KARABÜK UNIVERSITY ENGINEERINGFACULTY

COMPUTER ENGINEERING DEPARTMENT

%100 ENGLISH

2012-2013 CURRICULUM COURSE CONTENTS

1st. Semester Courses	
COURSE CODE	**DESCRIPTION**
CAL 183 Mathematics I (4-0) 4-4	Numbers, absolute value, inequalities involving absolute value function, induction, and the coordinates, complex numbers. Functions. Junction function. Trigonometric functions. Limits of functions. Continuity. Properties of continuous functions. Derivatives. Exchange rate, mean value theorem and applications. Maximum and minimum detection and its applications, hyperbolic functions and their derivatives, closed and Inverse Function Derivatives, Curves and Parametric Equations, and their derivatives.
PHY 183 General Physics I (4-0) 4-4	Physical quantities, units and measurements, vectors, Moment Equilibrium and Center of Gravity, Motion in one dimension, Acceleration, motion diagrams, two-dimensional motion, Newton's laws of motion, force, friction force, circular motion, non-uniform circular motion, Acceleration systems, motion, motion-resistant environments, Work and kinetic energy, kinetic energy theorem, business and power, potential energy and conservation laws, Conservative and nonconservative forces.
CHE183 General Chemistry (3-0) 3-3	Matter knowledge, structure of atom, electron sequence, periodic system, chemical bonds and interactions, naming and finding valence, concepts of mole and equivalence, chemical laws, reactions and calculations, gases, solutions and concentration
CME 111 Programming Languages I (3-2) 4-8	Problem solving and algorithm development. Computer hardware and software. Introduction to computer programming: machine language, assembly and high-level programming languages. Programming with C programming language: arithmetic and logical expressions, data types, input/output operations, basic control structures, Loops, Function definition and the passing parameters, Prepared functions, Arrays and Matrices, Using of Struct, String operations and functions.
CME 113 Introduction to Computer Engineering (3-0) 3-5	Definition of Computer Engineering and Working Area of Computer Engineers, Computer Terms, Working Principle of Computer, Binary Numbers, Software and Hardware Concepts, General Computer Architecture, Operating System Concepts, Computer Security, Office Programs and Applications, Database Concepts, Internet and Computer Networks.
HST 181 Ataturk's Principles and History of Revolutions I (2-0) 2-2	Definition of revolution and Turkish revolution, notions, History of revolutions in Turkey, Movements appeared to save the Ottoman Empire, I. World War, Treaty of Sevr, Demolition of the Ottoman Empire, Period of Turkish National Struggle , Congresses, The wars made in the period of Turkish National Struggle, relationships with Western World and treaties, Lausanne Peace Treaty
TRK181 Turkish Language I (2-0) 2-2	Definition of language and culture, language-culture relationship, point of language as a social institution in people's life, status of Turkish language among world languages, Turkish language development and historical process, Turkish language recent status and expanding field, register, dialect and accent

	knowledge, Turkish sound facilities and rules about phonetic, derivational and inflectional affixes, application of spelling and punctuation rules.
FOL 181 Foreign Language I (2-0) 2-2	Tenses, verbs, name phrases, compound adjectives, plural phrases, compound nouns, noun phrases, sentences established with verbal adjective, Tenses used in narration, past simple, past progressive, past perfect simple, past continuous, reflexive pronouns, irregular verbs, comparison structures, modal structures, possibility, necessity, permission, capability, models indicating request, future tense, simple present tense, past tense auxiliary verbs, idioms, simultaneous words, structures which strengthens the expression, passive voice, tenses, adverbs.
2nd. Semester Courses	
COURSE CODE	**DESCRIPTION**
CAL 186 Mathematics II (4-0) 4-4	Concept of integral, Definite and indefinite integral, Integral of various functions, Definition of differential, Mean value theorem, Multiple integral, Line integral, Sequels, Series.
PHY 186 General Physics II (4-0) 4-4	Coulomb's Law, Electric Field, Gauss Law, Electric potential, Capacitance and Dielectrics, Current and Resistance, Magnetic Fields, Magnetic Field Sources, Faraday's Law, Electromagnetic Waves.
CAL 192 Linear Algebra (3-0) 3-3	Matrices and System of Equations, Systems of Linear Equations, Row Echelon Form, Matrix Algebra, Elementary Matrices, Determinants, The Determinant of a Matrix, Properties of Determinants, Cramer's Rule, Vector Spaces, Definition of Vector Space, Subspaces, Linear Independence, Basis and Dimension, Change of Basis, Row Space and Column Space, Linear transformations, Matrix Representations of Linear Transformations, Ortogonality, The Scalar Product, Orthogonal Subspaces, Inner Product Spaces, Orthonormal Sets, The Gram-Schmidt Orthogonalization Process, Eigenvalues and Eigenvectors, Diagonalization.
CME 112 Programming Languages II (3-2) 4-8	Bitwise Operations, Pointers, Sorting and Search Algoritms, File operations, Lists, Introduction to Visual Programming, Components, Class and object concepts, Event handling, Basic graphic operation in visual programming languages.
CME 114 Probability and Statistics (3-0) 3-5	Introduction to statistics. Data type, Sampling and collecting data, Frequency tables, Visualizing data,Central tendency measures(mean, mod, median), Dispersion measures(variance and standart deviation), Introduction to probability, Conditional probability and independence, Probability density function, Random variables, expectation, moment generating functions. Distributions(Normal, Binom, Bernoulli, uniform, Gaussian, exponential, poisson, gamma), Hypothesis testing.
HST 182 Ataturk's Principles and History of Revolutions II (2-0) 2-2	Definition of revolution and Turkish revolution, notions, State of Turkey after Lausanne Peace Treaty, Declarations of Independence, abolition of the Caliphate, Trials of Transition to multi-party System, Sheikh Said rebellion, Examination Turkish foreign policy, Teaching Ataturk’s Elements and Revolutions. Teaching Ataturk’s Elements and Revolutions on account of national sodality and integrity in terms of reaching the level of modern civilizations.
TRK 182 Turkish Language II (2-0) 2-2	Turkish derivational affixes, general composition information, plan to be used in written composition, Usingverb and noun in Turkish, The written and spoken expression types and samples of composition, Using of proposition and adverb in Turkish.

FOL 182 Foreign Language II (2-0) 2-2	Comparisons: as...as, …-er than, more than; superlatives: the….-est,…the most, Affirmative-Negative-Question Forms of the Present Continuous Tense, Modals: Should for suggestion and Must/Have to for necessity, Requests/Permission: Can/Could/May, Hobbies, Likes/Dislikes, Connectors: But, and, because; Too and Enough, Imperatives, Affirmative-Negative-Question Forms of the Simple Past Tense, The simple future: Will; the Future tense with Going to, If clause: Type I, If Clause: Type II, Affirmative-Negative-Question Forms of Present Perfect Tense, Affirmative-Negative-Question Forms of Present Perfect Continuous Tense, Subordinators/ Linkers

3rd.Semester Courses	
COURSE CODE	**DESCRIPTION**
FOL 281 Technical Foreign Language I (2-0) 2-2	Basic technical terms of Computer Engineering and Computer Science.
CAL 283 Differential Equations (3-0) 3-4	First-order differential equations. Nonlinear equations reducible to linear equations. Equations with constant coefficients. Systems of linear equations. Differential equations with variable coefficients. Partial differential equations. Solution with separation of variables. Fourier series and Fourier integrals. Orthogonal functions.
CME 221 Logic Circuits (3-1) 3.5-6	Introduction to computer architecture. Number systems. Boolean algebra. Logic gates and flip flops. Combinational and sequential circuit design. Registers, counters. Bus transfer. RAM, ROM units. Instruction execution and hardwired control.
CME 223 Circuit Analysis (3-1) 3.5-6	Introduction and definitions, resistances and their color code Current, voltage, power, energy. Circuit elements: Voltage and current sources, resistance and Ohm's law. Kirchoff's laws. Simple resistive circuits: serial-parallel combinations. Delta-to Wye transformation Techniques of Circuit Analysis: Node-voltage method, mesh-current method, source transformations, Thevenin and Norton equivalents, maximum power transfer, superposition. Operational Amplifier circuits. Inductance, capacitance, and mutual inductance. Response of first-order RL and RC Circuits. Natural and step responses of RLC Circuits.
CME 225 Object Oriented Programming (3-1) 3.5-6	Introduction to C++ programming, Introduction to Object Oriented Programming, Objects and classes, Constructors and destructors, Operator overloading, Inheritance, Pointers to Objects, Polymorphism, The Unified Modeling Language (UML), Exceptions, Templates, The Standard Template Library – STL
CME 227 Data Structures (3-1) 3.5-6	Basic data structures, Stack, Queues, Trees, Lists. Sorting and search algorithms and applications. Recursion.
4 th. Semester Courses	
COURSE CODE	**DESCRIPTION**
FOL 282 Technical Foreign Language II (2-0) 2-2	Basic technical terms of Computer Engineering and Computer Science.

CME220 Discrete Mathematics (3-0) 3-4	Introduction to discrete mathematics, proposition logic and proofs. Mathematical proof methods, Set theory. Sets algebra. Relations and operations. Functions, Algebra Structures. Groups and Semi-Groups. Lattice Structures, Bool Algebra, Trees, Basic Graph Concepts, Simple Graph, Multi Graph, Planar Graph, 3D Graph, Weighted Graph, Directional Graph, Uncompleted Graph, Shortest path algorithm, Graph terminologies, Storing graphs in memory, Coloring graph, Navigation on graphs and related algorithms BFS-Breadth First Search, DFS-Depth First Search), Dijkstra Alg., Floyd Alg., Bellman-Ford Alg.
CME222 Algorithms (3-1) 3.5-6	Introduction to algorithms. Analyzes concepts in algorithm design, problem solving strategies, complexity analysis. Dynamic programming (matrix-chain multiplication, longest common subsequence). Basic graph algorithms (BFS, DFS, Topological sort). Greedy algorithms, minimum spanning trees (kruskal algorithm, prim algorithm), shortest path (bellman-ford algorithm, dijkstra algorithm). Compression algorithm (Huffman algorithm).
CME224 Electronics (3-1) 3.5-6	Structure and characteristics of diode. Circuits with diode. Structure and characteristics of the transistor. DC analysis of simple transistor amplifiers. Small signal analysis and design. Structure and characteristics of field effect transistor. DC analysis and small signal analysis of simple amplifiers with field effect transistor and design. Investigating the stability of amplifiers. Classification of cascade amplifiers and coupling types. Analysis and design of cascade amplifiers, investigating the frequency characteristics of amplifiers. Feedback amplifiers. Amplifier classes. Power amplifiers. Large signal analysis and distortion. Cooling of the power transistor. Differential amplifiers. Introduction to operational amplifiers. Basic power supply circuits and regulation circuits. Experiments related to topics.
CME226 Database Management (3-1) 3.5-6	Information about Data. Introduction to database.Study on an example database architecture. Relational Algebra, Entity Relation Diagrams. Normalization. DDL and DLL Queries, SQL, Transaction Management. Synchronization control, database recovery, database security, database management. General knowledge of the administration to create a database, tables, indexes, views, constraints, and triggers. Project presentations.
CME228 Internet Based Programming (3-1) 3.5-6	The basics of Web Design, HTML, Text Editors, Web Design Editors (Frontpage, Macromedia Dreamweaver), Tables, Frames, Sytles, CSS, Server-Client Concept, Uploading web sites to server, Publishing web sites on internet, Script Languages, ASP, PHP, variables, operators, conditional expression, loops, arrays, Web Forms, Data transferring between pages, Sessions, Database connection and operations, XML and Web Services.
5 th. Semester Courses	
COURSE CODE	**DESCRIPTION**
CME399 Industrial Practice I (0-0) 0-6	Giving utmost importance to practice of computer systems which are used in industrial and private institutions..
FOL 381 Reading and Speaking at Foreign Language (2-0) 2-2	The weighted subject is speaking skill. The contents of lecture are; source searching in web, academic presentation about occupational subject, group and team studies, acting, speaking , communication etc.

CME321 Microprocessors (3-1) 3.5-6	8 bit microprocessor architecture, 8 bit microcontroller architecture, Microcontroller addressing mode, Instruction set, machine language and programming, sample applications, Intel x86 microprocessor architecture, addressing mode, Introduction to x86 assembly language, Writing programme and compiling, Using debug, Instruction set, Data transfer instruction, Arithmetic and logic instruction, program control instruction, Calling subroutines, Using stack, Interrupts and its usage, Input–Output processes, Keyboard and display processes.
CME323 Numerical Analysis (3-1) 3.5-4	The representation of number in computer system. Error concept, Taylor and Mclauren Series, Convergence methods to nonlinear equation system Linear equation systems, Divided difference, interpolation, Backward interpolation, Numerical derivative, Numerical integration, Euler, Taylor and Runge-Kutta methods.
CME325 Data Communication Systems (3-1) 3.5-4	Information about data and communication. Introduction to data communication. Protocol architecture. Data transmission, signal encoding techniques, digital communication techniques, data link control, multiplexing, spread spectrum. Wide area networks, circuit switching, packet switching, routing, ATM.
CME327 Signals and Systems (3-1) 3.5-6	Memory, cause, stability, invertibility, linearity and independent from time, linear independent systems from time, pulse response, functions of a complex variable, complex series and its integrals. Transform methods, Fourier series continuous time Fourier transforms, frequency response. Sampling theory. Laplace and Z transform Systems functions.
CME329 Introduction to Computer Science (3-1) 3.5-6	Basic subject in computer, Fundamentals of computer science, Concrete and abstract concept, Numbers systems, Mathematical induction, Proposal logic, Bool Algebra, Set concept, Cartesian product, Relations, Functions, Rational numbers Reel numbers, Denumerability, Equivalence.
CME331 Content Management Systems (3-1) 3.5-6	In this course, it is expected from students to create and develop a dynamic teaching and content management system. And understanding the content management systems in terms of remote, or hybrid technologies used in education for teaching, the classification of the different user actions, such as content delivery and evaluation of functions and variables which are important areas to understand the system.
ESC301 Labour Law (2-0) 2-2	Business law scope, individual business law, collective business law, social security law, social security system.
ESC 303 Patent and Industrial Design (2-0) 2-2	Product design process, design theory and methodical approach to classification, idea generating, idea, examining the first design development and test market analysis, the final product development, product marketing presentations, product development activities, designing processes, teamwork with the design and design strategy, the designer's action and makes the process of external approaches, organizational design process, design process, finding and creating new ideas, decision making and properties

ESC305 Entrepreneurship (2-0) 2-2	Introduction, course information. Entrepreneurship in Turkey, Development of Entrepreneurship, Fundamentals of Entrepreneurship, Entrepreneurship Process, Functions of the entrepreneur. Basic concepts of business: What is the business, internal environment, external environment, production process, factors of production; Managerial functions: planning, organizing, leading (communication, motivation, leadership), control; Basic Business Functions, Business Types: according to size, according to their functions, according to the capital ownership; Legal Structure of enterprises. Venture Types: Business building, acquisition, mergers, franchising, agency, dealership. Feasibility Study. Procedure of establishing a business, the legal provisions. Creativity: Factors Affecting Creativity, Motivation, Attitudes and Behaviors, Environment, Opinion. Error and Risk Taking, Stages of Creativity, Creativity Techniques, Creativity Exercises. Innovation; Sources of Innovation, Innovation Policy, Innovation Processes, Types of Innovation. Intellectual Property, Patent, Trademark, Copyright. Internal entrepreneurship, innovation. Produce entrepreneurial ideas while engage in a work. Project work. Business Plan; definition and preparation, main chapters. Project work. Finance; finding and development of capital: Loans, external resources, funds, leasing, venture capital. Project work. Project presentations.
ESC307 Communication Skills (2-0) 2-2	Verbal, nonverbal, written, formal, non formal and organization to communicate between the inside and the outside.
ESC 309 International Communication (2-0)2-2	Introduction to international communication. Globalization. Globalization of communication. Economic, politic and cultural globalization. Post-industrial and postmodern society terms. Advanced capitalism and information necessity. New communication technologies. Reorganization of capitalism.
ESC311 Critical Analytic Thinking Techniques (2-0) 2-2	Concepts and definitions, the brain as a thinking organ, the grouping of thinking, involuntary thinking and characteristics, voluntary thinking, thinking features voluntary, voluntary methods of thinking, critical and analytical thinking, the basic characteristics and criteria of critical-analytical thinking, stages of critical-analytical thinking, critical-analytical factors that affecting the thinking, the scope of critical-analytical thinking, how the critical-analytical thinking should be done?
ESC313 Project Management (2-0) 2-2	Project planning, control principles and methods. Implementation project plan. Resource planning and tabulation (PERT/CPM). Project following and conclusion. Leadership for effective team study. Effectual project management ability. Special problems of firms that using this technology.
SOC381 Values Education (2-0) 2-2	
6th. Semester Courses	
COURSE CODE	**DESCRIPTION**
FOL 382 Foreign Language for Business Life (2-0) 2-2	Job application to various institutions and companies, project application, writing articles to establish commercial relations, job interviews with companies, talking on the phone, Working in English-dominated work environment, preparation of documents such as the application, request, response , report forms etc.
CME320 Computer Architecture (3-1) 3.5-7	Digital Logic Circuits, Digital Components, Data Representation, Register Transfer and Micro operations, Basic Computer Organization and Design, Programming The Basic Computer, Micro programmed Control, Central Processing Unit, Pipeline and Vector Processing, Computer Arithmetic, Input-Output Organization, Memory Organization, Multiprocessors.

CME322 Automata Theory (3-1) 3.5-7	Automata and regular languages, finite state machine. Regular languages and push down automata. Context-free language and grammars. Normal structural grammar. Indecision and insolvability. Turing machines and use of problem solutions.
CME324 Operating Systems (3-1) 3.5-6	Operating System Concept, History of operating systems, Operating Systems-Hardware Relations, Process Management, Processes, Threads, Scheduling, Deadlocks, Memory Management, Swapping, Paging, Virtual Memory, Input-Output Management, File Systems, Multi-processor systems, Multimedia Operating System, Security and Protection.
CME326 Computer Networks (3-1) 3.5-6	Connecting to Network, Connecting to Service Through ISP, Planning Addressing Structure, Network Services, DHCP, DNS, Classful and Classless Inter Domain Routing, Variable Length Subnet Masking, Virtual LAN, Routing, Switching in a Enterprise Network, Wireless Technologies, Finding Solutions to Network Problems.
CME328 Real Time Systems (3-1) 3.5-6	Real-time systems definition and general features, the introduction of the examination of basic reference model of the real-time system , review of job ranking and job working techniques implemented on real-time systems, investigation and comparisons of real-time systems working according to priority and time , in real-time system resource usage and sharing techniques, basic physical size and converting techniques to electrical signals, the analog signal processing techniques and operational amplifier applications, Digital / Analog and Analog / Digital conversion techniques, real-time examination of computer equipment and comparisons, the study of environmental units and applications to the central processor connection techniques, real-time investigation of computer software.
CME318 Fundamentals of Distance Education (3-1) 3.5-6	Concepts related to distance education. The reason for distance education. History of distance education. Teaching environments of distance education. Distance education models. Theories related to distance education. Distance education in Turkey. Distance education in the world. Technologies used in distance education. Techniques and methods used in the planning, preparation and application of the distance education technologies. Programs required for the preparation of courses in the computer. Software design for course content and presentation. The software design of distance education can be done. The future of distance education.
ESC302 Research and Presentation Skills (2-0) 2-2	Science and basic concepts (facts, information, absolute, true, false, universal knowledge, etc.), basic information about the history of science, the scientific nature of the research, scientific methods and different opinions on these methods, problem, research model, the universe and the sampling, data collection and data collection methods (quantitative and qualitative data collection techniques), data recording, analysis, interpretation and reporting.
ESC 304 Human Resources Management (2-0) 2-2	Personnel management, definitions and scope. Relationship with other sciences. Personnel problems and solutions. Personnel control. Human resources (internal resourcing and outsourcing). Work load analysis. Workforce analysis. Personnel evaluation methods. Personnel education and development. Work evaluation techniques. Wage systems. Motivation. Leadership. Complaint mechanism. Communication. Discipline. Health and protection.
ESC 306 Management Systems (2-0) 2-2	As about management and organizational; basic concepts, the concept of administrative, organization and functioning of organizations, organizational forms, management functions and the development of management in historical process.

ESC 308 Occupational Health and Safety (2-0) 2-2	Basic concepts of occupational safety and health. Basic working areas of ergonomics. Reasons of work accidents. Avoidance models. Calculation of costs. Investigation and reporting. Occupational illness, its types and avoidance methods. Occupational safety methods at workshop and laboratuaries. Personel and machine protective equipments. Fire and explosion prevention methods. Principals and objectives of first aid. ISG legislation.
ESC310 Corporate Behavior (2-0) 2-2	General information, introduction. Concept of corporate communication and its importance, corporate image and its features. Corporate identity concept, Corporate image / corporate identity and corporate communication. The elements of corporate communication; corporate philosophy, corporate behavior, corporate design. Types of corporate communication, used tools, corporate communication plan. Using in-house communication for corporate communication, natural Communication and its channels. Public Relations, definition, importance, characteristics, benefits, target groups. Sponsorship, the definition, importance, characteristics, benefits, types, sponsorship agreement. Corporate advertising, definition, importance, characteristics, benefits, basic concepts, applications. Sales and development, target audience selection, promotion planning, events organization. Exhibitions and fairs; definition, importance, preparation, stand design, planning, team management, promotion and publicity. Event management, design, planning, process management, service-making, team building. Crisis management, crisis definition, crisis management process, the crisis communication plan. Instruction and case studies
ESC312 Standardization (2-0) 2-2	Standardization Policy, standardization in Turkey, Standardization in International Commercial Relations, Implementation of the mandatory standards in Turkey
ESC314 Art of Communication (2-0) 2-2	Communication and art, Design, Communication tools, Media: New media, Social media, e-Teaching
7th. Semester Courses	
COURSE CODE	**DESCRIPTION**
CME499 Industrial Practice II (0-0) 0-6	Giving utmost importance to practice of computer systems which are used in industrial and private institutions.
ESC461 Introduction to Economy (2-0) 2-2	Introduction to economy, economical ideas, definition of economy and interest in other sciences, economical systems, issues of population and economic growth, Functioning of price mechanism, the laws of supply and demand and economic decision units, production, production costs and factors of production, nature, labor, capital and types of undertakings, labor and unemployment problems, international labor flows, banks and money, inflation, deflation and devaluation, foreign investment, multinational corporations, trade exchanges, electronic trading.
CME421 Senior Project I (1-2) 2-2	Students will undertake a small-scale project under supervision of a staff member.
CME423 Computer Graphics (3-0) 3-5	Introduction to graphic system, Matrix representation and homogeneous coordinates, Two-dimensional and three-dimensional transformations, Graphic techniques, Deformation, Shading, Surface mapping, Hatching, Color, Animation, Representation of curves and surfaces, Solid modeling, Graphic station. User graphic design.
CME425 Introduction to Data Mining (3-0) 3-5	Introduction to data mining, background of data mining, data preparation techniques, data warehouse and OLAP, data analyzing techniques, clustering techniques, classification techniques, estimation techniques, decision trees, data mining problems, text mining, web mining, sample implementations.

CME427 Programming of Mobile Devices (3-0) 3-5	Programmable mobile systems and architectures, Mobile operating systems, Fundamentals of mobile systems, Read/Write to file, using XML files, using XML Web services, using mobile equipments and emulator, debuging and test ,Mobile GUI applications, I/O process, sending SMS and e-mail.
CME429 Introduction to Image Processing (3-0) 3-5	Digital image processing fundamentals, Image enhancement in Spatial and frequency domain, Image restoration, Color image processing, Wavelet transform, Image compression, Morphological image processing, segmentation, Image representation and description, Object recognition..
CME431 Artificial Intelligence (3-0) 3-5	Introduction to artificial neural networks, Artificial neural network building, Artificial neural network structures and applications, Learning: Supervised and unsupervised learning, Fuzzy logic, Neural fuzzy logic controller and applications, Classical and fuzzy clusters, Expert systems, Evolutionary algorithms, Genetic algorithms and applications..
CME433 Wireless Network (3-0) 3-5	Introduction to transmission and networks, Fundamentals of wireless communication, Architectures and topologies of wireless networks, Antennas, Multipath propagation, Satellite communication, Cellular systems (GPS/GPRS), Wireless LANs, Security of Wireless Network, Mobile IP, Ad Hoc networks, The Bluetooth technology and the IEEE802.11 standard.
CME435 Web Services (3-0) 3-5	The basic of web programming, Fundamentals of web services, Background of distributed computing, XML, Calling web services: SOAP, Definition of web services, WSDL, Exploring and publishing web services: UDDI, Addressing and notification, services oriented architecture, process and work flow: BPEL, Motion processing, Life cycle of developing web services.
CME437 Industrial Information Systems (3-0) 3-5	The data levels on Industrial systems , each level of the programming structure, data communication systems and security structures, Automation hierarchical presentation. Layers and internal structures. To measure the physical size. Instruments and standards and actuator structures. Instruments and controller networks and network topology. Control issues. All system security, availability, reliability. Presentation of Level 1 system, Level 2 system, MRP and ERP systems. Database applications. Communication with TCP/IP and OPC server. Decision support systems.
CME439 Robot Technologies (3-0) 3-5	Robot types, robot components and application area of robot technologies. Mechanical structure of robots, Sensors and application area of robots. Coordinate systems and conversion matrices. Control architecture of mobile robots, defining location, mapping, route planning, learning and image processing algorithms, Multi robot systems.
CME441 Special Topics in Computer Engineering I (3-0) 3-5	The lessons will be covered within the scope of issues to be determined by instructor. Changed Information Systems and Information Technologies, and enterprise information systems in the current investigation that affects them. Data collection, data storage approaches, resource planning, analytics and decision support, security, network-based examination of the development of e-business systems.
CME443 Remote Sensing Technologies (3-0) 3-5	Fundamental terms and definitions and historical development of remote sensing, Photogrammetric and application area, Electromagnetic spectrum, visible, infrared, thermal and radar images, Band image and pixel concept in remote sensing, Light and light sources for remote sensing, Spatial, Spectral, Radiometric and Temporal Resolutions, Working principles of active and passive sensors, Representation of satellite image in computer, pseudo color coloring, Introduction to digital image processing, Radiometricand geometric

	rectification/restoration, image enhancement techniques, Vegetation indices, Classification of satellite images, Thematic maps and their characteristics.
CME445 Control Systems and Applications (3-0) 3-5	Definition of system, feedback conception. Structures and features of the open and close loop control systems, account of transfer functions. Block diagrams, simplifying methods and simplifying of block diagrams with MATLAB commands. Sign flowing diagrams and its functions, account of transfer function with Mason gain formula and model applications, Expressing systems at state-space form, Confirming state variable and getting block diagrams of phase exchange. Model concepts and its kinds. Static and dynamic elements of systems. Modeling electrical and mechanical elements and relationship between each other. Modeling arithmetical models of shifting and circular mechanic systems and electrical systems. Modeling serial structures. Effective impedance calculation. Similarity of electrical and mechanic systems. Modeling mechanic systems and model calculating about the subject. Analyzing the answers of first-degree and second degree systems at time domain. Composing transfer function and phase exchange block diagram and getting simulation results according sample input signals.
CME 447 GPS Based Systems (3-0) 3-5	Introduction to GPS, Coordinate and Time System, Satellite Orbits, Orbit parameters and estimation of satellite coordinates, GPS signal structure, definition of pseudo-range observations, RINEX data structure, GPS based positioning and Navigation systems, Vehicle tracking system, Mobile Device Applications, Algorithms used in navigation solutions and positioning.
8th. Semester Courses	
COURSE CODE	**DESCRIPTION**
ESC462 Ethics (2-0) 2-2	Introduction to ethical concepts. Professionalism and professional ethics codes. Ethics in design. Rights and responsibilities in business. Technical and ethical problems. Risk, safety and accident. Responsibility for scientific research. Experimental study responsibility. Printing and publication of research results in the powers and responsibilities.
CME422 Senior Project II (1-2) 2-4	Students will undertake a big-scale project under supervision of a staff member.
CME424 Compiler Design (3-0) 3-6	Introduction to compilation, Formal languages, A simple level compilation, Lexical analysis-allocation tokens , Regular expression, finite state machines, Lexical analysis generator design, Deterministic and non-deterministic finite automata, Preparation of symbol table and recognition of expressions, Grammatical and Semantic analysis, Parsing techniques, Type checking, Code generation, Code optimization.
CME426 Software Engineering (3-0) 3-6	Definition of software engineering and the importance, Software processes and Product types, Software Project Management: Metrics, Estimation, Planning and Risk analysis, Software requirement analysis, Software design techniques, Software implementation, Software quality assurance, Software testing, Software maintenance, User interface design, User system interaction, Help system, User documentation, Software reliability.
CME428 Game Programming (3-0) 3-6	Stages of game programming, Game Theory, The platforms of game developing: PC, XBox and mobile devices, 2D Games, 3D Games, Multiplayer Games, sample applications and relevant developments and research.
CME430 Artificial Neural Networks	Artificial neural networks (ANN). Artificial neural cells and neural network structure, basic features. Single-layer and multi-layer networks. Supervised and unsupervised learning. Learning rule with least square average method.

(3-0) 3-6	Applications of Artificial Neural Networks, Object / pattern recognition. Signal processing. Failure analysis and failure detection. System modeling and control. Learning process. Learning algorithms. Artificial intelligence and fuzzy logic.
CME432 Principles of Parallel Programming (3-0) 3-6	Introduction to Parallel Programming. Parallel architecture and scalability, system conjunction and communications. Shared and Distributed memory models, Distributed data processing, algorithm design, communication in parallel and distributed platform , synchronization, Complicity of parallel algorithm and comparing parallel algorithms.
CME434 Geographic Information Systems (3-0) 3-6	The basic map information, Its historical development of GIS, Information systems, Non spatial and spatial information systems. What is GIS?, Geographic assets, Data models and DBMS of GIS, Data acquisition types, Examining data quality, Data control operations, Spatial analyzing in GIS, network analysis, geometric operations, Grid analysis, Organization of GIS software and hardware, System design in GIS, GIS applications.
CME436 Introduction to Pattern Recognition (3-0) 3-6	Data and pattern, recognition, intuition, measuring, classification, learning in daily life. Bayes Decision theorem, possibility of error, maximum possibility estimation, dimensional factors, Markov models, non-parametric techniques, closest neighbor inference, linear discriminate functions, unsupervised learning, grouping.
CME438 System Programming (3-0) 3-6	Representing Data in a Computer, Parts of a Computer System, Elements of Machine Language, Basic Instructions, Branching and Looping, Procedures, Bit Manipulation, String Operations, Floating Point Operations, Kernel of operating systems and system calls, Interrupts, Device Drivers, Compilers, Linkers and Loaders.
CME440 Introduction to Bioinformatics (3-0) 3-6	Description of bioinformatics, content and history; biologic database and access to information I. Biologic database and access to information II ; Collection and storage of array: Presentation arrays to databases; Array formats. Investigating important bioinformatics centers I: NCBI, EBI, SIB. Investigating important bioinformatics centers II: SRS. Comparison array methods I Algorithms (Dot Matrix; Dynamic Programming).Comparison array methods II: Dual Alignment Applications: BLAST. Comparison array methods III: Dual Alignment Applications: FASTA. Dual Alignment Applications III: Multiple Alignment: Methods, creating Filogenetic tree and applications: CLUSTAL W; T-Coffee etc. Classification protein and scanning secondary databases. Protein Analysis.Viewing structure three dimensions of proteins: RasMol, Swiss-PdbViewer. Primer designing (PCR principles; FASTPCR). Restriksion Analysis (Restriksion Enzyme: General Information; REBASE)
CME442 Special Topics in Computer Engineering II (3-0) 3-6	The lessons will be covered within the scope of issues to be determined by instructor. Changed Information Systems and Information Technologies, and enterprise information systems in the current investigation that affects them. Data collection, data storage approaches, resource planning, analytics and decision support, security, network-based examination of the development of e-business systems.

CME444 Optimization Theory (3-0) 3-6	Introduction to optimization, one-variable optimization, multi-variable optimization, modeling of optimization problems, multi-purpose optimization, constricted optimization, unconstructed optimization, equality and inequality limited optimization, convex and concave functions, Lagrange multipliers and comment, Lagrange multipliers and comments, the Kuhn-Tucker, Duality, graphics solution, the search techniques, Fibonacci, gold rate call gradient calls, Newton search, direct search techniques, Hooke-Jeves call, Powell Search, quadratic programming, portfolio and quadratic programming applications, portfolio analysis.
CME446 Computer and Network Security (3-0) 3-6	Network Security Introduction and Basic Concepts, Risk Assessment, Security Policy, Threat Classification, passwords, access permissions. Cryptographic Techniques, Traditional Methods, Open Key Methods, Digital Signature, protocols, encryption software. TCP / IP Protocols and Services Safety, Firewalls, Virtual Private Networks, Attack Detection Systems.
CME448 Digital Signal Processing (3-0) 3-6	Introduction to signal processing, discrete-time systems and signals. Analyzing signal and system frequency space, Discrete time Fourier transformation: Transformation of time-invariant system analysis, Sampling, Analyzing Z Transformation of systems and signals. Digital filter design.