

Computer Engineering

EGCI 100 Introduction to Computer Engineering

1

Prerequisites: -

Introduction to computer engineering. Computer systems. Hardware and Software. Operating System Open-source technology: Linux. Fundamental of computer network. Internet and World Wide Web (WWW). Practical exercises with Office application. Introduction to computer programming.

EGCI 111 Computer Programming

4

Prerequisites: -

Introduction to computer concepts, computer components, hardware and software, hardware and software interaction, and Electronic Data Processing (EDP) concepts. Introduction to program design and implementation using a high-level language: types and expressions, iterative and conditional control statements, functions, Boolean logic, array and record structures, pointers, and introduction to recursion.

EGCI 200 Engineering Mathematics

4

Prerequisites: ICMA 215

Ordinary Differential Equations of the first and second order; Laplace Transform and its application to solve differential equations; Linear Algebra including operations with matrices, determinants, eigenvalue problem and diagonalization; Vector Differential Calculus.

EGCI 201 Discrete Mathematics

4

Prerequisites: -

Basic set theory, mathematical reasoning, relations, functions, graphs, trees, introduction to number theory.

EGCI 204 Engineering Mechanics

4

Prerequisites: ICPY 132

Force system; resultant; equilibrium; fluid statics; kinematics and kinetics of particles and rigid bodies; Newton's second law of motion.

EGCI 205 Numerical Methods for Engineers

4

Prerequisites: EGCI 111

General principles of numerical calculations; accuracy estimation in numerical calculations; roots of polynomial and nonlinear functions; systems of linear algebraic equations; interpolation; differentiation and integration; numerical solution of ordinary differential equations; Fourier methods; curve fitting and approximation of functions; Optimization; application of numerical methods for engineering problems.

EGCI 206 Engineering Mathematics II

4

Prerequisites: ICMA 215

Basic complex analysis, Probability and random variables; Gaussian process, Ergodic process, Mathematics for linear systems; Superposition, Convolution, Fourier Analysis; Discrete time Fourier transform (DTFT), Z-transform and Inverse Z-transform.

EGCI 212 Programming Techniques

4

Prerequisites: EGCI 111

Programming techniques and concepts. Various techniques for Efficient Programming, Software-Bug Prevention, Debugging, Testing, and Source-Code Maintenance. Scope/Lifespan of variables, Pointers, Data Abstraction, Error Handling, and Object- Oriented Programming Concept.

EGCI 213 Programming Paradigms

4

Prerequisites: EGCI 212

Introduction to programming paradigms and programming languages; fundamental programming concepts: data types, basic programming statements, functions, memory management; object oriented programming, concurrent programming, event-driven programming.

EGCI 221 Data Structures and Algorithms

4

Prerequisites: EGCI 111

Analysis of algorithms; abstract data type; linear data structures: linked lists, stacks, queues; nonlinear data structures: trees, hash tables, graphs; sorting and searching algorithms; recursion, divide and conquer, dynamic programming, greedy algorithms; introduction to NP-completeness.

EGCI 230 Electric Circuit Analysis

4

Prerequisites: EGCI 206

Circuit elements; Kirchhoff's laws and reference direction; elementary concepts of network graphs; resistive circuits; node and mesh analysis; Thevenin theorem and Norton theorem; Op-amp, inductor and capacitor, first-order and second order circuit; step responses; zero input and zero-state responses; DC transient and AC steady-state response; elementary transfer functions; sinusoidal waveforms; phasor representations; impedance and admittance; sinusoidal steady-state analysis; complex power; frequency response.

EGCI 232 Engineering Electronics

4

Prerequisites: -

Introduction to solid-state electronics as circuit elements, including diodes, bipolar transistor, rectifier circuits, Zener diodes regulators, power supplies, power amplification, MOSFETs, applications in operational amplifiers in various feedback configurations.

EGCI 233 Digital Circuit Design Lab

1

Co-requisite: EGCI 234

Laboratory experiments related to EGCI 234 course. Examples of included experimental topics are Introduction to Digital Systems Lab, Basic Gates' Operations, Boolean algebra, Design of Adder and Subtractor Circuits, Encoder and Decoder Circuits, Multiplexer and Demultiplexer Circuits, Design of Sequential Circuits.

EGCI 234 Digital Circuit Design

4

Co-requisite: EGCI 233

Digital Circuit Design, Basic Gates, Boolean Algebra, Combination Logic Circuit Design (e.g. Decoder, Encoder, Multiplexer, and Comparator circuits), Logic Minimization, Number Systems, Binary Codes, Flip Flops and register, Counter Circuits, Synchronous and Asynchronous Circuit Design, A/D and D/A converters, Memory Organization.

EGCI 252 System Programming

4

Prerequisites: -

Students will be introduced the basic concepts of system programming. Fundamental concepts in process management, concurrency and communication will be described including signals, thread, and thread synchronization, semaphores, Inter- Process Communication.

EGCI 301 Computer Graphics

4

Prerequisites: EGCI 111

Principles of computer graphics, graphics systems and models, graphics programming, graphic devices and their controls, color model, geometric objects and transformations, viewing, shading, clipping, and hidden-surface removal.

EGCI 305 Statistics for Research in Computer Engineering

4

Prerequisites: ICMA 215

The design of experiments and the methods for collection and presentation of data; descriptive statistics; elementary probability and normal distributions; estimation of parameters; hypothesis testing; analysis of variance; regression and correlation analysis of frequencies and non-parametric methods.

EGCI 312 Professional Practices I	1
Prerequisites: - Introduction to Matlab/Octave, Programming environment in Matlab, commands, variables. Matrices and vectors. Loops, conditions, scripts, user-defined functions.	
EGCI 313 Professional Practices II	1
Prerequisites: - Study and develop skills to utilize modern technology in Computer: hardware and software, Open-Source technology, Communication technology, Computer graphic tools, Microprocessor interfacing techniques, input/output, and peripheral devices. I/O technology and intelligent system and other relevant topics.	
EGCI 319 Internship In Computer Engineering	2
Prerequisites: - Practical training in an industrial factory or an organization with computer-related systems, computer control system, or systems using computer processing. The training with the minimum period of 144 hours. Students must present a paper to the department, including the report of the training outcome from the employer.	
EGCI 321 Database Systems	4
Prerequisites: - Data model: entity-relationship, relational. Logical and Physical database design, Query Language, Data Dependencies and Normalization, Transaction, Crash Recovery, Concurrency control, Internet Databases.	
EGCI 330 Microprocessor and Interfacing	4
Prerequisites: - Introduction to microprocessor, microprocessor architecture and instruction set, addressing modes, assembly language, memory interfacing, interrupts & DMA, interfacing with I/O devices, microprocessor's interfacing programming and applications.	
EGCI 331 Introduction to IC Design	4
Prerequisites: EGCI 234 N MOS and C MOS integrated circuit technologies; properties of N MOS and C MOS circuits; calculation of parameters in circuits, static and dynamic MOS circuits; system design; circuit drawing and testing; computer arithmetic; performance evaluation; synthesis of digital circuits from HDL models; modeling and simulation; fault models and testing the use of CAD tools in circuit design.	
EGCI 332 Embedded Systems	4
Prerequisites: - Embedded system design and development process; portable battery operated embedded systems; high-level language programming for embedded system applications; real-time operating system; advanced peripheral interfacing; DAC and ADC converters; Sensors and signal conditioners.	
EGCI 333 Computer Architecture	4
Prerequisites: EGCI 234 Computer components: design of logic circuits; working of and designing register level components used in computer systems; data representation in computer systems; clock signal; datapath design; design of control unit using microprogram (CISC architecture) and logic circuit (RISC architecture); working of computer of each architecture; performance enhancement; pipeline systems of computer; memory systems; principles and working of cache memory; input-output system design; fundamentals of serial and parallel communication; parallel processing architecture. Fault tolerance.	
EGCI 341 Software Engineering	4
Prerequisites: EGCI 321	

Software life cycle; need and specification; large-scale software development; scheduling, developing, constructing, testing and maintenance of software system; object-oriented analysis and design; software reuse; documentation; management of software project; case study of software system in the market.

EGCI 351 Operating Systems

4

Prerequisites: EGCI 252

Contemporary concepts of computer operating systems; Thread; CPU scheduling; definition and details of harmonizing cooperating process; system resources management; deadlock handling; main memory management and design; virtual memory management; auxiliary memory management; file systems; protection and security; introduction to distributed operating systems.

EGCI 372 Data Communication and Computer Networks

4

Prerequisites: -

Introduction to data communication. Network Topology. OSI and TCP/IP model. Ethernet Fundamental. Principle of physical layer. Principle of data transmission and data link control protocol. Circuit Switching and Packet Switching. Principle of transport layer. Principle of network layer. Routing fundamentals and protocol. TCP/IP protocol and IP addressing. Application layer and wireless network.

EGCI 400 Morals and Ethical Studies for Computer Engineers

1

Prerequisites: -

History and overview; public policy; methods and tools of analysis, professional and ethical responsibilities; risks and liabilities; intellectual properties; privacy and civil liberties; computer crime and economic issues for computer engineering.

EGCI 404 Theory of Computation

4

Prerequisites: EGCI 201

Introduction to structure of languages and characteristic of languages: formal languages, regular languages and non-regular languages, context-free grammar and context-free languages. Describe the characteristic of state machines that are used to check the membership of languages: finite state machines, transducers, state transition machines, non-deterministic finite state machines, push-down state machines, Turing machines. Advanced theory of computation: Kleene's theorem, recursively enumerable languages, decision problems.

EGCI 406 Mechatronics

4

Prerequisites: -

Microcontroller; digital input/output; switches and LEDs; analog input/output; PWM signal; switching devices; relays; motors; H-bridge; serial communication; power supply; sensors; PCB design; feedback control

EGCI 425 Data Mining

4

Prerequisites: -

Knowledge discovery in database; data preparation, data visualization, and data transformation; clustering, association analysis, classification and ensemble classification; metrics and evaluation; data warehouse, online analytical processing (OLAP); effects of data mining, current technology and trend, applications of data mining.

EGCI 427 Web Programming

4

Prerequisites: -

Semi-structured data models for the Web (such as XML, etc.), semi-structured data management, associated query languages and query systems for Web data, query processing and optimization over semi-structured data as well as over multiple distributed sources. Data integration over the Web, warehousing of Web data. Mappings from relational and object-oriented database servers to web data. Discussion on some novel data-intensive applications on the Web such as electronic commerce, digital libraries, and distance education relating to web database issues.

EGCI 428 Mobile Device Programming

4

Prerequisites: -

Fundamental of the mobile device programming; concept of mobile device technology; basic mobile device programming; user-interface design; database connection; remote sensors controlling; mobile web services; Develop a prototype for the mobile device application for with notification services.

EGCI 429 Web Application Architecture

4

Prerequisites: -

Fundamental concepts of Web application development from a managerial perspective; extensible Markup Language (XML) and Hypertext Markup Language (HTML) technology; fundamental principles of architecture, process, and elements of Web applications; Web services application development; mobile applications such as geographical information system and social networks.

EGCI 432 Distributed Systems

4

Prerequisites: EGCI 111

Naming, consistency, concurrency, and security and reviews some of the current best practices in distributed computing models: peer-to-peer, grid computing, and distributed object model.

EGCI 461 Artificial Intelligence

4

Prerequisites: -

Foundations of artificial intelligence, solving problems by searching, knowledge representation, first order logic, inference in first-order logic, planning, probabilistic reasoning systems, introduction to Prolog, natural language processing, genetic algorithm, and machine learning techniques.

EGCI 463 Pattern Recognition

4

Prerequisites: Consent of instructor

Preprocessing for data recognition: features extraction, classification or linear techniques for recognition. Parametric and nonparametric techniques, Bayesian classifiers, methods, neural networks, hybrid method, learning techniques. Applications in pattern recognition.

EGCI 465 Fuzzy Sets and Neural Networks

4

Prerequisites: EGCI 201

Basic principles of fuzzy logic, fuzzy numbers, fuzzy sets, fuzzy relations, fuzzy rules and reasoning, fuzzy inference systems, fuzzy system design, structure and characteristic of various artificial neural networks, supervised and non-supervised learning, classification, fuzzy techniques and neural networks application in engineering.

EGCI 467 Natural Language and Speech Processing

4

Prerequisites: -

Algorithms for the processing of linguistic information, computational properties of natural languages. Morphological, syntactic, and semantic processing from a linguistic and an algorithmic perspective, modern quantitative techniques in NLP: using large corpora, statistical models for acquisition, and representative systems.

EGCI 474 Internetworking Technologies I

4

Prerequisites: Consent of instructor

Theoretical and practical aspects of routing, including internetworking models, internet protocol, and routing technologies. Laboratory work is required.

EGCI 475 Internetworking Technologies II

4

Prerequisites: EGCI 474

Theoretical and practical aspects of advanced routing and switching technologies, including Hierarchical Network Design Model, Layer 2 Switching, Internet Protocol version 6, Spanning Tree Concepts, Inter-VLAN, WAN Technologies, Network Security, Network Services, and Network Troubleshooting. Laboratory work is required.

EGCI 476 Cryptography and Computer Security

4

Prerequisites: -

Introduction to basic theory and techniques in cryptography. Symmetric and Asymmetric encryption. Cryptanalysis techniques. Security in computer network. Security threats and Vulnerabilities. Authentication mechanisms. Identification schemes. Security in operating system and application. Firewall, Intrusion Detection system.

EGCI 477 Penetration Testing and Prevention**4****Prerequisites: -**

Process of penetration testing. Collection and analysis of computer network vulnerabilities. Tools for penetration testing. Ethics of penetration testing processes. Summarizing and reporting the result from penetration testing. Planning and Design of prevention systems to protect computer network form vulnerabilities.

EGCI 486 Image Processing**4****Prerequisites: Consent of instructor**

Image processing systems, Introduction to digital image processing, Digital image fundamentals, Image Enhancement, Image Transformation, Image Restoration, Color image processing, Image compression, Morphological image processing, Image segmentation, Object recognition.

EGCI 491 Project Seminar**1****Prerequisites: Consent of instructor**

Write a project proposal for an approved topic, for further research and implementation in the Computer Engineering Project course.

EGCI 492 Computer Engineering Project**2****Prerequisites: EGCI 491**

The computer engineering project supervised by the faculty. Students complete the project. A complete project report and an oral examination is required.

EGCI 493 Cooperative Education**8****Prerequisites: -**

Integrate and adapt all classroom knowledge into real practice in corporate environment, gain working experience and teamwork experience under supervision of mentors from the companies and advisors from the department, in order to prepare the students from transition from school to work after graduation.

EGCI 494 Fundamental of Digital Forensics**4****Prerequisites: -**

Introduction to basic of digital forensics. Data Collection and Investigation from Operating System such as Windows and Unix. Computer files system storage. Collecting and analyzing network traffic. Data analysis and validation. Digital Forensic Tools.

ICMA 215 Calculus**4****Prerequisites: ICNS 102 Principles of Mathematics**

Derivatives of logarithmic and exponential functions; techniques of integration; improper integrals and indeterminate forms; applications of the derivative and integration; infinite series; functions of several variables; limits and continuity; partial derivatives.

ICPY 132 Principles of Physics**4****Prerequisites: -**

Measurement, units and dimensions; vectors; description of motion; Newton's Laws of Motion; work: kinetic energy, potential energy, conservation of energy; linear momentum and it's Law of the Conservation; equilibrium and elasticity; periodic motion; one dimensional wave motion; sound and hearing; hydrostatics; heat and thermal properties of matter; electricity and magnetism; geometrical optics; nuclear physics.



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