

Course Description

CpE 230 Digital Logic Design (3 Cr. Hr.)

Fundamentals of digital electronics, Binary number system; Boolean algebra, logic gates, digital circuit analysis, gate-level and block level design of combinational digital circuits: adders/subtractors, comparators, multiplexers, decoders. Analysis, design and applications of sequential logic circuits: flip-flops, registers, counter, and their design procedures, memory elements: RAM and ROM.

Prerequisite: Math 152 .

CpE 231 Digital Logic Design Lab (1 Cr. Hr.)

Hands-on experience on topics that are theoretically covered in the digital logic design course, basic logic gate experiments, combinational logic circuits experiments, and sequential logic circuits experiments. The experiments on all topics vary from functional troubleshooting to gate and block level design implementation.

Prerequisite: CpE 230.

CpE 250: Object Oriented Programming Design (4 Cr. Hr. : 3 Theory + 1 Lab)

Overview of OOP language, Object Oriented Programming methodologies, Classes and data abstraction, Constructors and destructors, Operator Overloading and conversions, Subclasses and Inheritance, Virtual functions and polymorphism, Templates and Exception handling. Hands-on experience on theoretical engineering topics in a comprehensive application laboratory

Prerequisite: CS 101

CpE 310B: Engineering Computation and Simulation(2 Cr. Hr. : 1 Theory + 1 Lab)

Overview of engineering computation algorithms and simulation environments, Issues in engineering Solution to sets of linear equations, curve fitting, Finite difference techniques and applications, Numerical integration, Numerical Solution of ordinary differential equations, Numerical Solution of partial differential equations, Random number generation, Simulation of linear continuous-time dynamic systems, Simulation of discrete-event systems, simulation of random processes.

Prerequisite: CpE 250

CpE 344A: Microprocessor and microcontroller Systems Design (3 Cr. Hr.)

Introduction to microprocessors and Microcontrollers, Embedded Controllers and application, Instruction Set and Register Set for microprocessors and microcontrollers, programming microprocessors and microcontroller, microprocessor and microcontrollers Hardware Configuration, Resets and Interrupts, Clock and Timer Systems, Memory maps, Analog-To-Digital (A/D) and Digital- To analog (D/A), Converters, parallel interfacing , serial interfacing, microprocessor and microcontroller applications.

Prerequisite: CpE230.

CpE 345A: Microprocessor and Microcontroller Systems Laboratory (1 Cr. Hr.)

This is a one credit hour lab, which comes as hands-on experience on topics that are theoretically covered in the microprocessor and microcontroller design course. During this lab course, the student utilizes a real 8-bit microprocessor and microcontrollers, different types of application, ranging from sensing simple environment parameter such temperature to controlling simple systems using closed loop controller such as room temperature.

Prerequisite: CpE 344+ CpE 231.

CpE 346A: Computer Hardware Design Using HDL language (3 Cr. Hr.)

The objective of the course is to provide a comprehensive coverage of digital hardware design concepts using HDL. The basics of HDL module and coding structure: data types, expressions, and statements will be introduced. Introduction to hierarchical and behavioral design approaches are tackled.

Prerequisite: CpE 230.

CpE 347A: Computer Hardware Design Laboratory (1 Cr. Hr.)

Hands-on experience on topics related to advanced digital logic design using HDL language. Students will be exposed to design issues with behavioral and structural models of combinational and sequential logic circuits.

Prerequisite: CpE 346.

CpE 350: Object-Oriented Modeling and Applications (3 Cr. Hr.)

Principles of the Object-Oriented paradigm including, advanced issues of inheritance and polymorphism, Object-Oriented analysis, Object-Oriented Design, behavioral modeling of object oriented software, structural modeling of object oriented software, modeling of the dynamicity of object oriented software, Design patterns and distributed software; the design patterns part includes creational, structural and behavioral patterns, design of distributed object oriented software using components object model (COM) distributed software design utilizing technologies such as J2EE and .NET framework.

Prerequisite: CpE 250.

CpE 354B: Data Structures and Algorithms: (4 Cr. Hr. : 3 Theory + 1 Lab)

Introduction to algorithms and abstract data types and structures, data structure includes arrays, linked lists, queues, stacks, binary trees, Graph, hash tables, Algorithm includes sorting algorithms, searching algorithms, shortest path in a graph, algorithm analyses including Big-Oh analysis, programming techniques includes static versus dynamic memory allocation, recursion, and hashing techniques.

Prerequisite: CpE 250.

CpE 440A: Computer Architecture (3 Cr. Hr.)

Basic computer organization, central processing unit, arithmetic logic unit, microprogramming control and control unit, arithmetic processor, input/output units, memory units.

Prerequisite: CpE 346.

CpE 444: Computer Interfacing (3 Cr. Hr.)

Design and interfacing of the 80X86 PC. In-depth description of the 8086/ 8088 microprocessor-based systems: bus buffering, memory interfacing, interrupt handling, keyboard and display interfacing, floppy drive controller interfacing, and direct memory access (DMA) controller interfacing. The specific 8086/ 8088 microprocessor-supporting chips: 8284 Clock Generator and Driver, 8288 Bus Controller, 8251 USART, 8255 PPI, 8259 PIC, and 8237 DMA Controller.

Prerequisite: CpE 344.

CpE 445: Computer Interfacing Laboratory (1 Cr. Hr.)

Hands-on experience with DEBUG programming, assembler directives, PC BOIS and BOIS interrupts, hardware programming with C/C++, PC interface through LP and COM ports, DAC and ADC converters, Stepper motors, disk drives, and PC-to-PC interface.

Prerequisite: CpE 444 and CpE 345.

CpE 450C: Database Systems Design (4 Cr. Hr. : 3 Theory + 1 Lab)

This course focuses on database systems physical infrastructure and performance. Topics include: DBMS Architecture, physical storage hierarchy, Indexes, database model, Relational Query Language (SQL), Query processing and optimization, introduction to distributed databases. The impact of new technology on database management systems such as web enabled systems, back-end database computers organization and performance, distributed database management systems, concurrency control and query execution in both distributed and centralized systems. Required software tools: A main-stream commercial DBMS such as SQL 2000 or Oracle. Individual projects are given for the students to sharpen their database development skills using latest software tools and concepts.

Prerequisite: CpE 354.

CpE 452: Software Engineering (3 Cr. Hr.)

This course aims at introducing software engineering as an engineering discipline. The fundamentals of software engineering and the software development processes are introduced. Topics covered include: Software project management: project planning, scheduling and risk management, Software requirements and specifications, Software systems modeling and design techniques, software quality assurance (QA), change management policies. CASE tools and software development environments. Software testing and validation, documentation and maintenance, software cost analysis and estimation

Prerequisite: CpE 350.

CpE 453: Software Engineering and Object Oriented Design Laboratory (3 Cr. Hr.)

Hands-on experience on software engineering and the software development process. Students will be exposed to software process issues including Software project management, project planning and scheduling, Software requirements and specifications, Software design techniques, CASE tools such as rational rose will be used.

Prerequisite: CpE 452.

CpE 460: Operating Systems Design (4 Cr. Hr. : 3 Theory + 1 Lab)

Operating system structures, process concept, hierarchy of processes, semaphores, inter-process communication, CPU scheduling, deadlocks, memory management, virtual memory, secondary storage management, file systems, I/O systems, study development of a sample operating system.

Prerequisite: CpE 354.

CpE 466A: Operating Systems Programming (4Cr. Hr. : 3 Theory + 1 Lab)

Philosophy and structure of the Win32 API and UNIX system services: file system, process and thread management, inter-process communication, network programming, and synchronization. Microsoft Windows and UNIX TCP and UDP Communications. Connection-Oriented Client-Server Architecture. Remote procedure calls and COM overview. Individual projects are given to students to enhance their systems programming development skills using latest software tools and concepts. The project divided into sub-tasks runs through the whole semester.

Prerequisite: CpE 460.

CpE 480 Computer Aided Design (3 Cr.Hr.)

Broad introduction to computer-aided design tools for digital systems using HDL, emphasizing implementation algorithms and data structures. Topics covered: design styles, layout editors, symbolic compaction, module generators, placement and routing, automatic synthesis, design-rule checking, circuit extraction, simulation and verification.

Prerequisite: CpE 346.

CpE 500: Field Training (9 Cr. Hr.)

A training period of six months to be spent in the industry (inside or outside Jordan), under the follow up of an academic faculty member from the department, periodic reports and a final report must be submitted for evaluation, an oral examination is required.

CpE 540: Advanced Topics in Computer Architecture (3 Cr. Hr.)

An introduction to the problems involved in designing and analyzing current machine architectures. Major topics include performance and cost analysis, pipeline processing, vector machines and numerical applications, hierarchical memory design, and multiprocessor architectures. A quantitative approach allowing a computer system designer to determine the extent to which a design meets design goals is emphasized.

Prerequisite: CpE 440

CpE 542A: Principles of Embedded Systems (3 Cr. Hr.)

Fundamentals of embedded system hardware and firmware. Embedded processor selection, hardware/firmware partitioning, glue logic, circuit design, popular microcontroller for embedded systems, architecture and instruction set of the microcontroller, hardware-software co-design techniques and verification techniques, embedded programming environments, real-time embedded systems, real-time scheduling.

Prerequisite: CpE 444.

CpE 544A: Advanced Microprocessor and Microcomputer Systems (3 Cr. Hr.)

Study of the advanced microprocessor architectures including 32/64-bit RISC processors from leading manufacturers. The design concepts, performance and architectural limitations of RISC and CISC families of microprocessors will be compared based on detailed architectural analysis of the selected devices. Topics include: address/instruction pipelines, burst cycles, memory caching and cache coherency issues, register renaming, speculative instruction execution and other performance-oriented techniques.

Prerequisite: CpE 444.

CpE 554: Software Design Techniques (3 Cr. Hr.)

Understanding of some of the most flexible and useful design techniques, including structured design, state-based design, and object-oriented design. Software engineering principles applied to make appropriate trade-offs between function, quality, cost, and schedule. Main concepts of design quality, usability, reliability, and maintainability of software, technique selection to best fit the needs of the problem at hand .

Prerequisite: CpE 452.

CpE 556: Software Requirements Engineering (3 Cr. Hr.)

This course will introduce the principles, tools, and techniques for requirements elicitation, specification, and analysis. Students will learn the role of requirements in system development and maintenance, goals of the requirements phase, essential difficulties of specifying requirements, effective methods, tools and techniques, techniques for formally modeling and specifying software requirements, and the role of prototyping in validating requirements.

Prerequisite: CpE 452.

CpE 560: Distributed Operating Systems (3 Cr. Hr.)

Concepts and design of distributed systems, basic distributed algorithms for classical problems such as mutual exclusion and global snapshots, fault tolerance, distributed object-oriented middleware platforms, client/server architecture, underlying communication paradigms and protocols.

Prerequisite: CpE 460.

CpE 562: Computer Networks (3 Cr. Hr.)

Study of computer network architectures, protocols, and interfaces. The OSI reference model and Internet architecture. LAN and WAN technologies, networking and internetworking techniques, packet/cell switching, , end-to-end protocols, congestion control, network security, and an in-depth coverage of TCP/IP.

Prerequisite: CME 462.

CpE 563: Computer Network Laboratory (1 Cr. Hr.)

Hands-on experience on computer network protocol through utilizing computer network simulator. Students will be exposed to TCP/IP network module, different networks topology, Simulate important protocols, Simulate physical layer signaling. Student also will have the ability to develop or modify existing protocols. Student will administer and configure network lab that includes multiple routers switches, and workstations.

Prerequisite: CpE 562* (co-requisite) .

CpE 564A: Advanced Computer Networks (3 Cr. Hr.)

This course provides an in-depth study and comparison of the two primary networking paradigms, Internet/broadcast and switched. The course is implementation-oriented, focusing on issues such as routing, broadcast, multicast, mobility, network configuration, and quality of service.

Prerequisite: CpE 562.

CpE 566: Design of Network Protocols (3 Cr. Hr.)

Methods and solutions in design of distributed application layer protocols: Architecture, ports, layering, protocols, authentication, connection-less and connection-oriented protocols, chaining, referral, multicasting, replication and caching.

Prerequisite: CpE 562.

CpE 568A: Multimedia Systems and Technology (3 Cr. Hr.)

Multimedia systems, digital video and audio compression and encoding techniques, operating system support for digital audio and video, as well as network and transport protocols for multimedia. Real time application, real time operating system for multimedia and quality of services (QoS). An emphasis will be placed on design issues.

Prerequisite: CpE 562.

CpE 572: Robotics (3 Cr. Hr.)

Mathematical modeling of robot mechanisms and the analysis methods used to design control laws for these mechanisms. Homogeneous transformations and relative coordinate frames. Topics include: kinematics of robot manipulators, Robot velocities and static forces, manipulator dynamics, reference trajectory generation, control theory applied to robot manipulators, and tele-operation control

Prerequisite: CpE 542.

CpE 574B: Artificial Neural Network and Fuzzy Systems (3 Cr. Hr.)

Theory and applications of artificial neural networks and fuzzy logic: multi-layer perceptrons, self-organizing maps, radial basis networks, Hopfield networks, recurrent networks, fuzzy-set theory, fuzzy logic control, adaptive fuzzy neural networks, genetic algorithms, and evolutionary computing. Applications to control, pattern recognition, nonlinear system modeling, speech and image processing.

Prerequisite: CME 312.

CpE 584A: Digital Image Processing (3 Cr. Hr.)

Digitization and coding of images, characterization and representation of digital images in spatial and frequency domains, image restoration, perception and enhancement, point-, algebraic-, and geometric operations, discrete image transforms, , image filtering, image reconstruction, pattern recognition principles: segmentation and object measurement.

Prerequisite: CME 312.

CpE 586A: Pattern Recognition and Computer Vision (3 Cr. Hr.)

Image understanding and analysis, study of the underlying image segmentation techniques, object measurements including shape and texture analysis, feature selection and extraction, classification, multispectral image analysis, 3D imaging, computerized tomography, stereometry and stereoscopic imaging.

Prerequisite: CpE 584.

CpE 596: Special Topics (3 Cr. Hr.)

Contents will vary and will be posted the time the course is offered.

Prerequisite: directed by the department.

CpE 598A: Graduation Project (3 Cr. Hr.)

Theoretical investigation and practical implementation of special projects under the supervision of an academic member of the faculty.