MS IN COMPUTER ENGINEERING

In Workflow

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Approval Path

1. Fri, 18 Sep 2020 17:30:12 GMT
   Gareth Figgess (figgess): Approved for ECS College Committee Chair
2. Fri, 18 Sep 2020 17:44:35 GMT
   Kevan Shafizadeh (kevan): Approved for ECS Dean

History

1. May 1, 2018 by clmig-jwehrheim
2. Feb 21, 2019 by 212408496

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Changes proposed by: Behnam Arad (101010646)

Academic Group: (College)

Engineering & Computer Science

Academic Organization: (Department)

Engineering

Catalog Year Effective:

2021-2022 Catalog

Individual(s) primarily responsible for drafting the proposed degree major program:

Name (First Last)	Email	Phone 999-999-9999
Behnam Arad	arad@csus.edu	916-278-7160

Type of Program Proposal:

Major

Program Change Type:

Non-Substantive

Title of the Program:

MS in Computer Engineering

Designation: (degree terminology)

Master of Science

Briefly describe the program proposal (new or change) and provide a justification:

In response to the increase in the number of unit for CpE 201 to meet the new Graduate Writing Intensive (GWI) requirement.

Objectives of the degree program:

Computer Engineering Graduate Program Learning Objectives are:

1. Graduates will be capable of integrating undergraduate fundamentals and advanced knowledge to solve complex Computer Engineering relatedproblems

2. Graduates will be prepared for professional advancement in computer engineering. They will have the ability to pursue continuous learning andidentify, understand, and apply new knowledge within the field.

3. Graduates will have the ability to undertake a research and development project and to document the work in clear and effective manner,appropriate to the standards in the field

4. Graduates will have the ethics and the communication skills to be an effective team member

University Learning Goals

Graduate (Masters) Learning Goals:

Critical thinking/analysis
Communication
Information literacy
Disciplinary knowledge
Intercultural/Global perspectives
Professionalism

Will this program be required as part of a teaching credential program, a single subject, or multiple subject waiver program (e.g., Liberal Studies, Biology) or other school personnel preparation program (e.g., School of Nursing)?

No

Catalog Description:

Total units required for MS: 30 minimum, (including 0-5 units of 500-level courses for Plan A, B, or C) and the remaining units from the list of required and elective courses

Program Description

The Master of Science degree in Computer Engineering is jointly supported by the Departments of Computer Science and Electrical and Electronic Engineering. The program is designed to provide opportunities for students with undergraduate degrees in Computer Engineering, Computer Science, Electrical Engineering, or a closely related field to pursue graduate studies in this interdisciplinary field. The program provides students with broad and advanced knowledge in areas such as advanced microprocessor architecture, parallel computer architecture, advanced microprocessor systems, distributed computing, data communication, computer networks, operating systems, and concurrent programming. The program is sufficiently flexible to allow students to conduct independent research and broaden their professional scope. Each student plans a program of study in consultation with a graduate advisor and/or his/her thesis or project advisor and works closely with these advisors.

Computer Engineering is a part of the larger Information Technology (IT) discipline. Highly skilled computer engineers who have advanced knowledge of both hardware and software and who can design, test, and implement complex digital systems are a part of the IT workforce. Networks such as the Internet, Intranets, communication systems, banking computer systems, public utility systems, and transportation systems are just a few examples of areas where high-tech solutions and skilled workers are needed. The continuing dramatic progress in hardware and the sophistication of computing devices and systems require continually increasing technical skills in hardware and software.

Note: All graduate students are required to take CPE 201 in their first semester of study. Students may take no more than 6 units of CPE 299 to fulfill the unit requirements. Only those courses completed within seven years prior to date of graduation will satisfy course requirements.

Admission Requirements: Course prerequisites and other criteria for admission of students to the degree major program, and for their continuation in it.

Admission Requirements

Admission to the graduate program in Computer Engineering requires all of the following:

- a BS degree in Computer Engineering (CPE), Computer Science (CSC), Electrical and Electronic Engineering (EEE), or a closely related field;
- at least a 3.0 GPA in the last 60 units of the BS degree;
- Graduate Record Examination (GRE) general test scores and;
- background as specified in Required Basic Knowledge to enter the program.

Students with deficiencies in the admission requirements are advised to remove any such deficiencies before applying. However, under special circumstances, a student who does not satisfy the admission requirements may be admitted as a conditionally

classified graduate student. Conditional admission may be granted to those students who are likely to complete all the admission requirements. Deficiencies will be specified in the acceptance letter to the student and must be removed by the student before the student can become a fully classified graduate student.

A student registered as an unclassified or conditionally classified graduate student cannot use graduate courses to improve his/her grade point average for admittance to the program. Only undergraduate courses required in the degree program in CPE, CSC, or EEE may be taken or retaken to improve the GPA for admittance to the graduate program.

Required Basic Knowledge

A student must have completed the following list of Required Basic Knowledge before becoming a fully classified graduate student in Computer Engineering. Courses listed in parentheses are the equivalent Sacramento State courses.

Minimum required GPA in the following subject areas: 3.0

Electrical Fundamentals
Analog/Digital Electronics
CMOS and VLSI
Digital Logic Design and Introduction to Computer Organization
Assembly Language
Computer Interfacing
Object Oriented Programming
Algorithms and Data Structure
Systems Programming
Introduction to Operating Systems
Computer Networks and Internets
Differential Equations for Science and Engineering
Statistics and Probability
Applied Linear Algebra
Numerical Analysis

Graduate Admission Procedures

Applications will be accepted as long as there is space available. All prospective graduate students, including Sacramento State graduates, must file all of the following with the Office of Graduate Studies, River Front Center 215, (916) 278-6470:

- an online application for graduate admission;
- two sets of official transcripts from colleges and universities attended, *other than Sacramento State*; and
- Graduate Record Examination (GRE) scores;

For more admissions information and application deadlines, please visit the Office of Graduate Studies website *(*http://www.csus.edu/gradstudies/*)*.

Approximately six weeks after receipt of all items listed above, a decision regarding admission will be mailed to the applicant.

Minimum Units and Grade Requirement for the Degree

Units required for the MS: 30

Minimum cumulative GPA: 3.0. Up to three courses in the program of study may have a grade of 'C+' or 'B-'. All other courses in the program of study must have a grade of 'B' or higher.

Advancement to Candidacy

Each student must file an application for Advancement to Candidacy indicating a proposed program of graduate study. This procedure should begin as soon as the classified graduate student has:

- removed any deficiencies in the admission requirements;
- completed at least 12 units of graduate level (200 series) Computer Engineering courses with a minimum 3.0 GPA; and
- passed the Writing Placement for Graduate Students (WPG) or secured approval for a WPG waiver.

Students must have been advanced to candidacy before they can register for Plan A, B or C. The student should fill out the form after planning a degree program in consultation with a Computer Engineering graduate advisor. The completed form must be signed by the CPE Graduate Coordinator and is then returned to the Office of Graduate Studies for approval.

Note: It should be recognized that the industry puts a high value on project and thesis problem-solving experience, and the demonstration of technical writing skills that these options require. Graduating under the Plan C option will not provide that experience. Students taking this option should consider, with their elective area advisors, other ways of gaining that valuable experience, such as through a CPE 299 Special Problems course.

As defined by policy http://www.csus.edu/umanual/acadaff/fsm00010.htm, a change in units constitutes a substantive change to the program. If your changes constitute a substantive change, please refer back to the 'Program Change Type' field above to ensure that 'Substantive' is selected.

Program Requirements: (If new courses are being created as part of a new program, it will be useful to propose courses first.)

Program Requirements

Code	Title	Units
A. Required Core Courses		**11**
CPE 201	Research Methodology [1]	
CSC/EEE 273	Hierarchical Digital Design Methodology	
CSC 205	Computer Systems Structure [2]	
EEE 270	Advanced Topics in Logic Design [2]	
B. Required Breadth Courses [2]		**6 - 12**
	Students must cover at least two from the following five areas with equal number from CSC and EEE courses:	
Algorithms and Applications		
CSC 206	Algorithms And Paradigms	
EEE 221	Machine Vision	
EEE 225	Advanced Robot Control	
EEE 244	Electrical Engineering Computational Methods and Applications	
EEE 246	Advanced Digital Control	
Computer Architecture and Digital Design		
CSC 242	Computer-Aided Systems Design and Verification	
EEE 272	High Speed Digital System Design	
EEE 274	Advanced Timing Analysis	
EEE/CSC 280	Advanced Computer Architecture	
EEE 285	Micro-Computer System Design I	
EEE 286	Microcomputer System Design II	
Microelectric Design		
EEE 230	Analog and Mixed Signal Integrated Circuit Design	
EEE 231	Advanced Analog and Mixed Signal Integrated Circuit Design	
EEE 232	Key Mixed-Signal Integrated Circuit Building Blocks	
EEE 234	Digital Integrated Circuit Design [2]	
EEE 235	Mixed-Signal IC Design Laboratory	
EEE 236	Advanced Semiconductor Devices	
EEE 238	Advanced VLSI Design-For-Test I	
EEE 239	Advanced VLSI Design-For-Test II	
Networks and Security		
CSC 250	Computer Security	
CSC 253	Computer Forensics	
CSC 254	Network Security	
CSC 255	Computer Networks	
Systems Software		
CSC 151	Compiler Construction	
CPE/CSC 159	Operating System Pragmatics [3,4]	
CSC 239	Advanced Operating Systems Principles and Design	
C. CSC Elective		**3**
	Courses from Area B (Required Breadth Courses) or any 200-level CSC courses subject to meeting the required prerequisites.	
D. EEE Elective		**3**
	Courses from Area B (Required Breadth Courses) or any 200-level EEE courses subject to meeting the required prerequisites.	
E. Culminating Requirement		**0 - 5**
CPE 500	Culminating Experience	
Plan A: Thesis (5 units) [5,6]		
Minimum 25 units of course work including 12 units from Area A (Required Core Courses), a minimum of 6 units from Area B (Required Breadth Courses), and a minimum of 3 units each from Area C (CSC Elective) and Area D (EEE Elective).		
Plan B: Project (2 units) [5,6]		
Minimum 28 units of course work including 12 units from Area A (Required Core Courses), a minimum of 12 units from Area B (Required Breadth Courses), and a minimum of 5 units from the following options:		
	a) 3 units from Area C (CSC Elective) and 1 unit 299 from CPE or EEE;	
	b) 3 units from Area D (EEE Elective) and 1 unit 299 from CPE or CSC; or	
	c) 3 units from Area C (CSC Elective) and 3 units from Area D (EEE Elective).	

Plan C: Comprehensive Exam (0 units) [5,6]

Minimum 30 units of course work including 12 units from Area A (Required Core Courses), a minimum of 12 units from Area B (Required Breadth Courses), and a minimum of 3 units each from Area C (CSC Elective) and Area D (EEE Elective).

Total Units	29-34

[1]   All graduate students must concurrently take CPE 201 in the semester they take their first graduate course.

[2]   Students whose undergraduate degree preparation has covered a significant amount of the material in the course may be allowed to waive the course. The course waiver form must be approved by the Computer Engineering Coordinator. In this case, for each CSC course waived students must take an additional CSC course, and for each EEE course waived students must take an additional EEE course from Required Breadth Courses or Elective Courses to satisfy the program unit requirement.

[3]   Students whose undergraduate degree preparation has not covered a significant amount of the material in CSC 159/CPE 159 must take this course as one of the CSC Breadth Requirement courses.

[4]   No more than 6 units of under 200-level courses.

[5]   Additional units from Area B (Required Breadth Courses), Area C (CSC Elective), or Area D (EEE Elective), or 299, to fulfill the minimum course work units.

[6]   The Masters Degree requires 18 units of Graduate (200-level) seminar courses. No more than six units of 295, 296, or 299 may be counted towards a degree.

For graduate programs, the number of declared undergraduate major and the degree production over the preceding years of the corresponding baccalaureate program:

Year Computer Engineering Enrollment Degrees Conferred

2018/19 400 39
2017/18 392 52
2016/17 416 32
2015/16 394 29
2014/15 380 21
2013/14 341 25
2012/13 230 18

Fiscal Impact to Change an Existing Program

Indicate programmatic or fiscal impact which this change will have on other academic units' programs, and describe the consultation that has occurred with affected units:

CpE 201 is administrated by the EEE Department. The revision is consistent with similar changes made to EEE 201 by the EEE Department. According to the EEE department Chair, the change does not have any fiscal impact.

Attach a copy of correspondence with these units:

CpE201 Fiscal Impact.pdf

Provide a fiscal analysis of the proposed changes:

No Fisacal impact.

How will the above changes be accommodated within the department/College existing fiscal resources?

No impact.

Will the proposed changes require additional resources?

No

What additional space, equipment, operating expenses, library, computer, or media resources, clerical/technical support, or other resources will be needed?

No additional resources required.

Key: 322