COURSE DESCRIPTIONS

EEE DEPARTMENT FIRST CYCLE COURSE DESCRIPTIONS

First year

Compulsory courses

ELT 101. Development of Reading and Writing Skills in English I
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 5**

Students will be able to develop and improve aspects of academic reading in the English language, develop new vocabulary which is relevant to academic studies and the ability to derive meaning from context, advance to a higher level of reading comprehension, apply skills learned from reading texts to writing essays, and preparing presentations, debates in English, to analyze and produce different types of essays (e.g. comparison and contrast, classification, process analysis, cause-and-effect analysis, and argumentative) that are unified, coherent and organized. In addition to the integration of reading with writing, research-based instruction will be adopted, so that students will develop basic research skills including library or Internet search.

MTH 101. Calculus I
Hours (Theoretical-Practical): 5 (3-2) **ECTS: 7**

Expand understanding of mathematical topics that may have been previously studied. Introduce and explore topics that possibly have not been part of the student's mathematical experience. Develop an appreciation for the development of mathematical thought and the contributions that mathematics has made to our world.

PHY 101. General Physics I
Hours (Theoretical-Practical): 5 (3-2) **ECTS: 6**

PHY 101 is an introductory physics course for undergraduate students. This course focuses on basic physics concepts and connections to everyday life. Course topics include Newtonian mechanics, fluids, heat, vibrations, electricity and magnetism, light and sound, quantum phenomenon, nuclear radiation, relativity, and cosmology. Connections to everyday life and society include energy conservation, global warming, nuclear energy, the origin of the universe, pseudoscience, and the search for extraterrestrial life. While advanced mathematics is not required for this course, basic math with some trigonometry and simple algebra is utilized. Proportional reasoning, estimating, and graphing skills are emphasized throughout the course. Overall goals of this course include students' gaining an appreciation for the physical world, improved critical thinking and reasoning skills, and improved scientific literacy for a better-informed public that can make intelligent voting decisions.

ELT 102. Development of Reading and Writing Skills in English II
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 5**

The course aims to enhance students\\' academic skills, by integrating critical thinking strategies such as inference, synthesizing and drawing logical conclusions. Students will be able to infer word meaning from context, evaluate and categorize information. One of the main points is to integrate reading with writing. In order to help students develop strategies in academic reading and writing, various types of essays (e.g. a cover letter, statement of purpose, writing a research proposal, writing an abstract) will be analyzed and composed, with special attention paid to intertextual cohesion and coherence. In addition to reading and writing, the course aims to integrate presentations and debates relevant to written texts implemented in the course design.

Second year

Compulsory courses

CEN 221. Object Oriented Programming
Hours (Theoretical-Practical): 5 (3-2) **ECTS: 6**
This course is intended to provide in-depth object-oriented problem solving. This class focuses on object-oriented design of applications. We will be using the C++ and C# programming language as a tool for implementation of specific solutions. Students will critically analyze and explore programming methodologies and apply their studies to the design and implementation of contemporary software applications. Using creativity to solve challenging problems, as well as finding the optimum solution, is expected of all students. Upon completion of the course, the student will be able to: Define and describe object, class, method, inheritance, polymorphism, and encapsulation, describe the use of object oriented analysis and design tools such as class diagrams, use cases, design and code non-trivial object oriented programs.

CEN 281. Electronic Circuits and Devices
Hours (Theoretical-Practical): 5 (3-2) **ECTS: 5**
This course covers semiconductor devices and electronic circuits; electrical characteristics, principles of operation, circuit models of diodes, field-effect and bipolar transistors, and operational amplifiers; analysis and design of basic application circuits.

CEN 283. Digital Design
Hours (Theoretical-Practical): 5 (3-2) **ECTS: 6**
The course is designed to introduce the basics of digital design, digital logic and automata theory to students together with a solid introduction to hardware design in HDL, namely Verilog.

MTH 201. Differential Equations
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 4**
This Course introduces basic topics and solution techniques of differential equations. To develop an appreciation for the development of mathematical thought and the contributions that mathematics has made to our world. This course is designed to expand understanding of advanced mathematical topics and their applications with real life problems and analyzing the results.

MTH 203. Discrete Mathematics
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 4**
This course covers elementary discrete mathematics for computer science and engineering. It emphasizes mathematical definitions and proofs as well as applicable methods. Topics include formal logic notation, proof methods; induction, well-ordering; sets, relations; elementary graph theory; integer congruence; asymptotic notation and growth of functions; permutations and combinations, counting principles; discrete probability. Further selected topics may also be covered, such as recursive definition and structural induction; state machines and invariants; recurrences; generating functions.

CEN 212. Programming Languages
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 6**
This course teaches the principles of functional, imperative, and logic programming languages. Topics covered include: meta-circular interpreters, semantics (operational and denotational), type systems (polymorphism, inference, and abstract types), object oriented programming, modules, and multiprocessing. The course involves substantial programming

assignments and problem sets as well as a significant amount of reading. The course uses the C# or JAVA and Python programming language for all of its assignments.

CEN 252. Computer Organization
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 6**
Organization of a simple stored-program computer: CPU, busses and memory. Instruction sets, machine code, and assembly language. Conventions for assembly language generated by compilers. Floating-point number representation. Hardware organization of simple processors. Address translation and virtual memory. Very introductory examples of input/output devices, interrupt handling and multi-tasking systems.

CEN 254. Data Structures
Hours (Theoretical-Practical): 4 (3-2) **ECTS: 7**
This course is designed to give an introduction to the concepts of data structures and algorithms which are related to specific data structure. Main goal of the course is to give essential information that every serious programmer needs to know about algorithms and data structures. All algorithms and data structures which are covered in this course will be implemented using Java programming language during practical sessions.

MTH 204. Numerical Analysis
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**
This course analyzed the basic techniques for the efficient numerical solution of problems in science and engineering. This course intended to cover usage of matlab for mathematical equations such as linear, non-linear, Lagrange, Approximation, Polynomial, Optimization and boundary value problems.

CEN 200. Industrial Training I
Hours (Theoretical-Practical): 0 (0-0) **ECTS: 2**
All students are required to undergo industrial training for a minimum period of 60 working days. Normally, the industrial training is carried out as two components which are after the fourth and sixth semester. Placement of students at various companies will be supervised and coordinated by the Industrial Training Committee set up by the Faculty. The students will be placed at various companies. The training at the various companies will expose the students to a real working environment including the companies' organization structures, business operations and administrative functions. The hands-on experience in the training will reinforce what has been taught at the University.

Third year

Compulsory courses

CEN 301. Operating Systems
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 5**
This course studies fundamental design and implementation ideas in the engineering of operating systems. Lectures are based on a study of LINUX. Topics include virtual memory, threads, context switches, kernels, interrupts, system calls, interprocess communication, coordination, and the interaction between software and hardware. Individual laboratory assignments are also designed for practical sessions.

CEN 351. Database Management Systems
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 5**
This course investigates how database management system techniques are used to design, develop, implement and maintain modern database applications in organizations. Individual laboratory assignments are also designed for practical sessions.

CEN 300. Industrial Training II
Hours (Theoretical-Practical): 0 (0-0) **ECTS: 2**

All students are required to undergo industrial training for a minimum period of 60 working days. Normally, the industrial training is carried out as two components which are after the fourth and sixth semester. Placement of students at various companies will be supervised and coordinated by the Industrial Training Committee set up by the Faculty. The students will be placed at various companies. The training at the various companies will expose the students to a real working environment including the companies' organization structures, business operations and administrative functions. The hands-on experience in the training will reinforce what has been taught at the University.

CEN 361. Computer Networks
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 5**

An introduction to the design and analysis of computer communication networks. Topics include application layer protocols, Internet protocols, network interfaces, local and wide area networks, wireless networks, bridging and routing, and current topics

CEN 392. Senior Design Project
Hours (Theoretical-Practical): (-) **ECTS: 7**

In this course students works individually under the supervision of assigned professors to tackle real design problems for industry. Students gain a variety of benefits from this open-ended problem-solving experience, which requires them to synthesize and apply the knowledge they have gained through their engineering courses, to work within time and budget constraints, and to present their progress and results through regular oral and written communications with company members.

Elective Courses

BUS 303. Production Management
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

The course includes topics such as systems, models and modelling approaches, decision analysis, certainty, risk and uncertainty conditions, linear programming, sensitivity analysis and transportation and assignment problems.

CEN 363. Introduction to Network Programming
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 5**

This course covers TCP/IP network programming using Berkeley sockets as the application program interface. After an introduction to the concepts of computer networks, TCP/IP protocols, and sockets, TCP/UDP sockets and their example client-server programs are presented. The second half of the course covers advanced topics including I/O multiplexing, threads, non-blocking I/O, client-server design alternatives, etc. Along the semester, three mini-program assignments will be given.

CEN 365. Introduction to Mobile and Wireless Networking
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 5**

This course is providing a comprehensive treatment of wireless data and telecommunication networks in wireless networking. Topics include Wireless Networking Trends, Key Wireless Physical Layer Concepts, Wireless Local Area Networks, Wireless Personal Area Networks, WiMAX (Physical layer, Media access control, Mobility and Networking), IEEE 802.22 Wireless Regional Area Networks, IEEE 802.21 Media Independent Handover, Wireless Cellular Networks: 1G and 2G, 2.5G, 3G, and 4G, Mobile IPv4, Mobile IPv6, TCP over Wireless Networks, Ad Hoc Networks - Issues and Routing, Wireless Sensor Networks, Wireless Mesh and Multi-Hop Relay Networks, Radio Frequency Identification (RFID).

CEN 311. Introduction to Web Engineering
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 5**
Provides an introduction to the discipline of Web Engineering. This course aims to introduce the methods and techniques used in Web-based system development. In contrast to traditional Software Engineering efforts, Web Engineering methods and techniques must incorporate unique aspects of the problem domain such as: document oriented delivery, fine-grained lifecycles, user-centric development, client-server legacy system integration and diverse end user skill levels. This course draws upon previous programming and computing experience to develop practical web development and maintenance skills. This course is intended for students with knowledge of both Internet communication concepts and an introductory programming knowledge

CEN 312. Web Programming
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 5**
This is a beginners' course in programming together with HTML. It follows a problem-based approach which requires you to design and create a website of ever-increasing sophistication as the course progresses while creating design documentation, reflecting on the process, and (optionally) sharing and communicating with others on the course. The output of your work will be presented as a publicly accessible website, and you will submit a portfolio that maps what you have done to the course learning outcomes.

CEN 352. Introduction to MIS
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 5**
This course examines the applications of computer-based information systems to the management of organizations. Topics include use of information to further the organization's mission and strategy, the role of users, the architecture of information and development of decision-support processes for managers. Technologies and tools such as HTML, database, and spreadsheet will be taught.

CEN 364. Introduction to Network Security
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 5**
The objective of this course is to teach the fundamental concepts, architectures and protocols related to network security. Topics covered include: overview of network security; basics of cryptography; threat models; authentication and authorization mechanisms and standards; public key infrastructure; electronic mail security; network layer security; transport layer and web security; packet filtering, firewalls, intrusion detection, and virtual private networks; recent topics in network security.

CEN 384. Computer Architecture
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 5**
This course is an undergraduate course on computer architecture with an emphasis on a quantitative approach to cost/performance design tradeoffs. The course covers the fundamentals of classical and modern processor design: performance and cost issues, instruction sets, pipelining, caches, physical memory, virtual memory, I/O superscalar and out-of-order instruction execution, speculative execution, long (SIMD) and short (multimedia) vector execution, multithreading, and an introduction to shared memory multiprocessors.

CEN 396. Digital Data Communications
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 5**
This course is intended to cover listed topics. Principles underlying communication network design, including physical layer, MAC layer modeling and engineering, and data link layer. Internet structure, Internet protocol models and engineering. Physical layer description will

include modulation, data transmission, and multiplexing. MAC layer modeling will include CSMA/CD, token ring and token bus techniques.

CEN 382. Microprocessors and Microcomputing
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 5**

Introduction to computer and microprocessor architecture, addressing modes. Arithmetic, logic and program control instructions. Programming microprocessor, 8086/8088 hardware specifications, interrupts, memory and basic I/O interface.

CEN 353. Introduction to E-Business/E-Commerce
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 5**

Electronic processing and transmission of data including text, sound and video for e-business. Electronic trading of goods and services, on-line delivery of digital contents, electronic fund transfer, electronic bill of lading, direct consumer marketing and after-sales services. E-business security, shopping carts, methods of electronic payments and XML related technologies.

CEN 355. Special Topics in Database Management Systems
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 5**

Introduction to database design and use of database management systems for applications. Topics include database architecture, comparison to file-based systems, historical data models, conceptual model; integrity constraints and triggers; functional dependencies and normal forms; relational model, algebra, database processing and Structured Query Language (SQL), database access from Applications-Embedded SQL, JDBC,Cursors, Dynamic SQL, Stored Procedures. Emerging trends will be studied, such as NoSQL databases, Internet & Databases and On-Line Analytical Processing (OLAP). A team project that builds a database application for a real-world scenario is an important element of the course.

CEN 308. Software Engineering
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

This course is aimed at helping students build up an understanding of how to develop a software system from scratch by guiding them thru the development process and giving them the fundamental principles of system development with object oriented technology using UML. The course will initiate students to the different software process models, project management, software requirements engineering process, systems analysis and design as a problem-solving activity, key elements of analysis and design, and the place of the analysis and design phases within the system development life cycle.

BUS 114. Communication Skills
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

Communication skills are an essential element every employee and manager must have as part of their standard tool set. In this course, through interactive lectures, self-assessments, role-playing activities and video simulations, students gain practical experience passed on a flexible, genuine and self-confident approach. They also gain the skills to collaborate on written reports and oral presentations honing their communications skills

BUS 131. Behavioral Sciences
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

Social Psychology is the scientific study of how our behaviors, thoughts, and emotions are affected by the real or imagined presence of other people. This broad definition will lead us into topics such as the self, social cognition, conformity, attitudes & persuasion, stereotyping, attraction, aggression, and pro-social behavior. The theories and ideas we will discuss in this class apply to almost every aspect of our day-to-day lives as well as business life, and thus I hope you will find that Social Psychology is both an important and exciting course. Class will

involve lectures, discussions, demonstrations, and videos if available. Although this is a large class, class discussion is encouraged and expected. It is important to keep up with the reading for the class

BUS 333. Customer Behavior
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

This course introduces students to the influence that consumer behaviour has on marketing activities. Students will apply theoretical concepts to marketing strategies and decision making. Topics include consumer and marketing segments, environmental influences, individual determinants, decision processes, and information research and evaluation.

CEN 137. Computer Literature and Skills
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 4**

This course is designed to develop students' computer literacy, keyboarding skills and to meet the needs of students in the associate degree programs and technical certificate programs. The student will learn from hands-on experiences basic skills in file management utilities, word processing, spreadsheets, and graphical presentations in the Windows environment.

MTH 103. Linear Algebra
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 4**

This is a basic subject on matrix theory and linear algebra. Emphasis is given to topics that will be useful in other disciplines, including systems of equations, vector spaces, determinants, eigenvalues, similarity, and positive definite matrices.

BUS 361. Leadership
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

Upon completion of this course the student will develop a working knowledge of leadership theory and practice. The student will also develop self-knowledge of his or her leadership philosophy and preferred leadership styles along with a skill for successful analysis of cases involving leadership.

ENG 101. Introduction to Engineering
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 4**

Introduction to engineering disciplines and their sub-fields, basic tools used in engineering practice, hands-on engineering projects. The course familiarizes students with field of engineering in general and the individual disciplines within engineering in particular. At the end of the course students are expected to be cognizant of the role of an engineer in society and are thus able to make an informed selection of a field within engineering as their major.

ENG 103. Technical Drawing I
Hours (Theoretical-Practical): 8 (2-6) **ECTS: 7**

Students learn to draft illustrations of machine parts, exploded pictorial assemblies, parts catalogs, plant layouts and elevations. The use of color and shading are introduced. Pictorial drawings combine elements of both technical and artistic drawing to convey all the information necessary to be used as guides by people involved in manufacturing, maintenance or sales where a complex part or process would be difficult to visualize when only orthographic views are given.

ENG 112. Bioenginnerig
Hours (Theoretical-Practical): 5 (3-2) **ECTS: 6**

Principles, practice, and the role of bioengineers in science, engineering, and commercialization of medical products are explained in the course. Professional ethics, career paths, introduction to graphical design tools and instrumentation are also pointed during course.

ENG 105. Engineering Technology I
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 6**

Engineering Technology course focuses primarily on the applied aspects of science and that portion of the technological spectrum closest to product improvement, industrial practices, and engineering operation functions.

ENG 108. Engineering Technology II
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 6**

This course includes the software skills required for installing and maintaining technological devices. Work-based learning strategies appropriate for this course include apprenticeship, cooperative education, internship, and job shadowing. This course helps prepare students for competitive events, community service, and leadership activities provide the opportunity to apply essential standards and workplace readiness skills through authentic experiences.

ENG 104. Technical Drawing II
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 5**

This course involves experience in technical drawing as a tool of technical communication. Emphases are on development of basic drafting skills, visualization and solving graphical problems as upper level of ENG 103.

ENG 106. Statics and Strength of Materials
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 5**

This course covers external and internal forces in structures and/or machines, including conditions of equilibrium, systems of force, moments of inertia and friction. It also covers the stress and strain relationships in materials.

ENG 110. Introduction to Visual Arts
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

This course provides an introduction to the language of the visual arts and a foundation for individual understanding and enjoyment of art. This class will focus on how art communicates, how to analyze and interpret it, and how we can see it as a cultural product that reveals something about the society that produced it. The first part of the course covers the basics of art theory and practice. The second part will focus on materials and techniques. And the third part will be a brief survey of the history of art from prehistory to the present. Class sessions will move between lecture and in-class discussions.

BUS 132. Introduction to Accounting
Hours (Theoretical-Practical): 3 (2-1) **ECTS: 5**

This course delve into the terminology employed in financial circles, the principles used in basic accounting and the systems put in place to ensure financial control is maintained. The course explores the main financial statements including the profit & loss account and the balance sheet and the everyday adjustments that have to be made.

BUS 103. Introduction to Business
Hours (Theoretical-Practical): 3 (2-1) **ECTS: 5**

This course presents a balanced view of business; the strengths, weaknesses, successes, failures, problems, and challenges. It provides students a base for more advanced courses. The objective of this course is to provide students a clear and complete description of the concepts underlying business and illustrate the dynamism and liveliness of business organizations and people who operate them with real life examples.

BUS 108. Introduction to Law
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

This course gives a general overview of law and legal systems. It covers the nature and sources of law, court systems, and the substantive areas of constitutional law, contracts,

torts, criminal law, contracts, agency, and property. This course is geared towards providing students with the basic knowledge of all aspects of the law, critical legal thinking, and a comparative approach to the civil and common law systems. This course is a prerequisite for all other Legal Studies courses.

BUS 112. Fundamentals of Management
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

This course provides a thorough understanding of what is required to set up organization, motivate and manage your team successfully and provides clear structures and tools to enable you to do this. It will show you how to master the five key areas of modern management: Goal Setting; Effective Time Management; Performance Management; Motivating Your Team.

BUS 221. Marketing I
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

The purpose of this course is to cover subjects that relate to foundations of marketing management in modern business establishments. Topics to be taught in this course include definition and scope of marketing, marketing environment, managing marketing information, consumer and business buyer behavior, creating value for target customers, product, services and branding strategy, new product development and product life-cycle strategies, pricing products: Understanding and capturing customer value.

BUS 222. Marketing II
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

Marketing is a key function for all commercial and non-commercial organizations today. This course covers basic marketing subjects and gives students an opportunity to prepare a real life project through which they will have a chance to see how marketing is applied in real world. Basic topics to be covered in this course include pricing, supply chain management, retailing, wholesaling, advertising, personal selling and direct marketing.

ECO 102. Introduction to Economics II
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

Students will learn about essential principles of economics. They will learn how people, companies and governments should manage scarce resources in an effective way as an upper level of ECO 101 course.

ECO 205. Microeconomics
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

Microeconomics is an introductory undergraduate course that teaches the fundamentals of microeconomics. This course introduces microeconomic concepts and analysis, supply and demand analysis, theories of the firm and individual behavior, competition and monopoly, and welfare economics. Students will also be introduced to the use of microeconomic applications to address problems in current economic policy throughout the semester.

ECO 206. Macroeconomics
Hours (Theoretical-Practical): 3 (2-1) **ECTS: 5**

This course provides an overview of macroeconomic issues: the determination of output, employment, unemployment, interest rates, and inflation. Monetary and fiscal policies are discussed. Important policy debates such as, the sub-prime crisis, social security, the public debt, and international economic issues are critically explored. The course introduces basic models of macroeconomics and illustrates principles with the experience of the U.S. and foreign economies.

BUS 105. Business English
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 5**

The course aims at developing fluency and accuracy in using Business English with the help of essential business content: basic structures and vocabulary, authentic reading and listening texts (e.g. newspaper articles, interviews, etc.), business reports and case studies. It covers the most important areas of management, production, marketing, finance and macroeconomics.

ELT 123. Oral Communication Skills I

Hours (Theoretical-Practical): 4 (2-2) **ECTS: 5**

This course provides students with the opportunity to practice and improve their listening and communication skills in English. Although our primary focus will be academic English, we will also touch on everyday English. Listening practice will include academic lectures, interviews, video and audio files and student selected materials. Frequent dictations will provide opportunities for detailed listening and will lead to some discussions about fast speech phenomena. Vocabulary improvement will focus on idiomatic English as well as academic register. Students will have opportunities to improve their speaking skills with discussions and presentations. We will also have a chance to discuss cultural topics related to the United States and the other countries represented in our class.

ELT 122. Oral Communication Skills II

Hours (Theoretical-Practical): 4 (2-2) **ECTS: 4**

Through weekly classes built around various topical themes, students will have the opportunity to practice speaking English, both formally and conversationally. Activities will include class discussions and individual and group presentations. This course aims to develop students' fluency and confidence in speaking English and will integrate different reading and listening samples into communication-oriented tasks. Following a brief assessment test at the beginning of the term, students will be divided into 2 groups based on their level of spoken English.

BUS 211. Organization Theory I

Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

The course examines the basic topics in organization theory. Topics include organizations and organization effectiveness, stakeholders, managers, and ethics, managing in a changing global environment, basic challenges of organizational design, designing organizational structure: authority and control, designing organizational structure: specialization and control, creating and managing organizational culture, and managing conflict, power, and politics.

BUS 212. Organization Theory II

Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

The course examines the basic topics in organization theory. Topics include organizations and organization effectiveness, stakeholders, managers, and ethics, managing in a changing global environment, basic challenges of organizational design, designing organizational structure: authority and control, designing organizational structure: specialization and control, creating and managing organizational culture, and managing conflict, power, and politics as an upper level of BUS 211.

CEN 101. Computer Engineering Orientation

Hours (Theoretical-Practical): 4 (2-2) **ECTS: 5**

A first introduction to the discipline of computer engineering. A brief survey of the computer science discipline, focusing on the computer's role in representing, storing, manipulating, organizing and communicating information. For students considering further computer science offerings, this course provides an accurate picture of what lies ahead, hopefully increasing interest in the discipline. Since, computers are used widely in all areas of modern life. For this reason it is important for all students to understand how computers work and how computers can be used as a problem-solving tool. The focus of this course is on computer applications. The course stresses the ways in which computers can help you solve

problems efficiently and effectively. The course provides a broad introduction to hardware, software, and mathematical aspects of computers.

CEN 111. Introduction to Algorithms & Programming
Hours (Theoretical-Practical): 5 (3-2) **ECTS: 7**
This course provides an introduction to programming of computational problems. It covers the common algorithms, algorithmic paradigms to solve these problems. The course emphasizes the relationship between algorithms and programming, and introduces basic performance measures and analysis techniques for these problems with programming practices.

CEN 112. C Programming
Hours (Theoretical-Practical): 5 (3-2) **ECTS: 7**
Learn the C programming language and its fundamental programming concepts. Gain the knowledge to write simple C language applications and undertake future courses that assume some background in computer programming. Topics include variables, data types, functions, control structures, pointers, strings, arrays and dynamic allocation principles. You need access to any programming environment that allows you to write, edit, compile, link and debug a C program.

MTH 102. Calculus II
Hours (Theoretical-Practical): 5 (3-2) **ECTS: 7**
Students should be prepared to use the mathematical apparatus of calculus in technical courses that follow in the curriculum. Course aims to provide both theoretical and practical knowledge for the students to use, combining mathematical rigor with engineering know-how.

PHY 102. General Physics II
Hours (Theoretical-Practical): 5 (3-2) **ECTS: 6**
By the end of the course students should be able to understand phenomena, concepts, terminology, and problem-solving skills in the field of electromagnetism, thermodynamics, optics, atomic, and nuclear physics.

MTH 104. Probability and Statistics for Engineers
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 5**
Emphasis is on probability theory and its applications, with a smaller module at the end covering basic topics in statistics (parameter estimation, hypothesis testing and regression analysis). The probability part includes events and their probability, the Total Probability and Bayes' Theorems, discrete and continuous random variables and vectors, the Bernoulli trial sequence and Poisson process models, conditional distributions, functions of random variables and vectors, statistical moments, second-moment uncertainty propagation and second-moment conditional analysis, and various probability models such as the exponential, gamma, normal, lognormal, uniform, beta and extreme-type distributions. In addition, the graduate subject has a module on system reliability, which covers both second-moment and full-distribution techniques. Throughout the subjects, emphasis is on application to engineering and everyday life problems.

BOS 101. Bosnian Language I
Hours (Theoretical-Practical): 2 (2-0) **ECTS: 0**
This course provides Basic communication skills such as understanding and speaking in Bosnian language by understanding the structure of Bosnian language on starter level.

BOS 102. Bosnian Language II
Hours (Theoretical-Practical): 2 (2-0) **ECTS: 0**
This course provides Basic communication skills such as understanding and speaking in Bosnian language by understanding the structure of Bosnian language on beginner level.

TDE 191. Turkish Language I
Hours (Theoretical-Practical): 2 (2-0) **ECTS: 0**
This course provides Basic communication skills such as understanding and speaking in Turkish language by understanding the structure of Turkish language on starter level.

TDE 192. Turkish Language II
Hours (Theoretical-Practical): 2 (2-0) **ECTS: 0**
This course provides Basic communication skills such as understanding and speaking in Turkish language by understanding the structure of Turkish language on beginner level.

CEN 304. Automata Theory And Formal Languages
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**
Finite automata and regular languages are one of the first and simplest models of computation, and their mathematical theory is quite elegant and simple. Finite automata are widely used to model certain physical systems (traffic light, vending machines, ...) or to describe some applications (lexical analysis, pattern search algorithm, ...). Finite automata constitute also a perfect illustration of basic concepts in set theory and discrete structure. Pushdown automata are finite automata with stacks. The theory is more complex, but has important applications in parsing and analysis of context-free languages which is also a fundamental concept in computer science. Turing machines were described by Alan Turing in 1937 and they are a powerful model of computation since they help computer scientists understand the limits of mechanical computation by providing a precise definition of an 'algorithm' or 'mechanical procedure'.

CEN 306. Analysis of Algorithms
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**
Techniques for the design and analysis of efficient algorithms, emphasizing methods useful in practice. Topics include sorting; search trees, heaps, and hashing; divide-and-conquer; dynamic programming; greedy algorithms; amortized analysis; graph algorithms; and shortest paths. Advanced topics may include network flow, computational geometry, number-theoretic algorithms, polynomial and matrix calculations, caching, and parallel computing.

CEN 321. Introduction to Logic Programming
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**
The course explores logic-based computing and logic programming. It includes an introduction to programming in logic, covering basic techniques for solving problems in a logic programming system. Particular attention will be paid to user interface issues and how a logic system can provide a useful computing environment. The course covers implementation issues, emphasizing how a logic programming system generalizes both traditional programming language systems and traditional database systems.

CEN 331. Introduction to Programming Language Design
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**
This course provides an introduction to programming language design and implementation. It provides experience in a variety of programming paradigms as well as an introduction to programming language theory.

CEN 334. Introduction to Human-Computer Interaction
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**
In this course, you will learn how to design technologies that bring people joy, rather than frustration. You'll learn several techniques for rapidly prototyping and evaluating multiple interface alternatives -- and why rapid prototyping and comparative evaluation are essential to excellent interaction design. You'll learn how to conduct fieldwork with people to help you get design ideas. How to make paper prototypes and low-fidelity mock-ups that are interactive -- and how to use these designs to get feedback from other stakeholders like your

teammates, clients, and users. You'll learn principles of visual design so that you can effectively organize and present information with your interfaces. You'll learn principles of perception and cognition that inform effective interaction design. And you'll learn how to perform and analyze controlled experiments online.

CEN 354. Introduction to Data Mining
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

Data mining is concerned with the extraction of novel knowledge from large amounts of data. This course introduces and studies the concepts, issues, tasks and techniques of data mining. Topics include data preparation and feature selection, association rules, classification, clustering, evaluation and validation, scalability, spatial and sequence mining, and data mining applications.

CEN 358. Introduction to Computer Vision
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

This course is an introduction to basic concepts in computer vision, as well some research topics. We will cover low-level image analysis, image formation, edge detection, segmentation, image transformations for image synthesis, methods for 3D scene reconstruction, motion analysis, tracking, and object recognition.

CEN 359. Introduction to Machine Learning
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

This course provides a broad introduction to machine learning and statistical pattern recognition. Topics include: supervised learning (generative/discriminative learning, parametric/non-parametric learning, neural networks, support vector machines); unsupervised learning (clustering, dimensionality reduction, kernel methods); learning theory (bias/variance tradeoffs; VC theory; large margins); reinforcement learning and adaptive control. The course will also discuss recent applications of machine learning, such as to robotic control, data mining, autonomous navigation, bioinformatics, speech recognition, and text and web data processing.

CEN 381. Introduction to Computer Graphics
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

Introduction to computer image synthesis, modeling, and animation. Topics may include visual perception, displays and framebuffers, image processing, affine and projective transformations, hierarchical modeling, hidden surface elimination, shading, ray-tracing, anti-aliasing, texture mapping, curves, surfaces, particle systems, dynamics, character animation, and animation principles.

CEN 383. Signal Processing For Computer Engineering
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

Fundamentals of signals and systems, classification of signals, continuous signals, Fourier Transforms, Inverse Fourier Transform, Laplace Transforms, Inverse Laplace Transforms, discrete signals, Fast Fourier Transform, Discrete Fourier Transforms, Z Transforms, filters, and the other applications.

CEN 390. Introduction to Artificial Intelligence
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

The goal of Artificial Intelligence is to build software systems that behave "intelligently". By this, we mean that the computer systems "do the right thing" in complex environments--that they act optimally given the limited information and computational resources available. This course provides an introduction to artificial intelligence. We will first study the core topics of knowledge representation, reasoning, and learning, all from the perspective of probabilistic methods. Then we will cover several of the "subject areas" of artificial intelligence where

these probabilistic methods are applied including Natural Language Processing, Perception (primarily vision), and Robotics.

CEN 391. Introduction to Neural Networks
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

This course explores the organization of synaptic connectivity as the basis of neural computation and learning. Perceptrons and dynamical theories of recurrent networks including amplifiers, attractors, and hybrid computation are covered. Additional topics include backpropagation and Hebbian learning, as well as models of perception, motor control, memory, and neural development.

CEN 393. Introduction to Evolutionary Computing
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

Evolutionary algorithms are search and optimization algorithms gleaned from the model of organic evolution. Their main components are a population of individuals that undergoes an iterative process of fitness evaluation, variation and selection. The existing approaches to evolutionary computation - including e.g. genetic algorithms, evolution strategies, evolutionary programming, genetic programming, classifier systems - all share the same basic model, but are considerably different in their practical instantiations. In the course, we will give an overview of the main representatives of evolutionary algorithms and explain the algorithms in detail. The main theoretical results about these algorithms as well as practical application examples are discussed.

CEN 394. Introduction to Pattern Recognition
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

This course will introduce the fundamentals of statistical pattern recognition. First, we will focus on generative methods such as those based on Bayes decision theory and related techniques of parameter estimation and density estimation. Next, we will focus on discriminative methods such as nearest-neighbor classification and support vector machines. Methods of pattern recognition are useful in many applications such as information retrieval, data mining, document image analysis and recognition, computational linguistics, forensics, biometrics and bioinformatics. In this course, we will emphasize computer vision applications.

CEN 395. Introduction to Mobile Programming
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

The course teaches students how to write mobile applications different fundamental programming languages. The course will lead the students through the essential concepts, tools, and techniques for developing applications. After completing this course, the students will have the knowledge and skills needed to create applications.

CEN 385. Introduction to Cryptography
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

This course is an introduction to modern cryptography. In general, cryptography aims to construct efficient schemes achieving some desired functionality, even in an adversarial environment. For example, the most basic question in cryptography is that of secure communication across an insecure channel: Can Alice send a message to Bob so that Bob understands the message, but no eavesdropper does? How can Bob be sure that the message received was sent by Alice? Another question is that of secure computation in an insecure environment: Can a group of parties perform some distributed computation (e.g., coordinate an attack, or tally a vote), so that an adversary controlling the communication channels and some of the parties cannot disrupt the computation or learn extra information?

CEN 396. Introduction to Evolutionary Computing
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

This course is intended to cover listed topics. Principles underlying communication network design, including physical layer, MAC layer modeling and engineering, and data link layer. Internet structure, Internet protocol models and engineering. Physical layer description will include modulation, data transmission, and multiplexing. MAC layer modeling will include CSMA/CD, token ring and token bus techniques.

ECO 101. Introduction to Economics I
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

Students will learn about essential principles of economics. They will learn how people, companies and governments should manage scarce resources in an effective way.

BUS 341. Operations Research
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

Defining a problem, developing a model appropriate to a problem, obtaining the solution of the model, analyzing the results, testing and implementing the model.

BUS 323. Project Evaluation And Finance
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 5**

This course considers financial and economic analysis of private and public projects associated with the operations in domestic and international environment. Due to the globalization and emergence of opportunities for private and public organizations became necessary to expand market shares, production and servicing capabilities, which are held by use of various project concepts. However, some projects implemented have not always fulfilled expectations as a result of inefficient planning, selection and evaluations.

BUS 337. International Marketing
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 5**

The purpose of this course is to introduce students with the concepts of international marketing. The course covers topics that pertain to marketing of goods and services in an international environment. Case studies and class discussions about the challenges of marketing in global environments will enhance student learning in this course. Some basic concepts covered in this course include regional market characteristics and preferential trade agreements, social and cultural environments, the political, legal and regulatory environments, importing, exporting and sourcing, global market entry strategies, brand, product and pricing decisions, global channel and communication decisions.

EDU 135. Introduction to Education
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 3**

The course looks at basic concepts in education and the bases of education as an academic discipline (philosophical, social, legal, psychological, economic and political principles). The course considers the historical development of education, methods in educational sciences, Turkish educational system and principles, the role of the teacher in the educational system, teaching as a profession and practices and developments in the field of teacher training.

EDU 136. Educational Psychology
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 3**

Educational Psychology focuses on how psychological theory and concepts can be understood and inform effective classroom practices. Topics include cognitive and social development, theories of motivation and learning, classroom management, individual and group differences and student assessment. Attention will be directed toward the nature and conditions of learning, critical aspects of learning and the problems encountered in fostering and directing learning.

EDU 235. Teaching Principles and Methods
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 3**

Basic concepts related to instruction, principles of learning and instruction, the importance and utilities of planned steps in instruction, planning instruction (yearly, weekly lesson plans), learning and instruction strategies, instructional methods and techniques, making a linkage between these methods, techniques and the practice, instructional materials, the roles and responsibilities of the teachers in enhancing the quality of instruction, competencies of teacher.

EDU 236. Instructional Technology and Material Design
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 3**

With a great deal of investment being put into outfitting schools with technology, the question of whether or not it is worth the investment is a valid one. Ongoing developments in technology necessitate to build a bridge between education and technology use actively in classroom. This course aims to provide an understanding that necessity and solutions. Latest developments for that integration goal will be introduced and students will be guided to prepare practical use of technological skills through in-class activities and assignments.

EDU 335. Classroom Management
Hours (Theoretical-Practical): 2 (2-0) **ECTS: 3**

One of the major challenges teachers face in their practice is classroom management. When a teacher does not have essential management skills, effective instruction may not occur in the classroom. In this course you will learn to create a productive learning environment.

EDU 336. Measurement and Evaluation
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 3**

Concepts of measurement and evaluation, classroom test construction, creation and use of derived scores, selection and use of published measurement instruments, alternative assessment, and current issues will be covered in the course.

EDU 435. Guidance and Counseling
Hours (Theoretical-Practical): 4 (2-2) **ECTS: 3**

The aim of this course is to give you the knowledge and skills necessary to become a qualified guidance and counselling. Guidance promotes personal, social, educational and vocational development in individuals.

EDU 436. Educational System and School Management in Europe
Hours (Theoretical-Practical): 3 (3-0) **ECTS: 3**

EDU 436 course examines the cultural values and historical developments which have shaped schooling in EU. The syllabus focuses mainly on the educational system in the leading European countries but also compares educational systems in Europe, Asia and the USA. As well as exploring education from kindergarten to university in Europe, students are placed in elementary schools in Europe to teach one hour of English per week. The course combines the theoretical aspects of teaching at the same time as providing students with the chance to teach.