm Exam<br>Final Exam and Preparation for Final Exam |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 2 | 91 |
| Assignment | 3 | 9 |
| Application | - | - |
| Term Project | - | - |
| Practice | - | - |
| Quiz | - | - |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | - | - | - |
| Reading Tasks | 14 | 2 | 28 |
| Internet and library search | 14 | 2 | 28 |
| Material Design and Implementation | - | - | 0 |

| | | | | |
|---|---|---|---|---|
| Term Project Preparation | - | - | - |
| Preparing a Presentation | - | - | 0 |
| Presentations | - | - | 0 |
| Midterm Exam and Preperation for Midterm Exam | 2 | 10 | 20 |
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |
| Other (Quizzes and preparation for quizzes) | - | - | 0 |
| Total Workload | | | 128 |
| Total Workload / 25 | | | 5,12 |
| Course Credit (ECTS) | | | 5 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | X | |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | X | |
| CO3 | 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 | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | X | | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | | X | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | X | | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | X | | |
| CO8 | Recognition of the need for lifelong learning; ability to access information, to follow developments in science and | | | X | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | technology, and to continue to educate him/herself | | | | | |
| | CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | X | | | | |
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | X | | | | |
| **The Course's Lecturer(s) and Contact Information** | 5. Assoc .Prof. Dr. Nursel AKÇAM (ynursel@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE105 MATERIAL SCIENCE |
| **Course Semester** | 1 |
| **Catalog Content** | Atom Model and Crystal Structures. Electrical and Thermal Conduction in Solids. Dielectric Materials and Insulations. Semiconductor Physics. Magnetic Properties and Superconductivity. Nano materials. Aerial Conductors and Underground Cables. Internal Installation Conductors and Pipes. Fiber Optic Cables. Switches, Fuses, Insulators and Lighting Armatures. Electric-Meters and Their Connections. Calculation of Current Carrying Capacity of Conductors and Heating in Cables. Basic Security Concepts in Electrical Installations. |
| **Textbook** | "Principles of Electrical Engineering Materials and Devices", S.O.KASAP, Mc Graw Hill, 3rd Edition 2002. |
| **Supplementary Textbooks** | "Lectures on the Electrical Properties of Materials", L. SOYMER, D. WALSH, Oxford University Press, 7th Edition, 2004 |
| **Credit** | 5 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | - |
| **Type of the Course** | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | To introduce frequently used engineering and especially electrical-electronics engineering materials. To learn the operation of basic materials used in electrical and electronics engineering and their practical applications. |
| **Course Learning Outcomes** | Students who succeed this course:<br>1.Know about conductors and dielectrics, selection and diagnosis of some basic materials and devices and teaching to connection of them to electrical circuits<br>2. Know important security rules starting to electrical-electronics engineering applications. |
| **Instruction Methods** | Theoretical |
| **Weekly Schedule** | 15. Atom Model and Crystal Structures<br>16. Electrical and Thermal Conduction in Solids<br>17. Dielectric Materials and Insulations<br>18. Semiconductor Physics<br>19. Magnetic Properties and Superconductivity<br>20. Nano materials<br>21. Aerial Conductors and Underground Cables<br>22. Internal Installation Conductors and Pipes<br>23. Fiber Optic Cables<br>24. Switches, Fuses, Insulators and Lighting Armatures |

<table>
<tr><td></td><td>25. Electric-Meters and Their Connections<br>26. Calculation of Current Carrying Capacity of Conductors and Heating in Cables<br>27. Basic Security Concepts in Electrical Installations<br>28. Material Research Presentations</td></tr>
<tr><td>Teaching and Learning Methods<br><br>(These are examples. Please fill which activities you use in the course)</td><td>Weekly theoretical course hours<br>Internet browsing, library work<br>Preparing a Presentation<br>Presentations<br>Preparation of Midterm and Midterm Exam<br>Final Exam and Preparation for Final Exam</td></tr>
<tr><td>Assessment Criteria</td><td>
<table>
<tr><th></th><th>Numbers</th><th>Total Weighting (%)</th></tr>
<tr><td>Midterm Exams</td><td>1</td><td>50</td></tr>
<tr><td>Assignment</td><td>1</td><td>50</td></tr>
<tr><td>Application</td><td>-</td><td>-</td></tr>
<tr><td>Projects</td><td>-</td><td>-</td></tr>
<tr><td>Practice</td><td>-</td><td>-</td></tr>
<tr><td>Quiz</td><td>-</td><td>-</td></tr>
<tr><td>Percent of In-term Studies (%)</td><td>-</td><td>60</td></tr>
<tr><td>Percentage of Final Exam to Total Score (%)</td><td>1</td><td>40</td></tr>
<tr><td>Attendance</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Workload</td><td>
<table>
<tr><th>Activity</th><th>Total Number of Weeks</th><th>Duration (weekly hour)</th><th>Total Period Work Load</th></tr>
<tr><td>Weekly Theoretical Course Hours</td><td>14</td><td>3</td><td>42</td></tr>
<tr><td>Weekly Tutorial Hours</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Reading Tasks</td><td>14</td><td>2</td><td>28</td></tr>
<tr><td>Studies</td><td>14</td><td>1</td><td>14</td></tr>
<tr><td>Material Design and Implementation</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Report Preparing</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Preparing a Presentation</td><td>1</td><td>5</td><td>5</td></tr>
<tr><td>Presentations</td><td>1</td><td>1</td><td>1</td></tr>
</table>
</td></tr>
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| | | | | |
|---|---|---|---|---|
| Midterm Exam and Preperation for Midterm Exam | 1 | 10 | 10 |
| Final Exam and Preperation for Final Exam | 1 | 15 | 10 |
| Other (should be emphasized) | - | - | - |
| Total Workload | | | 115 |
| Total Workload / 25 | | | 4,7 |
| Course Credit (ECTS) | | | 5 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | X | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | X | | | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | X | | | | |
| CO8 | 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 | | | | |
| CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | X | | | | |
| CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, | X | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | innovation; knowledge about sustainable development | | | | | |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | X | | | | |
| **The Course's Lecturer(s) and Contact Informations** | 6. Prof.Dr.M.Cengiz TAPLAMACIOĞLU<br>taplam@gazi.edu.tr | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE106 Logic Circuit Design Lab. |
| **Course Semester** | 2 |
| **Catalog Content** | Circuit design and practice using logic circuit gates. Half-adder, fulla-dder, multiplexer and flip-flop circuits measurements and simulation studies. |
| **Textbook** | Digital Design, M. Morris Mano, Prentice-Hall, Inc.,2011 |
| **Supplementary Textbooks** | • Systems Design, V. T. Rhyne, Prentice-Hall, Inc.<br>• Digital Foundamentals, Thomas L. Floyed, A. Bell & Howell Company.<br>• Principles of Digital Design, Daniel D. Gajski, Prentice-Hall, Inc. |
| **Credit** | 2 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | None |
| **Type of the Course** | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | A comprehensive understanding of the fundamentals of digital logic circuits. To learn the Logic Circuit Design concepts and to use this concepts to carry out simple designs. |
| **Course Learning Outcomes** | Students who succeed this course:<br>1. Know the operational principles of logic circuits.<br>2. Can realize an experiment by following the instructions given in laboratory manual<br>3. Can analyze the data obtained from the experiments and make comments on them.<br>4. Can prepare report including the experimental data, analysis and comments on the obtained data |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 1. Lojik gates (And,Or, Not, Nand, Nor, Exor, Exnor)<br>2. Half adder<br>3. Full adder Circuits<br>4. RS-Flip flop<br>5. D-Flip flop Circuits<br>6. Multiplexer<br>7. Up- Down Counter<br>8. Project design<br>9. Prıject design<br>10. Testing Project<br>11. Testing Project<br>12. Project presentation<br>13. Project presentation<br>14. Project presentation |

**Teaching and Learning Methods**

*(These are examples. Please fill which activities you use in the course)*

Weekly 2 hours pratical course
Reading Activities
Internet browsing, library work
Preparation report
Final Exam and Preparation for Final Exam
Preparation project and presentation

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | | |
| Assignment | | |
| Application | | |
| Projects | 1 | 53 |
| Practice | 7 | 47 |
| Quiz | | |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | | |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 0 | 0 | 0 |
| Weekly Tutorial Hours | 14 | 2 | 28 |
| Reading Tasks | 1 | 2 | 2 |
| Studies | 1 | 2 | 2 |
| Material Design and Implementation | 2 | 2 | 4 |
| Report Preparing | 4 | 2 | 8 |
| Preparing a Presentation | 1 | 2 | 2 |
| Presentations | 1 | 1 | 1 |
| Midterm Exam and Preperation for Midterm Exam | 0 | 0 | 0 |
| Final Exam and Preperation for Final Exam | 1 | 3 | 3 |

| | | | | |
|---|---|---|---|---|
| Other ( should be emphasized) | | | | |
| Total Workload | | | | 50 |
| Total Workload / 25 | | | | 2 |
| Course Credit (ECTS) | | | | 2 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledgein these areas in complex engineering problems. | | X | | | |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | X | | |
| CO3 | 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 | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | | X |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | | | X | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | | X | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | | X | |
| CO8 | 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 | |
| CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | | | X | | |
| CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; | X | | | | |

| | |
|---|---|
| | awareness of the legal consequences of engineering solutions . |
| **The Course's Lecturer(s) and Contact Informations** | 7. Assoc.Prof.Dr. Nursel AKÇAM (ynursel@gazi.edu.tr)<br>8. Res. Ass. Dr. Uğurhan KUTBAY (ukutbay@gazi.edu.tr) |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE201 ENGINEERING MATHEMATICS |
| **Course Semester** | 3 |
| **Catalog Content** | Vector and scalar fields, derivative of a vector function, partial derivative; parametric representation of curves; tangential vector, arc length; directional derivative and gradient of a scalar function; Divergence and curl of a vector function; Laplace operator; Conservative, solenoidal and irrotational fields; Line integrals of vector functions; Work done by a force, path independence; Surface and volume integrals; İntegral theorems: divergence and Stokes theorems; Fourier series and Fourier transform; Laplace and inverse Laplace transforms |
| **Textbook** | M. D. Greenberg, Advanced Engineering Mathematics, Pearson, 10th Edition,2011 |
| **Supplementary Textbooks** | E. Kreyszig, Advanced Engineering Mathematics, Wiley, 2006 |
| **Credit** | 6 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | - |
| **Type of the Course** | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | To learn the necessary fundamental mathematical concepts for electrical and electronics engineering. |
| **Course Learning Outcomes** | Students who succeed this course:<br>15. Know Orthogonal systems, transformations, vector and scalar fields.<br>16. Know vector arithmetics.<br>17. Know derivative and integral concepts for scalar and vector fields.<br>18. Know fundamental theorems. |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 1. Scalar and vector quantities, scalar and vector field concepts, vector arithmetic. Unit and position vector<br>2. Orthogonal coordinate systems; Cartesian, cylindrical coordinate systems and point and vector transformations in these systems<br>3. Spherical coordinate system, point and vector representation in this system and spherical-cylindrical and spherical-Cartesian point and vector transformations<br>4. Exact differential and vector derivatives, nabla operator, gradient and Laplacian concepts<br>5. Vector derivatives : Divergence of a vector fields<br>6. Vector derivatives : Curl of a vector fields<br>7. Line, surface and volume integrals for vector fields<br>8. Line, surface and volume integrals for vector fields<br>9. Divergence theorem<br>10. Stokes' Theorem<br>11. Helmholtz Theorem and classification of vector fields |

| | |
|---|---|
| | 12. Fourier series and Fourier transform<br>13. Fourier series and Fourier transform<br>14. Laplace and inverse Laplace transforms |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours<br>Internet browsing, library work<br>Preparation of Midterm and Midterm Exam<br>Preparation for Quizzes<br>Final Exam and Preparation for Final Exam |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 2 | 67 |
| Assignment | - | - |
| Application | - | - |
| Term Project | - | - |
| Practice | - | - |
| Quiz | 3-5 | 33 |
| Percent of In-term Studies (%) | - | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | - | - | 0 |
| Reading Tasks | | | |
| Internet and library search | 3 | 6 | 18 |
| Material Design and Implementation | - | - | - |
| Term Project Preparation | | | |
| Preparing a Presentation | | | |
| Presentations | | | |

| | | | | |
|---|---|---|---|---|
| Midterm Exam and Preperation for Midterm Exam | 2 | 20 | 40 |
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |
| Other (Quizzez and preparation for quizzes) | 10 | 3 | 30 |
| 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 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | X | | | | |
| CO3 | 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 | | | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | X | | | | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | X | | | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | X | | | | |
| CO8 | 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 | | | | |
| CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | X | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | X | | | | |
| **The Course's Lecturer(s) and Contact Information** | 9. Doç. Dr. Ertuğrul AKSOY (ertugrulaksoy@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE209 Probability and Statistics |
| **Course Semester** | 3 |
| **Catalog Content** | Basic concepts of probability and statistics. Random variables, functions of random variables. Multivariable distributions and densities. Independent random variables. Correlation, application of statistics to engineering systems. |
| **Textbook** | Introduction to Probability and Statistic for Engineers and Scientists-Shaldon M.Ross, Nobel. |
| **Supplementary Textbooks** | Probability and Statistics, Fikri Akdeniz<br>A First Course in Probability, S.M. Ross |
| **Credit** | 5 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | There is no prerequisite or co-requisite for this course. |
| Type of the Course | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | To provide students with the ability to identify concepts such as random variables, probability density functions and to use them in problem solving. To ensure that they can calculate the expected value, variance and standard deviation. To gain students the ability to perform parameter estimation and hypothesis testing. |
| **Course Learning Outcomes** | Students who succeed this course:<br>1. Define random variables.<br>2. Define the concept of probability density function and uses it in problem solving.<br>3. Calculate the expected value, variance and standard deviation.<br>4. Make parameter estimation.<br>5. Make Hypothesis testing. |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 1. Definition of probability, sample space and event, geometric probability, basic axioms of probability, finite probability spaces. |

| | |
|---|---|
| | 2. Conditional probability, axioms of conditional probability, multiplicative rule, some properties of conditional probability.<br>3. Independent events, complete independence, total probability formula, tree diagrams, Bayes' Theorem.<br>4. Definitions of continuous and discrete random variables, probability distribution and probability function of discrete random variables.<br>5. Probability distribution and probability density function of continuous random variables.<br>6. Distribution functions of discrete and continuous random variables, properties of distribution function.<br>7. Expected value, variance and standard deviation concepts, properties of expected value and variance.<br>8. Discrete probability distributions: Uniform, Bernoulli, Binom, Hypergeometric.<br>9. Discrete probability distributions: geometric, Pascal (negative binomial distribution), Poisson.<br>10. Continuous probability distributions: Uniform, Exponential, Normal (Gaussian).<br>11. Definition of statistic, basic concepts: Stack, parameter, sample, sampling, exact count, sampling types.<br>12. Sampling distribution, central limit theorem.<br>13. Point estimation, interval estimation (confidence interval).<br>14. Hypothesis testing, strength of the test, independence test, compatibility test. |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly 3 hours theoretical course<br>Reading Activities<br>Internet browsing, library work<br>Preparation of Midterm and Midterm Exam<br>Final Exam and Preparation for Final Exam |
| **Assessment Criteria** | |

| | **Numbers** | **Total Weighting (%)** |
|---|---|---|
| Midterm Exams | 2 | 100 |
| Assignment | | |
| Application | | |
| Projects | | |
| Practice | | |
| Quiz | | |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | | |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | 0 | 0 | 0 |
| Reading Tasks | 12 | 4 | 48 |
| Studies | 3 | 4 | 12 |
| Material Design and Implementation | 0 | 0 | 0 |
| Report Preparing | 0 | 0 | 0 |
| Preparing a Presentation | 0 | 0 | 0 |
| Presentations | 0 | 0 | 0 |
| Midterm Exam and Preperation for Midterm Exam | 2 | 10 | 20 |
| Final Exam and Preperation for Final Exam | 1 | 10 | 10 |
| Other ( should be emphasized) | 0 | 0 | 0 |
| Total Workload | | | 132 |
| Total Workload / 25 | | | 5,28 |
| Course Credit (ECTS) | | | 5 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledgein these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | X | |
| CO3 | 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 | | | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | X | | | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering | X | | | | |

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|---|---|---|---|---|---|---|---|
| | problems or discipline specific research questions | | | | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | X | | | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | X | | | | | |
| CO8 | 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 | | | | | |
| CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | X | | | | | |
| CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | | |
| CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | X | | | | |

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| **The Course's Lecturer(s) and Contact Informations** | 10. Res. Assist. Dr. Funda ERGÜN YARDIM (fundaergun@gazi.edu.tr) |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE212 Analog Electronics I |
| **Course Semester** | 4 |
| **Catalog Content** | Basic semiconductor concept. Physical electronics. Physics of P-N diodes. Bipolar junction transistors (BJTs). Field effect transistors (FETs). Transistor biasing and small signal models. Unijunction transistors (UJTs). P-N-P-N switching devices. Negative resistance microwave devices. Lasers. |
| **Textbook** | A. S. Sedra & A. Grabel, Microelectronic Circuits & Devices, Oxford University Press, 7tht Edition, 2014 |
| **Supplementary Textbooks** | B. G. Streetman and S. Banerjee, Solid State Electronic Devices, Prentice Hall Series |
| **Credit** | 6 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | EEE221(Attendance is compulsory) |
| **Type of the Course** | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | To learn the existing electronic circuit elements and their application fields and to have enough information to learn about new electronic circuit elements. |
| **Course Learning Outcomes** | Students who succeed this course:<br>1. Understand semiconductor, electron and hole concepts<br>2. Can find the carrier concentration and ferni level of intrinsic, n-type and p-type semiconductors<br>3. Can analyze the operation of p-n junction under equilibrium, forward and reverse bias and understands potential barrier, space charge region and leakage current concepts<br>4. Can analyze rectifier, clipper and clamper diode circuits<br>5. Know the components of DC power supply<br>6. Understand physical operation of BJT and can analyze and design single stage BJT amplifiers<br>7. Understand physical operation of FETs and can analyze and design single stage FET amplifiers<br>8. Understand operation principles of special purpose diodes (varactor, tunnel diode, photodiode, LED, laser).<br>9. Know p-n-p-n switching circuits and negative resistance microwave components |
| **Instruction Methods** | Face to face |
| **Weekly Schedule** | Week Topics<br>1. Energy bands and charge carriers in semiconductors.<br>2. Excess carriers in semiconductors.<br>3. P-N junction under equilibrium conditions. P-N junction under forward and reverse bias conditions.<br>4. Transient and A-C conditions.<br>5. Applications of p-n diodes. |

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| | 6. Other p-n diodes. Metal semiconductor junctions.<br>7. Field-effect transistors. Junction field effect transistor<br>8. MOS field effect transistor.<br>9. Bipolar junction transistor (BJT). Minority carrier distributions and terminal currents in BJT.<br>10. Switching of BJT.<br>11. Optoelectronic devices: Photodiodes, LEDs and Lasers.<br>12. Power devices: P-n-p-n diode, SCR and IGBT.<br>13. Negative conductance of microwave devices: Tunnel diode, IMPATT diode and Gunn diode.<br>14. Introduction to integrated circuits. |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours 4x14=56<br>Reading Activities 20<br>Internet browsing, library work 20<br>Preparation of quizzes, Midterm and Midterm Exam, quizzes 32<br>Final Exam and Preparation for Final Exam 10 |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 2 | 80 |
| Assignment | | |
| Application | | |
| Projects | | |
| Practice | | |
| Quiz | 6 | 20 |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | 1 | 40 |
| Attendance | | |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 4 | 56 |
| Weekly Tutorial Hours | | | |
| Reading Tasks | 10 | 2 | 20 |
| Studies | 10 | 3 | 30 |
| Material Design and Implementation | | | |

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|---|---|---|---|---|
| Report Preparing | | | | |
| Preparing a Presentation | | | | |
| Presentations | | | | |
| Midterm Exam and Preperation for Midterm Exam | 2 | 10 | 20 | |
| Final Exam and Preperation for Final Exam | 1 | 10 | 10 | |
| Other ( quizes) | 6 | 2 | 12 | |
| Total Workload | | | 148 | |
| Total Workload / 25 | | | 5.9 | |
| Course Credit (ECTS) | | | 6 | |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledgein these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | X | | | | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | X | | | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | X | | | | |
| CO8 | 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 | | | | |
| CO9 | Consciousness to behave according to ethical principles and professional and | | X | | | |

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|---|---|---|---|---|---|---|---|
| | | ethical responsibility; knowledge on standards used in engineering practice . | | | | | |
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | X | | | | |
| **The Course's Lecturer(s) and Contact Informations** | 11. Assoc.Prof.Dr. Tuğba Selcen NAVRUZ selcen@gazi.edu.tr<br>12. Dr. Mehmet KARAKAYA<br>13. mehmetkarakaya@gazi.edu.tr | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE214 Analog Electronics Laboratory I |
| **Course Semester** | 4 |
| **Catalog Content** | P-n junction diode, BJT and FET I-V characteristics, clipper, clamper and rectifier circuits, DC biasing of BJTs and FETs. BJT and FET amplifiers. |
| **Textbook** | A. S. Sedra & A. Grabel, Microelectronic Circuits & Devices, Oxford University Press, 7th Edition, 2014<br><br>Laboratory Manual |
| **Supplementary Textbooks** | B. G. Streetman and S. Banerjee, Solid State Electronic Devices, Prentice Hall Series |
| **Credit** | 2 |
| **Prerequisites of the Course**<br><br>**( Attendance Requirements)** | Prerequisite:EEE221<br><br>80% attendance is required |
| **Type of the Course** | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | To be able to set up a given circuit correctly, to make the measurements and to analyze the data obtained from the experiment. To be able to simulate the analyzed circuits |
| **Course Learning Outcomes** | Students who succeed this course:<br><br>1. Know the devices in Electronics Laboratory such as scope, signal generator, power supply and multimeter<br>2. Obtain the I-V characteristics of p-n junction Si, Ge , zener and LED diodes. Find the potential barrier and forward resistance values.<br>3. Set up clipper and clamper circuits and obtain input-outpur transfer characteristics.<br>4. Set up half-wave and full-wave rectifier circuits and obtain input-outpur transfer characteristics.<br>5. Set up clipper and regulator circuits with zener diode and make measurements.<br>6. Obtain I-V characteristics of BJTs.<br>7. Set up the circuits to test the stability of BJT circuits against temperature and choose the most stable circuit.<br>8. Measure the voltage gain, current gain, input and output resistances of a BJT amplifier.<br>9. Obtain I-V characteristics of FETs<br>10. Measure the voltage gain, current gain, input and output resistances of a FET amplifier<br>11. Simulate the analyzed circuits. |
| **Instruction Methods** | Face to face |
| **Weekly Schedule** | Week Topic<br><br>1 Introducing laboratory devices.<br>2 Practices to learn the use of lab devices<br>3 Obtaining I-V curves of p-n junction diodes. |

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| | 4 Clipper and clamper circuits<br>5 Rectifier circuits<br>6 Zener diode circuits<br>7 Midterm<br>8 BJT I-V characteristics<br>9 BJT stability analysis<br>10 BJT amplifier circuit<br>11 FET I-V characteristics<br>12 FET amplifier circuit<br>13 Practical exam<br>14 Practical exam. |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly applied course hours -28<br>Internet browsing, library work<br>Designing and implementing materials<br>Report preparing<br>Preparation of quizzes, Midterm and Midterm Exam, quizzes<br>Final Exam and Preparation for Final Exam |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 1 | 17 |
| Assignment | | |
| Application | | |
| Projects | | |
| Practice | 11 | 58 |
| Quiz | 8 | 25 |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | 1 | 40 |
| Attendance | | |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | | | |
| Weekly Tutorial Hours | 14 | 2 | 28 |
| Reading Tasks | | | |
| Studies | 1 | 2 | 2 |
| Material Design and Implementation | 1 | 3 | 3 |

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|---|---|---|---|---|
| Report Preparing | 10 | 1 | 10 |
| Preparing a Presentation | | | |
| Presentations | | | |
| Midterm Exam and Preperation for Midterm Exam | 1 | 2 | 2 |
| Final Exam and Preperation for Final Exam | 1 | 4 | 4 |
| Other ( should be emphasized) | 8 | 0.25 | 2 |
| Total Workload | | | 51 |
| Total Workload / 25 | | | 2.04 |
| Course Credit (ECTS) | | | 2 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledgein these areas in complex engineering problems. | X | | | | |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | X | | | | |
| CO3 | 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 | | | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | X | | | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | | | | X | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | X | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | X | | |
| CO8 | 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 | | |
| CO9 | Consciousness to behave according to ethical principles and professional and | | X | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | ethical responsibility; knowledge on standards used in engineering practice . | | | | | |
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | X | | | | |
| **The Course's Lecturer(s) and Contact Informations** | 14. Assoc.Prof.Dr. Tuğba Selcen NAVRUZ selcen@gazi.edu.tr<br>15. Dr. Mehmet KARAKAYA mehmetkarakaya@gazi.edu.tr | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE221 Circuit Theory I |
| **Course Semester** | 3 |
| **Catalog Content** | Circuit concept. Circuit variables and components. Ohmic circuits. Techniques and methods used for DC circuit analysis. Operational amplifiers. Inductance and capacitance. Transient and steady state responses of first and second order circuits. |
| **Textbook** | J. David Irwin, Basic Engineering Circuit Analysis, 10th ed. John Wiley |
| **Supplementary Textbooks** | J.W. Nilsson, S.A. Riedel, Electric Circuits, 9th. Ed., Prentice Hall |
| **Credit** | 7 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | MAT102 **(**Attendance is compulsory) |
| **Type of the Course** | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | To learn the necessary concepts and techniques required for the analysis of electric circuits, and to use these concepts to carry out simple designs. |
| **Course Learning Outcomes** | Students who succeed this course:<br>5. Are be able to use the basic circuit analysis methods (node voltages, loop and mesh currents)<br>6. Are able to use various techniques (circuit reduction, Y-delta conversion, Thevenin and Norton equivalents, superposition, source transformation) in circuit analysis.<br>7. Know and can use maximum power transfer concept.<br>8. Can analyze first and second order circuits by differential equation approach and step-by-step approach.<br>9. Can analyze operational amplifier circuits.<br>10. Can choose and apply the proper technique for the analysis of a complex circuit.<br>11. Can design a simple circuit. |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 1. Basic Concepts; Passive Sign Convention; Sources; Power and Energy; Resistor element; KCL and KVL.<br>2. Dependent Sources. Resistive Circuits. Current and voltage dividers.<br>3. Measuring current and voltage. Star-Delta transformation.<br>4. Node Voltages Method<br>5. Mesh Current Method.<br>6. Source Transformation. Thevenin Equivalent Circuit.<br>7. Thevenin Equivalent Circuit. Norton Equivalent Circuit.<br>8. Maximum Power Transfer<br>9. Superposition Technique.<br>10. Operational Amplifiers<br>11. Inductor and Capacitor.<br>12. First Order Circuits: Natural and Step Responses.<br>13. Second Order Circuits: Natural and Step Responses.<br>14. General review |

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| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly 4 hours theoretical course<br>Reading Activities<br>Internet browsing, library work<br>Preparation of Midterm and Midterm Exam<br>Final Exam and Preparation for Final Exam |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 2 | 70 |
| Assignment | | |
| Application | | |
| Projects | | |
| Practice | | |
| Quiz | 8 | 30 |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | | |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 4 | 56 |
| Weekly Tutorial Hours | 0 | 0 | 0 |
| Reading Tasks | 14 | 4 | 56 |
| Studies | 14 | 3 | 42 |
| Material Design and Implementation | 0 | 0 | 0 |
| Report Preparing | 0 | 0 | 0 |
| Preparing a Presentation | 0 | 0 | 0 |
| Presentations | 0 | 0 | 0 |
| Midterm Exam and Preperation for Midterm Exam | 2 | 10 | 20 |

| | | | | |
|---|---|---|---|---|
| Final Exam and Preperation for Final Exam | 1 | 10 | 10 |
| Other ( should be emphasized) | | | |
| Total Workload | | | 184 |
| Total Workload / 25 | | | 7,36 |
| Course Credit (ECTS) | | | 7 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledgein these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | X | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | X | | | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | X | | | | |
| CO8 | 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 | | | | |
| CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | X | | | | |
| CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| CO11 | Knowledge about the global and social effects of engineering practices on health, | X | | | | |

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|---|---|---|---|---|---|---|---|
| | | environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | | | | |
| **The Course's Lecturer(s) and Contact Informations** | 16. Prof. Dr. M. Timur AYDEMİR (aydemirmt@gazi.edu.tr)<br>17. Assoc.Prof.Dr. Nursel AKÇAM (ynursel@gazi.edu.tr)<br>18. Assoc.Prof.Dr. Tuğba Selcen NAVRUZ (selcen@gazi.edu.tr)<br>19. Res.Assist.. Dr. Funda ERGÜN YARDIM (fundaergun@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE222 Circuit Theory II |
| **Course Semester** | 4 |
| **Catalog Content** | Sinusoidal steady state analysis. Application of circuit analysis techniques to AC circuits. Phasors. Power and energy in sinusoidal circuits. Application of Laplace transformation to circuit analysis. Filters. Fourier series and transformation. Two-port circuits. Mutual inductance and transformers. |
| **Textbook** | J. David Irwin, Basic Engineering Circuit Analysis, 10th ed. John Wiley |
| **Supplementary Textbooks** | J.W. Nilsson, S.A. Riedel, Electric Circuits, 9th. Ed., Prentice Hall. |
| **Credit** | 6 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | EEE221 (Attendance is compulsory) |
| **Type of the Course** | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | To learn the methods, techniques and transformations necessary for AC circuit analysis, and how to design simple circuits by using these concepts. |
| **Course Learning Outcomes** | Students who succeed this course:<br>1. Can perform sinusoidal steady state analysis by using phasor concept<br>2. Can calculate power in single-phase AC circuits.<br>3. Can calculate rms and average values of periodical signals.<br>4. Can calculate circuit responses by using Laplace transformation<br>5. Can calculate frequency of circuits, can show the frequency variations by Bode graphs.<br>6. Can analyze and design passive low-pass, high-pass, band-pass, band-reject filter circuits<br>7. Can calculate the parameters of two-port circuits<br>8. Can perform simple AC circuit designs. |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 1. Basic definitions in sinusoidal steady state analysis: Amplitude, frequency, phase angle.<br>2. Phasor concept, Passive circuit elements in frequency domain<br>3. Application of mesh current and node voltage equations to AC circuits.<br>4. Application of other circuit analysis techniques and transformations to AC circuits.<br>5. AC Power in Steady State; Instantaneous power, Average Power<br>6. Maximum Power Transfer. RMS value calculations.<br>7. Power factor; Reactive Power, Complex Power. |

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| | 8. Magnetically Coupled Circuits and Ideal Transformers<br>9. Variable Frequency Response Analysis<br>10. Filter Networks<br>11. Application of Laplace Transformation to Circuit Analysis.<br>12. Passive Filter Circuits and transfer functions<br>13. Two Port Circuits<br>14. General review |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly 4 hours theoretical course<br>Reading Activities<br>Internet browsing, library work<br>Preparation of Midterm and Midterm Exam<br>Final Exam and Preparation for Final Exam |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 2 | 70 |
| Assignment | | |
| Application | | |
| Projects | | |
| Practice | | |
| Quiz | 6-8 | 30 |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | | |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 4 | 56 |
| Weekly Tutorial Hours | 0 | 0 | 0 |
| Reading Tasks | 14 | 3 | 42 |
| Studies | 14 | 2 | 28 |
| Material Design and Implementation | 0 | 0 | 0 |
| Report Preparing | 0 | 0 | 0 |

| | | | | |
|---|---|---|---|---|
| Preparing a Presentation | 0 | 0 | 0 |
| Presentations | 0 | 0 | 0 |
| Midterm Exam and Preperation for Midterm Exam | 2 | 10 | 20 |
| Final Exam and Preperation for Final Exam | 1 | 10 | 10 |
| Other ( should be emphasized) | 0 | 0 | 0 |
| Total Workload | | | 156 |
| Total Workload / 25 | | | 6,24 |
| Course Credit (ECTS) | | | 6 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledgein these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | X | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | X | | | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | X | | | | |
| CO8 | 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 | | | | |
| CO9 | Consciousness to behave according to ethical principles and professional and | X | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | ethical responsibility; knowledge on standards used in engineering practice . | | | | | |
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | | X | | |
| **The Course's Lecturer(s) and Contact Informations** | 20. Prof. Dr. M. Timur AYDEMİR (aydemirmt@gazi.edu.tr)<br>21. Assoc.Prof.Dr. Nursel AKÇAM (ynursel@gazi.edu.tr)<br>22. Assoc.Prof.Dr. Tuğba Selcen NAVRUZ (selcen@gazi.edu.tr)<br>23. Res.Assist.. Dr. Funda ERGÜN YARDIM (fundaergun@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE223 Circuit Theory Lab.- I |
| **Course Semester** | 3 |
| **Catalog Content** | Measurement of voltage, current and resistance. Node-voltage method and mesh current methods in dc circuits. Thevenin and Norton theorems. Linearity and superposition principles. RC, RL and RLC circuits. Oscilloscopes. Measurements with oscilloscopes. |
| **Textbook** | J. David Irwin, Basic Engineering Circuit Analysis, 10th ed. John Wiley |
| **Supplementary Textbooks** | J.W. Nilsson, S.A. Riedel, Electric Circuits, 9th. Ed., Prentice Hall. |
| **Credit** | 2 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | MAT102 |
| **Type of the Course** | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | To learn the basic DC circuit analysis concepts practically and to use ammeter, voltmeter and oscilloscope. |
| **Course Learning Outcomes** | Students who succeed this course:<br>12. Can use ammeter, voltmeter and oscilloscope.<br>13. Can carry out the experiments by following the instructions given in laboratory manual.<br>14. Can analyze and comment on the experimental data.<br>15. Can prepare reports including the measurement results, their analysis and comments. |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 1. Introducing the laboratory<br>2. PSPICE presentation<br>3. Measurement techniques, definitions, units<br>4. Mesuring resistance by ammeter and voltmeter<br>5. Oscilloscope<br>6. Measurements by oscilloscope<br>7. Measuring voltage, current and resistance<br>8. Node voltage method<br>9. Mesh current method<br>10. Thevenin ana Norton theorems<br>11. Linearity and superposition principles<br>12. RC circuit transient response<br>13. RL circuit transient response<br>14. RLC circuit transient response |

**Teaching and Learning Methods**

*(These are examples. Please fill which activities you use in the course)*

Weekly 2 hours pratical course
Reading Activities
Internet browsing, library work
Preparation report
Preparation of Midterm and Midterm Exam
Final Exam and Preparation for Final Exam

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | | |
| Assignment | | |
| Application | | |
| Projects | | |
| Practice | 11 | 60 |
| Quiz | 4 | 40 |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | | |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 0 | 0 | 0 |
| Weekly Tutorial Hours | 14 | 2 | 28 |
| Reading Tasks | - | - | - |
| Studies | 6 | 1 | 6 |
| Material Design and Implementation | 0 | 0 | 0 |
| Report Preparing | 6 | 2 | 12 |
| Preparing a Presentation | 0 | 0 | 0 |
| Presentations | 0 | 0 | 0 |
| Midterm Exam and Preperation for Midterm Exam | 4 | 2 | 8 |
| Final Exam and Preperation for Final Exam | 1 | 4 | 4 |

| | | | | |
|---|---|---|---|---|
| Other ( should be emphasized) | | | | |
| Total Workload | | | | 58 |
| Total Workload / 25 | | | | 2,32 |
| Course Credit (ECTS) | | | | 2 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledgein these areas in complex engineering problems. | X | | | | |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | X | | | | |
| CO3 | 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 | | | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | X | | | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | | | | X | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | X | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | X | | |
| CO8 | 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 | | |
| CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | | X | | | |
| CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; | X | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | awareness of the legal consequences of engineering solutions . | | | | | |

| | |
|---|---|
| **The Course's Lecturer(s) and Contact Informations** | 24. Prof. Dr. M. Timur AYDEMİR (aydemirmt@gazi.edu.tr)<br>25. Assoc.Prof.Dr. Nursel AKÇAM (ynursel@gazi.edu.tr)<br>26. Assoc.Prof.Dr. Tuğba Selcen NAVRUZ (selcen@gazi.edu.tr)<br>27. Res.Assist.. Dr. Funda ERGÜN YARDIM (fundaergun@gazi.edu.tr) |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE224 Circuit Theory Lab. II |
| **Course Semester** | 4 |
| **Catalog Content** | Frequency variation of capacitive and inductive reactance. Series RC and RL circuits. Parallel RC and RL circuits. Series and parallel RLC circuits. Filter circuits. Power and power factor in sinusoidal circuits. |
| **Textbook** | J. David Irwin, Basic Engineering Circuit Analysis, 10th ed. John Wiley<br>Laboratory handouts |
| **Supplementary Textbooks** | J.W. Nilsson, S.A. Riedel, Electric Circuits, 9th. Ed., Prentice Hall. |
| **Credit** | 2 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | EEE221 (Attendance is compulsory) |
| **Type of the Course** | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | To gain insight on ac electrical circuit analysis and filters through experiments |
| **Course Learning Outcomes** | Students who succeed this course:<br>1. Can measure the peak and rms values of amplitude and frequency of AC signals<br>2. Can analyze the effect of frequency variation on the impedance and on the amplitude and phase of current and voltage values in series and parallel RC circuits under AC bias.<br>3. Can measure the resonant frequency of RLC circuits<br>4. Can measure AC power<br>5. Can obtain the gain-frequency variation of active and passive filters.<br>6. Can simulate AC ciruits. |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 1. Introducing signal generation, AC signal measurement<br>2. Series RC circuits<br>3. Parallel RC circuits<br>4. Series resonant circuits<br>5. Parallel resonant circuits<br>6. AC power measurement<br>7. Reactive power balance<br>8. Calculating frequency response using PSPICE<br>9. Low-pass and High-pass filter circuits<br>10. Band-pass and Band*stop filter circuits<br>11. Active filters |

| | |
|---|---|
| | 12. Checking project<br>13. Checking project<br>14. Application exam |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly applied 2 hours course<br>Reading Activities<br>Internet browsing, library work<br>Report preparing<br>Final Exam and Preparation for Final Exam |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | | |
| Assignment | | |
| Application | | |
| Projects | 1 | 15 |
| Practice | 8 | 70 |
| Quiz | 8 | 15 |
| Percent of In-term Studies (%) | | |
| Percentage of Final Exam to Total Score (%) | | |
| Attendance | | |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | | | |
| Weekly Tutorial Hours | 14 | 2 | 28 |
| Reading Tasks | | | |
| Studies | 2 | 1 | 2 |
| Material Design and Implementation | | | |
| Report Preparing | 8 | 2 | 16 |
| Preparing a Presentation | | | |
| Presentations | | | |

| | | | | |
|---|---|---|---|---|
| Midterm Exam and Preperation for Midterm Exam | | | | |
| Final Exam and Preperation for Final Exam | 1 | 2 | 2 | |
| Other ( quiz and project) | 2 | 4 | 8 | |
| Total Workload | | | 56 | |
| Total Workload / 25 | | | 2,24 | |
| Course Credit (ECTS) | | | 2 | |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledgein these areas in complex engineering problems. | X | | | | |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | X | | | | |
| CO3 | 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 | | | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | X | | | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | | | | X | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | X | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | X | | |
| CO8 | 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 | | |
| CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | | X | | | |
| CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, | X | | | | |

<table>
<tr><td></td><td><table>
<tr><td></td><td>innovation; knowledge about sustainable development</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO11</td><td>Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions .</td><td>X</td><td></td><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>The Course’s Lecturer(s) and Contact Informations</td><td>28. Prof. Dr. M. Timur AYDEMİR (aydemirmt@gazi.edu.tr)<br>29. Assoc.Prof.Dr. Nursel AKÇAM (ynursel@gazi.edu.tr)<br>30. Assoc.Prof.Dr. Tuğba Selcen NAVRUZ (selcen@gazi.edu.tr)<br>31. Res.Assist.. Dr. Funda ERGÜN YARDIM (fundaergun@gazi.edu.tr)</td></tr>
</table>

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE252 ELECTROMAGNETICFIELD THEORY |
| **Course Semester** | 4 |
| **Catalog Content** | Electrostatic fields in free space and materials; Solution methods of electrostatic problems; Energy and forces in electrostatic fields; Electric fields and conductors; Magnetostatic fields in free space and materials; Solution methods of magnetostatic problems; Magnetic properties of materials; Relationship between circuit and field theory; Introduction to the Maxwell equations. |
| **Textbook** | M. N. O Sadiku, Elements of Electromagnetics, Oxford University Press, 2001. |
| **Supplementary Textbooks** | D. K. Cheng, Fundamentals of Engineering Electromagnetics, Addison Wesley, 1993. |
| **Credit** | 5 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | EEE201 (Attendance is Compulsory) |
| **Type of the Course** | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | To learn the electromagnetics as a study of effects of stationary and moving charges and to see the necessity of electromagnetic theory in explanation of electragnetic phenomenon. |
| **Course Learning Outcomes** | Students who succeed this course:<br>16. Know the relationship between charges/currents and fields.<br>17. Know the charges/currents-potentials and potentials-fields relationships<br>18. Know the electromagnetic classification of materials.<br>19. know field behavior in material space.<br>20. Know the relationship between cicuit theory and electromagnetic theory**.** |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 15. Coulomb's law, electroststic field intensity, electric field intensity due to continuous charge distribution<br>16. Electric flux density and Gauss law Applications of Gauss law<br>17. Electric potential and electric field-potential relationship<br>18. Electric dipole and energy density in electrostatic fields<br>19. Convection and conduction current, Ohm law and electrical resistance concept, Joule law<br>20. Polarization in dielectrics, dielectric constant and continuity equation<br>21. Boundary conditions for electrostatic fields<br>22. Electrostatic boundary value problems, Poisson and Laplace equations, Uniqueness theorem and capacitance<br>23. Fundamental postulates of magnetostatics, Ampere law and magnetic vector potential<br>24. Biot-Savart law |

<table>
<tr><td></td><td>25. Magnetic dipole, magnetic diople moment, magnetization of materials and classification of magnetic materials<br>26. Forces due to magnetic fields and magnetic boundary conditions<br>27. Inductance, inductor, magnetic energy and magnetic circuits<br>28. Introduction to time varying fields and Maxwell equations</td></tr>
<tr><td>Teaching and Learning Methods<br><br>(These are examples. Please fill which activities you use in the course)</td><td>Weekly theoretical course hours<br>Internet browsing, library work<br>Preparation of Midterm and Midterm Exam<br>Preparation for Quizzes<br>Final Exam and Preparation for Final Exam</td></tr>
<tr><td>Assessment Criteria</td><td>
<table>
<tr><th></th><th>Numbers</th><th>Total Weighting (%)</th></tr>
<tr><td>Midterm Exams</td><td>2</td><td>67</td></tr>
<tr><td>Assignment</td><td></td><td></td></tr>
<tr><td>Application</td><td></td><td></td></tr>
<tr><td>Term Project</td><td></td><td></td></tr>
<tr><td>Practice</td><td></td><td></td></tr>
<tr><td>Quiz</td><td>3-5</td><td>33</td></tr>
<tr><td>Percent of In-term Studies (%)</td><td></td><td>60</td></tr>
<tr><td>Percentage of Final Exam to Total Score (%)</td><td></td><td>40</td></tr>
<tr><td>Attendance</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Workload</td><td>
<table>
<tr><th>Activity</th><th>Total Number of Weeks</th><th>Duration (weekly hour)</th><th>Total Period Work Load</th></tr>
<tr><td>Weekly Theoretical Course Hours</td><td>14</td><td>4</td><td>56</td></tr>
<tr><td>Weekly Tutorial Hours</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Reading Tasks</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Internet and library search</td><td>7</td><td>2</td><td>14</td></tr>
<tr><td>Material Design and Implementation</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Term Project Preparation</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Preparing a Presentation</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Presentations</td><td>-</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
</table>

| | | | | |
|---|---|---|---|---|
| Midterm Exam and Preperation for Midterm Exam | 2 | 15 | 30 |
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |
| Other (Quizzez and preparation for quizzes) | 5 | 1 | 5 |
| Total Workload | | | 125 |
| Total Workload / 25 | | | 5 |
| Course Credit (ECTS) | | | 5 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | | | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | X | | | | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | X | | | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | X | | | | |
| CO8 | 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 | | | | |
| CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | X | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | X | | | | |
| **The Course's Lecturer(s) and Contact Information** | 32. Doç. Dr. Ertuğrul AKSOY (ertugrulaksoy@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE101 INTRODUCTION TO ELECTRICAL-ELECTRONICS ENGINEERING |
| **Course Semester** | 1 |
| **Catalog Content** | Seminars presented by experts in the fields on popular topics of Electrical and Electronic Engineering as well as project planning, management, risk management, change management, and work safety. |
| **Textbook** | - |
| **Supplementary Textbooks** | - |
| **Credit** | 2 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | - |
| **Type of the Course** | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | Introducing the Electrical and Electronics Engineering to new students. |
| **Course Learning Outcomes** | Students who succeed this course:<br>3. know basic principles and various areas of EEE<br>4. know engineering ethic concept |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 29. About the Department of EEE<br>30. About the Laboratories<br>31. What is an Engineer, and EEE?<br>32. What is electric energy?<br>33. Department course packages: Microvawe and Antennas option course package<br>34. Department course packages: Electronics option course package<br>35. Department course packages: Control option course package<br>36. Department course packages: Computer option course package<br>37. Department course packages: Telecommunications option course package<br>38. Department course packages: Power Electronics option course package<br>39. Department course packages: High Voltage option course package<br>40. Department course packages: Biomedical option course package<br>41. Engineering and Ethics<br>42. Components used in EEE |

**Teaching and Learning Methods**

*(These are examples. Please fill which activities you use in the course)*

Weekly theoretical course hours
Internet browsing, library work
Preparation of Midterm and Midterm Exam
Final Exam and Preparation for Final Exam

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 2 | 100 |
| Assignment | | |
| Application | | |
| Term Project | | |
| Practice | | |
| Quiz | | |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 1 | 14 |
| Weekly Tutorial Hours | - | - | - |
| Reading Tasks | | | |
| Internet and library search | 4 | 2 | 8 |
| Material Design and Implementation | | | |
| Term Project Preparation | | | |
| Preparing a Presentation | | | |
| Presentations | | | |
| Midterm Exam and Preperation for Midterm Exam | 3 | 4 | 12 |
| Final Exam and Preperation for Final Exam | 4 | 4 | 16 |

| | | | | |
|---|---|---|---|---|
| Other (Quizzez and preparation for quizzes) | | | | |
| Total Workload | | | | 50 |
| Total Workload / 25 | | | | 2 |
| Course Credit (ECTS) | | | | 2 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | X | | | | |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | X | | | | |
| CO3 | 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 | | | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | X | | | | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | X | | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | X | | | |
| CO8 | 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 | | | |
| CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | | | X | | |
| CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century | | | X | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | | | | |
| **The Course's Lecturer(s) and Contact Information** | 33. Doç. Dr. Ertuğrul AKSOY (ertugrulaksoy@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE304 MICROPROCESSORS |
| **Course Semester** | 6 |
| **Catalog Content** | Microprocessor based systems. An introduction to the ARM microprocessor family. Software Architecture: addressing modes. Data transfer instructions. Arithmetic, logical, bit manipulation, program transfer, and processor control instructions. Software and hardware interrupts. An introduction to the programming. Programming applications. Hardware architecture: hardware details of the ARM. Memory system design. I/O system design. |
| **Textbook** | 1- ARM System-on-Chip Architecture, Steve Furber, 2nd Edition<br>2- Embedded Systems: Introduction To ARM Cortex-M Microcontrollers, Jonathan W. Valvano |
| **Supplementary Textbooks** | 1- Embedded Systems: Real-Time Interfacing to ARM Cortex M Microcontrollers, Jonathan W. Valvano<br>2- Embedded Systems: Real-Time Operating Systems for ARM Cortex M Microcontrollers, Jonathan W. Valvano |
| **Credit** | 5 |
| **Prerequisites of the Course**<br>**(Attendance Requirements)** | EEE104 Logic Circuit Design is prerequisite. Attendance is compulsory. |
| **Type of the Course** | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | The aim of this course is to explain the instruction set architectures of microprocessors (assembly commands, addressing modes, command formats, run times etc.), internal structure of microprocessor, memory hierarchy and programming input/output ports. |
| **Course Learning Outcomes** | Students who succeed this course:<br>1. Know the instruction set architecture.<br>2. Can use assembly commands and write assembly programs.<br>3. Understand the internal structure and memory hierarchy of the microprocessor.<br>4. Can program input / output ports.<br>5. Can make a project using microprocessor / microcontroller. |
| **Instruction Methods** | Face to face |
| **Weekly Schedule** | 1- General information about microprocessors and architectures |

| | |
|---|---|
| | 2- Concept of instruction set architecture and general structure of microprocessor<br>3- Assembly instructions - I<br>4- Assembly instructions - II<br>5-Addressing modes<br>6- Binary encoding of instructions and instruction formats<br>7- Performance calculation and run times of instructions<br>8- Midterm<br>9- Internal structure of microprocessor - I<br>10- Internal structure of microprocessor - II<br>11- Memory hierarchy<br>12- Programming of input / output ports - I<br>13- Programming of input / output ports - II<br>14- Sample projects |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours<br>Reading Activities<br>Internet browsing, library work<br>Project<br>Report preparing<br>Preparing a Presentation<br>Preparation of Midterm and Midterm Exam<br>Final Exam and Preparation for Final Exam |
| **Assessment Criteria** | |

| | **Numbers** | **Total Weighting (%)** |
|---|---|---|
| Midterm Exams | 1 | 40 |
| Assignment | 5 | 40 |
| Application | - | - |
| Projects | 1 | 20 |
| Practice | - | - |
| Quiz | - | - |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | - | - | 0 |
| Reading Tasks | 14 | 1 | 14 |
| Studies | 14 | 1 | 14 |
| Material Design and Implementation | - | - | 0 |
| Report Preparing | 5 | 3 | 15 |
| Preparing a Presentation | 1 | 10 | 10 |
| Presentations | - | - | 0 |
| Midterm Exam and Preperation for Midterm Exam | 1 | 10 | 10 |
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |
| Other ( should be emphasized) | - | - | 0 |
| Total Workload | | | 125 |
| Total Workload / 25 | | | 5 |
| Course Credit (ECTS) | | | 5 |

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

| No | Program Outcomes | 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 knowledgein these areas in complex 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 analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | | X |
| 5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | | | | | X |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | | | X |
| | 7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | | 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 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | | | X | | |
| | 10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | 11 | xi) Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | X | | | | |
| **The Course's Lecturer(s) and Contact Informations** | 34. Assoc.Prof.Dr. Hasan Şakir BİLGE (bilge@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE306 MICROPROCESSORS LAB |
| **Course Semester** | 6 |
| **Catalog Content** | Microprocessor based systems. An introduction to the ARM microprocessor family. Software Architecture: addressing modes. Data transfer instructions. Arithmetic, logical, bit manipulation, program transfer, and processor control instructions. Software and hardware interrupts. An introduction to the programming. Programming applications. Hardware architecture: hardware details of the ARM. Memory system design. I/O system design. |
| **Textbook** | 3- ARM System-on-Chip Architecture, Steve Furber<br>4- Embedded Systems: Introduction To ARM Cortex-M Microcontrollers, Jonathan W. Valvano |
| **Supplementary Textbooks** | 3- Embedded Systems: Real-Time Interfacing to ARM Cortex M Microcontrollers, Jonathan W. Valvano<br>4- Embedded Systems: Real-Time Operating Systems for ARM Cortex M Microcontrollers, Jonathan W. Valvano |
| **Credit** | 2 |
| **Prerequisites of the Course**<br>**(Attendance Requirements)** | EEE104 Logic Circuit Design is prerequisite. Attendance is compulsory. |
| **Type of the Course** | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | The aim of this course is to explain the instruction set architectures of microprocessors (assembly commands, addressing modes, command formats, run times etc.), internal structure of microprocessor, memory hierarchy and programming input/output ports. |
| **Course Learning Outcomes** | Students who succeed this course:<br>1. Know the instruction set architecture.<br>2. Can use assembly commands and write assembly programs.<br>3. Understand the internal structure and memory hierarchy of the microprocessor.<br>4. Can program input / output ports.<br>5. Can make a project using microprocessor / microcontroller. |
| **Instruction Methods** | Face to face |
| **Weekly Schedule** | 1- General information about microprocessors and architectures<br>2- Concept of instruction set architecture and general structure of microprocessor |

| | |
|---|---|
| | 3- Assembly instructions - I<br>4- Assembly instructions - II<br>5-Addressing modes<br>6- Binary encoding of instructions and instruction formats<br>7- Performance calculation and run times of instructions<br>8- Midterm<br>9- Internal structure of microprocessor - I<br>10- Internal structure of microprocessor - II<br>11- Memory hierarchy<br>12- Programming of input / output ports - I<br>13- Programming of input / output ports - II<br>14- Sample projects |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly applied course hours<br>Reading Activities<br>Internet browsing<br>Project<br>Report preparing<br>Preparing a Presentation<br>Presentations |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | - | - |
| Assignment | - | - |
| Application | 7 | 100 |
| Projects | - | - |
| Practice | - | - |
| Quiz | - | - |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Weekly Theoretical Course Hours | - | - | 0 |
| Weekly Tutorial Hours | 7 | 2 | 14 |
| Reading Tasks | 7 | 1 | 7 |
| Studies | 7 | 1 | 7 |
| Material Design and Implementation | - | - | 0 |
| Report Preparing | 8 | 1 | 8 |
| Preparing a Presentation | 1 | 2 | 2 |
| Presentations | 1 | 2 | 2 |
| Midterm Exam and Preperation for Midterm Exam | - | - | 0 |
| Final Exam and Preperation for Final Exam | 1 | 10 | 10 |
| Other ( should be emphasized) | - | - | - |
| Total Workload | | | 50 |
| Total Workload / 25 | | | 2 |
| Course Credit (ECTS) | | | 2 |

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

| No | Program Outcomes | 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 knowledgein these areas in complex 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 analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | | X |
| 5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | | | | | X |
| 6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | | | X |
| 7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare | | | | X | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | | | |
| | 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 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | | | X | | |
| | 10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | 11 | xi) Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | X | | | | |
| **The Course's Lecturer(s) and Contact Informations** | 35. Assoc.Prof.Dr. Hasan Şakir BİLGE (bilge@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE308 Numerical Analysıs |
| **Course Semester** | 6 |
| **Catalog Content** | Introduction to MATLAB for numerical solutions, Error Analysis, Root approximations, Matrices and Determinants, Differential Equations, Linear and Parabolic Regressions, Numerical Integration. |
| **Textbook** | 1. "Numerical Methods for Engineers" Chapra S. C. New York London : McGraw-Hill, 2006. |
| **Supplementary Textbooks** | - |
| **Credit** | 4 |
| **Prerequisites of the Course**<br><br>**( Attendance Requirements)** | - |
| **Type of the Course** | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | To learn the necessary concepts and techniques required for the analysis of numerical solutions and to apply these techniques using MATLAB. |
| **Course Learning Outcomes** | Students who succeed this course:<br><br>1. Know error analysis, Taylor series and difference equations<br><br>2. Have knowledge about Matrix and Determinant and Numerical solutions for electrical applications<br><br>3. Can make software applications |
| **Instruction Methods** | Face to face expression, Applied expression, Question-Answer |
| **Weekly Schedule** | 29. Introduction to MATLAB<br>30. Error Analysis<br>31. Taylor Series & Difference Equations<br>32. Bisection root approximation, Newton-Raphson root approximation, Secant Method<br>33. Software Applications of root approximations<br>34. Matrices & Determinants<br>35. Numerical solutions for Matrices & Determinants and Electrical applications<br>36. Numerical Differantial Equations<br>37. Electrical applications of Differantial Equations<br>38. Regressions<br>39. Numerical Integral Methods<br>40. Software Applications of Numerical Integral Methods<br>41. Software Applications<br>42. General review |

**Teaching and Learning Methods**

*(These are examples. Please fill which activities you use in the course)*

Weekly theoretical course hours
Weekly applied course hours
Reading Activities
Internet browsing, library work
Report preparing
Preparation of Midterm and Midterm Exam
Final Exam and Preparation for Final Exam

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 1 | 50 |
| Assignment | 1 | 50 |
| Application | - | - |
| Projects | - | - |
| Practice | - | - |
| Quiz | - | - |
| Percent of In-term Studies (%) | - | 60 |
| Percentage of Final Exam to Total Score (%) | - | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | 2 | 3 | 6 |
| Reading Tasks | 14 | 1 | 14 |
| Studies | 14 | 1 | 14 |
| Material Design and Implementation | | | |
| Report Preparing | - | - | - |
| Preparing a Presentation | - | - | - |
| Presentations | - | - | - |
| Midterm Exam and Preperation for Midterm Exam | 1 | 14 | 14 |
| Final Exam and Preperation for Final Exam | 1 | 10 | 10 |

| | | | | |
|---|---|---|---|---|
| Other ( should be emphasized) | - | - | - |
| Total Workload | | | 100 |
| Total Workload / 25 | | | 4 |
| Course Credit (ECTS) | | | 4 |

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

| No | Program Outcomes | 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 knowledgein these areas in complex 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 analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | X | |
| 5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| 6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | X | | | | |
| 7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | 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 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | | X | | | |
| 10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| 11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | X | | | |

**The Course's Lecturer(s) and Contact Informations**

36. Assoc. Prof. Dr. Fırat HARDALAÇ (firat@gazi.edu.tr)

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE311 Analog Electronics II |
| **Course Semester** | 5 |
| **Catalog Content** | Multistage amplifiers. Bode plots. DC, RC and transformer coupled amplifiers. Differential pair stages. Current sources. Operational amplifier applications. Power amplifiers. Positive and negative feedback in amplifiers. Integrated circuit power supply regulators. Noise in amplifiers |
| **Textbook** | A. S. Sedra & A. Grabel, Microelectronic Circuits & Devices, Oxford University Press, 7th edition, 2014 |
| **Supplementary Textbooks** | B. G. Streetman and S. Banerjee, Solid State Electronic Devices, Prentice Hall Series |
| **Credit** | 6 |
| **Prerequisites of the Course**<br><br>**( Attendance Requirements)** | EEE212<br><br>70% attendance is required |
| **Type of the Course** | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | To introduce students to design analog electronic circuits |
| **Course Learning Outcomes** | Students who succeed this course:<br><br>1. Know four types of main amplifier circuits (Current, Voltage, Transresistance, Transconductance).<br>2. Can make low and high frequency analysis of BJT and FET amplifiers and can apply Miller theorems<br>3. Can make DC and AC analysis of multistage BJT and FET amplifiers<br>4. Know compound transistor pairs (CE-CE, CC-CC, CB-CB)<br>5. Learn differential amplifier structure, can make coomon and difference mode analysis and can find important parameters of differential amplifier<br>6. Know constant current source circuits and their importance in ICs<br>7. Know the structure and packaging types operational amplifiers (OPs). They can measure and calculate important OP parameters<br>8. Know linear and nonlinear applications of OPAMPs and can analyze these these applications<br>9. Know about class A, B and AB power amplifiers and can compare their gain and efficiency values<br>10. Learn the concepts of negative and positive feedback amplifier circuits and their applications |
| **Instruction Methods** | Face to face |
| **Weekly Schedule** | Week Topics<br><br>1. Small signal analysis of BJT and FET amplifiers<br>2. Frequency response of BJT and FET amlifiers<br>3. DC and AC analysis of multistage amplifiers<br>4. Frequency anaysis of multistage amplifiers. |

<table>
<tr><td></td><td>5. Analysis of CE-CE, CC-CC, CB-CB and darlington pairs<br>6. Constant current sources .<br>7. Differential amplifiers: Operation at difference and common mode<br>8. Operational amplifier (OP) parameters<br>9. Linear applications of Ops<br>10. Nonlinear applicaitons of OPs<br>11. Power amplifiers (Class A, B and AB), transformer coupled amplifiers<br>12. Designing DC power supply using OP and circuit elements<br>13. Negative feedback in amplifiers<br>14. Positive feedback in amplifiers and noise</td></tr>
<tr><td>Teaching and Learning Methods<br><br>(These are examples. Please fill which activities you use in the course)</td><td>Weekly theoretical course hours<br>Reading Activities<br>Internet browsing, library work<br>Preparation of quizzes, Midterm and Midterm Exam, quizzes<br>Final Exam and Preparation for Final Exam</td></tr>
<tr><td>Assessment Criteria</td><td>
<table>
<tr><th></th><th>Numbers</th><th>Total Weighting (%)</th></tr>
<tr><td>Midterm Exams</td><td>2</td><td>80</td></tr>
<tr><td>Assignment</td><td></td><td></td></tr>
<tr><td>Application</td><td></td><td></td></tr>
<tr><td>Projects</td><td></td><td></td></tr>
<tr><td>Practice</td><td></td><td></td></tr>
<tr><td>Quiz</td><td>6</td><td>20</td></tr>
<tr><td>Percent of In-term Studies (%)</td><td></td><td>60</td></tr>
<tr><td>Percentage of Final Exam to Total Score (%)</td><td>1</td><td>40</td></tr>
<tr><td>Attendance</td><td></td><td></td></tr>
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</td></tr>
<tr><td>Workload</td><td>
<table>
<tr><th>Activity</th><th>Total Number of Weeks</th><th>Duration (weekly hour)</th><th>Total Period Work Load</th></tr>
<tr><td>Weekly Theoretical Course Hours</td><td>14</td><td>4</td><td>56</td></tr>
<tr><td>Weekly Tutorial Hours</td><td></td><td></td><td></td></tr>
<tr><td>Reading Tasks</td><td>10</td><td>2</td><td>20</td></tr>
<tr><td>Studies</td><td>10</td><td>3</td><td>30</td></tr>
<tr><td>Material Design and Implementation</td><td></td><td></td><td></td></tr>
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| | | | | |
|---|---|---|---|---|
| Report Preparing | | | | |
| Preparing a Presentation | | | | |
| Presentations | | | | |
| Midterm Exam and Preperation for Midterm Exam | 2 | 10 | 20 | |
| Final Exam and Preperation for Final Exam | 1 | 10 | 10 | |
| Other ( should be emphasized) | 6 | 2 | 12 | |
| Total Workload | | | 148 | |
| Total Workload / 25 | | | 5.92 | |
| Course Credit (ECTS) | | | 6 | |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledgein these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | X | | | | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | X | | | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | X | | | | |
| CO8 | 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 | | | | |
| CO9 | Consciousness to behave according to ethical principles and professional and | | X | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | ethical responsibility; knowledge on standards used in engineering practice . | | | | | |
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | X | | | | |
| **The Course's Lecturer(s) and Contact Informations** | 37. Assoc.Prof.Dr. Tuğba Selcen NAVRUZ selcen@gazi.edu.tr<br>38. Dr. Mehmet KARAKAYA mehmetkarakaya@gazi.edu.tr | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE313 Analog Electronics Laboratory II |
| **Course Semester** | 5 |
| **Catalog Content** | Voltage/Current gain, input/output resistances and cur-off frequency measurements for multi-stage amplifiers, differential amplifiers, constant current sources, parameter measurements of operational amplifiers, positive and negative feedback amplifiers. |
| **Textbook** | A. S. Sedra & A. Grabel, Microelectronic Circuits & Devices, Oxford University Press, 7th edition, 2014<br><br>Laboratory manual |
| **Supplementary Textbooks** | B. G. Streetman and S. Banerjee, Solid State Electronic Devices, Prentice Hall Series |
| **Credit** | 2 |
| **Prerequisites of the Course**<br><br>**( Attendance Requirements)** | EEE212<br><br>80% attendance is required |
| **Type of the Course** | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | To be able to set up a given circuit correctly, to make the measurements and to analyze the data obtained from the experiment. To be able to simulate the analyzed circuits |
| **Course Learning Outcomes** | Students who succeed this course:<br><br>1. Can set up multi-stage amplifiers. Can measure voltage/current gain, input/output resistances and cut-off frequencies of the circuit.<br>2. Can set up capacitive and direct coupled circuits and obtain their amplifier parameters.<br>3. Can measure gain, resistance and frequency measurements of Darlington compound amplifier circuits.<br>4. Measure gain of differenatial amplifier for common and differential mode operations.<br>5. Measure operational amplifier parameters.<br>6. Obtain input-output characteristics of negative feedback Opamp circuits.<br>7. Make gain and resistance measurements of feedback amplifier with BJT and FET.<br>8. Obtain output signal of positive feedback Opamp circuits. Observe the variation of output with the variation of circuit elements. |
| **Instruction Methods** | Face to face |
| **Weekly Schedule** | Week Topic<br><br>1 Reminding the laboratory equipments.<br>2 The voltage gain, current gain, input/output resistances and cut-off frequencies of capatively coupled two stage BJT amplifier. |

| | |
|---|---|
| | 3 The voltage gain, current gain, input/output resistances and cut-off frequencies of capatively coupled two stage BJT/FET amplifier.<br>4 The voltage gain, current gain, input/output resistances and cut-off frequencies of direct coupled two stage amplifier.<br>5 The voltage gain, current gain, input/output resistances and cut-off frequencies of darlington compound amplifier.<br>6 Common mode operation of differential amplifier<br>7 Midterm<br>8 Differential mode operation of differential amplifier<br>9 Constant current sources<br>10 Opamp parameters<br>11 Negative and positive feedback Opamp circuits<br>12 Measurements of BJT feedback amplifier<br>13 Practical Exam<br>14 Practical Exam |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly applied course hours<br>Internet browsing, library work<br>Designing and implementing materials<br>Report preparing<br>Preparation of quizzes, Midterm and Midterm Exam, quizzes<br>Final Exam and Preparation for Final Exam |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 1 | 17 |
| Assignment | | |
| Application | | |
| Projects | | |
| Practice | 10 | 58 |
| Quiz | 8 | 25 |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | 1 | 40 |
| Attendance | | |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Weekly Theoretical Course Hours | | | | |
| Weekly Tutorial Hours | 2 | 11 | 22 | |
| Reading Tasks | | | | |
| Studies | 1 | 2 | 2 | |
| Material Design and Implementation | 1 | 3 | 3 | |
| Report Preparing | 10 | 1 | 10 | |
| Preparing a Presentation | | | | |
| Presentations | | | | |
| Midterm Exam and Preperation for Midterm Exam | 1 | 2 | 2 | |
| Final Exam and Preperation for Final Exam | 1 | 10 | 10 | |
| Other ( should be emphasized) | 8 | 0.25 | 2 | |
| Total Workload | | | 51 | |
| Total Workload / 25 | | | 2.04 | |
| Course Credit (ECTS) | | | 2 | |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledgein these areas in complex engineering problems. | X | | | | |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | X | | | | |
| CO3 | 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 | | | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | X | | | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | | | | X | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | X | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; | | | X | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | | | |
| | CO8 | 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 | | |
| | CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | | X | | | |
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | X | | | | |
| **The Course's Lecturer(s) and Contact Informations** | 39. Assoc.Prof.Dr. Tuğba Selcen NAVRUZ selcen@gazi.edu.tr<br>40. Dr. Mehmet KARAKAYA mehmetkarakaya@gazi.edu.tr | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE321 SIGNALS AND SYSTEMS |
| **Course Semester** | 5 |
| **Catalog Content** | Continuous and discrete time signal and systems. Feedback, memory, stability, linearity, time-invariance. LTI systems defined by differential / difference equations. Convolution. Fourier series and transform. Modulation. Sampling. Laplace transform. Z-transform. Transfer function representation. |
| **Textbook** | 3. Signals and Systems: Anaylsis Using Transform Methods and MATLAB, 3rd ed., M. J. Roberts, Mc Graw Hill, 2018. |
| **Supplementary Textbooks** | 1. Signal and Systems : A. V. Oppenheim, A.S. Willsky, Prentice Hall, 1997<br>2. Signal and Systems : D. K. Lindner, Mc Graw Hill, 1999 |
| **Credit** | 6 |
| **Prerequisites of the Course**<br>**(Attendance Requirements)** | EM222 (Attendance is compulsory) |
| **Type of the Course** | Compulsory (third year course) |
| **Instruction Language** | English |
| **Course Objectives** | To learn basic properties and importance of signals and systems in engineering applications, and to understand the methods used in the system analysis and synthesis |
| **Course Learning Outcomes** | Students who succeed this course:<br>9. Understand the concept of signals and systems.<br>10. Know the basic system properties and meaning of linear time-invariant systems.<br>11. Can use the Fourier Series representations for periodic signals.<br>12. Understand and can use the Fourier transform methods for the analysis of continuous-time and discrete-time signals and systems.<br>13. Understand and can use the z-transform methods for the analysis discrete-time signals and systems.<br>14. Understand the differences and uses of different transform methods and know when to apply which. |
| **Instruction Methods** | 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 their properties |

<table>
<tr><td></td><td>4. LTI SYSTEMS: Modeling, impulse response and concepts of convolution.<br><br>5. CONVOLUTION: Determination of systems responses by convolution summation or integral.<br><br>6. DIFFERENTIAL EQUATIONS: Classical or transform techniques for the analysis of continuous time LTI systems defined by differential equations.<br><br>7. MIDTERM EXAM I<br><br>8. DIFFERENCE EQUATIONS: Modeling of discrete-time LTI systems by difference equations and analysis techniques<br><br>9. FOURIER SERIES: Importance of Fourier series expansions and its use in system analysis.<br><br>10. FOURIER TRANSFORM: Application of Fourier transform technique in system analysis.<br><br>11. FREQUENCY DOMAIN: Analysis of LTI systems in the frequency domain, modulation, sampling.<br><br>12. Z TRANSFORM: Introduction to the method of Z transform in the analysis and synthesis of discrete-time systems<br><br>13. MIDTERM EXAM II<br><br>14. TRANSFER FUNCTION: Representation of systems by transfer functions and their properties.</td></tr>
<tr><td>Teaching and Learning Methods<br><br>(These are examples. Please fill which activities you use in the course)</td><td>Weekly theoretical course hours<br>Weekly recitation hours<br>Internet browsing, library work<br>Midterm Exams and Preparation for Midterm Exams<br>Introduction seminar for MATLAB<br>Work for Term Project using MATLAB<br>Final Exam and Preparation for Final Exam<br>Presentation of the MATLAB Project</td></tr>
<tr><td>Assessment Criteria</td><td>
<table>
<tr><th></th><th>Numbers</th><th>Total Weighting (%)</th></tr>
<tr><td>Midterm Exams</td><td>2</td><td>67</td></tr>
<tr><td>Assignment</td><td>-</td><td>-</td></tr>
<tr><td>Application</td><td>-</td><td>-</td></tr>
<tr><td>Term Project</td><td>1</td><td>33</td></tr>
<tr><td>Practice</td><td>-</td><td>-</td></tr>
<tr><td>Quiz</td><td>-</td><td>-</td></tr>
<tr><td>Percent of In-term Studies (%)</td><td></td><td>60</td></tr>
</table>
</td></tr>
</table>

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|---|---|---|---|---|
| | Percentage of Final Exam to Total Score (%) | 1 | 40 | |
| | Attendance | - | - | |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | 10 | 1 | 10 |
| Reading Tasks | 14 | 1 | 14 |
| Internet and library search | 14 | 1 | 14 |
| Material Design and Implementation | - | - | 0 |
| Term Project Preparation | 6 | 5 | 30 |
| Preparing a Presentation | - | - | 0 |
| Presentations | - | - | 0 |
| Midterm Exam and Preperation for Midterm Exam | 2 | 10 | 20 |
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |
| Other (Quizzez and preparation for quizzes) | - | - | 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 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing | | | | X | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | | |
| | CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| | CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | | X | |
| | CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | X | | |
| | CO8 | 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 | | |
| | CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | X | | | | |
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | X | | | | |
| **The Course's Lecturer(s) and Contact Information** | 41. Prof. Dr. Özgül SALOR-DURNA (salordurna@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE326 CONTROL SYSTEMS I |
| **Course Semester** | 6 |
| **Catalog Content** | Basic Concepts: what is a control system? Mathematic models of physical systems: transfer functions, block diagram analysis, state equations,. Transient and steady-state analysis of systems, details on second order systems. Definition of state-space representations; controllability and observability. Stability analysis: Routh-Hurwitz method, root-locus method, Bode plots and Nyquist analysis. Relative stability and design in frequency domain. Compensator design in frequency domain. |
| **Textbook** | Modern Control Engineering : K. Ogata, Prentice Hall. 5th Edition 2010 |
| **Supplementary Textbooks** | Automatic Control Systems : B. C. Kuo, Prentice Hall. 1995 |
| **Credit** | 6 |
| **Prerequisites of the Course**<br>**(Attendance Requirements)** | EM321 (Attendance is compulsory) |
| **Type of the Course** | Compulsory (third year course) |
| **Instruction Language** | English |
| **Course Objectives** | To familiarize students with the fundamental properties of classical classic control systems. Experiments are carried out to illustrate the basic methods used. |
| **Course Learning Outcomes** | Students who succeed this course:<br>15. Understand the concept of control systems.<br>16. Know the basic control system properties and representations: transfer functions, block diagrams and state equations.<br>17. Can make transient and steady-state response of second order linear control systems.<br>18. Understand the concept of system stability.<br>19. Can make control system stability analysis using Routh-Hurwitz, root-locus methods and Nyquist stability criterion.<br>20. Understand the consept of relative stability. |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 1. BASIC CONCEPTS: Open and closed loop control systems, advantages of feedback<br>2. SYSTEM MODELING: Mathematical models, transfer functions and block diagrams<br>3. TIME DOMAIN ANALYSIS: Transient and steady-state response analysis, detailed analysis on second order systems |

| | |
|---|---|
| | 4. STATE-SPACE ANALYSIS: Definition and types of state-space representations<br>5. STATE-SPACE ANALYSIS: Controllability and observability<br>6. STABILITY: Basic concepts, Routh-Hurwitz criterion<br>7. MIDTERM EXAM 1<br>8. ROOT-LOCUS METHOD: Definition of the method and obtaining the locus<br>9. ROOT-LOCUS METHOD: Plotting examples of root-locus<br>10. NYQUİST CRITERION: Short revıew of complex analysis for method definition<br>11. MIDTERM 2<br>12. NYQUİST CRITERION: Plotting Nyquist diagram samples for stability analysis<br>13. RELATIVE STABILITY: Definition and its application<br>15. FREQUENCY DOMAIN ANALYSIS: Compensator design |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours<br>Internet browsing, library work<br>Midterm Exams and Preparation for Midterm Exams<br>Work for Term Project using MATLAB<br>Final Exam and Preparation for Final Exam<br>Presentation of the MATLAB Project |
| **Assessment Criteria** | |

| | **Numbers** | **Total Weighting (%)** |
|---|---|---|
| Midterm Exams | 2 | 67 |
| Assignment | - | - |
| Application | - | - |
| Term Project | 1 | 33 |
| Practice | - | - |
| Quiz | - | - |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | 1 | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | - | - | - |
| Reading Tasks | 14 | 1 | 14 |
| Internet and library search | 14 | 1 | 14 |
| Material Design and Implementation | - | - | 0 |
| Term Project Preparation | 5 | 8 | 40 |
| Preparing a Presentation | - | - | 0 |
| Presentations | - | - | 0 |
| Midterm Exam and Preperation for Midterm Exam | 2 | 10 | 20 |
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |
| Other (Quizzez and preparation for quizzes) | - | - | 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 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | X | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results | X | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | for investigating complex engineering problems or discipline specific research questions | | | | | |
| | CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | | X | |
| | CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | X | | |
| | CO8 | 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 | | |
| | CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | X | | | | |
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | X | | | | |
| **The Course's Lecturer(s) and Contact Information** | 42. Prof. Dr. Özgül SALOR-DURNA (salordurna@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE331 FOUNDATIONS OF ENERGY SYSTEMS |
| **Course Semester** | 5 |
| **Catalog Content** | Introduction to energy systems. Power calculation in single-phase AA circuits. Reactive power compensation. Modern high voltage capacitors. Introduction to three-phase systems. Phasor analysis in three phase systems. Connection combinations and power analysis in three-phase systems. Single line displays of three phase power systems and power transformers. Power cabling and practical calculation methods. Short circuit calculations in power systems. Fuses, contactors and cutters. Ground. Introduction to touch and step voltage calculations. Stability and Smart Grids in energy systems. |
| **Textbook** | 'Elements of Power Systems Analysis', W.D.Stevenson, Jr, Mc Graw Hill, 4th edition 2016. |
| **Supplementary Textbooks** | 4. 'Elctrical Machinary', A.E.Fitzgerald, C. Kingsley, Jr, S.D. Umans, Mc Graw Hill. |
| **Credit** | 5 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | EEE222 |
| **Type of the Course** | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | Introduction to energy system fundamentals, analysis of single and three phase power systems, description of basic characteristics of low voltage power systems with the solved examples. |
| **Course Learning Outcomes** | Students who succeed this course:<br>1- Model low voltage power systems.<br>2- Investigate and solve basic problems of power systems.<br>3- Have general knowledge about the device and apparatus characteristics of the power systems. |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 19. Introduction to energy systems and basic definitions and apparatus.<br>20. Power calculation for single phase a.c. systems (power computation R, L, C, R-L and RLC circuits).<br>21. Reactive power compensation for single phase systems and solution of examples.<br>22. Fundamental design, construction and usage properties of modern high voltage capacitors.<br>23. Introduction to three phase systems and analysis of current and voltage phasors.<br>24. Three phase generator and transformer phasor analysis in terms of connection types (Delta or Star).<br>25. Combination of generator and load connections for three phase systems and power analysis |

| | |
|---|---|
| | 26. Single line diagrams of three phase systems and power transformers.<br>27. Power cables and practical computation methods.<br>28. Introduction to short circuit computations for low voltage systems and examples.<br>29. Fuses, contactors, circuit breakers for power systems. Measurement methods for low voltage systems.<br>30. Grounding (earthing) concept and methods. Introduction to touch and step voltages.<br>31. Stability and Smart Grids in energy systems.<br>32. General review |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours<br>Internet browsing, library work<br>Preparation of Midterm and Midterm Exam<br>Term Project<br>Final Exam and Preparation for Final Exam |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 1 | 67 |
| Assignment | - | - |
| Application | - | - |
| Term Project | 2 | 33 |
| Practice | - | - |
| Quiz | - | - |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | - | - | 0 |
| Reading Tasks | 14 | 1 | 14 |
| Internet and library search | 14 | 1 | 14 |
| Material Design and Implementation | - | - | 0 |

| | | | | |
|---|---|---|---|---|
| Term Project Preparation | 2 | 5 | 10 |
| Preparing a Presentation | - | - | 0 |
| Presentations | - | - | 0 |
| Midterm Exam and Preperation for Midterm Exam | 1 | 15 | 15 |
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |
| Other (Quizzez and preparation for quizzes) | - | - | - |
| Total Workload | | | 115 |
| Total Workload / 25 | | | 4,7 |
| Course Credit (ECTS) | | | 5 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | X | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | X | | | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | X | | | | |
| CO8 | Recognition of the need for lifelong learning; ability to access information, to follow developments in science and | X | | | | |

| | | | | | | | |
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| | | technology, and to continue to educate him/herself | | | | | |
| | CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | X | | | | |
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | X | | | | |
| **The Course's Lecturer(s) and Contact Information** | 43. Prof. Dr. M. Cengiz TAPLAMACIOĞLU (taplam@gazi.edu.tr)<br>44. Öğr. Gör. Dr. Süleyman Sungur TEZCAN | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE336 ELECTROMECHANICAL ENERGY CONVERSION |
| **Course Semester** | 6 |
| **Catalog Content** | Electromagnetic circuits. Electromechanical energy conversion. Single-phase and three-phase transformers. DC motors and generators: principles of operation, speed control. Rotating magnetic fields and three-phase windings. Induction machines: principles of operation, equivalent circuit, speed control. Synchronous machines: equivalent circuit, state characteristics, synchronization. Special electrical machines. |
| **Textbook** | 5. S.J. Chapman, Electric Machinery Fundamentals, 5th ed., 2011, McGraw Hill |
| **Supplementary Textbooks** | 1. A.E. Fitzgerald, et.al.,6th ed., 2013, Electric Machinery, McGraw Hill |
| **Credit** | 6 |
| **Prerequisites of the Course**<br><br>**( Attendance Requirements)** | EEE331 Foundations of Energy Systems<br><br>(Attendance is required) |
| **Type of the Course** | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | To learn the principles of electromechanical energy conversion and to use these principles to teach how electrical machines work; operation principles, applications and control methods of transformers, dc and ac machines; special electrical machines. |
| **Course Learning Outcomes** | Students who succeed this course:<br><br>21. Understand the basic concepts of electromechanical energy conversion and use these concepts in solving problems<br>22. Understand the operation principles of single and three phase transformers and analyze their performance<br>23. Understand the rotating field concept<br>24. Understand the operation principles of alternating current and direct current machines, and are be able to conduct performance analysis of these machines by using these principles with the use of equivalent circuits.<br>25. Carry out simple electromechanical system designs |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 33. INTRODUCTION: Definition of electromechanical energy conversion. Review of basic laws. Basic methods and concepts that are necessary in the analysis of magnetic circuits.<br>34. ELECTROMAGNETIC CIRCUITS: Calculation of self and mutual inductance. Hysteresis phenomenon. Losses in electromagnetic circuits. Permanent magnets. Analysis of systems containing permanent magnets.<br>35. TRANSFORMERS: Operation principles and applications of single phase transformers. Ideal and non-ideal |

transformers. Calculation of equivalent circuit parameters. Efficiency and regulation. Three phase transformers.
36. ELECTROMAGNETIC ENERGY CONVERSION: Definition and calculation of stored energy. Energy balance for motor and generator operations. Co-energy. Force and torque calculation.
37. ELECTROMAGNETIC ENERGY CONVERSION: Singly and multiply excited systems. Force and torque in permanent magnet systems.
38. Midterm I
39. DC MACHINES: DC machine fundamentals. Induced voltage and torque equations. Equivalent circuit.
40. DC MACHINES: Separately excited, shunt, series and compound dc machines. Speed and voltage regulation and efficiency. Permanent magnet dc machines.
41. AC MACHINES: AC machine fundamentals. Rotating fields and pole concept. MMK and flux distributions. Voltage and torque generation.
42. SYNCHRONOUS MACHINES: Principles and construction. Equivalent circuit and analysis. Phasor analysis. Power and torque relationship. Operation under load.
43. Midterm II
44. THREE PHASE INDUCTION MOTORS: Operation principles and structure. Types of IMs. Analysis through equivalent circuit. Calculation of equivalent circuit parameters. Speed control.
45. SINGLE PHASE INDUCTION MOTORS: Operation principles and types. Calculation of equivalent circuit parameters and analysis. Application areas.
46. OTHER SPECIAL MOTORS: Operation principles of reluctance motors, universal motor, step motor, hysteresis motor and other special purpose motors.

**Teaching and Learning Methods**

*(These are examples. Please fill which activities you use in the course)*

Weekly theoretical course hours
Internet browsing, library work
Preparation of Midterm and Midterm Exam
Preparation for Quizzes
Term Project
Final Exam and Preparation for Final Exam

**Assessment Criteria**

| | **Numbers** | **Total Weighting (%)** |
|---|---|---|
| Midterm Exams | 2 | 45 |
| Assignment | 6 | 10 |
| Application | - | 0 |
| Term Project | 1 | 15 |
| Practice | - | - |
| Quiz | 6 | 30 |
| Percent of In-term Studies (%) | | 60 |

| | | | |
|---|---|---|---|
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 4 | 56 |
| Weekly Tutorial Hours | 3 | 2 | 6 |
| Reading Tasks | 14 | 1 | 14 |
| Internet and library search | 14 | 1 | 14 |
| Material Design and Implementation | - | - | 0 |
| Term Project Preparation | 4 | 2 | 8 |
| Preparing a Presentation | - | - | 0 |
| Presentations | - | - | 0 |
| Midterm Exam and Preperation for Midterm Exam | 2 | 10 | 20 |
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |
| Other (Quizzes and preparation for quizzes) | 6 | 2 | 12 |
| 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 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | X | | |
| | CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| | CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | X | | | | |
| | CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | X | | |
| | CO8 | 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 | | |
| | CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | X | | | | |
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | CO11 | xi) Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | X | | | |
| **The Course's Lecturer(s) and Contact Information** | 45. Prof. Dr. M. Timur AYDEMİR (aydemirmt@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE351 ELECTROMAGNETIC WAVES |
| **Course Semester** | 5 |
| **Catalog Content** | Maxwell's equations in time and frequency domains, Electromagnetic Energy and Power, Wave Equation, Uniform Plane Waves, Reflection Transmission and Refraction. Introduction to Transmission Lines. |
| **Textbook** | D.Cheng, Field and Wave Electromagnetics, Addison-Wesley, 2nd Edition. |
| **Supplementary Textbooks** | 1) Inan, Electromagnetic Waves, Prentice-Hall<br>2) J.A.Edminister, Electromagnetics, Schaum Outline Series |
| **Credit** | 5 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | EEE252 (Attendance is compulsory) |
| **Type of the Course** | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | To get the maximum amount of knowledge about electromagnetics to understand satellite links, wireless and optical communications systems. |
| **Course Learning Outcomes** | Students who succeed this course:<br>1) Understand and can use Maxwell equations in point form and in integral form.<br>2) Understand Faraday's law and can use it in problem solving.<br>3) Can derive wave equation using Maxwell's equations<br>4) Know and use planar wave solutions of wave equation.<br>5) Can analyze the behaviour of planar waves at interfaces. |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 1) Introduction : review of vector analysis, potential functions.<br>2) Maxwell's equations : point form and integral form of maxwell's equations, time-harmonic fields.<br>3) Electromagnetic waves : scalar wave equation, solutions of wave equation, helmholtz equation.<br>4) Plane waves : plane waves in a simple, source-free medium.<br>5) Plane waves in a lossless medium : the propagation of time-harmonic electromagnetic waves in a lossless medium, wave behavior in space and time.<br>6) Midterm exam I.<br>7) Plane waves in lossy media : uniform plane wave propagation in lossy dielectric and in a good conductor.<br>8) Boundary conditions: boundary conditions for electromagnetic fields. |

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| | 9) Plane waves in an arbitrary direction : uniform plane waves in an arbitrary direction, non-uniform plane waves.<br><br>10) Electromagnetic energy flow: poynting' theorem, electromagnetic power carried by a uniform plane wave, instantaneous and time-average power, complex poynting theorem.<br><br>11) Midterm exam II.<br><br>12) Polarization of electromagnetic waves : linear polarization, circular polarization, elliptical polarization.<br><br>13) Reflection, transmission and refraction of waves at planar interfaces: normal incidence , multiple dielectric interfaces, oblique incidence, total internal reflection.<br><br>14) Introduction to transmission lines : transmission line parameters, transmission line equations, voltage and current wave equations. |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours<br>Preparation of Midterm and Midterm Exam<br>Final Exam and Preparation for Final Exam |

**Assessment Criteria**

| | **Numbers** | **Total Weighting (%)** |
|---|---|---|
| Midterm Exams | 2 | 100 |
| Assignment | - | - |
| Application | - | - |
| Projects | - | - |
| Practice | - | - |
| Quiz | - | - |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| **Activity** | **Total Number of Weeks** | **Duration (weekly hour)** | **Total Period Work Load** |
|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | - | - | 0 |
| Reading Tasks | 14 | 2 | 28 |
| Internet and library search | - | - | 0 |
| Material Design and Implementation | - | - | 0 |
| Report Preparing | - | - | 0 |
| Preparing a Presentation | - | - | 0 |
| Presentations | - | - | 0 |
| Midterm Exam and Preperation for Midterm Exam | 2 | 15 | 30 |
| Final Exam and Preperation for Final Exam | 1 | 25 | 25 |
| Other (should be emphasized) | - | - | 0 |
| Total Workload | | | 125 |
| Total Workload / 25 | | | 5 |
| Course Credit (ECTS) | | | 5 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | X | | |
| CO3 | 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 | | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | X | | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | X | | | | |

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|---|---|---|---|---|---|---|---|
| | CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | X | | |
| | CO8 | 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 | | |
| | CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | | X | | | |
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | | X | | |
| **The Course's Lecturer(s) and Contact Information** | Prof.Dr. Erkan AFACAN (e.afacan@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE392 PROJECT MANAGEMENT |
| **Course Semester** | 5 |
| **Catalog Content** | Engineering design process. Project selection and needs analysis. Requirement specification. Concept generation and evaluation. System design: Functional decomposition and behavioral models. Testing. System Reliability. Teams and teamwork. Project Management. Ethical and Legal Issues. Oral presentation techniques. |
| **Textbook** | 6. R.M. Ford, C.S. Coulston, Design for Electrical and Computer Engineers, 2008, McGraw Hill. |
| **Supplementary Textbooks** | 1. P. Kosky, R. Balmer, W. Keat, G. Wise; Exploring Engineering: An Introduction to Engineering and Design; 4th Ed. Elsevier, 2016. |
| **Credit** | 2 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | None (Attendance is required) |
| **Type of the Course** | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | The objective of this course is tolearn the concepts and processes associated with design projects. |
| **Course Learning Outcomes** | Students who succeed this course:<br>26. Can define a design problem based on a need statement; can generate alternative solutions to solve the problem, and can evaluate the options to find the best solution.<br>27. Can perform time, budget and human resources to realize the solution.<br>28. Understand the concepts such as project management, risk management, change management.<br>29. Know how to design experiments to test the proposed solutions.<br>30. Understand the importance of team work and how to share the tasks for an effective teamwork.<br>31. Understand the importance of work ethics and apply the ethical theories in sample cases.<br>32. Understand the legal issues involved with engineering decisions.<br>33. Know about the standards used in engineering practices.<br>34. Know how to write design reports.<br>35. Know how to prepare effective presentations. |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 47. Engineering design process.<br>48. Project selection and needs analysis.<br>49. Requirement specification.<br>50. Concept generation and evaluation.<br>51. System design: Functional decomposition.<br>52. System design: Behavioral models.<br>53. Testing. |

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| | 54. System Reliability.<br>55. Teams and teamwork.<br>56. Project Management.<br>57. Ethical and Legal Issues.<br>58. Case study 1<br>59. Case study 2<br>60. Oral presentation techniques. |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours<br>Internet browsing, library work<br>Preparation of Midterm and Midterm Exam<br>Final Exam and Preparation for Final Exam |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 1 | 100 |
| Assignment | - | - |
| Application | - | - |
| Term Project | - | - |
| Practice | - | - |
| Quiz | - | - |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 1 | 14 |
| Weekly Tutorial Hours | - | - | 0 |
| Reading Tasks | 14 | 1 | 14 |
| Internet and library search | 14 | 1 | 14 |
| Material Design and Implementation | - | - | 0 |
| Term Project Preparation | - | - | 0 |
| Preparing a Presentation | - | - | 0 |

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|---|---|---|---|---|
| Presentations | - | - | 0 |
| Midterm Exam and Preparation for Midterm Exam | 1 | 5 | 5 |
| Final Exam and Preparation for Final Exam | 1 | 5 | 5 |
| Other (Quizzes and preparation for quizzes) | - | - | 0 |
| Total Workload | | | 52 |
| Total Workload / 25 | | | 2 |
| Course Credit (ECTS) | | | 2 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | X | | | | |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | X | | | | |
| CO3 | 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 | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | X | | | | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | | | X | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | X | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | X | | |
| CO8 | 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 | | |
| CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | | | | | X |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | | | | | X |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | | | | X |
| **The Course's Lecturer(s) and Contact Information** | 46. Prof. Dr. M. Timur AYDEMİR (aydemirmt@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE401 Electronic Measuring and Instrumentation |
| **Course Semester** | 7 |
| **Catalog Content** | Basic principles and characteristics of the measurement (sensitivity, accuracy, linearity, effect, response time, etc.) Design and calibration terms, measurement errors and error sources. Measuring and measuring methods of circuit elements, analogue measuring instruments, moving measuring instruments, changing the measuring limits and measuring instrument accuracy. Alternating current bridges; inductance, capacity and loss factor. Q-m. Counters and digital measurement, analog-digital conversion and converters; Flash, single and double slope voltage-frequency converters. Power and energy measurement triggering circuits and measurement. Instrumentation amplifiers and related concepts. |
| **Textbook** | W. Bolton, 'Electrical and Electronic Measurement and Testing', Longman Scientific&Technical, 1993. |
| **Supplementary Textbooks** | F. S: Tse, I.E. Morse, 'Measurement and instrumentation in engineering', University of Cincinnati, Ohio, 1989. |
| **Credit** | 6 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | - |
| **Type of the Course** | Elective |
| **Instruction Language** | English |
| **Course Objectives** | Learning the concept of measurement and instrumentation for electrical-electronics engineers |
| **Course Learning Outcomes** | Students who succeed this course:<br>1. Know the basic principles of measurement<br>2. Know the calibration techniques of measurement devices<br>3. Understand digital measuring<br>4. Know the structure of analog/Digital convertors<br>5. Know the structure of flash concertors<br>6. Know the structure of instrumentation amplifiers. |
| **Instruction Methods** | Face to face expression, Applied expression, Question-Answer |
| **Weekly Schedule** | 1. Basic principles of measurement<br>2. Calibration concepts<br>3. Measuring and measurement methods of circuit elements<br>4. Maxwell-Wien bridge, Wheatstone bridge applications<br>5. Measurement with Hay bridge<br>6. Owen bridge |

| | |
|---|---|
| | 7. Serial and parallel capacity bridges<br>8. Q-meter, Schering bridge<br>9. Analog measurements<br>10 Digital measurements, Analog-digital conversion and converters<br>11.Flash converters<br>12. Power and energy measurement trigger circuits and measurement<br>13. Instrumentation amplifiers<br>14. General review |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours<br>Reading Activities<br>Internet browsing, library work<br>Preparation of Midterm and Midterm Exam<br>Final Exam and Preparation for Final Exam |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 1 | 100 |
| Assignment | - | - |
| Application | - | - |
| Projects | - | - |
| Practice | - | - |
| Quiz | - | - |
| Percent of In-term Studies (%) | - | 60 |
| Percentage of Final Exam to Total Score (%) | - | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | - | - | - |

| | | | | |
|---|---|---|---|---|
| Reading Tasks | 14 | 2 | 28 |
| Studies | 14 | 3 | 42 |
| Material Design and Implementation | - | - | - |
| Report Preparing | - | - | - |
| Preparing a Presentation | - | - | - |
| Presentations | - | - | - |
| Midterm Exam and Preperation for Midterm Exam | 1 | 20 | 20 |
| Final Exam and Preperation for Final Exam | 1 | 25 | 25 |
| Other ( should be emphasized) | - | - | |
| Total Workload | | | 157 |
| Total Workload / 25 | | | 6,28 |
| Course Credit (ECTS) | | | 6 |

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

| No | Program Outcomes | 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 knowledgein these areas in complex 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 analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | X | | |
| 5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | | | | X | |
| 6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | | | |
| 7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | X | | |
| 8 | Recognition of the need for lifelong learning; ability to access information, to | | | | X | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | follow developments in science and technology, and to continue to educate him/herself | | | | | |
| | 9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | | | | X | |
| | 10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | | | | X | |
| | 11 | xi) Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | | X | | |
| **The Course's Lecturer(s) and Contact Informations** | | 47. Assoc. Prof. Dr. Fırat HARDALAÇ (firat@gazi.edu.tr) | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE411 Digital Electronics |
| **Course Semester** | 7 |
| **Catalog Content** | TTL, MOS , CMOS Combinational Logic, NOT, AND, OR, NAND, NOR and XOR, XNOR derivative gates. IEC symbols, dynamic responses and their applications. Functions of combinational logic. Pulse generators and flip-flops. Triggering devices and Schmitt trigger. Sequential logic, counters, registers. Memory circuits, RAM, ROM, EPROM , PLA, magnetic and optical storage units. Interface circuits A/ D and D / A conversion. |
| **Textbook** | T A Demassa and Z Ciccone, Digital Integrated Circuits, John Wiley and Sons, 1996 |
| **Supplementary Textbooks** | A. S. Sedra & A. Grabel, Microelectronic Circuits & Devices, Oxford University Press, 7th edition, 2014 |
| **Credit** | 7 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | 70% attendance is required |
| **Type of the Course** | Elective |
| **Instruction Language** | English |
| **Course Objectives** | To provide extensive knowledge of operation and design of digital IC's including RTL, DTL, TTL, ECL, NMOS and CMOS technologies. To provide PSPICE simulations of digital IC's. |
| **Course Learning Outcomes** | Students who succeed this course:<br>11. Understand properties of digital circuits: VTC, logic swing, transition width, noise, fan in, fan out, transient characteristics, power dissipation and power delay product<br>12. Understand modes of operation of PN junction, MN Schottky, BJT, FET, MOSFET and CMOS in digital IC's<br>13. Know operational principles of RTL and DTL gates and design these gates.<br>14. Analyze, design and simulate TTL, STTL ans LSTTL gates<br>15. Analyze design and simulate ECL gates<br>16. Know R-loaded, E-O loaded and E-D loaded NMOS inverters<br>17. Analyze design and simulate NMOS gates<br>18. Analyze design and simulate CMOS combinational gates<br>19. Know operational principles of CMOS drives, static and dynamic CMOS gates<br>20. Analyze memory circuits |
| **Instruction Methods** | Face to face |
| **Weekly Schedule** | Week Topics<br>15. Prpperties of digital circuits<br>16. PN junction, MN Schottky, BJT, FET, MOS, CMOS modes of operation<br>17. Operation and design of RTL, DTL gates |

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|---|---|
| | 18. Operation and design of TTL, STTL, LSTTL gates<br>19. Other TTL gates: (AND; NOR, OR, AOI, XOR, Schmitt inverter and NAND gates<br>20. ECL gates: MECL I-III<br>21. Midterm 1<br>22. Other ECL gates<br>23. Other ECL gates<br>24. Operation graphical determination of VTC, calculation of critical voltages<br>25. NMOS gates<br>26. CMOS inverter<br>27. CMOS Schmitt trigger, driver, static and dynamic CMOS gates<br>28. Memories |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours<br>Weakly lab course hours<br>Reading Activities<br>Internet browsing, library work<br>Preparation of Midterm and Midterm Exam,<br>Final Exam and Preparation for Final Exam |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 2 | 67 |
| Assignment | | |
| Application | 8 | 33 |
| Projects | | |
| Practice | | |
| Quiz | | |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | 1 | 40 |
| Attendance | | |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | 14 | 2 | 28 |
| Reading Tasks | 10 | 2 | 20 |
| Studies | 10 | 3 | 30 |

| | | | | |
|---|---|---|---|---|
| Material Design and Implementation | | | | |
| Report Preparing | 8 | 2 | 16 | |
| Preparing a Presentation | | | | |
| Presentations | | | | |
| Midterm Exam and Preperation for Midterm Exam | 2 | 10 | 20 | |
| Final Exam and Preperation for Final Exam | 1 | 10 | 10 | |
| Other ( quizzes) | 6 | 2 | 12 | |
| Total Workload | | | 178 | |
| Total Workload / 25 | | | 7.1 | |
| Course Credit (ECTS) | | | 7 | |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledgein these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | X | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | | | X | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | X | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | X | | | | |
| CO8 | 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 | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | | X | | | |
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | X | | | | |
| **The Course's Lecturer(s) and Contact Informations** | 48. Assoc.Prof.Dr. Tuğba Selcen NAVRUZ selcen@gazi.edu.tr<br>49. Dr. Mehmet KARAKAYA mehmetkarakaya@gazi.edu.tr | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE412 VLSI Design |
| **Course Semester** | 8 |
| **Catalog Content** | Design techniques for rapid implementations of very large-scale integrated (VLSI) circuits, Metal-Oxide-Semiconductor (MOS) technology and logic. Structured design. Design rules, layout procedures. Design aids: layout, design rule checking, logic, and circuit simulation. Timing. Testability. Projects to design and layout circuits. |
| **Textbook** | Neil H E Weste & K. Eshraghian, Principles of VLSI design, Addision Wesley publishing, , 4th Edition 2011 |
| **Supplementary Textbooks** | B Razavi, Design of analog CMOS Integrated circuits, Mc Graw Hill, 2001 |
| **Credit** | 6 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | 70% attendance is required |
| **Type of the Course** | Optional |
| **Instruction Language** | English |
| **Course Objectives** | To introduce students the design techniques and tools for rapid implementations of very large-scale integrated (VLSI) circuits |
| **Course Learning Outcomes** | Students who succeed this course:<br>21. Have basic understanding of integrated circuit technology and basic fabrication steps of a CMOS process<br>22. Can use an industrial commercial circuit simulation and design tool<br>23. Understand basic electrical properties of MOS circuits<br>24. Can design logic gates and create layouts of them<br>25. Understand parasitic effects<br>26. Can create hierarchical designs<br>27. Can design computational elements<br>28. Can design memory elements and design accurate clock distribution networks<br>29. Can create basic digital circuits with HDL<br>30. Can design for testability |
| **Instruction Methods** | Face to face |
| **Weekly Schedule** | Week Subject<br>1 Introduction to VLSI design problem.<br>2 Design Layout, design action<br>3 Design methods and technologies<br>4 MOS technology<br>5 Logic structural design. |

| | |
|---|---|
| | 6 Design rules.<br>7 Design methods<br>8 Design tools.<br>9 Design with HDL.<br>10 Logical circuit simulation.<br>11 Timing.<br>12 Power consumption<br>13 Testability.<br>14 Design Project. |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours<br>Reading Activities<br>Internet browsing, library work<br>Designing and implementing materials<br>Report preparing<br>Preparation of quizzes, Midterm and Midterm Exam, quizzes<br>Final Exam and Preparation for Final Exam |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 1 | 50 |
| Assignment | | |
| Application | | |
| Projects | 1 | 50 |
| Practice | | |
| Quiz | | |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | 1 | 40 |
| Attendance | | |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | | | |
| Reading Tasks | 11 | 2 | 22 |

| | | | | |
|---|---|---|---|---|
| Studies | 11 | 2 | 22 |
| Material Design and Implementation | 2 | 20 | 40 |
| Report Preparing | 2 | 2.5 | 5 |
| Preparing a Presentation | | | |
| Presentations | | | |
| Midterm Exam and Preperation for Midterm Exam | 1 | 10 | 10 |
| Final Exam and Preperation for Final Exam | 1 | 10 | 10 |
| Other ( should be emphasized) | | | |
| Total Workload | | | 151 |
| Total Workload / 25 | | | 6.04 |
| Course Credit (ECTS) | | | 6 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledgein these areas in complex engineering problems. | | | X | | |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | X | | |
| CO3 | 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 | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | X | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | X | | | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | X | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | CO8 | 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 | | | | |
| | CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | | X | | | |
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | X | | | | |
| **The Course's Lecturer(s) and Contact Informations** | 50. Assoc.Prof.Dr. Tuğba Selcen NAVRUZ selcen@gazi.edu.tr | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE 431 SEMICONDUCTOR TECHNOLOGY |
| **Course Semester** | Fall |
| **Catalog Content** | Preparation of semiconductor wafers. Insulator film preparation on semiconductors. Photolithography. Doping materials and doping procedure, metallization, main connections and packing. Integrated circuit |
| **Textbook** | 1- J. Allison, Electronic Integrated Circuits, McGraw-Hill.<br>2- D.V. Morgan and K. Board, An Introduction to Semiconductor Microtechnology, John Wiley and Sons. |
| **Supplementary Textbooks** | 7. A.S. Grove, Physics and Technology of Semiconductor Devices, John Wiley and Sons |
| **Credit** | 6 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | Attendance Required |
| **Type of the Course** | Elective (Compulsory for the selected package) |
| **Instruction Language** | English |
| **Course Objectives** | Provide information about preparation of semiconductor circuit parts and applications. Introduction to design of complex integrated circuits and fabrication processes. Discussion on new technological developments of semiconductor. |
| **Course Learning Outcomes** | Students who succeed this course:<br>1. Have ability to describe fabrication process steps of integrated circuits and IC design. |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 43. Week: Introduction to microtechnology<br>44. Week: Semiconductor growth and preparation<br>45. Week: Fundamental processes: Crystal slicing, oxidation, window opening, diffusion and epitaxy.<br>46. Week: Oxidation.<br>47. Week: Doping and type conversion.<br>48. Week: Diffusion, epitaxy, and ion implant.<br>49. Week: Mid-term exam 1<br>50. Week: Integrated circuit components and processes.<br>51. Week: Electrical isolation of integrated circuit components.<br>52. Week: Collector doped isolation, silicon gate process.<br>53. Week: Metallization, interconnection, and packaging.<br>54. Week: Mid-term exam 2 |

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|---|---|
| | 55. Week: Integrated circuit design.<br>56. Week: Future developments in semiconductor microtechnology. |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours<br>Internet browsing, library work<br>Preparation of Midterm and Midterm Exam<br>Preparation for Quizzes<br>Term Project<br>Final Exam and Preparation for Final Exam |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 2 | 50 |
| Assignment | - | - |
| Application | - | - |
| Term Project | 1 | 20 |
| Practice | - | - |
| Quiz | 8 | 30 |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | - | - | 0 |
| Reading Tasks | 14 | 1 | 14 |
| Internet and library search | 14 | 1 | 14 |
| Material Design and Implementation | - | - | 0 |
| Term Project Preparation | 5 | 5 | 25 |
| Preparing a Presentation | - | - | 0 |
| Presentations | - | - | 0 |

| | | | | |
|---|---|---|---|---|
| Midterm Exam and Preperation for Midterm Exam | 2 | 10 | 20 |
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |
| Other (Quizzez and preparation for quizzes) | 8 | 2 | 16 |
| Total Workload | | | 151 |
| 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 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | X | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | X | | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | X | | |
| CO8 | 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 | | |
| CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | X | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | CO11 | xi) Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | X | | | |
| **The Course's Lecturer(s) and Contact Information** | 51. Dr. Öğr. Üyesi Mehmet KARAKAYA (mehmetkarakaya@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEM 414E Optoelectronics |
| **Course Semester** | Spring |
| **Catalog Content** | A review of physical and geometrical optics, and nature of light. Introduction to the principles and design of semiconductor optoelectronic devices including photodiodes, solar cells, light-emitting diodes, laser diodes, and CCDs. Applications include photovoltaics, displays, photodetection, and optical communications. |
| **Textbook** | 1- S. O. KASAP, Optoelectronics and Photonics: Principles and Practices, Pearson. |
| **Supplementary Textbooks** | 1- Bahaa E. A. SALEH and Malvin C. TEICH, Fundamentals of Photonics, Wiley |
| **Credit** | 6 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | Attendance Required |
| **Type of the Course** | Elective (Compulsory for the selected package) |
| **Instruction Language** | English |
| **Course Objectives** | 1-Understanding basic laws and phenomena in the area of<br>Optoelectronics and Lasers<br>2-Theoretical and practical preparation of students to acquire and apply knowledge and skills in Optoelectronics and Lasers |
| **Course Learning Outcomes** | 1. Understand the nature of light<br>2. Solve analytical and design problems in physical optics and fiber optics;<br>3. Understand how photodetectors, LEDs, lasers, and solar cells work, and be able to design simple optoelectronic systems such as fiber optic and free space communication channels, interferometers, simple imaging systems. |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 57. Week: Nature of Light Conceptual Overview: Wave Equation, Refractive index, group and phase velocity Pointing vector<br>58. Week: Nature of Light Conceptual Overview: Snell's law, Fresnel's equations, Optical Resonators, Optical Tunneling, Coherence, Diffraction.<br>59. Week: Semiconductor Science and Light-Emitting Diodes: semiconductor physics, pn junctions. |

60. Week: Semiconductor Science and Light-Emitting Diodes: Light-emitting diodes and types
61. Week: Stimulated Emission Devices: Optical Amplifiers and Lasers: Stimulated Emission, Photon Amplification, and Optical amplifiers
62. Week: Stimulated Emission Devices: Optical Amplifiers and Lasers: Gas Lasers, Laser diodes, quantum well devices
63. Week: Mid-term exam 1
64. Week: Photodetectors and Image Sensors: pn Junction Photodiode, The pin Photodiode, Avalanche Photodiode
65. Week: Photodetectors and Image Sensors: Heterojunction Photodiodes, Schottky Junction Photodetector, Phototransistors,
66. Week: Polarization and Modulation of Light:
67. Week: Mid-term exam 2
68. Week: Dielectric Waveguides and Optical Fibers
69. Week: Dielectric Waveguides and Optical Fibers
70. Week: Photovoltaic Devices: Solar Cells

**Teaching and Learning Methods**

*(These are examples. Please fill which activities you use in the course)*

Weekly theoretical course hours
Internet browsing, library work
Preparation of Midterm and Midterm Exam
Preparation for Quizzes
Homeworks
Final Exam and Preparation for Final Exam

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 2 | 50 |
| Assignment | 5 | 30 |
| Application | - | - |
| Term Project | 1 | 20 |
| Practice | - | - |
| Quiz | - | - |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |

| | | | |
|---|---|---|---|
| Weekly Tutorial Hours | - | - | 0 |
| Reading Tasks | 14 | 1 | 14 |
| Internet and library search | 14 | 1 | 14 |
| Material Design and Implementation | - | - | 0 |
| Term Project Preparation | 5 | 5 | 25 |
| Preparing a Presentation | - | - | 0 |
| Presentations | - | - | 0 |
| Midterm Exam and Preperation for Midterm Exam | 2 | 10 | 20 |
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |
| Assignments | 8 | 2 | 16 |
| Total Workload | | | 151 |
| 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 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | X | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | X | | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports | | | X | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | | | |
| | CO8 | 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 | | |
| | CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | X | | | | |
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | CO11 | xi) Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | X | | | |
| **The Course's Lecturer(s) and Contact Information** | 52. Dr. Öğr. Üyesi Mehmet KARAKAYA (mehmetkarakaya@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE421 DIGITAL SIGNAL PROCESSING |
| **Course Semester** | 7 |
| **Catalog Content** | Discrete-time signals and systems. Sampling. Linear time-invariant systems. Z-transform, inverse Z-transform, 2-D Z-transform. The discrete Fourier transform. Digital filter design techniques: IIR and FIR filters. Fast Fourier Transform techniques. |
| **Textbook** | Digital Signal Processing, Alan V. Oppenheim and Ronald W. Schafer, 3rd Edition 2009 |
| **Supplementary Textbooks** | |
| **Credit** | 6 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | EEE321 (Attendance is required) |
| **Type of the Course** | Elective (Compulsory for the selected package) |
| **Instruction Language** | English |
| **Course Objectives** | To learn the processing of digital signals by using discrete Fourier transform, Z-transform, Fast Fourier transform and digital filter design techniques. |
| **Course Learning Outcomes** | Students who succeed this course:<br>4- Know discrete Fourier transform,<br>5- Know Z-transform<br>6- Know Fast Fourier transform<br>7- Know filter design techniques. |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 61. Discrete-time signals and systems.<br>62. Sampling. Linear time-invariant systems.<br>63. Z-transform.<br>64. Inverse Z-transform, 2-D Z-transform.<br>65. Fourier analysis of signals by using the discrete Fourier transform.<br>66. Midterm I<br>67. Linear convolution using the discrete Fourier transform and 2-D discrete Fourier transform.<br>68. Digital filter design techniques.<br>69. IIR filters.<br>70. FIR filters.<br>71. Fast Fourier Transform techniques.<br>72. Algorithms related to Fast Fourier transform.<br>73. Introduction to DSP's. An overview of C5000 and C6000 DSP's architecture.<br>74. Hardware of DSP's, software development environments, data formats, signal processing chain of DSP's. |

**Teaching and Learning Methods**

*(These are examples. Please fill which activities you use in the course)*

Weekly theoretical course hours
Internet browsing, library work
Preparation of Midterm and Midterm Exam
Preparation for Quizzes
Term Project
Final Exam and Preparation for Final Exam

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 1 | 42 |
| Assignment | 3 | 16 |
| Application | - | - |
| Term Project | - | - |
| Projects | 1 | 42 |
| Practice | - | - |
| Quiz | - | - |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | - | - | 0 |
| Reading Tasks | 14 | 1 | 14 |
| Internet and library search | 14 | 1 | 14 |
| Material Design and Implementation | - | - | 0 |
| Term Project Preparation | 5 | 5 | 25 |
| Preparing a Presentation | - | - | 0 |
| Presentations | - | - | 0 |
| Midterm Exam and Preperation for Midterm Exam | 2 | 10 | 20 |

| | | | | |
|---|---|---|---|---|
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |
| Other (Quizzez and preparation for quizzes) | 5 | 3 | 15 |
| 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 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | X | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | | X | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | X | | |
| CO8 | 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 | | |
| CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | X | | | | |
| CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | X | | | | |
| **The Course's Lecturer(s) and Contact Information** | 53. Prof. Dr. M. İrfan KARAGÖZ(irfankaragoz@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE423 INDUSTRIAL CONTROL |
| **Course Semester** | 7 |
| **Catalog Content** | Introduction to industrial control. Sensors and transducers. Signal conditioning. Digital signals. Data representation systems. Actuators. System modelling. Dynamic response of systems. Interface systems. PLCs. Industrial communication systems |
| **Textbook** | 8. W. Bolton, Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering (6th Edition) Pearson, 2016 |
| **Supplementary Textbooks** | 2. Industrial Communication Technology Handbook, Second Edition by Richard Zurawski, CRC Press; 2 edition (August 26, 2014)<br>3. Curtis D. Johnson, Process Control Instrumentation Technology (8th Edition), Jul 1, 2005, Pearson<br>4. Peng Zhang, Advanced Industrial Control Technology, Elsevier Pub., 1st ed. 2010<br>5. Rex Miller, Industrial Electricity and Motor Controls, 2nd Edition, McGraw-Hill Education; 2013 |
| **Credit** | 6 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | None (Attendance is required) |
| **Type of the Course** | Elective (Compulsory for the selected package) |
| **Instruction Language** | English |
| **Course Objectives** | The objective of this course is to learn the students the principles of industrial control systems and their components. |
| **Course Learning Outcomes** | Students who succeed this course:<br>36. Understand the operation principles of commonly used sensors and describe their performance.<br>37. Understand the concept of signal conditioning and analyze and design common signal conditioning circuits.<br>38. Understand the analog-to-digital, digital-to-analog conversion and digital signal processing.<br>39. Describe the basic elements of data acquisition systems.<br>40. Understand the operation principles of commonly used actuators.<br>41. Devise models from basic building blocks for mechanical, electrical, fluid and thermal systems.<br>42. Devise models for rotational-translational, electromechanical systems.<br>43. Identify interface requirements and how they can be realized.<br>44. Describe the basic structure of PLCs and their operation; develop a simple ladder program.<br>45. Understand commonly used communication interfaces such as RS-232, IEEE 488, 20 mA current loop and CAN. |
| **Instruction Methods** | Face-to-face |

**Weekly Schedule**

75. Introduction to industrial control.
76. Sensors
77. Transducers
78. Signal conditioning
79. Digital signals.
80. Data representation systems
81. Mechanical actuators
82. Electrical actuators
83. System modelling.
84. Dynamic response of systems.
85. Interface systems
86. PLCs: Structure and principles
87. PLC: Programming
88. Industrial communication systems

**Teaching and Learning Methods**

*(These are examples. Please fill which activities you use in the course)*

Weekly theoretical course hours
Application
Internet browsing, library work
Preparation of Midterm and Midterm Exam
Preparation for Quizzes
Term Project
Final Exam and Preparation for Final Exam

**Assessment Criteria**

| | **Numbers** | **Total Weighting (%)** |
|---|---|---|
| Midterm Exams | 2 | 35 |
| Assignment | 3 | 5 |
| Application | 2 | 10 |
| Term Project | 1 | 25 |
| Practice | - | - |
| Quiz | 5 | 25 |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| **Activity** | **Total Number of Weeks** | **Duration (weekly hour)** | **Total Period Work Load** |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | 2 | 5 | 10 |
| Reading Tasks | 14 | 1 | 14 |
| Internet and library search | 14 | 1 | 14 |

| | | | | |
|---|---|---|---|---|
| Material Design and Implementation | - | - | 0 |
| Term Project Preparation | 5 | 4 | 20 |
| Preparing a Presentation | - | - | 0 |
| Presentations | - | - | 0 |
| Midterm Exam and Preperation for Midterm Exam | 2 | 10 | 20 |
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |
| Other (Quizzes and preparation for quizzes) | 5 | 2 | 10 |
| 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 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | X | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | X | | | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | X | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | CO8 | 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 | | |
| | CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | X | | | | |
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | CO11 | xi) Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | X | | | |
| **The Course's Lecturer(s) and Contact Information** | 54. Prof. Dr. M. Timur AYDEMİR (aydemirmt@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE431 POWER ELECTRONICS 1 |
| **Course Semester** | 7 |
| **Catalog Content** | Basic characteristics and operation principles of thyristors and diodes. Single phase and three phase rectifiers. Uncontrolled, semi-controlled and controlled rectifiers. Non-idealities in rectifiers. Harmonics at the input and output of the converters. Input power factor. Transformer utilization and unbalances. AC voltage controllers. Line frequency rectifier applications. |
| **Textbook** | 9. Power Electronics: circuits, devices, and applications; M. Rashid, Prentice-Hall, 2013 |
| **Supplementary Textbooks** | 8- Power Electronics: Converters, Applications, and Design; N. Mohan, Tore Undeland, William P. Robbins<br>10. Elements of Power Electronics, Philip T. Krein, Oxford University Press |
| **Credit** | 6 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | None (Attendance is required) |
| **Type of the Course** | Elective (Compulsory for the selected package) |
| **Instruction Language** | English |
| **Course Objectives** | The objective of this course is to learn the operation principles of the line frequency power converters and power devices, and analysis and design of these converters. |
| **Course Learning Outcomes** | Students who succeed this course:<br>46. Understand the concept of power control through switching.<br>47. Understand the basic operation principles of power semiconductors used in line frequency power conversion circuits and can perform basic calculations.<br>48. Can identify the basic rectifier topologies used in line-frequency converters and can analyze these converters.<br>49. Can design rectifier circuits to meet certain requirements and can select power devices considering realistic conditions.<br>50. Know the meaning and ideal values of certain parameters to evaluate the performance of converters. |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 89. Application areas of power electronics and introduction basic principles<br>90. Review of basic techniques used in power electronics (Fourier analysis, transient circuit analysis)<br>91. Operation principles and characteristics of diodes and thyristors<br>92. Analysis of basic rectifier circuits, Definition and calculation of performance parameters.<br>93. Analysis of single phase diode rectifiers<br>94. Analysis of single phase thyristor rectifiers<br>95. Analysis of three phase rectifiers: Uncontrolled rectifiers |

| | |
|---|---|
| | 96. Analysis of three phase rectifiers: Controlled rectifiers<br>97. Analysis of three phase rectifiers: Semi-controlled rectifiers<br>98. 12-pulse and 18-pulse rectifiers<br>99. Impact of line inductance (overlap)<br>100. Unbalanced operation and solution of transformers at the converter input<br>101. Thyristor gate circuits<br>102. Loss analysis and snubbers |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours<br>Internet browsing, library work<br>Preparation of Midterm and Midterm Exam<br>Preparation for Quizzes<br>Term Project<br>Final Exam and Preparation for Final Exam |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 2 | 40 |
| Assignment | 4 | 10 |
| Application | - | - |
| Term Project | 1 | 20 |
| Practice | - | - |
| Quiz | 5 | 30 |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | - | - | 0 |
| Reading Tasks | 14 | 1 | 14 |
| Internet and library search | 14 | 1 | 14 |
| Material Design and Implementation | - | - | 0 |
| Term Project Preparation | 5 | 5 | 25 |

| | | | | |
|---|---|---|---|---|
| Preparing a Presentation | - | - | 0 |
| Presentations | - | - | 0 |
| Midterm Exam and Preperation for Midterm Exam | 2 | 10 | 20 |
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |
| Other (Quizzes and preparation for quizzes) | 5 | 3 | 15 |
| 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 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | X | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | X | | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | X | | |
| CO8 | 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 | | |
| CO9 | Consciousness to behave according to ethical principles and professional and | X | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | ethical responsibility; knowledge on standards used in engineering practice . | | | | | |
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | CO11 | xi) Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | X | | | |
| **The Course's Lecturer(s) and Contact Information** | 55. Prof. Dr. M. Timur AYDEMİR (aydemirmt@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE432 POWER ELECTRONICS II |
| **Course Semester** | 8 |
| **Catalog Content** | Operation principles of DC-DC converters. DC-DC converter topologies. Operation principles and characteristics of high frequency power semiconductor devices. Calculation of switching losses. Snubber and protection circuits. DC-AC converters (inverters). Pulse Width Modulation. |
| **Textbook** | 11. Power Electronics: circuits, devices, and applications; M. Rashid, Prentice-Hall,2013 |
| **Supplementary Textbooks** | 9- Power Electronics: Converters, Applications, and Design; N. Mohan, Tore Undeland, William P. Robbins<br>12. Elements of Power Electronics, Philip T. Krein, Oxford University Press |
| **Credit** | 7 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | EEE431 (Attendance is required) |
| **Type of the Course** | Elective (Compulsory for the selected package) |
| **Instruction Language** | English |
| **Course Objectives** | The objective of this course is to learn the operation principles of the high frequency power converters and power devices, and analysis and design of these converters. |
| **Course Learning Outcomes** | Students who succeed this course:<br><br>51. Understand the concept of power control through switching<br>52. Understand the basic operation principles of power semiconductors used in high frequency power conversion circuits.<br>53. Can perform the basic calculations related to power semiconductors used in high frequency power conversion circuits.<br>54. Can identify the basic DC-DC converter topologies operated at high switching frequencies and can analyze these converters.<br>55. Have the know ledge about the magnetics components used in high frequency power electronics and can perform basic magnetic component designs.<br>56. Can identify basic protection and limitation circuits used in power electronics and can perform their basic calculations.<br>57. Know the principles of DC-AC inversion and the concept of pulse width modulation, and can use this concept to solve problems.<br>58. Can design dc-dc converter circuits to meet certain requirements and can select power devices considering realistic conditions.<br>59. Can simulate power electronic converters.<br>60. Can conduct experiments by following the instructions on a power electronic experiment document; analyze and interpret data obtained in the experiment. |

<table>
<tr><td>Instruction Methods</td><td>Face-to-face</td></tr>
<tr><td>Weekly Schedule</td><td>103. Basic principles of DC-DC conversion.<br>104. Buck type dc-dc converter: Operation principles and filter design.<br>105. Boost, Buck-Boost and Cuk DC-DC Converters<br>106. Pulse Width Modulation concept and its application<br>107. Continuous and Discontinuous operation limits of dc-dc converters.<br>108. A general look at the isolated dc-dc converter topologies.<br>109. Forward DC-DC Converters<br>110. Flyback dc-dc converters<br>111. Half and Full bridge dc-dc converters<br>112. Snubbers<br>113. Heat sinks<br>114. Operation principles of inverters and sinusoidal pulse width modulation<br>115. Single phase inverters<br>116. Three phase inverters</td></tr>
<tr><td>Teaching and Learning Methods<br><br>(These are examples. Please fill which activities you use in the course)</td><td>Weekly theoretical course hours<br>Laboratory experiments<br>Internet browsing, library work<br>Preparation of Midterm and Midterm Exam<br>Preparation for Quizzes<br>Term Project<br>Final Exam and Preparation for Final Exam</td></tr>
<tr><td>Assessment Criteria</td><td>
<table>
<tr><th></th><th>Numbers</th><th>Total Weighting (%)</th></tr>
<tr><td>Midterm Exams</td><td>2</td><td>35</td></tr>
<tr><td>Assignment</td><td>3</td><td>5</td></tr>
<tr><td>Application</td><td>6</td><td>25</td></tr>
<tr><td>Term Project</td><td>1</td><td>15</td></tr>
<tr><td>Practice</td><td>-</td><td>-</td></tr>
<tr><td>Quiz</td><td>4</td><td>20</td></tr>
<tr><td>Percent of In-term Studies (%)</td><td></td><td>60</td></tr>
<tr><td>Percentage of Final Exam to Total Score (%)</td><td></td><td>40</td></tr>
<tr><td>Attendance</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Workload</td><td>
<table>
<tr><th>Activity</th><th>Total Number of Weeks</th><th>Duration (weekly hour)</th><th>Total Period Work Load</th></tr>
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</td></tr>
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| | | | | |
|---|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | 6 | 4 | 24 |
| Reading Tasks | 14 | 1 | 14 |
| Internet and library search | 14 | 1 | 14 |
| Material Design and Implementation | - | - | 0 |
| Term Project Preparation | 5 | 5 | 25 |
| Preparing a Presentation | - | - | 0 |
| Presentations | - | - | 0 |
| Midterm Exam and Preperation for Midterm Exam | 2 | 10 | 20 |
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |
| Other (Quizzes and preparation for quizzes) | 4 | 4 | 16 |
| Total Workload | | | 175 |
| Total Workload / 25 | | | 7 |
| Course Credit (ECTS) | | | 7 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | X | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | | X | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | X | | | |

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|---|---|---|---|---|---|---|---|
| | CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | X | | |
| | CO8 | 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 | | |
| | CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | X | | | | |
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | CO11 | xi) Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | X | | | |
| **The Course's Lecturer(s) and Contact Information** | 56. Prof. Dr. M. Timur AYDEMİR (aydemirmt@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE434 ELECTRIC MOTORS AND DRIVES |
| **Course Semester** | 8 |
| **Catalog Content** | DC Motor speed and torque control methods and their applications. Choppers. Four quadrant operation. Induction motor speed and torque control methods. Scalar control techniques. Principles of vector control. Speed control in synchronous motors. Reluctance motors. |
| **Textbook** | 13. R. Krishnan, Electric Motor Drives, Prentice Hall, 2002 |
| **Supplementary Textbooks** | 6. N. Mohan, Electric Drives: An Integrative Approach, Univ. of Minnesota Pr.<br>7. T. Wildi, Electrical Machines, Drives and Power Systems, Prentice Hall |
| **Credit** | 7 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | EEE336 (Attendance is required) |
| **Type of the Course** | Elective (Compulsory for the selected package) |
| **Instruction Language** | English |
| **Course Objectives** | The objective of this course is to learn the principles of speed control of DC and AC motors, and analysis and design of drive systems used for this purpose. |
| **Course Learning Outcomes** | Students who succeed this course:<br><br>61. Know about the advantages of using electric drives.<br>62. Know the principles of speed control DC motors, induction motors and brushless AC motors<br>63. Know the power electronic converter topologies used for speed control of DC motors, induction motors and brushless AC motors, and to be able to analyze these converters.<br>64. Can perform modeling and simulation analysis of dc motors.<br>65. Can design a simple controller for dc motors. |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 117. Basic concepts of electric drives. Definition of a drive system and its components. Motors, power converters, semiconductor devices, gears and controllers.<br>118. Review of DC motors. Steady state and dynamic analysis of separately excited and PM dc motors.<br>119. Modeling of dc motors with state variables. Transfer functions. Control through armature and field circuits.<br>120. Phase Controlled DC Motor Drives: Principles and topologies.<br>121. Chopper Controlled DC Motor Drives: Principles and topologies.<br>122. Designing a controller for PM dc motors.<br>123. Review and speed control principles of induction motors.<br>124. IM drives (voltage control) principles.<br>125. IM drives (frequency control) principles. |

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|---|---|
| | 126. Inverter topologies: 6-step and PWM inverter operation.<br>127. Review and speed control principles of synchronous motors.<br>128. Brushless DC and PM AC motors and drive principles.<br>129. Single Phase Induction Motors.<br>130. Step Motors |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours<br>Laboratory experiments<br>Internet browsing, library work<br>Preparation of Midterm and Midterm Exam<br>Preparation for Quizzes<br>Term Project<br>Final Exam and Preparation for Final Exam |
| **Assessment Criteria** | |

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 2 | 35 |
| Assignment | 3 | 5 |
| Application | 6 | 25 |
| Term Project | 1 | 15 |
| Practice | - | - |
| Quiz | 4 | 20 |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | 6 | 4 | 24 |
| Reading Tasks | 14 | 1 | 14 |
| Internet and library search | 14 | 1 | 14 |
| Material Design and Implementation | - | - | 0 |
| Term Project Preparation | 5 | 5 | 25 |
| Preparing a Presentation | - | - | 0 |

| | | | | |
|---|---|---|---|---|
| Presentations | - | - | 0 |
| Midterm Exam and Preperation for Midterm Exam | 2 | 10 | 20 |
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |
| Other (Quizzes and preparation for quizzes) | 4 | 4 | 16 |
| Total Workload | | | 175 |
| Total Workload / 25 | | | 7 |
| Course Credit (ECTS) | | | 7 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | X | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | | X | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | X | | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | X | | |
| CO8 | 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 | | |
| CO9 | Consciousness to behave according to ethical principles and professional and | X | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | ethical responsibility; knowledge on standards used in engineering practice . | | | | | |
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | CO11 | xi) Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | X | | | |
| **The Course's Lecturer(s) and Contact Information** | 57. Prof. Dr. M. Timur AYDEMİR (aydemirmt@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE446 INTRODUCTION TO CRYPTOGRAPHY |
| **Course Semester** | Spring |
| **Catalog Content** | Elementary number theory. Finite fields and quadratic residues. Classical cryptosystems. Block ciphers. Stream ciphers. Shannon's theory. Public key cryptography. Primality and factoring. Primality tests and prime number generation. Quantum cryptography. |
| **Textbook** | 1) E. Afacan, Kriptografiye Giriş, Epos Yayınları, 2016. |
| **Supplementary Textbooks** | 1) D. R. Stinson, Cryptography: Theory and Practice, CRC, 1995.<br>2) B. Schneier, Applied Cryptography: Protocols, algorithms and source code in C, Wiley, 1996. |
| **Credit** | 6 |
| **Prerequisites of the Course**<br><br>**( Attendance Requirements)** | Attendance is compulsory |
| **Type of the Course** | Elective |
| **Instruction Language** | English |
| **Course Objectives** | To learn the basics of cryptography and to give knowledge about the commonly used methods in cryptography. |
| **Course Learning Outcomes** | Students who succeed this course:<br>1) Acquire basic knowledge about number theory and apply basic operations in number theory.<br>2) Know the classical cipher systems shift cipher, substitution cipher, affine cipher, Vigenere cipher, Hill cipher, permutation cipher, and encrypt and decrpyt by using these methods.<br>3) Know the modern cipher systems RSA and ElGamal cipher, and encrypt and decrpyt by using these methods. |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 1) Fundamental definitions; Binary operation<br><br>2) Groups: Rings and fields<br><br>3) Integers and integer arithmetics<br><br>4) Modular arithmetics<br><br>5) Shift cipher; Substitution cipher; Affine cipher<br><br>6) Vigenere cipher; Hill cipher; Permutation cipher<br><br>7) Stream ciphers<br><br>8) Digraph transformations<br><br>9) RSA cipher<br><br>10) Cryptoanalysis<br><br>11) Shannon theory |

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| | 12) Primality and factoring<br>13) Primality test and prime number generation<br>14) Quantum cryptography |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours<br>Assignment<br>Preparation of Midterm and Midterm Exam<br>Final Exam and Preparation for Final Exam |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 2 | 67 |
| Assignment | 3 | 33 |
| Application | - | - |
| Projects | - | - |
| Practice | - | - |
| Quiz | - | - |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | - | - | 0 |
| Reading Tasks | 14 | 2 | 28 |
| Internet and library search | - | - | 0 |
| Material Design and Implementation | - | - | 0 |
| Report Preparing | 3 | 10 | 30 |
| Preparing a Presentation | - | - | 0 |

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|---|---|---|---|---|
| Presentations | - | - | 0 |
| Midterm Exam and Preperation for Midterm Exam | 2 | 15 | 30 |
| Final Exam and Preperation for Final Exam | 1 | 25 | 25 |
| Other (should be emphasized) | - | - | 0 |
| Total Workload | | | 155 |
| Total Workload / 25 | | | 6.2 |
| Course Credit (ECTS) | | | 6 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | X | | |
| CO3 | 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 | | | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | X | | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | X | | | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | X | | | |
| CO8 | 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 | | |
| CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | | | X | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | | | X | |
| **The Course's Lecturer(s) and Contact Information** | Prof.Dr. Erkan AFACAN (e.afacan@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE541 MICROWAVE TECHNIQUE I |
| **Course Semester** | 7 |
| **Catalog Content** | Review of electromagnetic wave theory. Frequency and time domain analysis of transmission lines. TEM mode transmission lines. Rectangular and circular wave guides. Equivalent circuit analysis of microwave systems. Impedance transformation and matching techniques. Microstrip devices. |
| **Textbook** | Microwave Engineering, David M. Pozar, Addision-Wesley Publishing Company, 4th Edition 2011 |
| **Supplementary Textbooks** | Foundations for Microwave Engineering, R. E. Collin,, McGraw-Hill. |
| **Credit** | 7 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | None (Attendance is required) |
| **Type of the Course** | Elective (Compulsory for the selected package) |
| **Instruction Language** | English |
| **Course Objectives** | The objective of this course is to learn transmission lines, waveguides, microwave systems, impedance transformation and impedance matching techniques. |
| **Course Learning Outcomes** | Students who succeed this course:<br>66. Understand basic issues about the transmission lines and waveguides<br>67. Develop the skills of design and analyze passive microwave components and impedance matching networks<br>68. Solve problems with SMITH Chart in transmission lines<br>69. Develop the basic skills of problem solving in the field of microwave engineering |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 131. INTRODUCTION: Review of electromagnetic theory, Maxwell's equations, boundary conditions, Helmholtz's (wave) equation.<br>132. PLANE WAVES: Plane waves in lossless media, plane waves in lossy media, skin depth, group velocity, phase velocity.<br>133. TRANSMISSION LINE THEORY: Field analysis of transmission line; general transmission-line equations, transmission-line parameters.<br>134. TRANSMISSION LINE THEORY: Wave characteristics on an infinite transmission-line. Wave characteristics on an finite transmission-lines.<br>135. TRANSMISSION LINE THEORY: The terminated lossless transmission-line, lossy transmission-lines. Reflection on transmission lines. |

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| | 136. TRANSMISSION LINE THEORY: Reflection coefficient and standing-wave ratio, power on transmission-line.<br>137. TRANSMISSION LINE THEORY: The Smith chart, admittances on Smith chart<br>138. TRANSMISSION LINE THEORY: The Smith chart applications<br>139. IMPEDANCE MATCHING: Analyzing solutions for single-stub, double-stub, shunt and series stubs.<br>140. IMPEDANCE MATCHING: Applying for single-stub, double-stub, shunt and series stubs with Smith chart.<br>141. TRANSMISSION LINE AND WAVEGUIDES: General solutions for TEM, TE and TM waves, transverse electromagnetic waves, transverse magnetic waves, transverse<br>142. TRANSMISSION LINE AND WAVEGUIDES: Rectangular waveguides; TM waves in rectangular waveguides, TE waves in rectangular waveguides.<br>143. TRANSMISSION LINE AND WAVEGUIDES: Circular waveguides; TM waves in circular waveguides, TE waves in circular waveguides.<br>144. MICROWAVE RESONATORS: Excitation of resonators, rectangular resonators, quality factor in resonators. |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours<br><br>Internet browsing, library work<br><br>Reading Tasks<br><br>Preparation of Midterm and Midterm Exam<br><br>Term Project<br><br>Final Exam and Preparation for Final Exam |
| **Assessment Criteria** | |

| | **Numbers** | **Total Weighting (%)** |
|---|---|---|
| Midterm Exams | 2 | 67 |
| Assignment | - | - |
| Application | 5 | 33 |
| Term Project | - | - |
| Practice | - | - |
| Quiz | - | - |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | 14 | 2 | 28 |
| Reading Tasks | 14 | 2 | 28 |
| Internet and library search | 14 | 2 | 28 |
| Material Design and Implementation | - | - | 0 |
| Term Project Preparation | - | - | 0 |
| Preparing a Presentation | - | - | 0 |
| Presentations | - | - | 0 |
| Midterm Exam and Preperation for Midterm Exam | 2 | 10 | 20 |
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |
| Other (Quizzes and preparation for quizzes) | - | - | 0 |
| Total Workload | | | 166 |
| Total Workload / 25 | | | 6.64 |
| Course Credit (ECTS) | | | 7 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | X | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and | | | | X | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | interpret results for investigating complex engineering problems or discipline specific research questions | | | | | |
| | CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | | X | |
| | CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | X | | |
| | CO8 | 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 | | | |
| | CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | X | | | | |
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | | X | | | |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | | | X | |
| **The Course's Lecturer(s) and Contact Information** | 58. Assoc .Prof. Dr. Nursel AKÇAM (ynursel@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE542 MICROWAVE TECHNIQUE II |
| **Course Semester** | 8 |
| **Catalog Content** | Passive reciprocal and nonreciprocal devices. Electromagnetic resonators. Periodic structures and microwave filters. Microstripline structures and coupled lines. Solid state microwave devices. |
| **Textbook** | Microwave Engineering, David M. Pozar, Addision-Wesley Publishing Company. |
| **Supplementary Textbooks** | Foundations for Microwave Engineering, R. E. Collin,, McGraw-Hill. |
| **Credit** | 6 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | EEE451 Microwave Technique (Attendance is required) |
| **Type of the Course** | Elective |
| **Instruction Language** | English |
| **Course Objectives** | The objective of this course is to learn microstripline structures and solid state microwave devices. |
| **Course Learning Outcomes** | Students who succeed this course:<br>70. Gain the ability of analyze and design the passive RF and microwave circuits<br>71. Design passive microwave components, due to their motivational and practical value. Know methods used for analysis and logic behind these design<br>72. Can analyze and design the active RF and microwave amplifiers<br>73. Can analyze and design the oscillator<br>74. Design active microwave components due to their motivational and practical value. Know methods used for analysis and logic behind these design |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 145. Introduction to microwave and a brief reminding about electromagnetic theory<br>146. Terminations<br>147. Attenuators<br>148. Phase Shifters<br>149. Directional Couplers<br>150. Power Dividers<br>151. Circulators<br>152. Active Microwave Components<br>153. Introduction to Active Microwave Circuits<br>154. Noise in Microwave Circuits<br>155. Detectors and Mixers<br>156. Transistor Amplifier Design<br>157. Oscillator Design<br>158. PIN Diode Control Circuits |

**Teaching and Learning Methods**

*(These are examples. Please fill which activities you use in the course)*

Weekly theoretical course hours

Internet browsing, library work

Reading Tasks

Preparation of Midterm and Midterm Exam

Term Project

Final Exam and Preparation for Final Exam

**Assessment Criteria**

| | **Numbers** | **Total Weighting (%)** |
|---|---|---|
| Midterm Exams | 2 | 67 |
| Assignment | - | - |
| Application | - | - |
| Term Project | 1 | 33 |
| Practice | - | - |
| Quiz | - | - |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| **Activity** | **Total Number of Weeks** | **Duration (weekly hour)** | **Total Period Work Load** |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | - | - | - |
| Reading Tasks | 14 | 2 | 28 |
| Internet and library search | 14 | 2 | 28 |
| Material Design and Implementation | - | - | 0 |
| Term Project Preparation | 8 | 2 | 16 |
| Preparing a Presentation | 1 | 8 | 8 |
| Presentations | 1 | 1 | 1 |
| Midterm Exam and Preperation for Midterm Exam | 2 | 10 | 20 |

| | | | | |
|---|---|---|---|---|
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |
| Other (Quizzes and preparation for quizzes) | - | - | 0 |
| Total Workload | | | 143 |
| Total Workload / 25 | | | 5.72 |
| Course Credit (ECTS) | | | 6 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | X | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | | | | X | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | | X | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | X | | |
| CO8 | 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 | | | |
| CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | | X | | | |
| CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, | | X | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | innovation; knowledge about sustainable development | | | | | |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | | | X | |
| **The Course's Lecturer(s) and Contact Information** | 59. Assoc .Prof. Dr. Nursel AKÇAM (ynursel@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE543 RADIO WAVE PROPOGATION |
| **Course Semester** | 7 |
| **Catalog Content** | Wave propagation in free space. Spread backed-channel, electromagnetic field attenuation in free space. Electromagnetic communication links; LOS model, reflection, refraction and diffraction. Scattering, Rayleigh's criterion, surface waves. Atmospheric losses. The noise and losses of the communication devices. Earth surface effect in communication links. Effect of the ionosphere in communication. Effect of the troposphere in communications. Noise and interference. Link quality account. Transmission modeling. |
| **Textbook** | Robert E. Collin, Antennas and Radiowave Propagation McGraw-Hill C.A.Balanis, Antenna Theory : Analysis and Design,Wiley. |
| **Supplementary Textbooks** | Stutzman and Thiele, Antenna Theory and Design, Wiley. Krauss, Antennas, McGraw-Hill |
| **Credit** | 6 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | EEE352 Electromagnetic Waves (Attendance is required) |
| **Type of the Course** | Elective |
| **Instruction Language** | English |
| **Course Objectives** | The objective of this course is to learn the details of noise and interference concepts who used in electromagnetic communications. |
| **Course Learning Outcomes** | Students who succeed this course:<br>1. Understand the principles of the propagation of the radiowaves<br>2. Understand electromagnetic communication links and the effect of earth on communication links.<br>3. Develop the skills of solving the engineering problems and design |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 159. Review of electromagnetic theory, Maxwell's equations , boundary conditions, Helmholtz's (wave) equation.<br>160. Wave propagation in free space<br>161. Attenuation of the electromagnetic field in free space.<br>162. Electromagnetic communication links; LOS model, reflection, refraction and diffraction.<br>163. Scattering, Rayleigh's criterion, surface wave.<br>164. Atmospheric attenuation<br>165. Attenuation by rain, fog, snow, etc.<br>166. Noises and losses in communication devices.<br>167. Earth effect in communication links.<br>168. The effect of ionosphere on communication. |

<table>
<tr><td></td><td>169. The effect of troposphere on communication.<br>170. Noise and interference.<br>171. Link budget. Transmission modeling.<br>172. Homework Presentations</td></tr>
<tr><td>Teaching and Learning Methods<br><br>(These are examples. Please fill which activities you use in the course)</td><td>Weekly theoretical course hours<br><br>Internet browsing, library work<br><br>Reading Tasks<br><br>Preparation of Midterm and Midterm Exam<br><br>Final Exam and Preparation for Final Exam</td></tr>
<tr><td>Assessment Criteria</td><td>
<table>
<tr><th></th><th>Numbers</th><th>Total Weighting (%)</th></tr>
<tr><td>Midterm Exams</td><td>2</td><td>67</td></tr>
<tr><td>Assignment</td><td>-</td><td>-</td></tr>
<tr><td>Application</td><td>-</td><td>-</td></tr>
<tr><td>Term Project</td><td>1</td><td>33</td></tr>
<tr><td>Practice</td><td>-</td><td>-</td></tr>
<tr><td>Quiz</td><td>-</td><td>-</td></tr>
<tr><td>Percent of In-term Studies (%)</td><td></td><td>60</td></tr>
<tr><td>Percentage of Final Exam to Total Score (%)</td><td></td><td>40</td></tr>
<tr><td>Attendance</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Workload</td><td>
<table>
<tr><th>Activity</th><th>Total Number of Weeks</th><th>Duration (weekly hour)</th><th>Total Period Work Load</th></tr>
<tr><td>Weekly Theoretical Course Hours</td><td>14</td><td>3</td><td>42</td></tr>
<tr><td>Weekly Tutorial Hours</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Reading Tasks</td><td>14</td><td>2</td><td>28</td></tr>
<tr><td>Internet and library search</td><td>14</td><td>2</td><td>28</td></tr>
<tr><td>Material Design and Implementation</td><td>-</td><td>-</td><td>0</td></tr>
<tr><td>Term Project Preparation</td><td>8</td><td>2</td><td>16</td></tr>
<tr><td>Preparing a Presentation</td><td>1</td><td>8</td><td>8</td></tr>
<tr><td>Presentations</td><td>1</td><td>1</td><td>1</td></tr>
</table>
</td></tr>
</table>

| | | | | |
|---|---|---|---|---|
| Midterm Exam and Preperation for Midterm Exam | 2 | 10 | 20 |
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |
| Other (Quizzes and preparation for quizzes) | - | - | 0 |
| Total Workload | | | 143 |
| Total Workload / 25 | | | 5.72 |
| Course Credit (ECTS) | | | 6 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | X | |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | X | |
| CO3 | 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 | | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | X | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | | | | X | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | | X | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | | | X |
| CO8 | 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 | | |
| CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | | | X | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | | X | | | |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | | | X | |
| **The Course's Lecturer(s) and Contact Information** | 60. Assoc .Prof. Dr. Nursel AKÇAM (ynursel@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE454 ANTENNAS |
| **Course Semester** | 8 |
| **Catalog Content** | Antenna parameters. Wire typed antennas. Radiation from aperture antennas. Transmitter and receiver antennas. Antenna arrays. Reflector antennas. Energy transfer between antennas. Ground wave and sky wave propagation. Satellite communications. Introduction to radar systems. |
| **Textbook** | C. A. Balanis, Antenna Theory : Analysis and Design, Wiley 3rd Edition 2005 |
| **Supplementary Textbooks** | Stutzman and Thiele, Antenna Theory and Design, Wiley<br>Krauss, Antennas, McGraw-Hill |
| **Credit** | 7 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | EEE351 (Attendance is required) |
| **Type of the Course** | Elective (Compulsory for the selected package) |
| **Instruction Language** | English |
| **Course Objectives** | The objective of this course is to learn antenna parameters, different types of antennas, radiation diagrams and impedance of antennas. Students are also informed about ground waves, propagation and Radar systems. |
| **Course Learning Outcomes** | Students who succeed this course:<br>75. Understan the fundamentals of antenna theory<br>76. Comprehend the basic properties of various types of antennas and analyze methods<br>77. Understand the principles of the propagation of radio waves<br>78. Develop the skills of solving the engineering problems and design |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 173. REVIEW OF FUNDAMENTALS OF ELECTROMAGNETİC RADIATION: Maxwell's Equations, Boundary Conditions, propagation of Electromagnetic Waves, Poynting vector.<br>174. FUNDAMENTAL PARAMETERS OF ANTENNAS: Radiation Pattern, Radiation Power Density, Radiation Intensity, Directivity.<br>175. FUNDAMENTAL PARAMETERS OF ANTENNAS: Gain, Antenna Efficiency, Bandwidth, Polarization, Input Impedance.<br>176. RADIATION INTEGRALS: The Vector Potentials for Electric and Magnetic Current Sources, Solution of the Inhomogeneous Vector Potential Wave Equation.<br>177. RADIATION INTEGRALS: Far-Field Radiation, Duality Theorem, Reciprocity and Reaction Theorems. |

<table>
<tr><td></td><td>178. LINEAR WIRE ANTENNAS: Infinitesimal Dipole, Small Dipole, Region Separation, Finite Length Dipole, Half-Wavelength Dipole.<br>179. LINEAR WIRE ANTENNAS: Image Theory, Vertical Electric Dipole, Horizontal Electric Dipole.<br>180. RECEIVING ANTENNAS: Polarization Mismatch for Antennas, Friis Transmission Formula, Radar Range Equation, Antenna Noise Temperature.<br>181. LOOP ANTENNAS: Small Circular Loop, Circular Loop of Constant Current, Circular Loop with Non-uniform Current, Ferrite Loop.<br>182. ANTENNA ARRAYS: Two-Element Array, N-Element Linear Array, Design Procedures, Planar Arrays, Circular Arrays, design Considerations.<br>183. HORN ANTENNAS: E-Plane Sectorial Horn, H-Plane Sectorial Horn, Pyramidal Horn, Design Procedures.<br>184. REFLECTOR ANTENNA : Plane Reflector, Parabolic Reflectors<br>185. BASIC PROPAGATION MODELS: Definition of Path Loss, Noise Modeling, Free Space Loss, Plane Earth Loss, Link Budgets.<br>186. SATELLITE FIXED LINKS: Tropospheric Effects, Ionospheric Effects, Satellite Earth Station Antennas.</td></tr>
<tr><td>Teaching and Learning Methods<br><br>(These are examples. Please fill which activities you use in the course)</td><td>Weekly theoretical course hours<br><br>Internet browsing, library work<br><br>Reading Tasks<br><br>Preparation of Midterm and Midterm Exam<br><br>Term Project<br><br>Final Exam and Preparation for Final Exam</td></tr>
<tr><td>Assessment Criteria</td><td>
<table>
<tr><th></th><th>Numbers</th><th>Total Weighting (%)</th></tr>
<tr><td>Midterm Exams</td><td>2</td><td>67</td></tr>
<tr><td>Assignment</td><td>-</td><td>-</td></tr>
<tr><td>Application</td><td>5</td><td>25</td></tr>
<tr><td>Term Project</td><td>1</td><td>8</td></tr>
<tr><td>Practice</td><td>-</td><td>-</td></tr>
<tr><td>Quiz</td><td>-</td><td>-</td></tr>
<tr><td>Percent of In-term Studies (%)</td><td></td><td>60</td></tr>
<tr><td>Percentage of Final Exam to Total Score (%)</td><td></td><td>40</td></tr>
<tr><td>Attendance</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
</table>

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | 14 | 2 | 28 |
| Reading Tasks | 14 | 2 | 28 |
| Internet and library search | 14 | 2 | 28 |
| Material Design and Implementation | - | - | 0 |
| Term Project Preparation | 7 | 1 | 7 |
| Preparing a Presentation | - | - | 0 |
| Presentations | 1 | 1 | 1 |
| Midterm Exam and Preperation for Midterm Exam | 2 | 10 | 20 |
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |
| Other (Quizzes and preparation for quizzes) | - | - | 0 |
| Total Workload | | | 174 |
| Total Workload / 25 | | | 6.92 |
| Course Credit (ECTS) | | | 7 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | X | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and | | | | X | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | interpret results for investigating complex engineering problems or discipline specific research questions | | | | | |
| | CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | | X | |
| | CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | X | | |
| | CO8 | 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 | | | |
| | CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | X | | | | |
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | | X | | | |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | | | X | |
| **The Course's Lecturer(s) and Contact Information** | 61. Assoc .Prof. Dr. Nursel AKÇAM (ynursel@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE456 ELECTROMAGNETIC MODELLING |
| **Course Semester** | 8 |
| **Catalog Content** | Finite-difference time-domain method. Yee cell. Absorbing boundary conditions. Simulation of wave propagation. Finite element method. High frequency methods. Method of moments. Application of numerical and high frequency methods to antenna and microwave problems. |
| **Textbook** | 1) Numerical Techniques in Electromagnetics, M. N. O. Sadiku, CRC Press, 2001, Second Edition. |
| **Supplementary Textbooks** | - |
| **Credit** | 6 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | EEE351 (Attendance is compulsory) |
| **Type of the Course** | Elective (Compulsory for the selected package) |
| **Instruction Language** | English |
| **Course Objectives** | To get the maximum amount of knowledge about the widely used numerical methods in the solution of electromagnetic problems. |
| **Course Learning Outcomes** | Students who succeed this course:<br>1. Know finite difference method and apply to two dimensional problems.<br>2. Know two and three dimensional formulations of finite difference time domain method.<br>3. Know one dimensional formulation of finite difference time domain method and apply it.<br>4. Simulate wave propagation by using finite difference time domain method.<br>5. Know finite element method and apply to two dimensional problems. |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 1) Review of electromagnetic theory.<br>2) Classification of electromagnetic problems.<br>3) Separation of variables in rectangular coordinates.<br>4) Separation of variables in cylindrical coordinates.<br>5) Finite difference method.<br>6) Finite difference method: Application.<br>7) FDTD formulation for transverse magnetic (TM) waves.<br>8) FDTD formulation for transverse electric (TE) waves.<br>9) Finite element method. |

<table>
<tr><td></td><td>10) Finite element method: Application.<br>11) Moment method.<br>12) Moment method: Application.<br>13) High frequency methods.<br>14) High frequency methods: Application.</td></tr>
<tr><td>Teaching and Learning Methods<br><br>(These are examples. Please fill which activities you use in the course)</td><td>Weekly theoretical course hours<br>Term Project<br>Final Project<br>Presentations</td></tr>
<tr><td>Assessment Criteria</td><td>
<table>
<tr><th></th><th>Numbers</th><th>Total Weighting (%)</th></tr>
<tr><td>Midterm Exams</td><td>-</td><td>-</td></tr>
<tr><td>Assignment</td><td>-</td><td>-</td></tr>
<tr><td>Application</td><td>-</td><td>-</td></tr>
<tr><td>Projects</td><td>3</td><td>100</td></tr>
<tr><td>Practice</td><td>-</td><td>-</td></tr>
<tr><td>Quiz</td><td>-</td><td>-</td></tr>
<tr><td>Percent of In-term Studies (%)</td><td></td><td>60</td></tr>
<tr><td>Percentage of Final Exam to Total Score (%)</td><td></td><td>40</td></tr>
<tr><td>Attendance</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Workload</td><td>
<table>
<tr><th>Activity</th><th>Total Number of Weeks</th><th>Duration (weekly hour)</th><th>Total Period Work Load</th></tr>
<tr><td>Weekly Theoretical Course Hours</td><td>14</td><td>3</td><td>42</td></tr>
<tr><td>Weekly Tutorial Hours</td><td>-</td><td>-</td><td>0</td></tr>
<tr><td>Reading Tasks</td><td>14</td><td>2</td><td>28</td></tr>
<tr><td>Internet and library search</td><td>-</td><td>-</td><td>0</td></tr>
<tr><td>Material Design and Implementation</td><td>-</td><td>-</td><td>0</td></tr>
<tr><td>Term Project Preparation</td><td>4</td><td>12</td><td>48</td></tr>
</table>
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</table>

| | | | | |
|---|---|---|---|---|
| Final Project Preparation | 2 | 12 | 24 |
| Presentations | 3 | 2 | 6 |
| Midterm Exam and Preperation for Midterm Exam | - | - | 0 |
| Final Exam and Preperation for Final Exam | - | - | 0 |
| Other (Quizzez and preparation for quizzes) | - | - | 0 |
| Total Workload | | | 148 |
| Total Workload / 25 | | | 5.92 |
| Course Credit (ECTS) | | | 6 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | X | | |
| CO3 | 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 | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | X | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | X | | | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | | X | |
| CO8 | 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 | | |
| CO9 | Consciousness to behave according to ethical principles and professional and | | | X | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | ethical responsibility; knowledge on standards used in engineering practice . | | | | | |
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | | X | | |
| **The Course's Lecturer(s) and Contact Information** | Prof.Dr. Erkan AFACAN (e.afacan@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE458 RADIO FREQUENCY ELECTRONIC CIRCUITS |
| **Course Semester** | 8 |
| **Catalog Content** | RF (radio frequency) circuits, system architectures, noise measurement techniques and impedance matching, stability and noise figure for amplifier circuit design. |
| **Textbook** | RF Circuit Design, Chris Bowick, 2007, Elsevıer Scıence & Technology. |
| **Supplementary Textbooks** | An Introduction to RF Circuit Design for Communication Systems,<br>Roger C Palmer, 2016. |
| **Credit** | 6 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | None (Attendance is required) |
| **Type of the Course** | Elective |
| **Instruction Language** | English |
| **Course Objectives** | The objective of this course is to teach RF circuits and techniques |
| **Course Learning Outcomes** | Students who succeed this course:<br>1. Demonstrate an advanced understanding of the semiconductor physics underlying the operation of a range of RF devices<br>2. Draw the band diagrams for a range of semiconductor materials and RF devices and use them to predict and explain the current-voltage characteristics of those devices<br>3. Analyze devices with negative differential resistance and design oscillator circuits using the correct load resistance<br>4. Understand the design, fabrication, packaging, operation and characteristics of a wide range of two terminal RF devices<br>5. Analyze and design impedance matching circuits with both lumped components and distributed transmission line elements using analytical as well the graphical Smith Chart techniques<br>6. Evaluate the stability of RF transistors used in amplifier circuits and design corresponding matching net |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 187. Introduction to RF spectrum and applications,<br>188. Review of key aspects of semiconductor physics: band structure, effective mass and mobility, quantum wells and tunnelling<br>189. Two-terminal devices: transferred electron devices (Gunn diodes), IMPATT diodes, varactors, PIN diodes, tunnel diodes and quantum tunnel diodes<br>190. Overview of different transistor technologies for RF/microwave applications |

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|---|---|
| | 191. Introduction to coaxial, microstrip, coplanar transmission lines and planar filters, two-port networks and the scattering parameters<br>192. Impedance matching techniques (two-element L network, three-element matching, designing with Smith Chart, transmission-line matching network)<br>193. RF transistor amplifier design using scattering parameters (constant gain circle and constant noise circle)<br>194. Stability consideration and techniques for improving stability<br>195. Introduction to balanced amplifiers and distributed amplifiers<br>196. RF transmitters and receivers<br>197. Noise and noise figure<br>198. Mixers and modulators<br>199. Intermodulation and dynamic range<br>200. Amplifier linearisation techniques. |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours<br><br>Internet browsing, library work<br><br>Reading Tasks<br><br>Preparation of Midterm and Midterm Exam<br><br>Final Exam and Preparation for Final Exam |
| **Assessment Criteria** | |

| | **Numbers** | **Total Weighting (%)** |
|---|---|---|
| Midterm Exams | 2 | 67 |
| Assignment | 2 | 33 |
| Application | - | - |
| Term Project | - | - |
| Practice | - | - |
| Quiz | - | - |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| **Activity** | **Total Number of Weeks** | **Duration (weekly hour)** | **Total Period Work Load** |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | | | |
| Reading Tasks | 14 | 2 | 28 |
| Internet and library search | 14 | 2 | 28 |

| | | | |
|---|---|---|---|
| Material Design and Implementation | - | - | 0 |
| Term Project Preparation | - | - | 0 |
| Preparing a Presentation | - | - | 0 |
| Presentations | - | - | 0 |
| Midterm Exam and Preperation for Midterm Exam | 2 | 10 | 20 |
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |
| Other (Quizzes and preparation for quizzes) | - | - | 0 |
| Total Workload | | | 138 |
| Total Workload / 25 | | | 5.52 |
| Course Credit (ECTS) | | | 6 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | X | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | | | | X | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | | X | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | X | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | CO8 | 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 | | | | |
| | CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | | X | | | | |
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | | X | | | | |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | | | X | | |
| **The Course's Lecturer(s) and Contact Information** | 62. Assoc .Prof. Dr. Nursel AKÇAM (ynursel@gazi.edu.tr) | | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE461 INTRODUCTION TO BIOMEDICAL ENGINEERING |
| **Course Semester** | 7 |
| **Catalog Content** | Basic concepts of instrumentation. The origin of biopotentials. Biopotential amplifiers. ENG, EMG, EKG, EEG. Physiology and measurement of nervous, circulatory and respiratory systems. Therapeutic and prosthetic devices. |
| **Textbook** | Medical Instrumentation: Application and Design, John G. Webster, 4th Edition 2009 |
| **Supplementary Textbooks** | |
| **Credit** | 7 |
| **Prerequisites of the Course**<br><br>**( Attendance Requirements)** | Attendance is required |
| **Type of the Course** | Elective (Compulsory for the selected package) |
| **Instruction Language** | English |
| **Course Objectives** | To learn the basic concepts related to biomedical equipment and physiological parameters. |
| **Course Learning Outcomes** | Students who succeed this course:<br><br>1. Have basic information about the origin of biopotentials<br>2. Knowoperational principles of biomedical equipment,<br>3. Know measurement of physiological parameters. |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 201.Basic concepts of instrumentation.<br>202.The origin of biopotentials: Structure of nerve cells.<br>203.Biopotential transducers and electrodes.<br>204.Biopotential amplifiers.<br>205.Anatomy and function of the heart.<br>206.Operational principles of Electrocardiograph.<br>207.Respiratory system and modelling.<br>208.Operational principles of respirators.<br>209.Midterm<br>210.Anatomy and function of the brain.<br>211.Operational principles of EEG.<br>212.Hearing system physiology and cochlea implant approach.<br>213.Physiology of the kidney. Operational principles of hemodialysis system.<br>214. Lasers and its usage in medicine. |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours<br>Internet browsing, library work<br>Preparation of Midterm and Midterm Exam<br>Preparation for Quizzes<br>Term Project<br>Final Exam and Preparation for Final Exam |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 1 | 30 |
| Assignment | - | - |
| Application | - | - |
| Term Project | - | - |
| Laboratory | 2 | 30 |
| Practice | - | - |
| Quiz | - | - |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | - | - | 0 |
| Reading Tasks | 14 | 2 | 28 |
| Internet and library search | 14 | 1 | 14 |
| Material Design and Implementation | - | - | 0 |
| Term Project Preparation | - | - | 0 |
| Preparing a Presentation | - | - | 0 |
| Presentations | - | - | 0 |
| Laboratory | 4 | 2 | 8 |
| Laboratory reporting | 4 | 5 | 20 |
| Midterm Exam and Preparation for Midterm Exam | 2 | 19 | 38 |

| | | | | |
|---|---|---|---|---|
| Final Exam and Preparation for Final Exam | 1 | 25 | 25 |
| Other (Quizzes and preparation for quizzes) | - | - | - |
| Total Workload | | | 175 |
| Total Workload / 25 | | | 7 |
| Course Credit (ECTS) | | | 7 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | | X |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | | | | X | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | | | X |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | | | X |
| CO8 | 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 |
| CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | | | | | X |
| CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | | | | | X |

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|---|---|---|---|---|---|---|---|
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | | | X | |
| **The Course's Lecturer(s) and Contact Information** | 63. Prof. Dr. M. İrfan KARAGÖZ(irfankaragoz@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE462 MEDICAL IMAGING SYSTEMS |
| **Course Semester** | 8 |
| **Catalog Content** | 2-D signal processing. X-ray systems: Operational principles of roentgen tubes. Basic principles of Computerized Tomography. Nuclear Medicine and Gamma Cameras. Positron Emission Tomography (PET). Mathematical principles of Ultrasonography and medical applications. Magnetic Resonance Imaging Systems. |
| **Textbook** | Medical Imaging Systems, Dr. İrfan Karagöz and Dr. Osman Eroğul. |
| **Supplementary Textbooks** | Medical Imaging Systems, Albert Macovski. |
| **Credit** | 6 |
| **Prerequisites of the Course**<br><br>**( Attendance Requirements)** | Attendance is required |
| **Type of the Course** | Elective (Compulsory for the selected package) |
| **Instruction Language** | English |
| **Course Objectives** | Learning of the mathematical, operational principles and usage areas of medical imaging systems. |
| **Course Learning Outcomes** | Students who succeed this course:<br>1. Know about the imaging tecniques in medical imaging systems<br>2. Know he new instrumentation designs by studying the image reconstruction techniques and imaging sources of medical imaging systems. |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 215. 2-D signal processing.<br>216. X-ray systems: operational principles of roentgen tubes. Fluoroscopic methods and DSA imaging systems.<br>217. Basic principles of Computerized Tomography. Image reconstruction mathematics, ART.<br>218. Bakprojection. Convolution and Fourier Transform approach.<br>219. Scanning and image processing techniques in CT.<br>220. Nuclear Medicine and Gamma cameras: Operational principles, PMT's, Scintillation crystal. Detectors and collimators.<br>221. Positron emission Tomography (PET).<br>222. Mathematical principles of ultrasonography and medical applications.<br>223. Midterm<br>224. A,B, and M modes imaging. Ultrasonic characteristic of Tissue.<br>225. Magnetic resonance imaging systems: Energy levels, Larmor frequency.<br>226. T1-T2 relaxation. Spin-echo and multiple echo techniques. Gradient field. |

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| | 227. Imaging techniques: Slice selection, Frequency encoding, Phase encoding.<br>228. Obtaining the image of two different points. |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours<br>Internet browsing, library work<br>Preparation of Midterm and Midterm Exam<br>Preparation for Quizzes<br>Term Project<br>Final Exam and Preparation for Final Exam |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 1 | 37 |
| Assignment | 1 | 16 |
| Application | - | - |
| Term Project | - | - |
| Projects | 1 | 37 |
| Practice | - | - |
| Quiz | - | - |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Assignments | 1 | 5 | 5 |
| Weekly Tutorial Hours | - | - | 0 |
| Reading Tasks | 14 | 1 | 14 |
| Internet and library search | 14 | 1 | 14 |
| Material Design and Implementation | - | - | 0 |
| Term Project Preparation | 5 | 4 | 20 |
| Preparing a Presentation | - | - | 0 |
| Presentations | - | - | 0 |

| | | | | |
|---|---|---|---|---|
| Midterm Exam and Preperation for Midterm Exam | 2 | 10 | 20 |
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |
| Other (Quizzez and preparation for quizzes) | 5 | 3 | 15 |
| 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 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | | X |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | | | | | X |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | | | X |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | | | X |
| CO8 | 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 |
| CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | | | | | X |
| CO10 | Knowledge about business life practices such as project management, risk | | | | | X |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | | | | | |
| | CO11 | xi) Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | | | X | |
| **The Course's Lecturer(s) and Contact Information** | 64. Prof. Dr. M. İrfan KARAGÖZ(irfankaragoz@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE471 Power System Analysis I |
| **Course Semester** | 7 |
| **Catalog Content** | Introduction to power systems line parametres; inductance and capacitance of transmission lines. Short, medium and long length lines; current and voltage relations. Electrical characteristics of transformers and generators. |
| **Textbook** | 5- John J. Grainger and William D. Stevenson JR, Power System Analysis, McGraw-Hill, ISBN: 0-07-061293-5 |
| **Supplementary Textbooks** | 5- John J. Grainger and William D. Stevenson JR, Power System Analysis, McGraw-Hill, ISBN: 0-07-061293-5<br>6- J. Duncan Glover, Mulukutla S. Sarma Power System Analysis and Design, Thomson Learning, ISBN13: 978-0534953676 |
| **Credit** | 6 |
| **Prerequisites of the Course**<br><br>**( Attendance Requirements)** | - |
| **Type of the Course** | Elective (Compulsory for the selected package) |
| **Instruction Language** | English |
| **Course Objectives** | To introduce basic concepts and background for power systems analysis. To present methods of line representation, system modelling and three-phase short circuit fault analysis. |
| **Course Learning Outcomes** | Students who succeed this course:<br><br>79. Can calculate the equivalent inductance and capacitance of various transmission lines.<br>80. Can calculate the line parameters of various transmission lines.<br>81. Can model and analyze transmission lines.<br>82. Understand and apply the compensation concept. |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 229. Introduction to power systems and general background.<br>230. series impedance of transmission lines.<br>231. Inductance and Capacitance of transmission lines.<br>232. Capacitance of transmission lines.<br>233. Representation of transmission lines and current-voltage relations.<br>234. Introduction to short long transmission lines.<br>235. Calculation of receiving end voltage/current, sending end voltage/current<br>236. Calculation of voltage regulation and efficiency of the line, Compensation<br>237. Midterm 1.<br>238. Electrical characteristics of transformers and generators.<br>239. Calculation of line parameters at the medium long transmission line.<br>240. Calculation of receiving end voltage/current, sending end voltage/current, etc. at the nominal π circuit<br>241. Calculation of line parameters at the long transmission line. |

| | |
|---|---|
| | 242. Calculation of receiving end voltage/current, sending end voltage/current, etc. at the long transmission line |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours<br>Internet browsing, library work<br>Preparation of Midterm and Midterm Exam<br>Final Exam and Preparation for Final Exam |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 2 | 100 |
| Assignment | - | - |
| Application | - | - |
| Term Project | - | - |
| Practice | - | - |
| Quiz | - | - |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | - | - | 0 |
| Reading Tasks | 14 | 1 | 14 |
| Internet and library search | 14 | 1 | 14 |
| Material Design and Implementation | - | - | 0 |
| Term Project Preparation | - | - | 0 |
| Preparing a Presentation | - | - | 0 |
| Presentations | - | - | 0 |
| Midterm Exam and Preperation for Midterm Exam | 2 | 27 | 54 |

| | | | | |
|---|---|---|---|---|
| Final Exam and Preperation for Final Exam | 1 | 26 | 26 |
| Other (Quizzez and preparation for quizzes) | - | - | 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 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | | | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | X | | | | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | X | | | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | X | | | | |
| CO8 | 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 | | | | |
| CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | X | | | | |
| CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | CO11 | xi) Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | X | | | |
| **The Course's Lecturer(s) and Contact Information** | 65. Assis.Prof.Dr. Süleyman Sungur TEZCAN (stezcan@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE472 Power System Analysis II |
| **Course Semester** | 8 |
| **Catalog Content** | Per-unit quantities, System modelling, Symmetrical three-phase faults, Symmetrical components, Positive, negative and zero-sequence networks, Unsymmetrical faults on power systems; single line to ground, double line to ground and line to line fault analysis, Matrix analysis of power systems and solutions, Load flow analysis. |
| **Textbook** | 6- John J. Grainger and William D. Stevenson JR, Power System Analysis, McGraw-Hill, ISBN: 0-07-061293-5 |
| **Supplementary Textbooks** | 7- John J. Grainger and William D. Stevenson JR, Power System Analysis, McGraw-Hill, ISBN: 0-07-061293-5<br>8- J. Duncan Glover, Mulukutla S. Sarma Power System Analysis and Design, Thomson Learning, ISBN13: 978-0534953676 |
| **Credit** | 6 |
| **Prerequisites of the Course**<br><br>**( Attendance Requirements)** | EEE471 (Compulsory for the selected package) |
| **Type of the Course** | Elective (Compulsory for the selected package) |
| **Instruction Language** | English |
| **Course Objectives** | To introduce symmetrical faults and to introduce unsymmetrical fault analysis employing symmetrical components. To present matrix analysis methods of power systems and load flow analysis. To introduce power system stability and learn transient stability analysis. |
| **Course Learning Outcomes** | Students who succeed this course:<br><br>83. Can model the power systems and can analyze the symmetrical faults.<br>84. Can analyze the unsymmetrical faults.<br>85. Can make the load flow analysis of power systems. |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 243. PER-UNIT CALCULATIONS<br>244. SYSTEM MODELING<br>245. INTRODUCTION TO FAULTS ON POWER SYSTEMS<br>246. ANALYSIS OF UNSYMMETRICAL FAULTS<br>247. INTRODUCTION TO SYMMETRICAL COMPONENTS<br>248. SEQUENCE IMPEDANCES AND SEQUENCE NETWORKS<br>249. SINGLE LINE TO GROUND FAULT<br>250. DOUBLE LINE TO GROUND FAULT<br>251. LINE TO LINE FAULT<br>252. MIDTERM<br>253. INTRODUCTION TO LOAD FLOW Introduction, Power flow equations and the power flow problem.<br>254. LOAD FLOW ANALYSIS; Iteration schemes, accelerated Gauss-Seidel, Newton-Raphson Methods |

| | |
|---|---|
| | 255. LOAD FLOW ANALYSIS; Applications<br>256. POWER SYSTEM STABILITY; Introduction, Rotor-Dynamics, The swing Equation. |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours<br>Internet browsing, library work<br>Preparation of Midterm and Midterm Exam<br>Final Exam and Preparation for Final Exam |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 2 | 100 |
| Assignment | - | - |
| Application | - | - |
| Term Project | - | - |
| Practice | - | - |
| Quiz | - | - |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | - | - | 0 |
| Reading Tasks | 14 | 1 | 14 |
| Internet and library search | 14 | 1 | 14 |
| Material Design and Implementation | - | - | 0 |
| Term Project Preparation | - | - | 0 |
| Preparing a Presentation | - | - | 0 |
| Presentations | - | - | 0 |

| | | | | |
|---|---|---|---|---|
| Midterm Exam and Preperation for Midterm Exam | 2 | 27 | 54 |
| Final Exam and Preperation for Final Exam | 1 | 26 | 26 |
| Other (Quizzez and preparation for quizzes) | - | - | 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 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | | | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | X | | | | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | X | | | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | X | | | | |
| CO8 | 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 | | | | |
| CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | X | | | | |
| CO10 | Knowledge about business life practices such as project management, risk | X | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | | | | | |
| | CO11 | xi) Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | X | | | |
| **The Course's Lecturer(s) and Contact Information** | 66. Assis.Prof.Dr. Süleyman Sungur TEZCAN (stezcan@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE473 LIGHTING TECHNIQUES |
| **Course Semester** | 7 |
| **Catalog Content** | Light theories. Eye, sensitivity and vision types. Light reflection, absorption and transmission phenomenon. Definition of lighting terms. Lighting methods. Internal lighting systems and calculations. Pre-project preparation fundamentals. Feeder, column and main-column line formation. Fundamentals of practical application project preparations. Low power-factor correction methods in internal installations. Voltage-drop calculation for lighting systems. External lighting calculations. |
| **Textbook** | M. ÖZKAYA, Aydınlatma Tekniği, İTÜ Elektrik-Elektronik Fakültesi. |
| **Supplementary Textbooks** | 14. İ. KAŞIKÇI, Alçak Gerilim Elektrik Tesislerinin projelendirilmesi.<br>15. M.BAYRAM, Elektrik Tesislerinde Güvenlik.<br>16. TSE, Elektrik İç Tesisleri Yönetmeliği. |
| **Credit** | 7 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | - |
| **Type of the Course** | Elective |
| **Instruction Language** | English |
| **Course Objectives** | Learning of lighting theories for electrical-electronics engineers and interior lighting systems and calculation methods.<br>Preparation of a sample pre- and application lighting projects. |
| **Course Learning Outcomes** | Students who succeed this course:<br>10- Can make theoretical calculations of interior lighting systems.<br>11- Can design the interior lighting project.<br>12- Can put into practice the interior lighting calculations and project design, using the AutoCAD package software. |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 257. Light theories. Eye, vision sensitivity and vision types.<br>258. Physical concepts for lighting; reflection, absorption and deflection concepts.<br>259. Definition of lighting and light intensity units and terms.<br>260. Lighting types. Interior lighting systems.<br>261. Lighting calculations: example problems and applications.<br>262. Fundamentals of lighting pre-project preparation.<br>263. Formation of internal main and side conductor lines<br>264. Fundamentals of lighting application-project preparation<br>265. Voltage drop calculation of internal main and side conductor lines.<br>266. Methods for reactive power compensation for internal installations |

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| | 267. Voltage drop comparisons<br>268. External lighting calculations.<br>269. Introduction to street lighting.<br>270. Submission of projects and oral exam. Examining of example projects and discussions. |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours<br>Internet browsing, library work<br>Preparation of Midterm and Midterm Exam<br>Term Project<br>Final Exam and Preparation for Final Exam |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 1 | 50 |
| Assignment | - | - |
| Application | 1 | 33 |
| Term Project | 1 | 17 |
| Practice | - | - |
| Quiz | - | - |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | 14 | 1 | 14 |
| Reading Tasks | 14 | 1 | 14 |
| Internet and library search | 14 | 1 | 14 |
| Material Design and Implementation | 5 | 5 | 25 |
| Term Project Preparation | 5 | 4 | 20 |
| Preparing a Presentation | - | - | 0 |
| Presentations | - | - | 0 |

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|---|---|---|---|---|
| Midterm Exam and Preperation for Midterm Exam | 1 | 20 | 20 |
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |
| Other (Quizzez and preparation for quizzes) | - | - | - |
| Total Workload | | | 169 |
| Total Workload / 25 | | | 6,79 |
| Course Credit (ECTS) | | | 7 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | X | | |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | X | | |
| CO3 | 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 |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | | X |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | X | | | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | X | | | | |
| CO8 | 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 | | | | |
| CO9 | Consciousness to behave according to ethical principles and professional and | X | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | ethical responsibility; knowledge on standards used in engineering practice . | | | | | |
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | X | | | | |
| **The Course's Lecturer(s) and Contact Information** | 67. Prof.Dr. M.Cengiz TAPLAMACIOĞLU, (taplam@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE474 RENEWABLE ENERGY SYSTEMS |
| **Course Semester** | 8 |
| **Catalog Content** | General structure of renewable energy systems. General structure of power converters used in renewable energy systems. Solar power systems and principles. Panel structure and types. Maximum power point tracking algorithms. Connection types of solar inverters. Wind power systems and principles. Wind turbine types, connection types. Maximum power point tracking. Fuel cells and applications. Other renewable energy sources. Electric vehicles.. |
| **Textbook** | Alternative Enegy in Power Electronics; M.H. Rashid, Elsevier Inc |
| **Supplementary Textbooks** | Introduction to Renewable Energy for Engineers; K.D. Hagen, Pearson Education Inc. |
| **Credit** | 6 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | - |
| **Type of the Course** | Compulsory (Power Branch) |
| **Instruction Language** | English |
| **Course Objectives** | To learn the techniques necessary for the analysis and basic design of the electrical power transformation in renewable energy systems. |
| **Course Learning Outcomes** | Students who succeed this course:<br>1. Understand the working principles of renewable energy systems and can make basic calculations about these systems.<br>2. Have information about Turkey's renewable energy projection and legislation.<br>3. Know what electrical power converters used in renewable energy systems are and what they are used for.<br>4. Know system elements, control and network connection principles of the photovoltaic energy systems and can design them in the system level.<br>5. Know system elements, control and network connection principles of the wind energy systems and can design them in the system level.<br>6. Know system elements, control and network connection principles of the other renewable energy systems.<br>7. Know the energy storage technologies used in renewable energy systems.<br>8. Know the working principles and basic system components of electric vehicles and recognize the energy storage technologies used in these vehicles. |
| **Instruction Methods** | Face-to-face |

**Weekly Schedule**

271. Energy Sources and Renewable Energy
272. Turkey's Renewable Energy Projection and Legislation
273. Electrical Power Converters Used In Renewable Energy Systems
274. Photovoltaic Effect and Photovoltaic Semiconductor Structures
275. Photovoltaic Source Renewable Energy Systems
276. Maximum Power Point Tracking In Photovoltaic Source Renewable Energy Systems
277. Grid Connections of Photovoltaic Source Renewable Energy Systems
278. Basic Design of Photovoltaic Source Renewable Energy Systems
279. Wind Turbines and Structures
280. Wind Source Renewable Energy Systems
281. Wind Farms and Grid Connections
282. Hydraulic, Geothermal and Biomass Source Renewable Energy Systems
283. Energy Storage In Renewable Energy Systems
284. Electric Vehicles

**Teaching and Learning Methods**

*(These are examples. Please fill which activities you use in the course)*

Weekly theoretical course hours
Internet browsing, library work
Preparation of Midterm and Midterm Exam
Term Project
Final Exam and Preparation for Final Exam

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 1 | 50 |
| Assignment | 2 | 33 |
| Application | - | - |
| Term Project | - | - |
| Practice | - | - |
| Quiz | 1 | 17 |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |

| | | | | |
|---|---|---|---|---|
| Weekly Tutorial Hours | - | - | 0 |
| Reading Tasks | 14 | 1 | 14 |
| Internet and library search | 14 | 1 | 14 |
| Material Design and Implementation | - | - | 0 |
| Term Project Preparation | - | - | 0 |
| Preparing a Presentation | - | - | 0 |
| Presentations | - | - | 0 |
| Midterm Exam and Preperation for Midterm Exam | 1 | 25 | 25 |
| Final Exam and Preperation for Final Exam | 1 | 25 | 25 |
| Other (Quizzez and preparation for quizzes) | 5 | 4 | 20 |
| Total Workload | | | 140 |
| Total Workload / 25 | | | 5,6 |
| Course Credit (ECTS) | | | 6 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | X | |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | X | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | | | X | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | X | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign | | | X | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | | | |
| | CO8 | 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 | | |
| | CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | | X | | | |
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | CO11 | xi) Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | | X | | |
| **The Course's Lecturer(s) and Contact Information** | 68. Prof. Dr. M. Timur AYDEMİR (aydemirmt@gazi.edu.tr)<br>69. Doç. Dr. Haluk Gözde (hgozde@kho.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE478 High Voltage Techniques |
| **Course Semester** | 8 |
| **Catalog Content** | I-V characterics of gases. Electron emission processes. Ionization and deionization. Townsend and Streamer breakdown mechanisms. :Breakdown in electronegative gases. Corona discharges and loses. Breakdown mechanisms in solid and liquid insulations. Generation of A.C. D.C. and impulse voltages. |
| **Textbook** | 7- High Voltage Engineering Fundamentals: E. Kuffel and W. S. Zaengl, Pergamon Press, 1986 ISBN: 0-08-024212-x |
| **Supplementary Textbooks** | 9- High Voltage Engineering Fundamentals: E. Kuffel and W. S. Zaengl, Pergamon Press, 1986 ISBN: 0-08-024212-x<br>10- High Voltage Engineering: E. Kuffel and M. M. Abdullah, Pergamon Pres, 1970<br>11- Fundamentals of gaseous ionization and plasma electronics, Essam Nasser, John Wiley & Sons Canada, Limited, 1971 |
| **Credit** | 7 |
| **Prerequisites of the Course**<br><br>**( Attendance Requirements)** | - |
| **Type of the Course** | Elective (Compulsory for the selected package) |
| **Instruction Language** | English |
| **Course Objectives** | To learn breakdown in electronegative gases, lightning discharges and corona discharges |
| **Course Learning Outcomes** | Students who succeed this course:<br><br>86. Can analyze breakdown in electronegative gases.<br>87. Can analyze the lightning discharges<br>88. Can analyze the corona discharges . |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 285. Introduction to High Voltage Techniques.<br>286. Electron emission mechanisms.<br>287. Current – Voltage relationships in gases, free and mean free path of particles.<br>288. Electron avalanches mechanisms and ionization growth in gases.<br>289. Secondary processes and Townsend's breakdown mechanisms.<br>290. Paschens law and Paschens curve. Calculation of breakdown voltages.<br>291. Insulation property of Electronegative gases<br>292. Breakdown mechanisms.<br>293. Partial discharges and corona.<br>294. Breakdown mechanisms in liquid and solid dielectrics.<br>295. Generation of high voltages.<br>296. Measurement of high voltages.<br>297. Impulse Voltage Generator and Calibration of Impulse Voltage Generator<br>298. Voltage Multiplier |

**Teaching and Learning Methods**

*(These are examples. Please fill which activities you use in the course)*

Weekly theoretical course hours
Internet browsing, library work
Preparation of Midterm and Midterm Exam
Laboratory work
Final Exam and Preparation for Final Exam

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 1 | 50 |
| Assignment | - | - |
| Application | 1 | 50 |
| Term Project | - | - |
| Practice | - | - |
| Quiz | - | - |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | 9 | 5 | 45 |
| Reading Tasks | 14 | 1 | 14 |
| Internet and library search | 14 | 1 | 14 |
| Material Design and Implementation | - | - | 0 |
| Term Project Preparation | - | - | 0 |
| Preparing a Presentation | - | - | 0 |
| Presentations | - | - | 0 |
| Midterm Exam and Preperation for Midterm Exam | 1 | 30 | 30 |
| Final Exam and Preperation for Final Exam | 1 | 30 | 30 |

| | | | | |
|---|---|---|---|---|
| Other (Quizzez and preparation for quizzes) | - | - | 0 |
| Total Workload | | | 175 |
| Total Workload / 25 | | | 7 |
| Course Credit (ECTS) | | | 7 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | | | X |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 | | | | |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | X | | | | |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | X | | | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | X | | | | |
| CO8 | 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 | | | | |
| CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | X | | | | |
| CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| CO11 | xi) Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century | | X | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | | | | |
| **The Course's Lecturer(s) and Contact Information** | 70. Assis.Prof.Dr. Süleyman Sungur TEZCAN (stezcan@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE481 COMPUTER ARCHITECTURE |
| **Course Semester** | 7 |
| **Catalog Content** | Instruction set architecture (ISA), RISC and CISC architectures, assembly and machine language, addressing modes, branching and procedures. Computer arithmetic, arithmetic logic unit (ALU) design. Processor design, data path and control implementation, micro programmed control, interrupts. Pipelining, pipelined processor design. Memory hierarchy, caches, virtual memory. I/O devices, memory mapped I/O. |
| **Textbook** | 8- Computer Principles and Design in Verilog HDL, Yamin Li<br>9- The Designer's Guide to VHDL, by Peter J. Ashenden |
| **Supplementary Textbooks** | 12- Computer Architecture: A Quantitative Approach, John L. Hennessy, David A. Patterson |
| **Credit** | 6 |
| **Prerequisites of the Course**<br>**(Attendance Requirements)** | EEE304 (Attendance is compulsory) |
| **Type of the Course** | Elective (Computer Package Required Course) |
| **Instruction Language** | English |
| **Course Objectives** | The aim of this course is to learn microprocessor architectures, how to design the internal structure of a processor with hardware description languages. |
| **Course Learning Outcomes** | Students who succeed this course:<br>1. Know microprocessor architectures.<br>2. Can design the internal structure of the microprocessor.<br>3. Can program FPGA with hardware description languages. |
| **Instruction Methods** | Face to face |
| **Weekly Schedule** | 1- Command sets (ISA), RISC and CISC architectures<br>2- Assembly and machine languages, addressing modes<br>3- Hardware description languages - I<br>4- Hardware description languages - II<br>5- Computer arithmetic - I<br>6- Computer arithmetic - II<br>7- Arithmetic logic unit (ALU) design<br>8- Midterm<br>9- Processor design |

<table>
<tr><td></td><td>10- Data path design<br>11- Control unit design<br>12- Pipeline, pipeline processor design<br>13- Memory hierarchy, cache, virtual memory<br>14- Input and output units</td></tr>
<tr><td>Teaching and Learning Methods<br><br>(These are examples. Please fill which activities you use in the course)</td><td>Weekly theoretical course hours<br>Reading Activities<br>Internet browsing, library work<br>Project<br>Report preparing<br>Preparing a Presentation<br>Preparation of Midterm and Midterm Exam<br>Final Exam and Preparation for Final Exam</td></tr>
<tr><td>Assessment Criteria</td><td>
<table>
<tr><th></th><th>Numbers</th><th>Total Weighting (%)</th></tr>
<tr><td>Midterm Exams</td><td>1</td><td>40</td></tr>
<tr><td>Assignment</td><td>5</td><td>40</td></tr>
<tr><td>Application</td><td>-</td><td>-</td></tr>
<tr><td>Projects</td><td>1</td><td>20</td></tr>
<tr><td>Practice</td><td>-</td><td>-</td></tr>
<tr><td>Quiz</td><td>-</td><td>-</td></tr>
<tr><td>Percent of In-term Studies (%)</td><td></td><td>60</td></tr>
<tr><td>Percentage of Final Exam to Total Score (%)</td><td></td><td>40</td></tr>
<tr><td>Attendance</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>Workload</td><td>
<table>
<tr><th>Activity</th><th>Total Number of Weeks</th><th>Duration (weekly hour)</th><th>Total Period Work Load</th></tr>
<tr><td>Weekly Theoretical Course Hours</td><td>14</td><td>3</td><td>42</td></tr>
<tr><td>Weekly Tutorial Hours</td><td>-</td><td>-</td><td>0</td></tr>
<tr><td>Reading Tasks</td><td>14</td><td>1</td><td>14</td></tr>
<tr><td>Studies</td><td>14</td><td>1</td><td>14</td></tr>
<tr><td>Material Design and Implementation</td><td>-</td><td>-</td><td>0</td></tr>
<tr><td>Report Preparing</td><td>6</td><td>3</td><td>18</td></tr>
</table>
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| | | | | |
|---|---|---|---|---|
| Preparing a Presentation | 1 | 10 | 10 |
| Presentations | 1 | 6 | 6 |
| Midterm Exam and Preperation for Midterm Exam | 1 | 10 | 10 |
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |
| Other ( should be emphasized) | - | - | 16 |
| 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 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledgein these areas in complex 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 analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | | X |
| 5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | | | X | | |
| 6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | X | | | | |
| 7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | 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 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | X | | | | |
| 10 | Knowledge about business life practices such as project management, risk management, and change management; | X | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | awareness in entrepreneurship, innovation; knowledge about sustainable development | | | | | |
| | 11 | xi) Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | X | | | | |
| **The Course's Lecturer(s) and Contact Informations** | 71. Assoc.Prof.Dr. Hasan Şakir BİLGE (bilge@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE482 DATA STRUCTURES |
| **Course Semester** | 8 |
| **Catalog Content** | Fundamentals of object oriented programming. Classes, members functions, constructers, operator overloading, inheritance. Data structures: linked lists, stacks, queues, trees, hash tables and graphs. Algorithms and efficiency of algorithms. Sorting and searching algorithms. Event-driven programming. |
| **Textbook** | 10-C How to Program, Deitel&Deitel<br>11-C++ How to Program, Deitel&Deitel<br>12-Data Structures, Algorithms, and Applications in C++, Sartaj Sahni |
| **Supplementary Textbooks** | 13-Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein |
| **Credit** | 6 |
| **Prerequisites of the Course**<br>**(Attendance Requirements)** | EEE103 (Attendance is compulsory) |
| **Type of the Course** | Elective (Computer Package Required Course) |
| **Instruction Language** | English |
| **Course Objectives** | The aim of this course is to learn object oriented programming, data structures and algorithms. In particular, the application areas of these subjects in Electrical and Electronics Engineering are emphasized. |
| **Course Learning Outcomes** | Students who succeed this course:<br>1. Know concepts related to object oriented programming.<br>2. Can write object oriented programs.<br>3. Know how data structures work.<br>4. Can code basic algorithms related to data structures.<br>5. Can apply data structures and algorithms to Electrical-Electronics Engineering problems. |
| **Instruction Methods** | Face to face |
| **Weekly Schedule** | 1- Fundamentals of object-oriented programming<br>2- Class structures, member functions, constructive methods<br>3- Operator overloading<br>4- Inheritance<br>5- Polymorphism<br>6- Virtual and abstract classes |

| | |
|---|---|
| | 7- Linked lists<br>8- Midterm<br>9- Stacks<br>10- Queues<br>11. Trees<br>12- Hash tables and graphs<br>13- Algorithms and algorithm efficiency<br>14- Sorting and search algorithms |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours<br>Reading Activities<br>Internet browsing, library work<br>Project<br>Report preparing<br>Preparing a Presentation<br>Presentations<br>Preparation of Midterm and Midterm Exam<br>Final Exam and Preparation for Final Exam |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 1 | 40 |
| Assignment | 5 | 40 |
| Application | - | - |
| Projects | 1 | 20 |
| Practice | - | - |
| Quiz | - | - |
| Percent of In-term Studies (%) | | 60 |
| Percentage of Final Exam to Total Score (%) | | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | - | - | 0 |
| Reading Tasks | 14 | 1 | 14 |

| | | | | |
|---|---|---|---|---|
| Studies | 14 | 1 | 14 |
| Material Design and Implementation | - | - | 0 |
| Report Preparing | 6 | 3 | 18 |
| Preparing a Presentation | 1 | 10 | 10 |
| Presentations | 1 | 6 | 6 |
| Midterm Exam and Preperation for Midterm Exam | 1 | 10 | 10 |
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |
| Other ( should be emphasized) | - | - | 16 |
| 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 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledgein these areas in complex 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 analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | | X |
| 5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| 6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | X | | | | |
| 7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | X | | | |
| 8 | Recognition of the need for lifelong learning; ability to access information, to follow developments in science and | X | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | technology, and to continue to educate him/herself | | | | | |
| | 9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | X | | | | |
| | 10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| | 11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | X | | | | |
| **The Course's Lecturer(s) and Contact Informations** | 72. Assoc.Prof.Dr. Hasan Şakir BİLGE (bilge@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE484 Introduction to Computer Networks |
| **Course Semester** | 8 |
| **Catalog Content** | ISO-OSI model with sublayers, Local area network protocols, Ethernet and the data link layer, Error detection and correction, Datalink protocols, Routing, Internetworking, Internet with tools. |
| **Textbook** | "Cisco®Certified Network Associate Study Guide 6th Edition", *Todd Lammle ,Wiley Publishing* |
| **Supplementary Textbooks** | "Computer Networking, 5th edition", *J.F. Kurose and K.W. Ross, Addison Wesley* |
| **Credit** | 7 |
| **Prerequisites of the Course**<br><br>**( Attendance Requirements)** | - |
| **Type of the Course** | Compulsory (for branch) |
| **Instruction Language** | English |
| **Course Objectives** | To learn the necessary concepts and techniques required for fundamental of computer networking. |
| **Course Learning Outcomes** | Students who succeed this course:<br><br>1. Understand the concept and applications of computer networks |
| **Instruction Methods** | Face to face expression, Applied expression, Question-Answer |
| **Weekly Schedule** | 71. Internetworking and Routing<br>72. The Internetworking Problem<br>73. Routers: Forwarding and Routing The IP Forwarding Path<br>74. Unicast Internet Routing: Intra- and Inter-Domain Routing<br>75. Router Design and Implementation<br>76. Security Problems with the Internet Architecture<br>77. End-to-End Congestion Control<br>78. Router-Assisted Congestion Control: Active Queue Management<br>79. Fair Queuing and Variants<br>80. Packet Trains Slides<br>81. Adaptive Network Applications<br>82. Wireless and Mobility: MAC Protocols, Routing<br>83. Multicast Routing and Transport<br>84. General review |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours<br>Weekly applied course hours<br>Reading Activities<br>Internet browsing, library work<br>Designing and implementing materials<br>Report preparing<br>Preparation of Midterm and Midterm Exam<br>Final Exam and Preparation for Final Exam |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 1 | 50 |
| Assignment | 1 | 50 |
| Application | - | - |
| Projects | - | - |
| Practice | - | - |
| Quiz | - | - |
| Percent of In-term Studies (%) | - | 60 |
| Percentage of Final Exam to Total Score (%) | - | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | 14 | 2 | 28 |
| Reading Tasks | 14 | 1 | 14 |
| Studies | 14 | 1 | 14 |
| Material Design and Implementation | 1 | 3 | 3 |
| Report Preparing | 14 | 2 | 28 |
| Preparing a Presentation | - | - | - |
| Presentations | - | - | - |
| Midterm Exam and Preperation for Midterm Exam | 1 | 20 | 20 |
| Final Exam and Preperation for Final Exam | 1 | 20 | 20 |

| | | | | |
|---|---|---|---|---|
| Other ( should be emphasized) | - | - | - |
| Total Workload | | | 169 |
| Total Workload / 25 | | | 6,8 |
| Course Credit (ECTS) | | | 7 |

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

| No | Program Outcomes | 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 knowledgein these areas in complex 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 analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | X | | |
| 5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | | X | | | |
| 6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | | X | |
| 7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | | 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 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | | | | X | |
| 10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | | | | X | |
| 11 | xi) Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | | | | X |

| | |
|---|---|
| **The Course's Lecturer(s) and Contact Informations** | 73. Assoc. Prof. Dr. Fırat HARDALAÇ (firat@gazi.edu.tr) |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE485 Introduction to Artificial Intelligence |
| **Course Semester** | 7 |
| **Catalog Content** | Introduction to MATLAB for Neural Networks, Neural network topology and applications |
| **Textbook** | "Artificial Intelligence", *Margaret A. Boden ,Elsevier* |
| **Supplementary Textbooks** | "Artificial Intelligence in Engineering Design", *Christopher Tong, Elsevier* |
| **Credit** | 6 |
| **Prerequisites of the Course**<br>**( Attendance Requirements)** | - |
| **Type of the Course** | Elective |
| **Instruction Language** | English |
| **Course Objectives** | To learn the necessary concepts and techniques required for the analysis artificial neural networks |
| **Course Learning Outcomes** | Students who succeed this course:<br>1. Know Artificial Intelligence<br>2. Have knowledge about artificial neural networks<br>3. Can design a neural network |
| **Instruction Methods** | Face to face expression, Applied expression, Question-Answer |
| **Weekly Schedule** | 85. Mind and Intelligence, Artificial Intelligence<br>86. Artificial Neural Networks and Computer<br>87. Introduction to Artificial Neural Networks<br>88. Neural Network Learning<br>89. Neural Network Structure<br>90. Neural Network learning algorithms<br>91. Neural Network design<br>92. Neural Network application areas<br>93. Perceptron Network Structure<br>94. Adaline Network Structure<br>95. Madaline Network Structure<br>96. Classification Problems<br>97. Artificial Neural Networks' Apllications<br>98. General review |
| **Teaching and Learning Methods**<br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours:<br>Reading Activities<br>Internet browsing, library work<br>Report preparing<br>Preparation of Midterm and Midterm Exam<br>Final Exam and Preparation for Final Exam |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Midterm Exams | 1 | 50 |
| Assignment | 1 | 50 |
| Application | - | - |
| Projects | - | - |
| Practice | - | - |
| Quiz | - | - |
| Percent of In-term Studies (%) | - | 60 |
| Percentage of Final Exam to Total Score (%) | - | 40 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 3 | 42 |
| Weekly Tutorial Hours | - | - | - |
| Reading Tasks | 14 | 1 | 14 |
| Studies | 14 | 2 | 28 |
| Material Design and Implementation | - | - | - |
| Report Preparing | - | - | - |
| Preparing a Presentation | - | - | - |
| Presentations | - | - | - |
| Midterm Exam and Preperation for Midterm Exam | 1 | 25 | 25 |
| Final Exam and Preperation for Final Exam | 1 | 25 | 25 |
| Other ( should be emphasized) | - | - | - |
| Total Workload | | | 144 |
| Total Workload / 25 | | | 5,76 |
| Course Credit (ECTS) | | | 6 |

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

| No | Program Outcomes | 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 knowledgein these areas in complex 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 analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | | X |
| 5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | | | | X | |
| 6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | X | | |
| 7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | 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 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | | X | | | |
| 10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | X | | | | |
| 11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | | | X | |

**The Course's Lecturer(s) and Contact Informations**

74. Assoc. Prof. Dr. Fırat HARDALAÇ (firat@gazi.edu.tr)

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE491 ELECTRICAL-ELECTRONIC ENGINEERING DESIGN I (SE) |
| **Course Semester** | Fall - Spring |
| **Catalog Content** | Application of the project management steps to a specific problem and preparation of conceptual design report. Carrying out project preparations towards entrepreneurship. |
| **Textbook** | 17. R.M. Ford, C.S. Coulston, Design for Electrical and Computer Engineers, 2008, McGraw Hill. |
| **Supplementary Textbooks** | 2. P. Kosky, R. Balmer, W. Keat, G. Wise; Exploring Engineering: An Introduction to Engineering and Design; 4th Ed. Elsevier, 2016. |
| **Credit** | 5 |
| **Prerequisites of the Course**<br><br>**( Attendance Requirements)** | 1. Being eligible to graduate at the end of the subsequent semester.<br>2. EEE392 (Attendance is required) |
| **Type of the Course** | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | The objective of this course is to apply the concepts and processes learned in EEE 391 Project Management course to a specific Electrical-Electronic Engineering problem and to prepare a project proposal based on this. |
| **Course Learning Outcomes** | Students who succeed this course:<br><br>89. Can design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; can apply modern design methods for this purpose.<br>90. Can design experiments for investigating complex engineering problems or discipline specific research questions.<br>91. Understand the entrepreneurship and innovation concepts; can prepare project proposal for an entrepreneurship program.<br>92. Can prepare conceptual design report.<br>93. Can prepare and conduct oral presentations. |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 299. Project selection. Establishing teams. Work sharing.<br>300. Requirement analysis.<br>301. Concept generation and evaluation.<br>302. System design.<br>303. Entrepreneurship and innovation concepts.<br>304. Entrepreneurship project proposal preparation.<br>305. Conceptual design.<br>306. Conceptual design.<br>307. Conceptual design.<br>308. Project Management.<br>309. Project Management.<br>310. Project Management.<br>311. Project Management.<br>312. Project Management. |

**Teaching and Learning Methods**

*(These are examples. Please fill which activities you use in the course)*

Weekly theoretical course hours
Internet browsing, library work
Report preparation
Presentation preparation
Presentation

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Entrepreneurship project | 1 | 40 |
| Conceptual design report | 1 | 40 |
| Presentation | 1 | 20 |
| | - | - |
| | - | - |
| | - | - |
| Percent of In-term Studies (%) | | 100 |
| Percentage of Final Exam to Total Score (%) | | 0 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 1 | 14 |
| Weekly Tutorial Hours | - | - | 0 |
| Reading Tasks | 10 | 2 | 20 |
| Internet and library search | 14 | 2 | 28 |
| Design | 14 | 3 | 42 |
| Report Writing | 6 | 5 | 30 |
| Preparing a Presentation | 1 | 15 | 15 |
| Presentation | 1 | 1 | 1 |
| Midterm Exam and Preparation for Midterm Exam | - | - | 0 |

| | | | | |
|---|---|---|---|---|
| Final Exam and Preparation for Final Exam | - | - | 0 |
| Other (Quizzes and preparation for quizzes) | - | - | 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 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | X | | |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | | X |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | X | | | | |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | X | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | | | X |
| CO8 | 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 |
| CO9 | Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice . | | | | | X |
| CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, | | | | | X |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | innovation; knowledge about sustainable development | | | | | |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | | | | X |
| **The Course's Lecturer(s) and Contact Information** | 75. Prof. Dr. M. Timur AYDEMİR (aydemirmt@gazi.edu.tr) | | | | | | |

| Course Description Form | |
|---|---|
| **Course Code and Name** | EEE492 ELECTRICAL-ELECTRONIC ENGINEERING DESIGN II (SE) |
| **Course Semester** | Fall - Spring |
| **Catalog Content** | Improving the conceptual design obtained for the design problem studied in EEE 491 Electrical-Electronic Engineering Design I course; generating the detailed design through the design processes; finalizing the design under realistic constraints and testing the design; reporting and presenting the results. |
| **Textbook** | 18. R.M. Ford, C.S. Coulston, Design for Electrical and Computer Engineers, 2008, McGraw Hill. |
| **Supplementary Textbooks** | 3. P. Kosky, R. Balmer, W. Keat, G. Wise; Exploring Engineering: An Introduction to Engineering and Design; 4th Ed. Elsevier, 2016. |
| **Credit** | 4 |
| **Prerequisites of the Course**<br><br>**( Attendance Requirements)** | 3. EEE491 Electrical-Electronic Engineering Design I (Attendance is required) |
| **Type of the Course** | Compulsory |
| **Instruction Language** | English |
| **Course Objectives** | The objective of this course is gain the students the abilities of carrying out engineering design under realistic constraints, testing the design, reporting the results in writing and in oral presentations, discuss the environmental, legal, etc. effects of the engineering solutions. |
| **Course Learning Outcomes** | Students who succeed this course:<br><br>94. Can produce the system designed under realistic constraints and conditions.<br>95. Can conduct experiments on the system they designed and produced; can interpret the data obtained from the tests.<br>96. Can prepare detailed design reports.<br>97. Can prepare final reports.<br>98. Can prepare and present oral presentations.<br>99. Gain knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; and become aware of the legal consequences of engineering solutions . |
| **Instruction Methods** | Face-to-face |
| **Weekly Schedule** | 313. Preparation of detailed design report<br>314. Preparation of detailed design report<br>315. Preparation of detailed design report<br>316. Preparation of detailed design report<br>317. Building the system<br>318. Building the system<br>319. Building the system<br>320. Building the system<br>321. Building the system |

| | |
|---|---|
| | 322. Tests<br>323. Tests<br>324. Tests<br>325. Report preparation<br>326. Report preparation |
| **Teaching and Learning Methods**<br><br>*(These are examples. Please fill which activities you use in the course)* | Weekly theoretical course hours<br>Internet browsing, library work<br>Report preparation<br>Presentation preparation<br>Presentation |

**Assessment Criteria**

| | Numbers | Total Weighting (%) |
|---|---|---|
| Entrepreneurship project | 1 | 40 |
| Conceptual design report | 1 | 40 |
| Presentation | 1 | 20 |
| | - | - |
| | - | - |
| | - | - |
| Percent of In-term Studies (%) | | 100 |
| Percentage of Final Exam to Total Score (%) | | 0 |
| Attendance | - | - |

**Workload**

| Activity | Total Number of Weeks | Duration (weekly hour) | Total Period Work Load |
|---|---|---|---|
| Weekly Theoretical Course Hours | 14 | 1 | 14 |
| Weekly Tutorial Hours | - | - | 0 |
| Internet and library search | 14 | 1 | 14 |
| Material Design and Implementation | 10 | 1 | 10 |
| Experiments | 4 | 5 | 20 |
| Report writing | 10 | 3 | 30 |
| Preparing a Presentation | 1 | 10 | 10 |

| | | | | |
|---|---|---|---|---|
| Presentation | 1 | 1 | 1 |
| Midterm Exam and Preparation for Midterm Exam | - | - | 0 |
| Final Exam and Preparation for Final Exam | - | - | 0 |
| Other (Quizzes and preparation for quizzes) | - | - | 0 |
| Total Workload | | | 99 |
| Total Workload / 25 | | | 4 |
| Course Credit (ECTS) | | | 4 |

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

| No | Program Outcomes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | | | | | | |
| CO1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. | | | X | | |
| CO2 | Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose | | | | | X |
| CO3 | 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 |
| CO4 | Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. | | | | | X |
| CO5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions | | | | | X |
| CO6 | Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually | | | X | | |
| CO7 | Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions | | | | | X |
| CO8 | 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 |
| CO9 | Consciousness to behave according to ethical principles and professional and | | | | | X |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | ethical responsibility; knowledge on standards used in engineering practice . | | | | | |
| | CO10 | Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development | | | | | X |
| | CO11 | Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions . | | | | | X |
| **The Course's Lecturer(s) and Contact Information** | 76. Prof. Dr. M. Timur AYDEMİR (aydemirmt@gazi.edu.tr) | | | | | | |