

# MASTER OF SCIENCE IN COMPUTER ENGINEERING

The purpose of this degree is to prepare students for advanced study and/or research or industrial practice in the field of computer engineering. The Master of Science in Computer Engineering (M.S.C.P.E.) program builds a strong foundation in all aspects of the design and development of computer systems, with a specialization in a major area. Students have the option to pursue thesis research under the guidance of a faculty adviser. Areas of study include computer hardware design, computer networking and telecommunications, and computer system and application software. The program is normally completed in three semesters of full-time study.

The admission requirements for this degree follow the existing admission requirements for master's degrees in the ECE department. Students whose accredited B.S. degree is not in computer engineering may pursue the M.S.C.P.E., provided that they have an adequate background and can demonstrate proficiency in the material contained in the following undergraduate courses:

ECE 211	Circuit Analysis I	3
ECE 213	Circuit Analysis II	4
ECE 218	Digital Systems	4
ECE 242 or CS 350	Digital Computers and Computing Computer Organization and Assembly Language Programming	3
ECE 311	Engineering Electronics	4
CS 201	Accelerated Introduction to Computer Science <sup>1</sup>	4
CS 401	Introduction to Advanced Studies I	3
MATH 251	Multivariate and Vector Calculus	4
MATH 252	Introduction to Differential Equations	4

<sup>1</sup> i.e. CS 115 and CS 116 combined

A student may demonstrate proficiency by successfully completing the courses or by demonstrating satisfactory performance in one or more special examinations administered by the department.

The program of study includes a minimum of 32 credit hours of acceptable graduate coursework, with a minimum of 21 credit hours of ECE coursework. A minimum of 20 credit hours must be taken at the 500-level or higher. Up to six credit hours of ECE short courses may be applied to the degree. Students, with adviser approval, select courses appropriate to their needs and interests. The program of study must include two core and two elective courses within one of the computer engineering (CPE) areas of concentration (computer hardware design, computer systems software, and networks and telecommunications), and at least one core course from each of the two remaining areas. An M.S.C.P.E. candidate may, with permission of a thesis adviser, include in their program a thesis of six to eight credit hours. The master's thesis is strongly recommended for pre-doctoral students. The thesis option requires a written thesis and an oral defense of the thesis. Thesis format and deadlines are set by the Graduate College.

## Master of Science in Computer Engineering (Coursework Only Option)

Requirement	Credits
Minimum Credits Required	32
Minimum ECE Course Credit	21
Maximum 400-Level Credit	12
Minimum 500-Level Credit	20
Maximum 700-Level Credit	6
Maximum Transfer Credit	9

Code	Title	Credit Hours
<b>Computer Engineering Major Courses</b>		(12-15)
Select two core courses from the chosen CPE area of concentration from the lists below (p. 2)		6-7
Select two elective courses from the chosen CPE area of concentration from the lists below (p. 2)		6-8
<b>Computer Engineering Elective Courses</b>		(6-8)
Select one core course from each of the two remaining CPE areas of concentration from the lists below (p. 2)		6-8
<b>General Electives</b>		(9-14)
Select 9-14 credit hours of general ECE electives		9-14

## Master of Science in Computer Engineering (Thesis Option)

Requirement	Credits
Minimum Credits Required	32
Minimum ECE Course Credit	21
Maximum 400-Level Credit	12
Minimum 500-Level Credit	20
Maximum 700-Level Credit	6
Maximum Transfer Credit	9

Code	Title	Credit Hours
<b>Computer Engineer Major Courses</b>		(12-15)
Select two core courses from the chosen CPE area of concentration from the lists below (p. 2)		6-7
Select two elective courses from the chosen CPE area of concentration from the lists below (p. 2)		6-8
<b>Computer Engineering Elective Courses</b>		(6-8)
Select one core course from each of the two remaining CPE areas of concentration from the lists below (p. 2)		6-8
<b>General Electives</b>		(1-8)
Select one to eight credit hours of general ECE electives		1-8
<b>Thesis Research</b>		(6-8)
ECE 591	Research and Thesis M.S. <sup>1</sup>	6-8

<sup>1</sup> Students pursuing the thesis option must complete six to eight credit hours of research work (ECE 591) leading to an M.S. dissertation with the approval of a thesis adviser.

## CPE Areas of Concentration

### Computer Hardware Design

Code	Title	Credit Hours
<b>Core Courses</b>		(6-7)
ECE 529 or ECE 429	Advncd VLSI Systems Dsgn Intro to VLSI Design	3-4
ECE 585	Advanced Compt Arch	3
<b>Elective Courses</b>		(51)
ECE 425	Anlys Dsgn Intgrtd Circuits	3
ECE 429	Intro to VLSI Design	4
ECE 441	Microcomputers/Embedded Comp	4
ECE 442	Internet of Things/Cyber Phys	3
ECE 446	Advanced Logic Design	4
ECE 485	Computer Organization & Design	3
ECE 523	Fund of Semiconductor Devices	3
ECE 529	Advncd VLSI Systems Dsgn	3
ECE 530	High Performnc VLSI/IC Systems	3
ECE 583	High Speed Compt Arithmetic	3
ECE 584	VLSI Archs Sgnl Prcs Commnctns	3
ECE 585	Advanced Compt Arch	3
ECE 586	Fault Dctcntn Digital Circuits	3
ECE 587	Hardware Software Codesign	3
ECE 588	CAD Techniques VLSI Dsgn	3
ECE 589	CAD of Analog IC	3

### Computer Systems Software

Code	Title	Credit Hours
<b>Core Courses</b>		(6)
CS 550	Advanced Operating Systems	3
CS 551	Operating Syst Design&Implemtn	3

<b>Elective Courses</b>		(39)
ECE 449	Obj-Orrntd Cmptr Sim	3
ECE 518	Computer Cyber Security	3
ECE 587	Hardware Software Codesign	3
CS 487	Software Engineering	3
CS 545	Distributed Computing Lndscp	3
CS 546	Parallel and Distributed Proc	3
CS 550	Advanced Operating Systems	3
CS 551	Operating Syst Design&Implemtn	3
CS 555	Anlytc Mdls Simul Comp Syst	3
CS 586	Software Systems Arch	3
CS 587	Software Project Management	3
CS 588	Advnd Software Engrg Dev	3
CS 589	Software Testing and Anlys	3

**Networks and Telecommunications**

<b>Code</b>	<b>Title</b>	<b>Credit Hours</b>
<b>Core Courses</b>		(7)
ECE 407	Intro Comp Ntwks with Lab	4
or ECE 408	Intro to Computer Ntwks	
ECE 541	Perform Eval Compt Ntwrk	3
or ECE 545	Advanced Computer Networks	
<b>Elective Courses</b>		(70)
ECE 407	Intro Comp Ntwks with Lab	4
ECE 408	Intro to Computer Ntwks	3
ECE 504	Wireless Comm System Design	3
ECE 508	Video Processing & Comm	3
ECE 511	Analysis Random Signals	3
ECE 513	Commctn Engrg Fundamentals	3
ECE 514	Digital Commctn Principles	3
ECE 515	Modern Digital Communications	3
ECE 516	Coding Distributed Storage Sys	3
ECE 517	Wireless Ntwrk Protocols/Stand	3
ECE 519	Coding Reliable Communications	3
ECE 520	Info Theory and Applications	3
ECE 541	Perform Eval Compt Ntwrk	3
ECE 542	Dsgn Optmztn Compt Ntwrks	3
ECE 543	Computer Network Security	3
ECE 544	Wireless and Mobile Networks	3
ECE 545	Advanced Computer Networks	3
ECE 546	Wireless Network Security	3
ECE 547	Wireless Netwrks Perf Analysis	3
ECE 570	Fiber Optic Communication Syst	3
ECE 584	VLSI Archs Sgnl Prcs Commctns	3
CS 455	Data Communication	3
CS 544	Computer Ntwrks II: Ntwrk Svc	3