Department of Electrical and Computer Systems Engineering
Birzeit University, Palestine
Computer Systems Engineering Course Descriptions

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235 Circuit Analysis

Basic definitions, DC circuit analysis, energy storage elements, first and second order circuits, sinusoidal steady state response, AC power, three phase circuits, Laplace transform analysis and circuit applications, frequency response, filter design, computer-aided circuit analysis using PSPICE.

Requirements: Math 331, PHYS 132.

245 Electronics

Semiconductor material and p-n junction, diode circuit applications, bipolar junction transistor; BJT biasing and small signal analysis, field effect transistor; FET biasing and small signal analysis, multistage system and frequency consideration, negative feedback concepts and applications, applications of operational amplifier, discrete and integrated oscillators, voltage regulators, pnpn and other devices; SCR, SCS, GTO, Diac triac, UJT, …..

Requirements: CO-requisiteENCS 235.

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331 Data Structure & Algorithms

Concentrates on data structures: primitive types, stacks, queues, arrays, sets, linked lists, trees, and graphs. Also covered are some basic operations using theses data structures including sorting, searching, recursion, hashing, and memory management. Proof of correctness of algorithms and complexity of algorithms might be included as well.

Requirements: COMP 230.

332 Control Systems

Introduction to automatic control concepts. Multi-input and multi-output systems. Control system concepts. Transient and steady state performance; stability analysis. Nyquist and Bode diagrams. Introduction to state-variable techniques. Control of physical systems with digital computers. Digital control systems design using transfer and state-space methods.

Requirements: ENCS 235, ENEE 334.

335 Communication Systems

Concepts of transmission of information via communication channels. Modulation techniques for transmission of continuous-time signals. Analog-to-digital conversion and pulse code modulation. Transmission of digital data. Effects of random signals and noise on communication. Optimum detection systems in the presence of noise. Elementary information theory

Requirements: ENEE 331, ENEE 334.

336 Computer Organization

Basic Computer Organization: computer structure and machine language; processing and input/output units, registers, principal machine instruction types and their formats, character representation, program control, fetch, indirect, execute, and interrupt cycles, timing, input/output operations. Register Transfer and micro operations : hardware implementation and sequencing of instruction fetch, address construction and instruction execution, data flow and control block diagram of simple processor. Central Processing Unit Organization: bus organization, ALU, stack, addressing modes, instruction formats, instruction types, interrupts. Microprogram Control Organization: Concept of microprogramming, control memory, microinstruction formats. Input/Output Organization: peripheral devices, modes of data transfer.

Requirements: ENEE 337

339 Advanced Digital Systems Design

Study the design of large and real digital systems. Part of the course will be focused on CAD tools and VHDL. Topics include (all or part of the following): VHDL. Implementation technology; transistor switch, speed of logic gate circuits, negative logic system, standard chips, programmable logic devices. CAD tools; logic synthesis and optimization, physical design, timing simulation, design flow, and examples from VHDL code. Asynchronous sequential circuits. Hazard. Digital systems design; building block circuits, design examples and clock synchronization. Testing logic circuits, interfacing.

Requirements: ENEE 337

401 Practical Training

Practical Training during summer in a specialized institute for a period above 6 weeks.

Requirements: Third or fourth year with department approval.

431 Digital Signal Processing (DSP)

Modeling of discrete systems in t-domain, z-domain, w-domain, discrete convolution, DFT-, FFT- and fast FFT- algorithms, design and implementation of FIR and IIR digital filters. Introduction to optimal filters and coding theory.

Requirements: ENECSE 335, ENEE 434, Co-requisite: ENECSE 435

434 Artificial Intelligence

A study of what is required to produce intelligent, human-like behavior in a computer system. That's include: Fundamental issues in intelligent systems. Search and optimization methods (problem spaces, Brute-force search, Heuristic search, local search, game-paying, constraints satisfaction). Knowledge representation and reasoning. Learning (unsupervised vs. supervised learning, classification vs. clustering vs. prediction, decision tree learning and neural network and /or fuzzy learning as examples). Agents (action selection and planning, collaboration between people and agents, communication between people and agents, expert assistants, agent architecture, interaction with stochastic environment, reinforcement learning. Multi-agent systems, and game theory and auctions).

Requirements: COMP 230, COMP 233.

435 Microprocessors

Microprocessor Systems: microprocessor (MP), memory, input/output, simple interfacing devices, bus architecture. Intel MP Architecture: busses, registers, flags, internal structure. Intel MP Programming: Intel MP instruction set, Assembly language, programming techniques; loops, indexing, time delays, subroutines real and protected modes. Parallel input/output and interfacing applications. Interrupts. General Purpose programmable peripheral devices. Examples of MP in engineering applications. Serial Input/Output and Data: software-controlled asynchronous serial input/output. Hardware-controlled serial input/output using programmable chips. Overview: 8-bit to 32-bit MP and single-chip microcontrollers.

Requirements: ENCS 339.

436 VLSI

Introduction to CMOS and MOSFETs, their characteristics and use in analog and digital circuit design, static and dynamic circuits. CMOS VLSI design methodology (emphasis on full-custom design, circuit and system levels). Extensive use of Mentor Graphics CAD tools for IC design, simulation and IC verification. Specific techniques for designing high-speed, low-power, and easily testable circuits. Introduction to fault modeling, fault testing, fault locating, and testability.

Requirements: Third or fourth year with department approval.

437 Computer User Interface Design

Principles of user interface design, introduction and basic concepts in man machine interaction, principles of operation of interaction hardware and software. Events, event trapping and buffering. Windows, menus, panels; their intercommunication and interaction techniques. Problems of functionality, clarity, complexity and efficiency in interface design. Robustness and error issues related to user interfaces.

Requirements: ENCS 336, COMP 234.

438 Fault-Tolerant Digital Systems

Applications of Fault-Tolerant computing. Fundamental Definitions of faults, errors, and failures, including the logical stuck-fault model. Design techniques to achieve fault tolerance, including hardware, software, information, and time redundancy. Analyzing fault-tolerant systems using combination and Markovian models. Methods for fault testing, fault location, and testability design.

Requirements: ENEE 337.

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511 Computer Design Laboratory

Selected design experiments based on microprocessors and computers.

Requirements: ENCS 435.

513 Computer Network Lab

Experiments will cover both administration, security, integration UNIX and other operating systems like windows. Topics might include: UNIX system administration, Network administration, switching, Advanced IP routing, securing the network, and design and integration between UNIX and Microsoft windows.

Requirements: ENCS 535.

514 Real-Time System Lab

Design and implementation of microprocessor based systems.

Requirements: ENCS 538.

520 Project Introduction

Introduction to the final graduation project. The main aim is to gather the necessary information and materials about the final project. Students present at the end of the semester the ongoing steps to be applied during the following semester.

Requirements: Fifth year. Completion of course ENCS 401 (Practical Training). Registered for the semester preceding the student's graduation..

530 Project

Final graduation project. Students should either design and implement a system related to the computer system engineering field or do research on a particular subject under supervision of a faculty staff members.

Requirements: ENCS 520

531 Distributed Systems and Algorithms

Fundamentals of distributed systems and algorithms. Problems, methodologies and paradigms for understanding and designing distributed application[MY25] , distributed systems and algorithms fault tolerance applications design, practical applications from current distributed systems.

Requirements: ENCS 534

532 Multimedia

Multimedia combines text, graphics, sound, video, and animation in a single application. Topics include: creating multimedia information systems. Design and effectiveness of multimedia information applications. Programming techniques for integrating video, sound, animation, and graphics, and design strategies for multimedia information systems. Compression and decompression. Multimedia servers and file systems. Networked and distributed multimedia systems.

Requirements: ENCS 535.

533 Net-Centric Computing

Introduction to net-centric computing. The web as an example of client-server computing. Building web application. Internet protocols. Distributed object systems. Distributed operating systems and distributed systems.

Requirements: ENCS 534, ENCS 535.

534 Operating Systems

The role of an Operating System in computer operations. Memory management and virtual memory. Process management, multiprogramming and multiprocessor systems. Interrupt processing. Input/output management and spooling. Information management and security. Introduction to distributed and networked operating systems. A comparative study of selected operating systems.

Requirements: ENCS 336.

535 Computer Networks

Data communication networks and open system standards. Layered network architecture. Local area networks (LANs). High-speed and Bridge LANs. Wide Area networks (WANs). Internetworking. Transport protocols. Error detection and correction. ARQ strategies. Framing. Identification and addressing. M/M/1 queuing system. Multiple access communication. Routing and flow control.

Requirements: COMP 336, ENEE 434, ENCS 335

536 Computer Architecture

Traditional Computer Architectures. Architecture of Micro programmed computer. Pipeline systems. Array systems. Multiprocessor systems. Multi-computer systems. Technology impact on computer system architecture. Modular computers. Adaptable architectures. Arithmetic Processor Organization: Addition and multiplication algorithms. Parallel network processors. Associative processors. Dedicated architectures. Mixed architectures. Distributed processing. Client-Server systems. Case studies.

Requirements: ENCS 336.

537 System Programming

System software such as command language interpreters, client-server applications, debuggers, mail servers, browsers, macro-processors, shells, archivers, distributed systems such as revision control systems; file systems, processes, threads, and interprocess communication

Requirements: ENCS 535.

538 Real-Time applications and Embedded Systems

The purpose of this course is to examine a variety of issues regarding the real-time application of embedded microprocessor systems and /or problems or real-time computer applications in process control or similar areas. That's include digital processing, the physics of sensors and transducers, signal representation, and system design and software development. Applications from the following list will be studied: automotive control, biomedical instrumentation, communication systems, speech processing, data compression, and audio processing.

Requirements: ENCS 434, ENCS 535

539 Selected Topics in Computer Engineering

Study of a particular subject related to Computers. The choice of the subject depends on both students and instructors needs.

Requirements: Forth level and department approval