ISTINYE UNIVERSITY FACULTY OF ENGINEERING

DEPARTMENT OF SOFTWARE ENGINEERING

COURSE DESCRIPTIONS

Department Required Courses

1. Semester

English I (8,4) 14

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

In this course, Atatürk's Principles which form the basis of the state are explained within the framework of the conditions under the Republic of Turkey was established. The following topics are covered in the course: The concept of revolution, general view of the demise of the Ottoman Empire, and the reasons for preparing the Turkish Revolution, various movements of thought in the last period of The Ottoman Empire, the breakdown of the Ottoman Empire, Mondros Ceasefire Agreement, the situation of the country in the face of occupations, the national struggle and the foundation of the Grand National Assembly.

Turkish Language I ((2,0) 2

The aim of this course is to enable students to understand the structure and functioning of Turkish language properly and to gain the ability of building correct and beautiful Turkish speaking as a means of both written and oral communication. In the course, the place and importance of language as a social institution, language-culture relations, spoken and writing language topics are covered, and examples from Turkish literature are discussed.

Mathematics I (3,0) 5

The aim of this course is to give the students a mathematical background by teaching them the necessary information about relations, functions, limit theorem, continuity, derivatives, and have them gain the ability to approach problems in a rational way. Students who complete this course successfully will learn to define the limit concept, the derivative as the rate of change, at the end of the course. They will be able to apply different derivation methods, use those methods in drawing curves, solve speed related problems, and basic optimization problems.

Introduction to Economics (3,0) 5

The aim of this course is to introduce the student to economic analysis tools. The real and monetary parts of the economy are examined separately. The main economic problems, inflation and unemployment, are examined. In the following sections, the monetary and real parts of the economy are examined together and discussed. Besides, the rules governing the students' daily life and today's economic environment, basic principles of economics, supply, demand, price formation, markets, factor markets, income distribution and state interventions, are explained.

ViSE Seminars I (1,0) 2

Istinye University faculty and visiting scholars give inspiring and thought provoking seminars on several interesting fields of research and development.

2. Semester

English II (8,4) 14

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

The aim of this course is to teach young people the Turkish Revolution under the leadership of Mustafa Kemal Ataturk, the founder of the Turkish Republic, and of Atatürk's thoughts, and modernity and secularism concepts in the context of Turkey, the history of the modernization experience shaped by this foundation within the perspective of the establishment of the nation-state in a secular and unitary structure after the destruction of the Ottoman Empire, and by the establishment Republic of Turkey. The student who takes this course is aimed to gain the reasoning behind the founding principles of the Republic of Turkey, and in the context of the Turkish Revolution, reasons on the solution of contemporary problems by classification, description, explanation and analysis skills, within the norms of modernity, and according to the principles at the society, individual national and country levels.

Turkish Language II (2,0) 2

This course aims to enable the students to comprehend the structure and functioning of the Turkish language properly and gain the ability of speaking Turkish correctly. In addition to the topics such as the current state of the Turkish language, the spread of the Turkish language, developments in Turkish culture from the Tanzimat period to the Republican era, and important works from the Turkish language literature are examined.

Linear Algebra (3,0) 5

This goal of this course is to have the students understand the matrix operations (addition, multiplication and inversion) and some related properties about matrix operations, in order to solve linear systems of equations using matrices, to define vector spaces, sub vector spaces, base and dimension concepts and their related theorems. Also, the students are expected to understand the concept of linear transformation, to show a linear transformation with a matrix, to recognize linear transformation spaces and to understand its structural properties, recognize linear functional and dual space concepts, find a dual basis of a space, and to be able to perceive relevant features.

Engineering Ethics and Basic Law (2,0) 5

In this course, the aim is to convey the basic universal ethical values that a software engineer should know. Besides, it is aimed to give information about personal law, civil law, commercial enterprises,

commercial companies, commercial law and debt law concepts that will be exposed by the students in real life.

ViSE Seminars II (1,0) 2

Istinye University faculty and visiting scholars give inspiring and thought provoking seminars on several interesting fields of research and development.

3. Semester

English III (3,1) 4

The benefits to be gained in this course are: using some simple things correctly despite some systematic mistakes, information on personal priority areas and the most frequently used words, reading and writing short texts encountered in everyday life, communicating in simple and routine exercises that require fast and direct information exchange on known topics and activities, writing short and simple texts that express top priority necessities.

Introduction to Probability and Statistics (3,0) 5

The aim of this course is to have the students gain knowledge about statistics, data collection, classification, frequency distributions, arithmetic, geometric and harmonic averages, median, mode, time series analysis, the probability concept, random variables, hypothesis tests and estimation.

Introduction to Software Engineering (3,2) 7

Being the first course directly related with the profession in the Software Engineering Department; as its name implies this course aims to convey the basic concepts of software engineering to the students. During the course; basic concepts and tools of software development, such as basic components, variables, functions, arithmetic and logic operators, loops, classes and exceptions, compiling, running, debugging, interpreting and integrated development environments (IDE), constitute the main topics of the course.

Digital Logic (3,2) 7

Number systems. Boolean algebra, logic expressions and their simplification. Logic design with gates. MSI and LSI technologies. Combinational circuits and sequential circuits. Counters, shift registers, flip-flops, computer organization, arithmetic logic, memory and control units, mini and microcomputer systems.

4. Semester

English IV (3,1) 4

This course includes teaching English grammar as well as reading-comprehension, writing, listening-comprehension and speaking skills at the intermediate level.

Communication Reporting and Presentation Techniques (2,0) 5

The aim of the course is to provide students with the ability to communicate and develop healthy and effective relationships within the society, business life and social areas. They will acquire the

knowledge and skills that they can communicate effectively by recognizing their environment and using their communication skills in business life, social and cultural life. This is aimed at; using basic communication tools, expressing oneself in a healthy way, rules regulating human relations, transferring the works done to another person.

Advanced Programming (3,2) 7

The aim of this course is to provide students with practical skills in advanced computer programming using a specific programming language and its tools. Advanced concepts (threads, packages, modules, serialization, closures, patterns, etc.) in computer programming and software development will be communicated to the students. The main goal of the course is to prepare the software engineer mentality in preparation for the high-level courses in the department curriculum.

Discrete Mathematics (3,0) 7

The aim of this course is to provide the software engineering students with a basic mathematical approach while solving computational problems. It is aimed to have them acquire the necessary background in discrete mathematical structures. For this purpose, the working logic of computers is explained in the course, based on this logical background, sets and relations are shown, and the general working mechanism of programming languages are explained. Course subjects are; set theory, logic, functions and basic concepts, combinatoric theory, productive functions, recurrence relations, logic bases, propositional logic, first order logic, logical inference, proof bases, set theory, induction and recursion bases, number theory, modular arithmetic, combinations and permutations, relations, and functions.

5. Semester

English V (3,1)

The benefits to be gained in this course are: using some simple things correctly despite some systematic mistakes, information on personal priority areas and the most frequently used words, reading and writing short texts encountered in everyday life, communicating in simple and routine exercises that require simple and direct information exchange on known topics and activities, writing short and simple texts that express top priority necessities.

Programming Languages (3,2) 6

In this course students will have a general knowledge of the basic concepts of syntactic and semantic structures of programming languages through comparative analysis of several programming languages. Additionally, awareness will be given to the students on the characteristics of several programming languages so that the gain the ability to understand general conceptual grammatical issues necessary for designing new programming languages and compilers.

Computer Architecture (3,2) 6

This course emphasizes today's computer architectures, especially the basic principles modern computer architecture, and the critical role of performance in computer design. Topics to be covered include number systems, computer arithmetic, evolution and performance of computers, memory, storage, input / output, processors, multi-core processors and clustered computer structures.

Data Structures and Algorithms (3,2) 7

The aim of this course is to teach how to arrange the data, and how various algorithms using those data can be used to solve a problem effectively with a computer program. The topics covered include basic mathematical tools for algorithm analysis, basic algorithm design techniques, arrays, lists, stacks, sequences, trees, graphics, stacks, and so on. advanced data structures and important algorithms from different fields.

6. Semester

English VI (3,1) 4

This course includes teaching English grammar as well as reading-comprehension, writing, listening-comprehension and speaking skills at the intermediate level.

Software Life Cycle and Construction (3,2) 7

Students who take this course will be able to identify and analyze the various stages of a software development process from the beginning till the end, i.e., feasibility analysis, scope definition, identification of problems, meeting system requirements, data collection, object and process modelling and proposing alternative solutions. The basic principles and techniques of software development will be explained. How to design easy-to-understand and easy-to-change software without errors will be illustrated in this course. This course consists of a number of problem sets and a term project. Some of the important issues are: specifications, invariants, testing, abstract data types, procedural programming, object oriented programming, concurrent programming, and functional programming.

Database Management (3,2) 6

This course describes the design and implementation of databases for database backed software applications. Students will learn about relational database management systems, keys, indexes, stored procedures, normalizations, join operations, database management and query techniques by using the standard SQL language.

Programming Laboratory (1,2) 6

This course aims to give students practical development experience in order to solve problems via computer programming. At the end of the course, students are expected to gain the knowledge and skills necessary to develop practical software applications that provide added value for their ultimate users. It is a research and application oriented course.

7. Semester

Operating Systems (3,2) 6

Issues such as process management, file management, memory management, input / output management, etc. constitute the basic knowledge that should be transferred to the students detailly. The basic structures of operating systems (virtual machines, paging, interprocess communication and synchronization, device drivers, etc.) are covered in this course. Additionally, problems encountered, and possible solutions devised while designing an operating system are explained at the entry level.

Analysis of Algorithms (3,2) 6

This course aims to give students the ability to solve any computing science problem using the techniques discussed in class. By the end of the course, you will have learned basic algorithm techniques including brute-force, greedy, divide and conquer, dynamic programming, and linear programming.

8. Semester

Graduation Project (0+0) 6

The goal is to have the students develop a professional algorithm and/or software to solve a problem or develop an application. The most important thing when evaluating the developed project is that it is an original one.

Software Engineering Management (3,2) 6

This course covers the quality of project planning, program management, project evaluation, software effort estimation, activity planning, risk management, monitoring and control, management contracts, human management and team formation, and software quality in general. Students who take this course will be able to define the life cycle of a software project, and list the natural steps of the project management. In addition, they will be able to evaluate, in terms of risk assessment and cost-benefit comparisons, when choosing the best ones among a number of competing project proposals.

Software Quality Management (3,2) 6

The aim of this course is to convey the quality of software quality, quality standards, and associated methodologies to the students. Students who complete this course successfully will be able to discuss the significance and importance of quality and various quality factors, review the quality components of the project life cycle, discuss software evaluations and audits, define different test strategies, techniques and tools, discuss the importance of measurement in order to obtain quality, and also gain knowledge and skills in analyzing software quality management standards, including those for process assessment and improvement models.

Department Elective Courses

Automata Theory (3+0) 6

The aim of this course is to teach automata, formal languages, grammars, and Turing machines which form the theoretical basis of compiler design in computer science and definition of computer languages. The main models of the computation that form the basis for software engineering will be covered. At the end of the course, the goal is such that all students have mastered the concepts in terms of engineering.

Introduction to Compiler Design (3+2) 6

This course deals with the logical design of compilers and the adaptation of this design in a physical environment. Topics to be covered include: syntactic analysis, parsing of keywords (top down, bottom up), semantic analysis, lower level code generation and optimization. The goal is to have the students develop a prototype compiler for a limited capability programming language.

Distributed Systems (3+2) 6

This course will provide students with distributed system algorithms and technologies. Theoretical foundations and system applications will be discussed. Students will then explore advanced topics based on research articles and other textbooks. In addition to theoretical studies, it is aimed to complete at least one project during a training period.

Artificial Intelligence (3+2) 6

The aim of this course is to enable students to study artificial intelligence from different perspectives. Students who are able to complete this course successfully will understand the artificial intelligence search models and generic search strategies, use Bayesian networks as a mechanism for handling artificial intelligence uncertainty, explore the design of artificial intelligence systems that are trying to do a better job using learning, and information representation. Some of the special topics covered include processing computer images, natural language processing, and robotics.

Computer Graphics (3+2) 6

The aim of this course is to enable the aimed students to learn three-dimensional computer graphics concepts and user interfaces and to be able to use advanced imaging techniques effectively, to gain the ability to use advanced graphic programming interfaces (OpenGL etc.) and user interfaces effectively, to create fast and high-quality animations and graphics. They are expected to gain the ability to design and use the necessary data structures in an effective and correct way, and to be exposed to two and three-dimensional game programming.

Introduction to Data Mining (3+2) 6

This course provides basic information about the data analysis methods and teaches how to use these methods by developing software programs with statistical inference capabilities. The goal is to focus on modeling issues as well as basic statistical approaches.

Data and Network Security (3+2) 6

This course covers the concept of information security at the beginning level, cryptographic algorithms and systems, as well as the creation of protection mechanisms using the techniques and approaches required to achieve network security. Students who complete this course successfully will have learned security algorithms, cryptographic algorithms, and simple encryption systems, electronic signatures, together with secure messaging and authentication topics.

Introduction to Machine Learning (3+2) 6

The aim of this course is to introduce the students with knowledge representation, problem solving and learning methods which form the basis of machine intelligence. Students who successfully complete this course will be able to understand the importance of linguistics in understanding human intelligence, develop intelligent systems by developing solutions to concrete computational problems, understand the concept of knowledge representation in intelligent systems engineering.

Management Information Systems (3+2) 6

The aim of the course is to motivate students to learn the role of Information Systems in organizations. It covers technical and managerial issues related to computer technology, knowledge development, information systems, and information architecture for business organizations.

Parallel Computing (3+2) 6

Subjects of this course: Modern computer elements, evolution of computer architectures, Flynn classification, multiprocessors and multiple computers, memory sharing multiprocessors, memory multiple computers, taxonomy of MIMD computers, distributed shared memory, message passing architectures, networked computers as multi-SIMD architectures, sequential computations and computing platforms for sequential applications, linear sequential processors, and nonlinear sequential processors.

Mobile Programming (3+2) 6

The aim of this course is to acquaint the students with the knowledge about application development on mobile devices, to understand application development differences between mobile devices and other programmable devices, identify and develop software applications for mobile environments.

Introduction to Artificial Neural Networks (3+2) 6

This course will present models and algorithms commonly used by Artificial Neural Networks (ANN). Content of the course are: basic nerve cell model, sensor, adaptive linear element, least squares algorithm, multi-layered perceptron (MLP), backpropagation (BP) learning algorithm, radial basis function (RBF) networks, self-organizing network, vector quantization learning network; support vector machines (SVM), continuous time and discrete time Hopfield networks, classification techniques, pattern recognition, signal processing and control applications.

Systems Programming (3+2) 6

Operating System environments and tools, programming in C language, programming in assembly language, use of system calls in computer programs.

Information Technologies and Tools (2,0) 5

This course aims to provide students who do not have familiarity with computers before, basic computer usage, teach them solution development techniques via computers, and the ability to use practical computing hardware and software for this purpose. Beginner and intermediate level activities such as operating system usage, using basic system tools, reviewing, changing, saving, and running several types of electronic documents and programs, etc. are included in the scope of this course.

Software Requirements Analysis (3,2) 6

Topics to be covered in this course are: Correct specification of software project requirements, i.e, identification of such requirements, analysis according to priorities, methods of preparing

requirements analysis documents. The course describes the techniques that can be applied in order to respond effectively to the question of whether the right job is done according to needs, i.e., validation, requirement description, documentation, verification and change management.

Human Computer Interaction (3,2) 6

The aim of this course is to teach user-centered design in software engineering. The topic will be addressed through an academic, professional and interdisciplinary approach. The subjects of computer science, anthropology and educational psychology are covered. It is aimed to describe the basic techniques and tools for user interface design, which are critical to the needs of end users in the software development process.

Software Testing and Maintenance (3,2) 6

Students who take this course will gain the ability to apply software measurement principles to plan software projects in order to understand the quality of their software projects. At the end of the course, students will also be able to prepare test cases for currently developed applications and implement these test cases to evaluate the original intended purpose of the developed software.

Communication Systems and Networks (3,2) 6

This course will cover the basics of digital communications and networks. Fundamentals of information theory, sampling and quantization, coding, modulation, signal perception and issues will be discussed; multiple access, secure packet forwarding, routing and communication protocols. The concepts taught in the class will be discussed in the context of communication systems between computers.

Network Programming (3,2) 6

The aim of this course is to familiarize the students with the general concepts of network programming and to give experience on network programming. Topics include; Introduction to network layers, TCP and UDP socket programming, client and server-side programming, consistency, latency, scalability, security and compression algorithms.

Web Application Development (3,2) 6

The aim of the course is to describe the main topics of Internet Web Programming and to give students the knowledge and skills needed to design and develop interactive web pages. Students will develop different software that varies according to the type of data and will reveal advanced interactive and runnable web pages. The main goal is to develop applications that can be run on the world wide web.