

# M.S. in Computer Engineering

*Candidates must satisfy a total of 30 credit hours (CH) with a minimum G.P.A. of 3.000 on a 4.000 scale.*

*All students must complete 12 credit hours (CH) of the core curriculum.*

## **CSE 7343 Operating Systems and Systems Software**

Theoretical and practical aspects of operating systems, including an overview of system software, time-sharing, and multiprogramming operating systems. Also, network operating systems and the Internet, virtual memory management, interprocess communication and synchronization, file organization, and case studies. *Prerequisite:* CSE 2341.

## **CSE 7344 Computer Networks and Distributed Systems**

Introduction to network protocols, layered communication architecture, multimedia applications and protocols, quality of service, congestion control, optical networks, DWDM, network survivability and provisioning, and wireless networks. There will be an interdisciplinary project requiring the use of currently available network design and simulation tools. *Prerequisite:* C- or better in CSE 4344.

## **CSE 7381 Computer Architecture**

Introduces the state-of-the art in uniprocessor computer architecture. The focus is on the quantitative analysis and cost-performance tradeoffs in instruction set, pipeline, and memory design. Covers quantitative analysis of performance and hardware costs, instruction set design, pipeline, delayed branch, memory organization, and advanced instruction-level parallelism.

## **CSE 7387 Digital Systems Design**

Modern topics in digital systems design including the use of HDLs for circuit specification and automated synthesis tools for realization. Programmable logic devices are emphasized and used throughout the course. This course has heavy laboratory assignment content and a design project. *Prerequisite:* C- or better in CSE 3381.

## **CSE 8098 Computer Science Seminar**

The course consists of the seminars and colloquia given by the resident faculty and invited guests in various specialized, as well as general topics in computer science.

*All students must complete 6 credit hours (CH) in a concentration area.*

*Architecture (two of the following)*

## **CSE 7385 Microprocessor Architecture and Interfacing**

Emphasizes the design of microcontroller-based computer systems. Starts with the presentation of microcontroller architecture and continues with the design of computer systems with hierarchical memory, input-output peripherals, and industry-standard bus interfaces. Includes a required laboratory with design projects in which students learn to use state-of-the-art CAD tools and laboratory instruments for hardware design, simulation, implementation, and debugging. *Prerequisites:* CSE 3381 or both EE 3181 and EE 3381.

## **CSE 8377 Fault-Tolerant Computing**

Faults, errors, and failures, hardware fault tolerance, reliability, availability, reliable distributed systems, check-pointing and recovery, atomic actions data and process resiliency, software fault tolerance, and case studies. *Prerequisite:* Permission of instructor.

## **CSE 8380 Parallel and Distributed Processing**

Parallel and distributed processing is a fast-growing technology that permeates many aspects of computer science and engineering. This course emphasizes the strong interaction between parallel and distributed algorithms, architectures, and software. Topics include parallelism analysis in numeric and non-numeric algorithms, array processors, associative processors, multiprocessors, marker-propagation networks, distributed operating systems, networks of workstations, Internet computing, and case studies. *Prerequisites:* Computer architecture and a high-level programming language.

## **CSE 8383 Advanced Computer Architecture**

Advanced topics in computer architecture and parallel processing. *Prerequisite:* CSE 7381.

*Design Automation (two of the following)*

### **CSE 7380 VLSI Algorithms**

Introduces problems, algorithms, and optimization techniques used in the design of high-performance VLSI design. Emphasis on algorithms for partitioning, placement, floor planning, wire routing, and layout compaction.

### **CSE 7387 Digital Systems Design**

Modern topics in digital systems design including the use of HDLs for circuit specification and automated synthesis tools for realization. Programmable logic devices are emphasized and used throughout the course. This course has heavy laboratory assignment content and a design project. *Prerequisite:* C- or better in CSE 3381.

### **CSE 8377 Fault-Tolerant Computing**

Faults, errors, and failures, hardware fault tolerance, reliability, availability, reliable distributed systems, check-pointing and recovery, atomic actions data and process resiliency, software fault tolerance, and case studies. *Prerequisite:* Permission of instructor.

### **CSE 8387 Switching Theory and Applications in VLSI CAD**

Advanced topics in switching theory and CAD methods. The underlying theory of the course topics is emphasized in addition to their application. Particular emphasis on the representation and properties of discrete functions and the synthesis and verification problems. Includes both binary and multiple-valued logic systems. Previous exposure to an HDL is highly beneficial but is not a prerequisite.

*Prerequisites:* Proficiency in using a modern programming language and CSE 7387 or equivalent.

*Networking (two of the following)*

### **CSE 7348 Internetworking Protocols and Programming**

Processing and interprocess communications, UNIX domain sockets, fundamentals of TCP/IP, Internet domain sockets, packet routing and filtering and firewall, SNMP and network management, client-server model and software design, remote procedure call (XDR, RPC, DCE), design of servers and clients, networking protocols for the World Wide Web, and internetworking over new networking technologies. *Prerequisites:* CSE 7343 and C programming.

### **CSE 7349 Data and Network Security**

Covers conventional and state-of-the-art methods for achieving data and network security. Private key and public key encryption approaches are discussed in detail, with coverage of popular algorithms such as DES, Blowfish, and RSA. In the network security area, the course covers authentication protocols, IP security, Web security, and system-level security. *Prerequisite:* CSE 7339 or equivalent with instructor permission.

### **CSE 8344 Computer Networks**

Fundamentals of computer communications networks. Introduction to computer networking elements, communications architectures and protocols. Case studies. Design and analysis of computer networks: topology, LAN/MAN technology network interface, LAN/MAN performance internetworking, and network management. *Prerequisite:* CSE 7344.

### **CSE 8349 Advanced Network and System Security**

In-depth analysis of secure networks and systems, security audit, intrusion detection and prevention, storage security, firewall configurations, security log analysis, DMZs, honeypots, malicious codes, and mobile and grid computing security. *Prerequisite:* CSE 7349.

*All students must complete 12 credit hours (CH) of elective courses. For a full listing, please refer to the graduate catalog.*