**Program Records**

|  |  |
| --- | --- |
| **About the Program** | The topics of Electrical-Electronics Engineering are based on mathematics, physics and calculation methods, and are related to the design of electrical and electronic devices, electronic circuits, sensor-detector and actuator developments, robotics and automation systems, power generation-transmission-distribution planning, electrical signal processing design, design and development of communication and optical systems. Today, Electrical and Electronics Engineers are working in areas such as electricity generation-transmission-distribution, telecommunications, defense industry, health technologies, computer and telephone production, information and communication technologies. In order to train high-profile engineers who will work in these areas and in many different fields, AGU Electrical-Electronics Engineering department with internationally experienced academic staff provides a comprehensive education in areas such as circuit design, digital design, electrical machinery, electronic circuit design, power systems, communication systems, control and robot systems and nano-bio-technologies. A unique curriculum and educational environment have been created for our students to provide knowledge not only in their own field Electrical and Electronics Engineering but also in other specialties, and to make them individuals with the capacity to guide their own lives after graduation. Our students can specialize in their fields of interest by taking appropriate field elective and free elective courses. |
| **Program Objectives** | 1. Our graduates with the comprehensive education will be able to take part in work life by undertaking the duties of engineering, research and development or entrepreneurship in national and international companies or government institutions.  2. Graduates will be able to carry out scientific studies, research and technological development and complete graduate studies in Electrical and Electronics Engineering and related fields.  3. Our graduates will have innovative and global vision and will be able to work independently. |
| **Qualification Awarded** | Bachelor’s Degree / Diploma in Electrical-Electronics Engineering |
| **Length of Program & Credits** | 4 years (excluding one year of English Preparatory Program) 240 ECTS |
| **Level of Qualification** | First Cycle (Bachelor’s) Degree; EQF-LLL Level 6, QF-EHEA Level 1 |
| **Mode of Study** | Full Time |
| **Field of Study** | 52-Engineering (522-Electric and Energy, 523-Electronics and Automation) |
| **Admission Requirements** | High school diploma; Placed by National Higher Education Exam (YKS) scores; Proof of English proficiency (TOEFL or Abdullah Gül University English Proficiency Exam)  For foreign students, proof the admission requirements that are announced by the university. |
| **Recognition of Credit Mobility** | Courses taken outside of the program could be transferred in accordance with the associated principals of the Abdullah Gul University Undergraduate Education and Examination Regulation rules by the respective management board. |
| **Graduation Requirements & Regulations** | Student has to complete all courses in the program curriculum with a minimum GPA of 2.00. |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Occupational Profiles of Graduates** | The graduates of the Department of Electronics and Electronics Engineering are among the most preferred engineers at all levels, from research and development engineers to project management and from production to sales, in the electricity, electronics and defense sectors and in national and international companies. Some of the graduates are doing graduate (masters and doctorate) research at various universities. | | | | | | | |
| **Access to Further Studies** | Graduates may apply to second cycle (Level 7 or Level 8) degree programs. | | | | | | | |
| **Assessment & Grading Policy** | Based on Abdullah Gul University Undergraduate Education and Examination Regulation rules; | | | | | | |
| Letter Grade | Coefficient | Score | Status |  | Letter Grade | Status |
| A | 4.00 | 90-100 | Pass |  | NA | Not Attended |
| A- | 3,67 | 87-89 | Pass |  | W | Withdrawn |
| B+ | 3,33 | 83-86 | Pass |  | I | Incomplete |
| B | 3,00 | 80-82 | Pass |  | T | Transferred |
| B- | 2,67 | 77-79 | Pass |  | S | Satisfactory |
| C+ | 2,33 | 73-76 | Pass |  | U | Unsatisfactory |
| C | 2,00 | 70-72 | Pass |  | P | In Progress |
| C- | 1,67 | 64-69 | Conditional Pass |  | EX | Exempt |
| D+ | 1,33 | 56-63 | Conditional Pass |  |  |  |
| D | 1,00 | 50-55 | Conditional Pass |  |  |  |
| F | 0,00 | 0-49 | Failed |  |  |  |
| **Program Outcomes** | On completion of the EEE program at AGU, the graduates will have:   1. An ability to apply knowledge of mathematics, science, general engineering and electrical-electronics engineering in complex engineering problems, 2. An ability to design and conduct experiments, as well as to analyze and interpret data in order to investigate the complex engineering problems and electrical-electronics engineering problems, 3. An ability to model, simulate and design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability, 4. An ability to function efficiently as a member or leader on intradisciplinary and multidisciplinary project teams, 5. An ability to identify, formulate, and solve local and global complex engineering problems, 6. An understanding of professional and ethical responsibility, knowledge on standards used in engineering, 7. An ability to communicate effectively, 8. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context, 9. A recognition of the need for, and an ability to engage in life-long learning, 10. A knowledge of contemporary issues and global problems, awareness on the legal consequences of engineering solutions, 11. An ability to choose and use the techniques, skills, and modern engineering tools necessary for engineering practice in Turkey and abroad, 12. An ability to use risk, change and project management techniques necessary for engineering projects, awareness on entrepreneurship and innovation. | | | | | | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TQF-HE & Program Outcomes Coverage** |  | **Knowledge**  Theoretical Conceptual | | | **Skills**  Cognitive  Practical | | **Competences** | | | | | | | |
| Work Independently and Take Responsibility | | Learning | | Communication and Social | | | Field Specific |
| P01 | X | | |  | |  | | X | |  | | |  |
| PO2 |  | | | X | |  | | X | |  | | |  |
| PO3 |  | | | X | |  | | X | |  | | | X |
| PO4 |  | | |  | | X | | X | |  | | |  |
| PO5 |  | | | X | |  | | X | |  | | |  |
| PO6 |  | | |  | |  | |  | |  | | | X |
| PO7 |  | | |  | |  | |  | | X | | |  |
| PO8 |  | | |  | |  | |  | |  | | | X |
| PO9 |  | | |  | | X | | X | | X | | |  |
| PO10 |  | | |  | |  | |  | | X | | |  |
| PO11 |  | | | X | |  | |  | | X | | |  |
| PO12 |  | | |  | |  | |  | | X | | | X |
| **Institutional & Program Outcomes Coverage** |  | | IO1 | IO2 | | IO3 | | IO4 | | IO5 | | IO6 | IO7 | |
| P01 | | X |  | |  | |  | |  | |  |  | |
| PO2 | |  |  | |  | |  | | X | |  |  | |
| PO3 | |  | X | |  | |  | | X | |  |  | |
| PO4 | |  |  | | X | | X | | X | |  |  | |
| PO5 | |  | X | |  | |  | | X | |  |  | |
| PO6 | |  |  | |  | |  | |  | |  | X | |
| PO7 | |  |  | |  | |  | |  | | X |  | |
| PO8 | | X |  | |  | |  | |  | |  |  | |
| PO9 | |  |  | |  | |  | | X | |  |  | |
| PO10 | |  |  | |  | | X | |  | |  | X | |
| PO11 | | X |  | | X | | X | |  | |  |  | |
| PO12 | |  | X | | X | |  | |  | |  |  | |

**Curriculum**

**ABDULLAH GÜL ÜNİVERSİTESİ / ABDULLAH GÜL UNIVERSITY**

**Electrical-Electronics Engineering Undergraduate Program**

*(For students who start their undergraduate education in Fall 2016)*

**FIRST YEAR / FALL Semester (Freshman Year)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Course Code | Course Name | Lec. | Lab | Credits | ECTS |
| MATH 151 | Calculus I | 5 | 0 | 5 | 6 |
| PHYS 101 | Physics I | 3 | 2 | 4 | 5 |
| COMP 101 | Art of Computing | 3 | 2 | 4 | 6 |
| ENG 101 | English I | 4 | 0 | 4 | 4 |
| GLB 101 | AGU Ways | 3 | 0 | 3 | 4 |
|  | *Science Elective\** | 3 | 2 | 4 | 5 |
|  | Total Credits | 21 | 6 | 24 | 30 |

\* EE100 Integrated Project I, CHEM 101 Chemistry for Engineers ve BIO 101 Biology for Engineers I (one of these three courses will be selected)

**FIRST YEAR / SPRING Semester (Freshman Year)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Code | Course Name | PreReq | Lec. | Lab | Credits | ECTS |
| MATH 152 | Calculus II | MATH 151 | 5 | 0 | 5 | 6 |
| PHYS 102 | Physics II |  | 3 | 2 | 4 | 5 |
| COMP 112 | Object Oriented Programming | COMP 101 | 3 | 2 | 4 | 6 |
| ENG 102 | English II | ENG 101 | 4 | 0 | 4 | 4 |
| GLB XXX | Global Issues Elective I |  | 3 | 0 | 3 | 4 |
| EE 102 | Exploring Profession |  | 3 | 2 | 4 | 5 |
|  | Total Credits |  | 21 | 6 | 24 | 30 |

**SECOND YEAR / FALL Semester (Sophomore Year)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Code | Course Name | PreReq | Lec. | Lab | Credits | ECTS |
| MATH 205 | Differential Equations | MATH 152 | 4 | 0 | 4 | 5 |
| EE 201 | Electric Circuits I |  | 3 | 0 | 3 | 5 |
| EE 211 | Electric Circuits I Lab |  | 0 | 2 | 1 | 2 |
| EE 203 | Digital Design |  | 3 | 0 | 3 | 4 |
| EE 213 | Digital Design Lab |  | 1 | 2 | 2 | 2 |
| EE 205 | Engineering Electromagnetics | MATH 152 PHYS 102 | 3 | 0 | 3 | 5 |
| GLB XXX | Global Issues Elective II |  | 3 | 0 | 3 | 4 |
| TURK 101 | Turkish I |  | 2 | 0 | 2 | 2 |
|  | Total Credits |  | 19 | 4 | 21 | 29 |

**SECOND YEAR / SPRING Semester (Sophomore Year)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Code | Course Name | PreReq | Lec. | Lab | Credits | ECTS |
| MATH 203 | Linear Algebra |  | 3 | 0 | 3 | 5 |
| EE 202 | Electric Circuits II | EE 201 | 3 | 0 | 3 | 5 |
| EE 212 | Electric Circuits II Lab |  | 0 | 2 | 1 | 2 |
| EE 204 | Signals and Systems |  | 3 | 2 | 4 | 6 |
| EE 206 | Electronics I | EE 203 | 3 | 0 | 3 | 5 |
| EE 216 | Electronics I Lab |  | 0 | 2 | 1 | 2 |
| GLB XXX | Global Issues Elective III |  | 3 | 0 | 3 | 4 |
| TURK 102 | Turkish II |  | 2 | 0 | 2 | 2 |
|  | Total Credits |  | 17 | 6 | 20 | 31 |

**THIRD YEAR / FALL Semester (Junior Year / FALL Semester)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Code | Course Name | PreReq | Lec. | Lab | Credits | ECTS |
| EE 299 | Summer Training I\* |  |  |  | 0 | 4 |
| MATH 301 | Probability and Statistics | MATH 152 | 3 | 0 | 3 | 5 |
| EE 311 | Electronics II | EE 206 | 3 | 0 | 3 | 4 |
| EE 321 | Electronics II Lab |  | 0 | 2 | 1 | 2 |
| EE 303 | Feedback Control Systems | EE 204 | 3 | 2 | 4 | 6 |
| EE 307 | Intro to Nanosci & Nanotech |  | 3 | 0 | 3 | 4 |
| GLB XXX | Global Issues Elective IV |  | 3 | 0 | 3 | 3 |
| HIST 201 | History of Turkish Republic I |  | 2 | 0 | 2 | 2 |
|  | Total Credits |  | 17 | 4 | 19 | 30 |

\*At least three semesters in the program

**THIRD YEAR / SPRING Semester (Junior Year)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Code | Course Name | PreReq | Lec. | Lab | Credits | ECTS |
| EE 491 | Senior Project I |  | 2 | 0 | 2 | 7 |
| EE 308 | Electric Machines and Drives |  | 3 | 2 | 4 | 6 |
| EE 306 | Fund. of Telecommunications Engineering | EE 204  MATH 301 | 3 | 0 | 3 | 6 |
| EE 304 | Embedded Systems | EE 203 | 3 | 2 | 4 | 6 |
| XXX | Nontechnical Elective |  | 3 | 0 | 3 | 3 |
| HIST 202 | History of Turkish Republic II |  | 2 | 0 | 2 | 2 |
|  | Total Credits |  | 16 | 4 | 18 | 30 |

**FOURTH YEAR / FALL Semester (Senior Year)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Course Code | Course Name | Lec. | Lab | Credits | ECTS |
| EE 492 | Senior Project II | 2 | 0 | 2 | 9 |
| OHS 401 | Occupational Health and Safety I | 2 | 0 | 2 | 1 |
|  | Concentration Area Elective |  |  |  | 5 |
|  | Concentration Area Elective |  |  |  | 5 |
|  | Concentration Area Elective |  |  |  | 5 |
|  | Concentration Area Elective |  |  |  | 5 |
|  | Total Credits |  |  |  | 30 |

**FOURTH YEAR / SPRING Semester (Senior Year)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Course Code | Course Name | Lec. | Lab | Credits | ECTS |
| EE 400 | Workplace Experience | 1 | 0 | 1 | 29 |
| OHS 402 | Occupational Health and Safety II | 0 | 0 | 0 | 1 |
|  | Total Credits |  |  | 1 | 30 |

**Concentration Area Electives**

(4 of these courses must be taken)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Code | Course Name | Lec. | Lab | Credits | ECTS |
| EE 404 | Antennas | 3 | 0 | 3 | 5 |
| EE 408 | Microwave Engineering | 3 | 0 | 3 | 5 |
| EE 420 | Flat Panel Display Technologies | 3 | 0 | 3 | 5 |
| EE 421 | Geometrical Optics | 3 | 0 | 3 | 5 |
| EE 422 | Nanophotonics | 3 | 0 | 3 | 5 |
| EE 423 | Optics and Photonics | 3 | 0 | 3 | 5 |
| EE 424 | Fiber Optic Communication | 3 | 0 | 3 | 5 |
| EE 432 | Digital Signal Processing | 3 | 0 | 3 | 5 |
| EE 434 | Sensors and Measurement | 3 | 0 | 3 | 5 |
| EE 440 | Neural Engineering | 3 | 0 | 3 | 5 |
| EE 443 | Biomedical Instrumentation and Signal Analysis | 3 | 0 | 3 | 5 |
| EE 445 | Fundamentals of BioMEMS | 3 | 0 | 3 | 5 |
| EE 451 | Power Electronics | 3 | 0 | 3 | 5 |
| EE 452 | Electric Power Systems | 3 | 0 | 3 | 5 |
| EE 453 | Power Distribution Systems | 3 | 0 | 3 | 5 |
| EE 454 | High Voltage Techniques | 3 | 0 | 3 | 5 |
| EE 455 | Introduction to Electric Drive Systems | 3 | 0 | 3 | 5 |
| EE 465 | Data Mining | 3 | 0 | 3 | 5 |
| EE 473 | Introduction to Robotics | 3 | 0 | 3 | 5 |
| EE 474 | Applied Programmable Logic Controllers | 3 | 0 | 3 | 5 |
| EE 485 | Semiconductor Device Fundamentals | 3 | 0 | 3 | 5 |
| EE 486 | Semiconductor Process and Device Fabrication | 3 | 0 | 3 | 5 |
| COMP 301 | Analysis of Algorithms | 3 | 2 | 4 | 6 |
| COMP 302 | System Programming | 3 | 2 | 4 | 5 |
| COMP 303 | Operating Systems | 3 | 0 | 3 | 6 |
| COMP 305 | Computer Organization | 3 | 0 | 3 | 6 |
| COMP 306 | Formal Languages and Automata Theory | 3 | 2 | 4 | 6 |
| COMP 308 | Computer Networks | 3 | 0 | 3 | 6 |
| COMP 403 | Blockchain and Cryptocurrencies | 3 | 0 | 3 | 5 |
| COMP 411 | Communication Networks | 3 | 0 | 3 | 5 |
| COMP 430 | Digital Image Processing | 3 | 0 | 3 | 5 |
| COMP 431 | Computer Vision | 3 | 0 | 3 | 5 |
| COMP 455 | Linux For Engineers and Scientists | 3 | 0 | 3 | 6 |
| COMP 461 | Deep Learning | 3 | 0 | 3 | 5 |
| COMP 462 | Bioinformatics | 3 | 0 | 3 | 5 |
| COMP 463 | Computational Genomics | 3 | 0 | 3 | 5 |
| COMP 464 | Pattern Recognition | 3 | 0 | 3 | 5 |
| COMP 465 | Artificial Intelligence | 3 | 0 | 3 | 5 |
| COMP 482 | Parallel Architectures | 3 | 0 | 3 | 5 |

**GLB Electives**

(4 GLB courses must be taken)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Code | Course Name | Lec. | Lab | Credits | ECTS |
| GLB 102 | Innovation and Entrepreneurship | 3 | 0 | 3 | 4 |
| GLB 201 | Food and Health | 3 | 0 | 3 | 4 |
| GLB 202 | Immigration and Population | 3 | 0 | 3 | 4 |
| GLB 301 | Sustainability | 3 | 0 | 3 | 4 |

**Curriculum Summary**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **%** |  | | **Courses** | **Credit** | **ECTS** |
| **10,0** | **AGU Signature Courses** GLB101, GLB102, GLB201, GLB202, GLB301, GLB302 | | 6 | 18 | 24 |
| **7,5** | **YÖK/HEC Courses**  ENG101, ENG102, TURK101, TURK102,  HIST201, HIST202, OHS401, OHS402 | | 8 | 20 | 18 |
| **63,33** | **Compulsory**   EExxx, MATHxxx, PHYSxxx, COMPxxx | | 30 | 99 | 152 |
| **15,0** | **Non-Technical Electives** XXX | | 2 | 6 | 6 |
| **Technical Electives**  EE4xx | | 6 | 18 | 30 |
| **4,17** | **Summer Practice** EE299, EE399 | | 2 | 0 | 10 |
| 100,0 | **TOTAL** |  | **54** | **161** | **240** |

**Program Course Code Descriptions**

|  |  |
| --- | --- |
| EE **X** x x | EE x x **X** |
| **1** Freshman | **odd** Fall |
| **2** Sophomore | **even** Spring |
| **3** Junior |  |
| **4-5** Senior |  |

**Courses Descriptions**

|  |  |
| --- | --- |
| Code | **EE 102** |
| Name | **Exploring Profession** |
| Hour per week | 5 (3 + 2) |
| Credit | 4 |
| ECTS | 5 |
| Level/Year | Undergraduate / 1 |
| Semester | Spring |
| Type | Compulsory |
| Prerequisites | none |
| Coordinator |  |
| Description | The purpose of this course is to provide the students a quick introduction to electrical-electronics engineering, with a focus on practical aspects. Lectures are given on fundamental topics of EE engineering and to complement the lab/project work. Student will have ability to solve engineering problems, perform simple lab experiments, write technical reports and work on a team. The social and ethical aspects of the engineering profession will be discussed. The course will provide self-learning and creative thinking abilities. |

|  |  |
| --- | --- |
| Code | EE201 |
| Name | Electric Circuits 1 |
| Hour per week | 3 (Theory) |
| Credit | 3 |
| ECTS | 5 |
| Level/Year | Undergraduate, 2 |
| Semester | Fall |
| Type | Compulsory |
| Prerequisites |  |
| Coordinator |  |
| Description | **This course provides fundamental knowledge and skills for** basic electrical properties and circuit analysis. **This course introduces/covers the fundamentals of** simple resistive circuits, techniques of circuit analysis, operational amplifiers, inductance, capacitance, RL, RC and RLC circuits. **This course intends to teach the students how** to analyze electrical circuits, how to identify, formulate, and solve electrical engineering problems. The course covers the following topics: Simple resistive circuits, techniques of circuit analysis, operational amplifiers, inductance, capacitance, RL, RC and RLC circuits. The types of circuit models are linear and the course will include formulating and building mathematical models that are appropriate for the linear electrical circuits. |

|  |  |
| --- | --- |
| Code | EE202 |
| Name | Electric Circuits 2 |
| Hour per week | 3 (Theory) |
| Credit | 3 |
| ECTS | 5 |
| Level/Year | Undergraduate / 2 |
| Semester | Spring |
| Type | Compulsory |
| Prerequisites |  |
| Coordinator |  |
| Description | **This course provides fundamental knowledge and skills for** basic electrical properties and circuit analysis of circuits with AC sources. **This course introduces/covers the fundamentals of** simple resistive circuits, techniques of phasor domain, techniques of AC circuit analysis, Laplace transformation, mutual inductance, power circuits, frequency response. **This course intends to teach the students how** to analyze electrical circuits, how to identify, formulate, and solve electrical engineering problems with AC sources. The course covers the following topics: Phasor domain, techniques of AC circuit analysis, Laplace transformation, mutual inductance, power circuits, frequency response. The types of circuit models include AC sources and the course will include formulating and building mathematical models that are appropriate for the electrical circuits including AC sources. |

|  |  |
| --- | --- |
| Code | **EE203** |
| Name | **Digital Design** |
| Hour per week | 3 (3 + 0) |
| Credit | 3 |
| ECTS | 4 |
| Level/Year | Undergraduate / 2 |
| Semester | Fall |
| Type | Compulsory |
| Prerequisites | None |
| Coordinator |  |
| Description | This course introduces the fundamentals of digital logic design. The topics include number systems, Boolean algebra, logic gates, combinational logic design, logic circuit simplification, latches and flip-flops, sequential logic design, registers, counters, arithmetic logic design, finite state machines, register transfer, and single-cycle computer. |

|  |  |
| --- | --- |
| Code | **EE204** |
| Name | **Signals and Systems** |
| Hour per week | 5 (3 + 2) |
| Credit | 4 |
| ECTS | 6 |
| Level/Year | Undergraduate / 2 |
| Semester | Spring |
| Type | Compulsory |
| Prerequisites | - |
| Coordinator |  |
| Description | This course introduces the mathematical background of signals, transformation of signals and systems concepts. The discussions begin with the definitions and properties of signals and systems to establish a common language. The analysis of linear time-invariant (LTI) systems (impulse response and convolution) and manipulations of signals (modulation and filtering) through the use of Fourier analysis, z-transform and other related mathematical operations are covered. These topics are illustrated first with continuous-time signals and then discrete-time signals. The topics also include the basics of sampling theorem. The MATLAB programming is introduced with its use in signals and systems problems. |

|  |  |
| --- | --- |
| Code | **EE 205** |
| Name | **Electromagnetic** |
| Hour per week | 3 (Theory) |
| Credit | 3 |
| ECTS | 5 |
| Level/Year | Undergraduate/ 2 |
| Semester | Fall |
| Type | Compulsory |
| Prerequisites | MATH 152, PHYS 102 |
| Coordinator |  |
| Description | This course introduces the fundamentals of theory of electrical and magnetic fields and their applications. The course covers the following topics: vector calculus, static electric fields, Coulomb’s law, Gauss law, electric potential, capacitance and capacitors, steady electric currents, current density, Kirchoff’s law, static magnetic fields, Biot-Savart law, magnetic dipole, magnetic forces and torques, time-varying fields and Maxwell’s equations. |

|  |  |
| --- | --- |
| Code | **EE206** |
| Name | **Electronics I** |
| Hour per week | 3 (3 + 0) |
| Credit | 3 |
| ECTS | 5 |
| Level/Year | Undergraduate / 2 |
| Semester | Spring |
| Type | Compulsory |
| Prerequisites | EE202, EE203 |
| Coordinator |  |
| Description | This course provides the basics of electronics. The topics include solid-state-electronics, diodes, diode circuits, field-effect transistors, bipolar junction transistors, op-amp circuits, and digital electronic circuits such as inverters, NAND gates, NOR gates, combinational logic gates, and sequential logic gates. |

|  |  |
| --- | --- |
| Code | EE211 |
| Name | Electric Circuits Lab 1 |
| Hour per week | 2 (Practice) |
| Credit | 1 |
| ECTS | 2 |
| Level/Year | Undergraduate, 2 |
| Semester | Fall |
| Type | Compulsory |
| Prerequisites |  |
| Coordinator |  |
| Description | Electric Circuits Lab 1 focuses on experiments on basic electrical properties and circuit analysis. After taking this course the students will be able to conduct experiments on electrical circuits, identify, formulate, and solve electrical engineering problems. Experiments include resistive circuits, techniques of circuit analysis, operational amplifiers, inductance, capacitance, RL, RC and RLC circuits are taught to students. |

|  |  |
| --- | --- |
| Code | EE212 |
| Name | Electric Circuits Lab 2 |
| Hour per week | 2 (Practice) |
| Credit | 1 |
| ECTS | 2 |
| Level/Year | Undergraduate, 2 |
| Semester | Spring |
| Type | Compulsory |
| Prerequisites |  |
| Coordinator |  |
| Description | Electric Circuits Lab 2 focuses on experiments on basic AC electrical properties and circuit analysis. After taking this course the students will be able to conduct experiments on AC electrical circuits, identify, formulate, and solve electrical engineering problems. Experiments include phasor domain, techniques of circuit analysis, mutual inductance, power, transformers, laplace transformation and frequency analysis are taught to students. |

|  |  |
| --- | --- |
| Code | **EE213** |
| Name | **Digital Design Lab** |
| Hour per week | 3 (1 + 2) |
| Credit | 2 |
| ECTS | 2 |
| Level/Year | Undergraduate / 2 |
| Semester | Fall |
| Type | Compulsory |
| Prerequisites | EE203 |
| Coordinator |  |
| Description | This laboratory course teaches how to design digital circuits and systems practically, based on the theoretical concepts obtained from EE203 (Digital Design). More specifically, the course educates how to design digital systems using hardware description language (HDL), and how to implement them by using an FPGA board. In addition, the course also includes implementation of digital circuits by using MSI chips. |

|  |  |
| --- | --- |
| Code | **EE216** |
| Name | **Electronics I Lab** |
| Hour per week | 2 (0 + 2) |
| Credit | 1 |
| ECTS | 2 |
| Level/Year | Undergraduate / 2 |
| Semester | Spring |
| Type | Compulsory |
| Prerequisites | EE206 |
| Coordinator |  |
| Description | This laboratory course provides students with opportunities to learn operation characteristics of basic electronic devices such as diodes, bipolar junction transistors, field effect transistors, and optoelectronic devices. It also introduces practical implementations of digital electronic circuits including inverters, NOR gates, NAND gates, complex gates, latches and flip-flops at the transistor level. In addition, it includes design and implementation of op-amp circuits. Most of the experiments are also accompanied by simulations through SPICE. |

|  |  |
| --- | --- |
| Code | **EE 251** |
| Name | **Undergraduate Research/Independent Study** |
| Hour per week | 2 |
| Credit | 1 |
| ECTS | 2 |
| Level/Year | Undergraduate / 2 |
| Semester | Fall |
| Type | Elective |
| Prerequisites |  |
| Coordinator |  |
| Description | The main purpose of this course is to provide the student an opportunity for working on a supervised research projects. This research project may involve theoretical or practical work that would involve designing, testing or investigation of a given research problem depending on the topic. The student is aware of how her or his project fits into and contributes to solving the larger problem to which it belongs. The student will directly work with a faculty member or a graduate student who is performing research supervised by a faculty member. |

|  |  |
| --- | --- |
| Code | **EE 252** |
| Name | **Undergraduate Research/Independent Study** |
| Hour per week | 2 |
| Credit | 1 |
| ECTS | 2 |
| Level/Year | Undergraduate / 2 |
| Semester | Spring |
| Type | Elective |
| Prerequisites |  |
| Coordinator |  |
| Description | The main purpose of this course is to provide the student an opportunity for working on a supervised research projects. This research project may involve theoretical or practical work that would involve designing, testing or investigation of a given research problem depending on the topic. The student is aware of how her or his project fits into and contributes to solving the larger problem to which it belongs. The student will directly work with a faculty member or a graduate student who is performing research supervised by a faculty member. |

|  |  |
| --- | --- |
| Code | **EE 299** |
| Name | **Summer Training-I** |
| Hour per week | 0 |
| Credit | 0 |
| ECTS | 4 |
| Level/Year | Undergraduate / 3 |
| Semester | Fall |
| Type | Compulsory |
| Prerequisites |  |
| Coordinator |  |
| Description | This course covers first internship program that provides experience in an engineering service, industrial, or research setting. This internship program cannot be less than 4 weeks. During internship, students will gain an understanding of the engineering workplace in industry. They will discover their own interests, better clarified their professional goals and develop practical engineering skills and judgment. |

|  |  |
| --- | --- |
| Code | **EE 303** |
| Name | **Feedback Control Systems** |
| Hour per week | 5 (3 + 2) |
| Credit | 4 |
| ECTS | 6 |
| Level/Year | Undergraduate / 3 |
| Semester | Fall |
| Type | Compulsory |
| Prerequisites | EE204 |
| Coordinator |  |
| Description | Lectures are given on fundamental topics of control engineering including transfer function analysis, criteria for transient response analysis and steady state errors, stability analysis, root-Locus analysis, Bode and Nyquist analysis. PID control design, state-space representations and state feedback control design and fuzzy controller. The lectures are combined with the laboratory works to gain practical skills on engineering control system designs. Students gain experience and skill in using software packages to solve control problems. The course also provides practice for developing critical thinking skills and solving open ended problems. |

|  |  |
| --- | --- |
| Code | **EE 304** |
| Name | **Embedded Systems** |
| Hour per week | 5 (3 + 2) |
| Credit | 4 |
| ECTS | 7 |
| Level/Year | Undergraduate / 3 |
| Semester | Fall |
| Type | Compulsory |
| Prerequisites |  |
| Coordinator |  |
| Description | Embedded Systems focuses on planning and realizing microcontroller-based projects using Assembly and C programming languages. Main topics include architecture and internal units of a microcontroller, different types of memory, interrupts and timers, register sets and addressing modes for a give microcontroller family, various communication protocols such as UART, SPI and I2C, interfacing with analog or digital signals and basic measurement techniques. |

|  |  |
| --- | --- |
| Code | **EE 306** |
| Name | **Fundamentals of communication engineering** |
| Hour per week | 3+0 (Theory + Practice) |
| Credit | 3 |
| ECTS | 6 |
| Level/Year | Undergraduate / 3 |
| Semester | Spring |
| Type | Compulsory, |
| Prerequisites | EE 204, MATH 301 |
| Coordinator |  |
| Description | This course covers the fundamental concepts and methods of telecommunication. The content of this course is: history of communication systems, electromagnetic spectrum and frequency allocation, baseband systems, modulation and demodulation concepts, analog AM (DSB, SSB, DSBSC, PAM, etc ) and PM modulations and demodulations, phase locked loops, digital modulation and demodulation, frequency and time multiplexing systems, communication in the presence of noise, BER calculation and eye diagram. |

|  |  |
| --- | --- |
| Code | **EE 307** |
| Name | **Nanoscience and Nanotechnology** |
| Hour per week | 3+0 (Theory + Practice) |
| Credit | 3 |
| ECTS | 4 |
| Level/Year | Undergraduate |
| Semester | Fall-Spring |
| Type | Elective |
| Prerequisites |  |
| Coordinator |  |
| Description | A broad overview of the nanoscience and nanotechnology, bulk and nano concepts, quantum confinement, atomic scale microscopy, nanowires, nanotubes, nanocrystals, 2D materials, nanofabrication techniques and device applications |

|  |  |
| --- | --- |
| Code | EE 308 |
| Name | Electrical Machines and Drives |
| Hour per week | 4 (3 + 2) |
| Credit | 4 |
| ECTS | 6 |
| Level/Year | Undergraduate/3 |
| Semester | Spring |
| Type | Compulsory |
| Prerequisites | NA |
| Coordinator |  |
| Description | This course intends to teach the students the principles of electromechanical energy conversion, principles of basic electrical machines and how to analyze them, how to approach various electrical machine startup problems, basic power electronics and drives technology. The course covers electromechanical energy conversion, magnetic circuits, transformers, rotating electrical machines, fundamentals of inverter and converter, AC and DC drives. |

|  |  |
| --- | --- |
| Code | **EE311** |
| Name | **Electronics II** |
| Hour per week | 3 (Theory) |
| Credit | 3 |
| ECTS | 4 |
| Level/Year | Undergraduate / 3 |
| Semester | Fall |
| Type | Compulsory |
| Prerequisites | EE206 |
| Coordinator |  |
| Description | This course introduces the fundamentals of analog electronics. In the course following topics are covered: small-signal models of the transistors, single-transistor amplifiers including common-emitter, common-base, common-collector, common-source, common-gate, and common-drain amplifiers, multi-stage amplifiers, differential amplifiers, and amplifier frequency response. |

|  |  |
| --- | --- |
| Code | **EE321** |
| Name | **Electronics II Lab** |
| Hour per week | 2 (Practice) |
| Credit | 1 |
| ECTS | 2 |
| Level/Year | Undergraduate / 3 |
| Semester | Fall |
| Type | Compulsory |
| Prerequisites | EE311 |
| Coordinator |  |
| Description | This laboratory course provides fundamental knowledge and skills for analog electronic circuits. Specifically, the course focuses on analyzing, designing, and implementing single-transistor amplifiers including common-emitter, common-base, common-collector, common-source, common-gate, and common-drain amplifiers, multi-stage amplifiers, and audio amplifiers. In the course, most of the experiments are accompanied by SPICE simulations. |

|  |  |
| --- | --- |
| Code | **EE 351** |
| Name | **Undergraduate Research/Independent Study** |
| Hour per week | 2 |
| Credit | 1 |
| ECTS | 2 |
| Level/Year | Undergraduate / 3 |
| Semester | Fall |
| Type | Elective |
| Prerequisites |  |
| Coordinator |  |
| Description | The main purpose of this course is to provide the student an opportunity for working on a supervised research projects. This research project may involve theoretical or practical work that would involve designing, testing or investigation of a given research problem depending on the topic. The student is aware of how her or his project fits into and contributes to solving the larger problem to which it belongs. The student will directly work with a faculty member or a graduate student who is performing research supervised by a faculty member. |

|  |  |
| --- | --- |
| Code | **EE 352** |
| Name | **Undergraduate Research/Independent Study** |
| Hour per week | 2 |
| Credit | 1 |
| ECTS | 2 |
| Level/Year | Undergraduate / 3 |
| Semester | Spring |
| Type | Elective |
| Prerequisites |  |
| Coordinator |  |
| Description | The main purpose of this course is to provide the student an opportunity for working on a supervised research projects. This research project may involve theoretical or practical work that would involve designing, testing or investigation of a given research problem depending on the topic. The student is aware of how her or his project fits into and contributes to solving the larger problem to which it belongs. The student will directly work with a faculty member or a graduate student who is performing research supervised by a faculty member. |

|  |  |
| --- | --- |
| Code | **EE 399** |
| Name | **Summer Training-II** |
| Hour per week | 0 |
| Credit | 0 |
| ECTS | 6 |
| Level/Year | Undergraduate / 4 |
| Semester | Fall |
| Type | Compulsory |
| Prerequisites | - |
| Coordinator |  |
| Description | This course covers first internship program that provides experience in an engineering service, industrial, or research setting. This internship program cannot be less than 6 weeks. During internship, students will gain an understanding of the engineering workplace in industry. They will discover their own interests, better clarified their professional goals and develop practical engineering skills and judgment. |

|  |  |
| --- | --- |
| Code | EE 404 |
| Name | Antennas |
| Hour per week | 3 (Theory) |
| Credit | 3 |
| ECTS | 5 |
| Level | Undergraduate/4 |
| Semester | Spring |
| Type | Elective |
| Prerequisites |  |
| Coordinator |  |
| Description | This course provides fundamental knowledge and skills for antenna engineering. In the course, theory of antennas is introduced together with the analyzing, designing, and testing principles. The course covers the following topics: introduction to antennas and wave propagation, electromagnetic fundamentals, wave equations and plane waves, electromagnetic power flow and Poynting’s vector, Green’s function, fundamental parameters of antennas, simple antennas such as linear wire, dipole and loop antennas, array theory, and various types of other antennas used for different applications. |

|  |  |
| --- | --- |
| Code | EE 408 |
| Name | Microwave Engineering |
| Hour per week | 3 (Theory) |
| Credit | 3 |
| ECTS | 5 |
| Level | Undergraduate/4 |
| Semester | Fall |
| Type | Elective |
| Prerequisites |  |
| Coordinator |  |
| Description | This course introduces the fundamentals of microwave engineering. It is aimed for the students to understand the theory and to learn how to analyze, design and test a microwave device and system. In the course following topics are covered: basic electromagnetic theory, transmission line theory, microwave network analysis including S-parameters and ABCD matrix, impedance matching and tuning, and microwave devices and applications such as microwave resonators, power dividers, directional couplers, microwave filters, and so on. |

|  |  |
| --- | --- |
| Code | **EE 421** |
| Name | **Geometrical Optics** |
| Hour per week | 3+0 (Theory + Practice) |
| Credit | 3 |
| ECTS | 10 |
| Level/Year | Undergraduate / 4 |
| Semester | Fall, Springs |
| Type | Elective |
| Prerequisites | None |
| Coordinator |  |
| Description | Ray optics and Fermats’ principle aberration and dispersion in optical systems, thin lens equations, ray tracing, Gaussian beam propagation, interference of light, single and double slit interference, optical resonators and their types and applications, modulation of light and modulation devices. |

|  |  |
| --- | --- |
| Code | **EE 423** |
| Name | **Photonics** |
| Hour per week | 3+0 (Theory + Practice) |
| Credit | 3 |
| ECTS | 10 |
| Level/Year | Undergraduate |
| Semester | Fall |
| Type | Elective / 4 |
| Prerequisites | None |
| Coordinator |  |
| Description | Photonics course intends to focus on basic concepts of light and photonics with their applications. This course includes contents from electromagnetic spectrum and its properties; beam optics and beam propagation; polarization of light; generation and detection of light; modulation of light via electro optic and acousto optic modulators; fiber optic cable and transmission of light through fiber optic cable. |

|  |  |
| --- | --- |
| Code | **EE 424** |
| Name | **Fiber optic communication** |
| Hour per week | 3+0 (Theory + Practice) |
| Credit | 3 |
| ECTS | 10 |
| Level/Year | Undergraduate / 4 |
| Semester | Springs |
| Type | Elective |
| Prerequisites | None |
| Coordinator |  |
| Description | In this course, the fiber optic communication links and the sub components will be covered. The content of this course is: optical transmitters and receivers, fiber optic based amplifiers, fiber optic cable properties and types, modulation of light, power budged in optical fiber links and multi-channel systems. |

|  |  |
| --- | --- |
| Code | EE434 |
| Name | Sensors and Measurement |
| Hour per week | 3 (Theory) |
| Credit | 3 |
| ECTS | 5 |
| Level/Year | Undergraduate / 4 |
| Semester | Fall |
| Type | Elective |
| Prerequisites |  |
| Coordinator |  |
| Description | **This course provides fundamental knowledge and skills for** basic sensor properties and sensor characterization. **This course introduces/covers the fundamentals of** ultrasonic, optical, biological, and image based techniques for sensor development. **This course intends to teach the students how** to analyze sensors, how to identify, formulate, and solve physical problems with sensor technologies. The course covers the following topics: Sensor types, characterization, applications, chemical biological sensors, micro/nano sensors. The types of sensors are extremely broad and the course will include formulating and building physical and mathematical models that are appropriate for the sensor development. |

|  |  |
| --- | --- |
| Code | **EE440** |
| Name | **Neural Engineering** |
| Hour per week | 3 (3 + 0) |
| Credit | 3 |
| ECTS | 5 |
| Level/Year | Undergraduate / 4 |
| Semester | Spring |
| Type | Elective |
| Prerequisites | - |
| Coordinator |  |
| Description | This course aims at equipping students with the understanding of neural anatomy, physiology, and neural diseases and fundamental knowledge for the development of diagnostic and therapeutic approaches. The course covers the fundamentals of neuroanatomy and neuroelectrophysiology, modeling of electrical activity on neural membranes (action potential), action potential propagation on a neuron and between neurons. In order to discuss neural engineering applications for diagnostic and therapeutic first different types of neural diseases are surveyed. Eye (vision) and ear (audition) and related diseases are introduced. Finally, technologies used in diagnosis of neural diseases such as the anatomical and functional imaging of the brain and neural system, and technologies for the treatment of neural diseases such as deep brain stimulation, retinal implants, cochlear implants and brain-computer interfaces. |

|  |  |
| --- | --- |
| Code | **EE443** |
| Name | **Biomedical Instrumentation and Signal Analysis** |
| Hour per week | 3 (3 + 0) |
| Credit | 3 |
| ECTS | 5 |
| Level/Year | Undergraduate / 4 |
| Semester | Fall, Spring |
| Type | Elective |
| Prerequisites | - |
| Coordinator |  |
| Description | The course provides fundamental knowledge and skills for the acquisition and processing of biosignals. The first part of the courses aims at introducing the fundamentals of bioinstrumentation, sensors and transducers. Firstly, the origins of bioelectric signals, and cardiac and neural anatomy and physiology basics are covered. The second part of the course focuses on biosignal types (ECG, EEG, EMG, etc.) and their properties, artifact removal (time and frequency domain filters), information extraction from the morphology of biosignals, and finally frequency characterization of biosignals. |

|  |  |
| --- | --- |
| Code | EE445 |
| Name | Fundamentals of Biomems |
| Hour per week | 3 (Theory) |
| Credit | 3 |
| ECTS | 5 |
| Level/Year | Undergraduate, 4 |
| Semester | Spring |
| Type | Elective |
| Prerequisites |  |
| Coordinator |  |
| Description | **This course provides fundamental knowledge and skills for** basic micro technology and its applications. **This course introduces/covers the fundamentals of** materials, fabrication process and applications of MEMS  **This course intends to teach the students how** to analyze MEMS, how to identify, formulate, and solve physical problems with MEMS technologies. The course covers the following topics: Fabrication Process: Etching, Deposition and patterning, Surface properties, Nanotechnology based transduction, Microfluidics, Micro/nano biosensors, Standard laboratory methods, Micro/nano cantilevers , Biochips, application of MEMS to medicine and biology. |

|  |  |
| --- | --- |
| Code | **EE 451** |
| Name | **Power Electronics** |
| Hour per week | 3 (3+0) (Theory) |
| Credit | 3 |
| ECTS | 5 |
| Level/Year | Undergraduate / 4 |
| Semester | Fall |
| Type | Elective |
| Prerequisites | MATH 151, MATH 152, MATH 205, EE 201, EE 202, EE 204 |
| Coordinator |  |
| Description: | The objective of this course is to introduce the students to elements of power electronics circuits, rectifiers, converters and inverters, and the operating principles to provide a firsthand practical experience via a semester project.  The course includes power calculations, AC/DC converters (rectifiers), isolated and non-isolated DC/DC converters, and basics of DC/AC converters (inverters). |

|  |  |
| --- | --- |
| Code | EE452 |
| Name | Electric Power Systems |
| Hour per week | 3 (3 + 0) |
| Credit | 3 |
| ECTS | 5 |
| Level | Undergraduate / 4 |
| Semester | Fall |
| Type | Elective |
| Prerequisites | NA |
| Coordinator |  |
| Description | This course intends to teach the studentspower system modeling, power flow calculation and short circuit studies and usage of a programming language on power system applications. The course covers the following topics: there phase system and connection (delta-y), power systems in per-unit system, admittance matrix modeling and usages, derivation of network reduction, derivation of Z bus modification, power Flow Calculation by using Gauss-Seidel and newton Raphson methods, symmetrical and unsymmetrical components, short circuit calculation, economic operation of power systems. |

|  |  |
| --- | --- |
| Code | EE453 |
| Name | Power Distribution Systems |
| Hour per week | 3 (3 + 0) |
| Credit | 3 |
| ECTS | 5 |
| Level | Undergraduate |
| Semester | Spring |
| Type | Elective |
| Prerequisites | NA |
| Coordinator |  |
| Description | This course intends to teach the studentspower distribution system modeling, primary and secondary system, voltage control and capacitor control and usage of a programming language on power system applications. The course covers the following topics: load characteristics and nature of loads, application of distribution transformers, design of sub transmission lines and distribution substation, design considerations of primary systems, design considerations of secondary systems, voltage drop and power loss calculations, application of capacitors to distribution systems, distribution system voltage regulation, and power system harmonics. |

|  |  |
| --- | --- |
| Code | EE454 |
| Name | High Voltage Technique |
| Hour per week | 3+0 (Theory) |
| Credit | 3 |
| ECTS | 5 |
| Level | Undergraduate/4 |
| Semester | Spring |
| Type | Elective |
| Prerequisites | None |
| Coordinator |  |
| Description | The aim of this course is to make students understand the high voltage phenomena. The course introduces the high voltage generation and measurement techniques, electrostatic field theory, high voltage cable properties and sizing, electrical discharges, losses, and their measurements. The role of insulation materials and insulation breakdown mechanisms are introduced. Stress control methods for satisfactory operation of power systems are discussed. The course includes the following topics: High voltage types, high voltage generation, measurement of high voltage, electrostatic fields, electrode systems, high voltage cable sizing, high voltage electrical discharges, bunched conductors and corona losses, dielectric losses of insulation materials, and non-destructive test techniques. |

|  |  |
| --- | --- |
| Code | EE455 |
| Name | Introduction Electric Drive Systems |
| Hour per week | 3+0 (Theory) |
| Credit | 3 |
| ECTS | 5 |
| Level | Undergraduate/4 |
| Semester | Fall |
| Type | Elective |
| Prerequisites | EE308 |
| Coordinator |  |
| Description | The aim of this course is to provide the basic theory for the analysis of DC and AC electric machines utilizing power electronics circuits with basic control schemes. The course includes the basic characteristics of dc machines, single and three phase drives, dc/dc converter drives, closed loop control of dc machines, induction machine drives, stator and rotor voltage control, frequency control, voltage and frequency control, current control, closed loop control of induction machines, synchronous machine drives, cylindrical and salient pole machines, reluctance motors, permanent magnet machines, closed loop control of synchronous machines. |

|  |  |
| --- | --- |
| Code | **EE 465** |
| Name | **Data Mining** |
| Hour per week | 3 (3 + 0) |
| Credit | 3 |
| ECTS | 5 |
| Level/Year | Undergraduate / 4 |
| Semester | Fall |
| Type | Elective |
| Prerequisites | COMP 101, MATH 203, MATH 301 |
| Coordinator |  |
| Description | This course introduces the fundamentals of data mining. It covers the following topics: introduction to data mining, data representation techniques, data preprocessing techniques, fundamental pattern discovery techniques such as frequent itemset and association rule mining, and basic concepts of classification and clustering algorithms. Through a course project, the students will use a data mining software and apply the concepts to a real problem. |

|  |  |
| --- | --- |
| Code | **EE 473** |
| Name | **Introduction to Robotics** |
| Hour per week | 3 (Theory) |
| Credit | 3 |
| ECTS | 5 |
| Level/Year | Undergraduate / 4 |
| Semester | Fall |
| Type | Elective |
| Prerequisites | - |
| Coordinator(s) |  |
| Description: | The purpose of this course is to provide the students with the fundamental tools of robotic system design, analysis, modeling, and control. The course content includes robot classifications, Rigid motions, Homogeneous transformations, Robot forward kinematics, Robot inverse kinematics, Differential kinematics and Jacobians, Motion planning and trajectory generation, Robot dynamics, Mobile robots, Independent joint control, and Robot sensors and actuators. The course provides self-learning and creative thinking abilities. |

|  |  |
| --- | --- |
| Code | **EE 474** |
| Name | **Applied Programmable Logic Controller** |
| Hour per week | 3 (Theory) |
| Credit | 3 |
| ECTS | 5 |
| Level/Year | Undergraduate / 4 |
| Semester | Spring |
| Type | Elective |
| Prerequisites | EE303 |
| Coordinator |  |
| Description: | The purpose of this course is to provide the students with the fundamental tools of programmable logic controller based system design, analysis, and control. The course content includes PLC and Control System Components, Relay Logic Diagrams, PLC Programming, Programming Logic Gate Functions in PLCs, PLC Timer and Counter Functions, PLC Math and Logic Functions, PLC Compare, Jump, and MCR Functions, PLC Subroutine Functions, PLC Sequencer Functions, PLC Interrupts, Process Control, PLC Networks, PLC Applications and Case Studies. |

|  |  |
| --- | --- |
| Code | **EE 485** |
| Name | **Semiconductor Device Fundamentals** |
| Hour per week | 3+0 (Theory + Practice) |
| Credit | 3 |
| ECTS | 4 |
| Level/Year | Undergraduate |
| Semester | Fall-Spring |
| Type | Elective |
| Prerequisites |  |
| Coordinator |  |
| Description | Crystal structure-atoms and electrons, Energy bands and charge carrier in semiconductors, Optical absorption, luminescence, carrier lifetime and diffusion, Junctions, Field effect transistors-Bipolar junction transistors, Photodiodes, Light emitting diodes, Solar cells, Lasers |

|  |  |
| --- | --- |
| Code | **EE486** |
| Name | **Semiconductor Process and Device Fabrication** |
| Hour per week | 3 (3 + 0) |
| Credit | 3 |
| ECTS | 5 |
| Level/Year | Undergraduate / 4 |
| Semester | Spring |
| Type | Elective |
| Prerequisites | None |
| Coordinator |  |
| Description | This course provides detailed coverage of microfabrication process technologies for various devices including CMOS and MEMS devices, and modeling of individual processes. The topics include CMOS fabrication process flow, semiconductor wafer growth, photolithography processes, thermal oxidation processes of silicon, diffusion processes, ion implantation processes, thin film deposition processes, wet and dry etching processes, and bulk micromachining and surface micromachining processes. |

|  |  |
| --- | --- |
| Code | **EE 491** |
| Name | **Senior Design Project I** |
| Hour per week | 4+0 (Theory + Practice) |
| Credit | 4 |
| ECTS | 7 |
| Level/Year | Undergraduate / 4 |
| Semester | Fall |
| Type | Compulsory |
| Prerequisites | EE 102, EE 201, EE 202, EE 203, EE 204, EE 205, EE 206,  and at least 3 out of the following 6 courses must be passed: EE 311, EE 303, EE 307, EE 304, EE 306, EE 308 |
| Coordinator |  |
| Description | This is the first part of a project that will give the student the ability to apply theory to practice in a complex system. The students work under the supervision of a faculty member and an external supervisor if the project is proposed from industry. |

|  |  |
| --- | --- |
| Code | **EE 492** |
| Name | **Senior Design Project II** |
| Hour per week | 4+0 (Theory + Practice) |
| Credit | 4 |
| ECTS | 7 |
| Level/Year | Undergraduate / 4 |
| Semester | Springs |
| Type | Compulsory |
| Prerequisites | EE 491 |
| Coordinator |  |
| Description | This is the second part of the senior design project. The students are expected to demonstrate or implement the design of a developed system, device or product. |