Computer Engineering

Introduction

The Computer Engineering program develops the necessary skills and competence in order to train students to design and implement both computer systems and networks. The curriculum emphasizes the areas of digital system architecture and design, microprocessors, communication theory and computer networks. In addition, enough emphasis is given to the study of computer science to provide a coherent view of computer systems and an understanding of the interdependencies of hardware and software components and their interfaces and tradeoffs.

Objective

Many of the products and services for the future growth of the Kingdom will be based on the competence and skills of computer engineers. The objective of the program is to graduate students in the discipline of computer engineering who will play an important role in the future and in the growth of the Kingdom

Skills

The computer Engineering program is expected to develop the necessary skills and competence to design and implement computer systems and networks. The core courses of the computer engineering curriculum provide the skills necessary for all computer engineers. A set of options allow the students to develop further specialization in the various related disciplines. Software courses included will give a comprehensive view of the discipline, and also enable the graduates to perform well in both hardware as well as software related areas.

Job Opportunities

Opportunities for employment in the Kingdom are plenty, and with the various projects launched these are expected to grow. Computer engineering graduates can seek employment in almost all industries that use IT, computer networks, and system design. They can work as systems analysts, software developers and programmers, and also in the areas of management of IT related projects.

Study Plan of Computer Engineering

The Preparatory Year Program

The preparatory programs will orient students in developing skills in the areas of thinking and problem solving in English. Most literature related to computers in available in the English language, and on the Internet. The program will help make a strong foundation for students to build on and excel in their studies. Further, since most computer related documentation such as Manuals, etc., are in English, it will be easier for students to contribute in their work place once their foundations are strong. It will also help in self learning and development which will become important in later years.

Second year Program: First Semester

Course Name & Id #	Subject	# of Lectures	# of Labs	# of credit hours
MATH 1xx	Calculus I	4	0	4
ENGL 1xx	English Comp I	3	0	3
PHYS 1xx	Physics I	3	3	4
CHEM 1xx	Chemistry	3	3	4
HUM 1xx	Humanities I	2	0	2
PE 1xx	Phys Education I	0	2	1
Total Number		Total #15	Total #6	Total #18

Second year Program: Second Semester

Course Name & Id #	Subject	# of Lectures	# of Labs	# of credit hours
MATH 1xx	Calculus II	4	0	4
ENGL 1xx	English Comp II	3	0	3
PHYS 1xx	Physics II	3	3	4
CS 1xx	Intro. To Comp. I	2	3	3
PE 1xx	Phys Education II	0	2	1
EE 1xx	Intro to Electrical Engineering	3	3	4
Total Number		Total #12	Total #11	Total #19

Third year Program: First Semester

Course Name & Id #		# of Lectures	# of Labs	# of credit hours
MATH 2xx	Linear Algebra	3	0	3
CS 2xx	Intro. To Comp. II	3	3	4
HUM 2xx	Humanities	2	0	2
MATH 2xx	Discrete Math I	3	0	3
EE/COE 2xx	Digital Logic Circuit Design	3	3	4
PE 1xx	Phys Education III	0	2	1
Total Number		Total #15	Total #9	Total #18

Third year Program: Second Semester

Course Name & Id #	Subject	# of Lectures	# of Labs	# of credit hours
CS 2xx	Data Structures and Alg	3	3	4
COE 2xx	Comp. Organization & Assembly Programming	3	3	4
HUM 2xx	Ethics	2	0	2
CS 2xx	Principles of e-Services	2	3	3
ENGL 2xx	Technical Report Writing	3	0	3
PE 2xx	Phys Education III	0	2	1
Total Number		Total #13	Total #11	Total #17

Fourth year Program: First Semester

Course Name & Id #	Subject	# of Lectures	# of Labs	# of credit hours
COE 3xx	Data & Computer Communications	3	0	3
COE 3xx	Digital System Design	1	6	3
STAT 3xx	Probability & Stat for Engineers	3	0	3
COE 3xx	Personal Computers	2	3	3
COE 3xx	Computer Architecture	3	0	3
PE 3xx	Phys Education IV	0	2	1
Total Number		Total #12	Total #11	Total #16

Fourth year Program: Second Semester

Course Name & Id #	Subject	# of Lectures	# of Labs	# of credit hours
COE 3xx	Internet Information Technologies	3	3	4
COE 3xx	Seminar	1	0	1
COE 3xx	Computer Networks	3	3	4
COE 3xx	Local Area Networks	3	0	3
COE 3xx	Computer Performance Evaluation	3	0	3
PE 3xx	Phys Education V	0	2	1
Total Number		Total #13	Total #8	Total #16

Fifth year Program: First Semester

Course Name & Id #	Subject	# of Lectures	# of Labs	# of credit hours
COE 4xx	Co-op Program	0	0	6
Total Number		Total #0	Total #0	Total #6

Fifth year Program: Second Semester

Course Name & Id #	Subject	# of Lectures	# of Labs	# of credit hours
HUM 4xx	Humanities	3	0	3
COE 4xx	COE Elective I	3	0	3
COE 4xx	COE Elective II	3	0	3
XXX 4xx	Technical Elective	3	0	3
COE 4xx	Senior Design Project	0	6	3
COE 4xx	COE Elective III	3	0	3
Total Number		Total #15	Total #6	Total #18

Computer Engineering Course Description

EE/COE 2xx Digital Logic Circuit Design (3-3-4)

Introduction to Computer Engineering. Binary number system. Digital circuits. Boolean algebra and switching theory. Manipulation and minimization of Boolean functions. Combinational circuit analysis and design, multiplexers, decoders, adders. Sequential circuit analysis and design, basic flip-flops, clocking, and edge-triggering, registers, counters, timing sequences, state assignment and reduction techniques. Register transfer level operations. Machine level programming.

Prerequisite: PHYS 1xx (Physics II).

Recommended Text Book:

Logic and Computer Design Fundamentals, Mano and Kime, Prentice Hall International, 1997.

Goal:

To teach basics of combinational/sequential logic, and to introduce students to some fundamentals in computer engineering.

Topics:

1. **Digital Computers and Information.** (3 hr.)
   Digital Computers, Number Systems, Arithmetic Operations Decimal Codes, Alphanumeric.

2. **Combinational Logic Circuits.** (12 hr.)
   Binary Logic and Gates, Boolean algebra, Standard Forms, Map Simplification, Map Manipulation, NAND and NOR Gates, Exclusive–OR Gates.

3. **Combinational Logic Design.** (9 hr.)
   Combinational Circuits, design Topics, Analysis Procedure, Design Procedure, Decoders, Encoders, Multiplexers, Binary Adders and Subtractors, Binary Multipliers, Decimal Arithmetic.

4. **Sequential Circuits.** (9 hr.)
   Sequential Circuit Definitions, Latches, Flip-Flops, Sequential Circuit Analysis, Sequential Circuit Design, Designing With D Flip-Flops, Designing With JK Flip-Flops.

5. **Registers and Counters.** (3 hr.)
   Registers, Shift Registers, Ripple Counter, Synchronous Binary Counters, Other Counters.

6. **Memory and Programmable Logic Devices.** (4 hr.)
   Programmable Logic Technologies, Read-Only Memory, Programmable Logic Array, Programmable Array Logic Devices.

7. **Register Transfer and Datapaths.** (3 hr.)
   Datapaths and Operations, Register Transfer Operations, Micro-operations.

Computer Usage:

Students will use PCs running tools for logic design and simulation, (e.g., LogicWorks).

Laboratory Experiments:

Simple experiments related to the design of basic combinational and sequential circuits will be conducted in the laboratory. The lab will have both hardware implementation projects as well as use of CAD tools for modeling and simulation of digital systems (e.g., schematic capture tools like LogicWorks)

ABET Category content:

Engineering Design: **2 credits or 50 %**
Engineering Sciences: **2 credits or 50 %**

COE 2xx Computer Organization and Assembly Language (3-3-4)

Introduction to computer organization. Octal and hexadecimal number systems, ASCII codes. Assembly language programming, instruction formats and types, memory and I/O instructions, arithmetic instructions, addressing modes, stack operations, and interrupts. ALU design. RTL, microprogramming, and hardwired control design. Practice of assembly language programming.

Prerequisite: COE 2xx (Digital Logic Circuit Design).

Text Book:

"Computer Organization and Assembly Language Programming", Michael Thorne, Addison Wesley, Second Edition, 1991.

Goals:

(1) To introduce the basics of computer organization. (2) To introduce assembly language programming. (3) To introduce the basics of control unit design.

Topics:

1. **Introduction.**
   Data and instruction representation. ASCII code. Octal and Hexadecimal numbers.
2. **Computer Organization.**
   Computer units and computer functions. Instruction cycle.
3. **Machine Instructions.**
   Instruction sets, instruction types and formats. Memory and I/O instructions, arithmetic instructions. Addressing modes. Stack operations.
4. **Assembly Language Programming.**
   Assembler directives. Subroutines. Debugging. Interrupts and interrupt routines.
5. **ALU Design.**
   Adders and Multipliers.
6. **Control Unit Design.**
   Register Transfer Level. Instruction sequencing. Microprogramming. Hardwired control.

Computer Usage:

Assembly Language Programming using PCs.

Laboratory Experiments:

Software experiments include practice of assembly language programming and debugging through a set of small- and medium-sized problems. Hardware experiments include designing and testing simplified microprogrammed and hardwired control units.

ABET Category content:

Engineering Topics: **2 credits or 50 %**
Engineering Design: **2 credits or 50 %**

COE 3xx Computer Architecture (3-0-3)

Memory hierarchy and cache memory. Integer and floating arithmetic. Instruction and arithmetic pipelining, superscalar architecture. Reduced Instruction Set Computers. Parallel architectures and interconnection networks.

Prerequisite: COE 2xx (Computer Organization and Assembly Language).

Text Book:

Barry Wilkinson, ``Computer Architecture, Design and Performance", Prentice Hall, Second Edition, 1996.

Goals:

(1) To understand the basics of memory management.
(2) To learn the principles of integer and floating arithmetic.
(3) To study the design of pipelined processors
(4) To comprehend the basic parallel architectures and interconnection networks.

Topics:

1. **Basic computer systems.** (5 hr.)
   Architectural developments. The stored program computer. Reduced instruction set computers (Instruction execution characteristics, architecture, pipelining, comparison with CISC).
2. **Instruction set design.** (3 hr.)
   Processor characteristics. Instruction formats. Internal operation of CPU.
3. **Cache memory systems.** (5 hr.)
   Cache memory organizations. Fetch and write mechanisms. Replacement policies. Cache performance.
4. **Memory management.** (5 hr.)
   Memory hierarchy. Paging. Replacement algorithms. Virtual memory systems. Segmentation.
5. **Integer and floating arithmetic.** (4 hr.)
   Integer representation. Integer arithmetic. Floating-point representation. Floating-point arithmetic.
6. **Pipelined processor design.** (6 hr.)
   Instruction overlap and pipelines. Instruction pipeline hazards. Superscalar processors. Arithmetic pipelines. Reservation tables.
7. **Multiprocessor systems and programming.** (9 hr.)
   Multiprocessor classification. SIMD multiprocessor systems. MIMD multiprocessor systems. Programming multiprocessor systems.

8.

Interconnection networks. (8 hr.)
Crossbar switch networks. Multiple bus networks. Single and multistage networks. Static interconnection networks. Bandwidth analysis of networks.

Computer Usage:

Programming assignments may be required to determine the speed-up when a program is run on a multiprocessor system rather than a uniprocessor system.

Laboratory Experiments:

No laboratory.

ABET Category content:

Engineering Topics: **2 credits or 67 %**
Engineering Design: **1 credits or 33 %**

COE 3xx Personal Computers (2-3-3)

Overview of system features and components. Microprocessor types and specifications. Motherboards, bus slots and I/O cards, memory, power supply, input devices, video display hardware, and audio hardware. Floppy disk, hard disk, and CD-ROM drives and controllers. Network cards. Preventive maintenance, backups, and warranties. Software and hardware diagnostic tools. Software and hardware troubleshooting. Applications.

Prerequisite: Junior standing.

COE 3xx Internet Information Technologies (3-0-3)

Electronic mail and file transfer. Information retrieval services and tools. Multimedia applications: Computer Supported Cooperative Work (CSCW); audio-video conferencing; networked hypertext and hypermedia; visual cyberspace; networking requirements of multimedia applications. World Wide Web (WWW) page and program development. The HyperText Markup Languages and the HyperText Transfer Protocols. Common Gateway Interfaces, Java and Java Script language. Web page style and design.

Prerequisite: Senior standing.

COE 3xx Local Area Networks (3-0-3)

Introduction to Local Area Networks (LANs). Classes of LANs. LAN design issues. LAN topologies. LAN transmission media. LAN protocols: Medium Access Control (MAC) and Logic Link Control (LLC). LAN standards. Network software: Network operating systems. LAN performance modeling and analysis. Internetworking: Bridges, Routers, and Gateways. Reliability, availability, survivability, and security.

Prerequisite: COE 3xx (Data and Computer Communications) or consent of instructor.

COE 3xx Computer Performance Evaluation (3-0-3)

Introduction to computer system performance analysis and evaluation. Review of basic probability distributions and basic concepts of statistics. Performance measures and measurement techniques. Performance analysis, performance prediction, asymptotic bounds on performance. Simulation and modeling of computer systems. Experimental and analytical approaches. Introduction to queuing network modeling. Case studies.

Prerequisite: STAT 3xx (Probability & Stat for Engineers) or consent of instructor.

COE 3xx DIGITAL SYSTEM DESIGN (1-6-3)

The purpose of this course is to integrate the students' knowledge in hardware and software from lecture and laboratory courses to design, implement, debug and document a major digital system. The twin learning experiences of making hardware versus software decisions, and participating in structured design are preferably integrated into the same project.

Prerequisite: Junior standing.

Text Book:

TTL Data Book & The 8051 Microcontroller, second edition, I. Scott Mackenzie, and handouts covering important topics in the area of digital system design, taken from technical literature and data books, in addition to major chapters of the Intel 8051 data book.

Recommended Grade Distribution:

Project: 50% (final report + final oral presentation: 10%, project evaluation: 40%)

One major intermediate report + performance: 5 + 10%

Homework/Quizzes + Attendance: 5%

PCB: 15% (Layout: 5%, PCB fabrication: 10%. if facilities available)

Final exam: 15%

COURSE OUTLINE:

The course outline emphasizes major concepts of embedded applications (Real life applications which have intelligence embedded in them) using intelligent controllers or microcontrollers and their parallel and serial interface with host PCs or workstations for the purpose of Data logging and analysis. Microcontrollers have been in the area for quite a long time, so the course concentrates first on giving the student a complete coverage of microcontroller hardware and software aspects. The students will utilize in this process a couple of microcontroller's

simulators and development systems to be able to develop their application. They will also have access to a software development package like visual basic and C compilers. Concepts of interfacing microcontrollers with PCs and dummy terminals using RS232 and RS 485 will be covered theoretically and practically. Examples on how to use high level programming languages such as C, Qbasic and Visual Basic for serial communication, data logging and control will be given. The students are supposed to design and build a prototype of a real PC based application using the above mentioned tools. Students will use the native assembly language of microcontroller they are using to write efficient programs, which they will burn, on EPROMS using an available EPROM programmer. The students will also be exposed to the experience of using TTL and CMOS components in their design, and interfacing of major components such as sensors, LCDs, LEDs, and Keypads to an application. Students are supposed to use logic analyzers, multimeters, and oscilloscopes for troubleshooting their system. The students should develop a good skill in how to build a user friendly environment for the PC using one of the efficient high level languages such as C or Pascal, but emphasis will be given now for object oriented languages. After the student completes the prototype successfully, he will transfer his design to a PCB using available CAD tools and PCB lab facilities.

The end product will be professionally documented in the form of a report. Students will work in groups of 3. There will be a group leader to each group responsible for distributing the tasks among members of the group. The leadership will be cyclic every month. The leader is responsible to report to instructor progress of work weekly basis.

The general policy of teaching in this project oriented course is to motivate the students and teach them to acquire excellence in designing and implementing advanced projects and training them to cope with dynamic requirements of the project, how to get data from company catalogs, and how to be able to make the best software and hardware decisions which they might face when they are exposed to real life experience in their career. Excellent projects may be nominated for scientific awards.

COE 3xx Data and Computer Communications (3-0-3)

Introduction to data communication. Overview of the OSI model. Frequency response, bandwidth, filtering, and noise. Fourier series and transform. Information theory concepts such as Nyquist theorem, Shannon theorem, and Sampling theorem. Analog and digital modulation techniques. Pulse Code Modulation (PCM). Communication systems circuits and devices. Data encoding. Physical Layer Protocols. Data Link Control (point to point communication; design issues; link management; error control; flow control). Multiplexing and Switching.

Prerequisite: EE 1xx (Intro to Electrical Engineering).
Corequisite: STAT 3xx (Probability & Stat for Engineers).

Text Book:

William Stalling, ``Data and Computer Communications", MACMILLAN, 5th Edition, 1996.

Goals:

(1) To understand the basics of communication signals. (2) To understand the requirements to get two computers exchange data. (3) To understand the basics of switching and networking.

Topics:

1. **Introduction.** (3 hr.)
   Communication Model. Computer Communication Architecture.
2. **Data Transmission.** (6 hr.)
   Concepts and Terminology. Analog and Digital Transmission. Transmission Impairments. Transmission Media.
3. **Data Encoding.** (3 hr.)
   Encoding of Digital Data as Digital Signals. Amplitude, Frequency, and Phase Shift Keying. Pulse Code and Delta Modulation. Analog Modulation (Amplitude, Frequency, and Phase Modulation).
4. **Digital Data Communication Techniques.** (6 hr.)
   Asynchronous and Synchronous Transmission. Error Detection Techniques. Interfacing.
5. **Data Link Control.** (12 hr.)
   Line Configuration. Flow and Error Control. Bit-Oriented Data Link Control.
6.

Multiplexing. (3 hr.)
Frequency, Time, and Space Division Multiplexing.

7. **Data Communication networking.** (9 hr.)
Computer Communication Networking. Broadcast versus Switched Networks. Circuit, Message, and Packet Switching. Digital Switching Concepts. Digital Data Switching Devices. The Digital Private Branch Exchange.

8. **Introduction to LAN/MAN Technology.** (3 hr.)
LAN/MAN Technology. The BUS, Tree, and Ring Topologies. Medium Access Control Protocols and Standards.

Computer Usage:

Simple programming assignment may be required to implement a simple data link protocol between two PCs connected via modems or null modem cables.

Laboratory Experiments:

Simple experiments in the form of demos of data communication devices and software available in the departmental computer networking laboratory.

ABET Category content:

Math & Basic Sciences: **2 credits or 67 %**
Engineering Sciences: **1 credits or 33 %**

COE 3xx Computer Networks (3-3-4)

Introduction to computer networks. Circuit, message, packet, and cell switching. The OSI model. WAN and LAN design issues. MAC layer design issues and protocols. Network layer design issues. Routing and congestion control. Internetworking. ISDN, B-ISDN, and ATM. Transport layer design issues and protocols. Application layer design issues and protocols. Examples of protocol suites and networks.

Prerequisite: COE 3xx (Data and Computer Communications) or Consent of Instructor.

Text Book:

Adrew S. Tanenbaum, "Computer Networks", Prentice Hall, 3rd Edition, 1996.

Topics covered:

1. **Introduction.** (4 hr)
   Network Hardware and Software. Reference Models. Example of Networks.
2. **N-ISDN, B-ISDN, and ATM.** (5 hr.)
   ISDN services and architecture. B-ISDN and ATM. ATM Switches.
3. **MAC Layer Design Issues and Protocols.** (9 hr.)
   Channel Multi-access problem. Multi-access protocols. IEEE 802 Standards. High Speed LANs.
4. **Network Layer.** (12 hr.)
   Network Layer Design Issues. Routing. Congestion Control. Internetworking. Network Layer in the Internet.
5. **Transport Layer.** (9 hr.)
   The Transport Service. Elements of Transport Protocols. A Simple Transport Protocol. The Internet Transport Protocols (TCP and UDP).
6. **Application Layer.** (6 hr.)
   Domain Name System (DNS). Simple Network Management Protocol (SNMP). Electronic Mail. File Transfer Protocol (FTP). The World Wide Web (WWW). Multimedia.

Laboratory Experiments:

The lab component will consist of experiments selected from the following tentative list:

Serial communication between PCs (character transfer).

Communication via MODEMs.
Experiments with standard protocols (such as Kermit, XModem, etc).
Demos of NICs and their installation (setting the card, connecting cables, installing the driver, loading TCP/IP software layers or Novell software, etc.).
Demos/Experiments of using network hardware debugging tools.
Use a network analyzer (e.g. Netsight) to look at frames and packets.
Networking experiments illustrating multiple access, hubs, etc. (using analyzers to demonstrate collisions and role of hubs).
Network traffic analysis and trouble shooting using Netsight.
Creation of a Web page.
Modeling and simulation of computer networks.
Setting up an FTP server.
Setting up a Web server.
Experiment on LAN design and installation.
Experiments with various network operating systems (such as TCP/IP, SPX/IPX).
Internetworking experiments (setting up and configuring routers, bridges, etc).
Experiments on mounting a network file system (NFS).
Experiments on performance modeling and analysis.

ABET Category content:

Engineering Sciences: **3 credits or 75 %**
Engineering Design: **1 credits or 25 %**

COE 3xx Seminar (1-0-1)

The purpose of this course is to help improve students' ability for presenting their technical work. It also teaches students about the nature of engineering as a profession, codes of professional conduct, ethics & responsibility, and the role of engineering societies. Case studies of conflict between engineering professional ethical values and external demands. The course features students' participation in discussions held by COE faculty members and invited guests.

Prerequisite: Junior standing.

Text Book:

Carson Morrison and Philip Hughes, ``Professional Engineering Practice: Ethical Aspects", McGraw-Hill Ryerson, 3rd Edition, 1992.

Goals:

(1) To teach students the nature of engineering as a profession. (2) To teach students the ethical and professional responsibility of engineers in the society. (3) To improve students' technical and professional communication skills.

Topics:

1. **Introduction.** Basic concepts and terminology in the engineering profession. The profession in present-day society. Regulation of the profession.

2. **Communications.**
The art of expressing ideas. Careful practical writing. The art of technical reporting. Technical presentations and seminar delivering. Critical reading of source material. Teamwork and small group discussion.

3. **Ethics and Social responsibility.**
Analysis of ethical and social issues related to the development and use of computer technology. Privacy, reliability, and risks. Responsibility of the professionals for the application and consequences of their work.

4. **Professional Computer Engineers.**

Computer Usage: None.

Laboratory Experiments: None.

ABET Category content:
Engineering Topics: 50 %
Social Science: 50 %

COE 4xx Cooperative Work (0-0-6)

A continuous period of a Full Term (15 weeks) spent in industry with the purpose of acquiring practical experience in applicable areas of Computer Engineering. During this period, a student is exposed to the profession of Computer Engineering by working in the field. Students are required to submit a final report and give a presentation about their experience and the knowledge they gained during their cooperative work.

Prerequisite: ENGL 2xx (Technical Report Writing) and the completion of 100 credit hours including all 3xx level COE courses.

COE 4xx Senior Design Project (0-6-3)

This course is designed to give students the experience of tackling a realistic engineering problem. The intent is to show how to put theoretical knowledge gained into practical use by starting from a word description of a problem and proceeding through various design phases to end up with a practical engineering solution. COE faculty in their respective specialization areas offers various projects. The project advisor guides the student in conducting feasibility study, preparation of specifications, and the methodology for the design. Detailed design and implementation of the project are carried out followed by testing, debugging, and documentation. An oral presentation and a final report are given at the end of the semester.

Prerequisite: Senior standing.

Reference Book: Robert Angus and Norman Gundersen, ``Planning, Performing, and Controlling Projects: Principles and Applications", Prentice-Hall, First Edition, 1997.

Recommended Grading Policies:

Motivation and self reliance (advisor) 10 points
One progress report (advisor) 6 points
Action plan (coordinator) 3 points
Understanding (advisor (5pts), coordinator and a member (1.5pts each)) 8 points
Final report (advisor (20pts) and coordinator (8pts)) 28 points
Accomplished work (advisor (10pts), coordinator and a member (3pts each)) 16 points
Presentation (advisor (7pts), coordinator and a member (6.5pts each)) 20 points
Attendance (advisor and coordinator (4.5pts each)) 9 points
Total 100 points

Mile-Stones:

1. First Organizational Meeting

The first two class meetings will be on the organization of Senior Design Projects and project selection.

2. Project Descriptions

Project descriptions offered by COE faculty will be posted on the COE Senior Design Project Bulletin.

3. Project Selection

Every student should see COE faculty for selecting a suitable project. Once you have chosen a project, then fill out the project Commitment Form and have it approved and signed by the project advisor. Hand in the signed commitment form to the course coordinator.

4. List of Selected Projects

The list of the selected projects together with the project advisors' names will be posted on the COE Senior Design Project Bulletin board.

5. Action Plan

Work out carefully a complete plan of action for the entire semester. This must be done under the guidance of your project advisor. The action plan should be sufficiently detailed in order to enable monitoring your progress. The plan should clearly indicate your targets, and how you will achieve them. A template action plan is posted in the COE Senior Design Project Bulletin board for your convenience. You must submit a copy of the action plan to the course coordinator and another copy to your project advisor.

6. Resource Requirements

Make a careful study of the resources required for your project, e.g. references, software, hardware components, boards, etc. and arrange for their availability through your project advisor. Remember that enough notice is required so that procurement can be guaranteed. The course coordinator will be willing to help facilitating this task. You must submit you resource requirements to the lab engineer

7. Regular Meetings and Attendance

All students enrolled in “Senior Project Course” and “Digital Design Lab Course” are required to attend the senior design meetings scheduled by the registrar. During the first two weeks, the course coordinator and assistant coordinator will distribute relevant material and provide some guidelines on how to select and carry out a senior design project. The following checklist should be observed:

(a) Make sure to attend all weekly meetings with the senior design project coordinators. An important percentage of the final grade is dedicated for attendance.

(b) Make sure to have weekly meetings with your project advisor.

(c) Make sure your project advisor signs the attendance sheet and indicate the progress made after each weekly meeting. Do not miss any meeting with your project advisor because an important percentage of the final grade is dedicated for attendance. Those who do not attend the regular project meetings with the project advisor will have their final course grade reduced accordingly.

8. Progress Report

You are required to submit one progress report during the term. If no progress report is submitted or the coordinator from your project advisor receives a warning notification of unsatisfactory performance, then you will be liable to receive a

grade of "Denial". Submit one copy of the progress report to your project advisor and another to the course coordinator.

9. Final Project Report

Four copies of the final project report should be submitted to the course coordinator. The report should comprehensively illustrate the accomplished work in the project. An outline of the final project report is posted in the COE senior design project bulletin for your convenience.

10. Evaluation Committee

An evaluation committee will be formed for each student. The committee will consist of the project advisor, the course coordinator, and at least one more faculty member. The grading policy and weight given to each committee member will be posted in the COE senior design project bulletin for your convenience. For your information, the grading policy shows the weight assigned to each of the following in deciding on your final grade in the course, i.e. attendance, action plan, progress report, final project report, evaluation of the project committee, etc.

11. Presentation

Each student will be scheduled to give a formal presentation of the findings of his project. The project advisor, the course coordinator and the members of the evaluation committee will evaluate the presentation. A schedule will be posted for the time and place of the presentation. You should consult with your project advisor at least two weeks before your presentation for the preparation required delivering a successful presentation.

Some Suggested COE Electives

COE 4xx Fault-Tolerant Computing (3-0-3)

Introduction to fault-tolerant computing (FTC). Goals of fault tolerance (FT). Design techniques to achieve FT. Evaluation of FT systems. Reliability modeling and analysis of FT systems. Availability modeling. Design of practical FT systems. Design of FT VLSI circuits. Introduction to testing.

Prerequisite: COE 3xx (Computer Architecture).

COE 4xx Real Time Systems (3-0-3)

Fundamentals of real time systems design; scheduling, interrupts, process communication and synchronization. Design of real time systems. Decomposition of real time systems. Applications of real time systems. Instrumentation for real time applications. Real time operating systems. Case studies.

Prerequisite: COE 3xx (Computer Architecture).

COE 4xx Distributed Systems (3-0-3)

Characterization of distributed systems, interprocess communication, client-server, remote procedure calls, logical and physical time, distributed coordination. File services, naming and directory services, distributed concurrency control, transactions and atomic commit problem. Case studies.

Prerequisite: Senior standing.

COE 4xx High Speed Networks (3-0-3)

Introduction to computer communication networks. Introduction to high speed networking. Impact of high speed on communication protocols. Design and performance issues of high speed networks. Standard high speed protocols and networks. Examples of high speed networks. Case studies. Future directions.

Prerequisite: Senior standing.

COE 4xx Internetwork Design and Management (3-0-3)

Types of computer networks. Principles of internetworking. The network development life cycle. Network analysis and design methodology. Internetworking hardware. Connectionless internetworking. Connection-oriented internetworking. Routing strategies. Structured wiring and backbone design. OSI internetworking. Network management (SNMP). Network security and firewalls. Network administration. Case studies.

Prerequisite: Senior standing

COE 4xx Mobile Computing (3-0-3)

Introduction to mobile computing. Designing computer networks to support user mobility. Models for indoor and outdoor mobile networks. System issues such as performance, quality of service, reliability, and security in mobile computing environment. Hardware, and access protocols, for mobile networks. Adapting existing protocols to support mobility.

Prerequisite: Senior standing.

COE 4xx Computer Vision Processing (3-0-3)

Introduction to vision processing. Illumination and imaging techniques. Planar and stereo-vision, pixel representation, preprocessing, smoothing, enhancement, and equalization. Edge detection, gradient, Laplacian, and thresholding. Segmentation, linear, polygonal, and Fourier descriptors. Introduction to 3D structures. Shape matching, search approaches, interpretation, and recognition.

Prerequisite: Senior standing

COE 4xx Special Topics in Computer Engineering (3-0-3)

Special topics in issues related to computer engineering. Topics and specifics will be announced well before the course starting date. These are current areas of computer engineering for one time offering in emerging areas and technologies and are given quick approvals.

Prerequisite: Senior standing.