ISTINYE UNIVERSITY FACULTY OF ENGINEERING

DEPARTMENT OF ELECTRICAL&ELECTRONICS ENGINEERING

COURSE DESCRIPTIONS

1. Semester

Differential and Integral Calculus (2+2), 6
Analytic geometry, functions and limits, derivatives, techniques and applications of differentiation, logarithmic and trigonometric functions. Definite and indefinite integrals, techniques of integration, with applications in sciences and engineering.

Computational Thinking (3+2), 7
Introduction to the central idea of computational thinking as it applies to a wide variety of human endeavors, including natural and physical sciences; computational mathematics with Sage, Matlab, and Mathematica; introduction to programming with Python.

Engineering Physics (3+1), 6
Vectors. Motion in one and two dimensions. Newton's laws and its applications. Work and energy. Conservation of mechanical energy. Momentum and motion of systems. Static equilibrium of rigid bodies. Rotation and angular momentum. Newton's law universal gravitation.

Computing Literacy (2+2), 5
Email and IM usage and etiquette; Computer security basics; Mobile and Cloud computing basics; Google apps and services: Docs, Sheets, Slides, Drive, Calendar, Keep, Scholar; Apple apps and services.

Engineering Design (3+0), 4
Introduction; The Design Process; Creative style; Brainstorming. Effective graphic and verbal communication of design ideas to groups and individuals, Student will learn how to research an engineering problem, where to find information and how to assess its validity, Students will be give an overview of key achievements in the history of engineering. There will also be stories with ethical implications.

Turkish Language I (2+0), 2
To teach the importance of language in human and social life; showing the classification of languages and teaching of Turkish among the world languages; to teach the characteristics of Turkish in terms of phonology, morphology, syntax; to analyze spelling and writing rules of Turkish.

2. Semester

Linear Algebra with Applications (2+2), 6
Systems of linear equations, matrix algebra, determinants, vector spaces and subspaces, basis and dimension, linear transformations, eigenvalues and eigenvectors, diagonalization, and orthogonality; singular-value decomposition.

Computational Mathematics (3+2), 7
A function approach integrating algebra, trigonometry, and differential calculus; properties and graphs of polynomial, rational, exponential, and logarithmic functions; properties and graphs of trigonometric functions; functions and limits; derivatives; techniques and applications of differentiation; logarithmic

and trigonometric functions; Integral calculus, including definite and indefinite integrals; techniques of integration, with applications in social and life sciences.

Computer Aided Design (2+2), 5
Introduction to computer aided technical drawing. Basic drawing functions and multi-view projection. Sectioning and conventions. General concepts in 3D modelling. Creating parts in 3D design and solid modeling. Transfering 3D parts to drafting detailing. Assembly modelling and assembling parts. Surface modelling.

Electronic Physics and Systems (3+1), 6
In this course the principles of electrical and electronical engineering and basic technology will be introduced. Application examples of the knowledge on engineering will be given. In addition, electric machinery, power electronics, and electrical driving circuits will be introduced according to the mechanical engineering requirements.

Human Body (2+2), 4
The structure and functions of macro molecules and proteins. The structures and functions of cells. Cellular respiration, transport, communication. Energy production, flow, use and photosynthesis. Human genetics and physiology. Biotechnology.

Turkish Language II (2+0), 2
To teach spelling, writing and punctuation rules, to teach basic elements of writing essays, to introduce Turkısh and World literary canons; to teach writing creative texts of literature especially story, poem and essay ; to teach writing scientific paper and texts; To analyse expression and punctuation disorders, to contribute lectures.

3. Semester

Differential Equations (2+2), 6
First and second order differential equations; separation of variables; linear differential equations; systems of first order equations; nonlinear differential equations and stability

Electrical Circuits (3+2), 7
Circuit elements and Kirchhoffs laws. Analysis of resistive circuits. Network theorems. Solutions of linear time-invariant differential equations. Analysis of first and second order circuits. Operational Amplifiers. Sinusoidal steady-state analysis, power calculations and balanced three-phase circuits.

Signal and Systems (3+2), 7
An introduction to continuous and discrete time signals and systems. Study of the Fourier transform, Fourier series, z-transforms, and the fast Fourier transform. Sampling theorems for continuous to discrete-time conversion. Difference equations for digital signal processing systems, digital system realizations with block diagrams, analysis of transient and steady state responses, and connections to other areas in science and engineering

General English I (2+0), 2
The English of the terms and concepts encountered in various branches of engineering are examined in depth, and for the proper use of these terms, Turkish-English bilingual translations are explained. English language training for students starts from simple forms and intended to develop over time.

Ataturk's Principles and History of Revolution I (2+0), 2
The Collapse of the Ottoman Empire, Tanzimat and Reform Edict, I. and II. Constitutional Era, Tripoli and Balkan Wars, Worl War I, Mudros Armistice, War of Independence; Amasya Circular, National Congresses, Establishment of Turkish Grand National Assembly, Declaration of Republic

Istinye Manifest I (0+1), 1

4. Semester

Digital Logic Design (3+2), 7
Principles and techniques of designing digital systems. Boolean algebra, state machines, simplification of switching expressions, and introductory computer arithmetic. Construct and analyze the operation of a latch, flip-flop and its application in synchronous

Vector Calculus (2+2), 6
Calculus of functions of several variables; vector-valued functions; scalar and vector fields; integration along paths, double and triple integrals; integration over surfaces and applications of integrals; integral theorems of vector calculus; infinite series; Fourier series; integrals and transforms; partial differential equations

Electronics (3+2), 7
Fundamental concepts in electronics. Diode, BJT and FET Circuits; design using ideal operational amplifiers; feedback; frequency response; biasing; current sources and mirrors; small-signal analysis; design of operational amplifiers.

General English II (2+0), 2
The English terms and concepts encountered are examined in depth and Turkish-English bilingual translations are used in order to use the concepts correctly. To be able to master professional English language, the students are informed about grammatical structures of sentences, spelling and pronunciation.

Ataturk's Principles and History of Revolution II (2+0), 2
Revolutions in Turkish politics, political parties and multi-party system attempts, revolutions in law, reorganization of public life, reforms in economics, Turkish foreign policy 1923-1938, Turkish domestic and international politics in post-Atatürk era.

Istinye Manifest II (0+1), 1

5. Semester

Probability Theory and Stochastic Processes (2+2), 5
This course provides a foundation in the theory and applications of probability and stochastic processes and an understanding of the mathematical techniques relating to random processes in the areas of signal processing, detection, estimation, and communication. Topics include the axioms of probability, random variables, and distribution functions; functions and sequences of random variables; stochastic processes; and representations of random processes.

Electronics Circuits (3+2), 7
Stability and response of feedback amplifier, wideband amplifier, operational amplifier characteristics, waveform generators and wave shaping, nonlinear circuit applications, signal generators, and

photolithography. Design of analog electronic circuits, circuit simulation, response characterization, and printed circuit construction

Electromagnetics (3+2),7
Basic electrical and magnetic phenomena, as well as laws for electrical circuits, both at direct current and alternating current. The course gives a thorough introduction to Maxwell's equations, and how to use them to derive the characteristics of electromagnetic waves.

6. Semester

Information Theory (3+2), 7
An introduction to mathematics of information theory. We will cover both classical and modern topics, including information entropy, lossless data compression, binary hypothesis testing, channel coding, and lossy data compression.

Computer Architecture (3+2), 7
Includes the organization and architecture of computer systems hardware; instruction set architectures; addressing modes; register transfer notation; processor design and computer arithmetic; memory systems; hardware implementations of virtual memory, and input/output control and devices

Cryptographic Engineering (3+2), 7
This course is designed for computer science, computer engineering, electrical engineering, and mathematics students interested in understanding, modeling, designing, developing, testing, and validating cryptographic software and hardware. We study algorithms, methods, and techniques in order to create state-of-art cryptographic embedded software and hardware using common platforms and technologies.

7. Semester

Capstone Project I (3+2), 7
Student groups design a significant computerbased project. Multiple groups may cooperate toward one large project. Each group works independently; interaction among groups is via interface specifications and informal meetings.

Control Systems (3+2), 7
Differential equations, Laplace transforms, transfer functions, poles and zeros, state space models, modeling, first and second order systems, stability, steady-state errors, root locus, Bode and Nyquist plots, transient response analysis and design, PID control, lead lag compensation, simple frequency response techniques. Stabilising feedback control for transfer function and state-space models

Istinye Manifest III (0+1), 1

8. Semester

Capstone Project II (3+2), 7
Student groups design a significant computerbased project. Multiple groups may cooperate toward one large project. Each group works independently; interaction among groups is via interface specifications and informal meetings.

Communications (3+2), 7
Evolution of radio communications and broadcast systems, new trends, economics of radio communications. Spectrum usage. Cellular concept, coverage, frequency re-use, interference. Broadcast concepts. Radio propagation. Large scale path loss, small scale fading and multipath. Modulation techniques for mobile radio and broadcast. Multiple access techniques for wireless communications. Networking and planning. Recent topics on wireless communications.

Istinye Manifest IV (0+1), 1

DEPARTMENT ELECTIVE COURSE DESCRIPTIONS

Directed Research (2+2), 5
The students are involved in projects that are going on research centers. They are required to attend meetings, develop code, help to build devices, and give presentations as needed. The lecturer covers basic research techniques, search, writing papers in LaTeX, and working with data.

Engineering Ethics (2+2), 5
The origins of ethical thought; ethical principles and basic theories; personal, academic and professional ethics for engineers; environmental ethics; ethical implications of technology, computer ethics; ethics in research and experimentation.

Photonics (2+2), 5
Fundamental principles of lasers, optical data processing, nonlinear optics, optical communications, optical computing, optical data storage, optical system design and holography. These are the fundamental enabling technologies for future high-speed communication systems including high performance telecommunication and data communication networks.

Introduction to MEMS (2+2), 5
Microelectromechanical devices (MEMS), such as pressure sensors, accelerometers, rate gyroscopes, and opto-mechanical assemblies and displays, require knowledge of a broad range of disciplines, from microfabrication to mechanics to electromagnetism. This course presents an introduction to this broad field, using examples, design projects, and hands-on labs drawn from real-world MEMS applications

Medical Instrumentation (2+2), 5
Medical terminology. General diagnostics. Electrophysical methods like ECG, EEG, EMG, defibrillator and pacemaker. Measurement techniques for respiration and circulation. Methods for intensive monitoring. clinical/chemical measurement techniques. Disinfection/sterilisation, sensors. Imaging techniques: X-rays, nuclear medicine, ultrasound, magnetic resonance. Supporting instrumentation like incubator, respirator, anaesthesia machine and dialysis machine. Surgical techniques with diathermy and laser.

Digital Signal Processing (2+2), 5
Fundamental principles of DT systems and signals, in both time and Fourier domains, are presented. These are followed by modern applications of digital signal processing (e.g telecommunications). Throughout the course, the focus is on developing techniques and algorithms for solving discrete-time signal processing problems.