

Proposal to Change the Academic Master Plan
Academic Planning Committee
(Short Form)

Name of Proposed Program: Computer Engineering

Person Proposing the New Program: Ivona Grzegorzcyk

Date of Proposal: August 2006

Approvals:

Academic Planning Committee Approval:

Chair(s): _____

Date: _____

Academic Senate Approval:

Chair: _____

Date: _____

Administration Approval:

President or Designee: _____

Date: _____

Proposal to Change the Academic Master Plan (Short Form)

1. Program Name: Computer Engineering

Academic Year of Implementation: 2010

Name of the program area or unit that would offer the proposed degree or program:
Math/Computer Science/Physics

Name, title, and rank, of individual(s) primarily responsible for drafting the proposed degree program:

A. J. Bieszczad, Associate Professor of Computer Science
Ivona Grzegorzcyk, Professor of Mathematics
Peter Smith, Professor of Computer Science
Bill Wolfe, Professor of Computer Science

2. Description

Description of the degree program. Major subject matter elements of the program, core content areas, and representative courses taught. (250 words)

Computer Engineering involves the design, development and operation of components for general purpose computers and embedded systems. Drawing largely upon the expertise and facilities now in place in Mathematics, Computer Science and Physics, the proposed Bachelor of Science degree in Computer Engineering will provide an integrated experience in computer software, computer hardware, and the interfaces between the two. The curriculum will balance theory and practice by encouraging students to identify creative solutions to problems as well as recognize constraints of costs, production and design. Courses in the program include Circuits and Systems, Computer Organization and Architecture, Linear Algebra, and Technical Writing.

Student Learning Objectives: Principal content and skills that students will learn in the program. (150 words)

1. Analyze, design and test systems that include both hardware and software.
2. Employ mathematical and computer-based tools in analysis and design.
3. Apply probability and statistics in engineering analyses
4. Identify ethical issues in hardware and software engineering.
5. Document experimental processes and write technical reports and papers.

3. Justification

An increasingly large majority of processors are in embedded rather than general-purpose systems. Examples of embedded systems are car controls (engine, ABS, cruise, climate control), kitchen appliances, utility controls (power, gas, water, A/C), store registers and payment stations, ATMs, PDAs, MP3 players, set top boxes, cell phones, and many other devices that we use everyday. The United States is falling behind in educating technically trained persons to assume positions in industrial, telecommunications and electronics fields. Locally, over seventy percent of Ventura County industry is technology or engineering based. The proposed program prepares students for employment in a variety of complex engineering industries. Students having knowledge of software and hardware systems, and the interface between them will have a competitive edge. The current degree program in Computer Science prepares student well for careers in software-engineering, but has only theoretical treatment of issues related to hardware interfaces.

Other Universities and CSU campuses that currently offer the proposed degree:

See table below.

Professional uses of the proposed degree program:

Students with a Bachelor's degree in Computer Engineering will be well-placed to enter the computer industry and related industries at a variety of levels. Microprocessors are becoming ubiquitous (in vehicles, appliances, hand-held communications devices for example); graduates with both hardware and software skills are particularly valuable. While many business-oriented applications are being off-shored to foreign countries, system level jobs have been resilient to that trend.

Community/Regional/Statewide need for the proposed program:

Locally there are many potential employers of our graduates. Examples are Haas Engineering (Camarillo), Teradyne (Agoura Hills), Logical Approach Engineering (Camarillo), JPL (Pasadena), Imation (Camarillo), Shell Solar (Camarillo) and Naval Base Ventura County.

4. Enrollment:

The expected number of majors in the year of initiation and three and five years thereafter. Please identify the data source(s) for these projections.

The CSUCI service area includes two dozen high schools and 8 community colleges. Three of the community colleges are in Ventura County. The estimates below are based on data obtained from VCCCD and CSU Northridge.

	<u>Number of Majors</u>	<u>Number of Graduates</u>
Initiation Year:	7-10	0
Third Year	15-20	4-6
Fifth Year	25-30	12-20

5. Resources and Budget

- a. Budget.** Costs estimated to be associated with the degree in the pre-implementation year, first, third and fifth year of operations. Provide narrative and justification.

	Pre-Implementation Year	First Year	Third Year	Fifth Year
Faculty: (By Rank)	1 (2008) (Open)	1 (2010) (Open)		
Staff: (By Job Class)	0.25-0.5 Lab Tech (share with Physics)		Support Co-ordinator	
Equipment:	\$65,000 Expect at least 50% to be donated			
Instructional:	2 faculty cover program for first 5 years Student lab assistants			
Program Development: (Consultants, etc)	Release time for involved faculty Advisory Board from industry			

Local industry is willing and able to help equip the labs. The degree program has relatively few new courses; current faculty can cover many of them though there will be a need for new faculty as the program grows.

- b. Facilities.** Identify new facilities, building modifications and other physical and space needs associated with the new degree. Provide narrative and justification.

Pre-Implementation Year	First Year	Third Year	Fifth Year
2009	2010	2012	2014

2008: Electrical Engineering Lab with 6 professional electronics workbenches (3 students per workbench). Each workbench has 10 electrical outlets, isolator surface, storage bins, and RJ-45 outlet. Room needs isolator floor, dedicated router and air conditioning. Some equipment will come from donations.

2012: Second lab TBD

ABET accreditation criteria state that “appropriate facilities must be available to foster faculty-student interaction and to create a climate that encourages professional development and professional activities”

Computer Engineering Programs at other campuses

Campus	Computer Engineering?	Units	Notes
CSU			
Bakersfield	N		Only first 3 years of 4-year program
Channel Islands	N		
Chico	Y	132	
Dominguez Hills	N		
East Bay	N		
Fresno	Y	124	
Fullerton	N		
Humbolt	N		
Long Beach	Y	129	
Los Angeles	Y	198(q)	Specialization within EE
Maritime Academy	N		
Monterey Bay	N		
Northridge	Y	132	
Pomona	Y	202(q)	
Sacramento	N		
San Bernadino	N		
San Diego	Y	129	
San Francisco	N		
San Jose	Y	133	
San Luis Obispo	Y	193(q)	
San Marcos	N		
Sonoma	N		
Stanislaus	N		
Non-CSU			
UC Santa Barbara	Y	184(q)	
UCLA	Y	190(q)	Option wiithin EE
CLU	N		
Pepperdine	N		
Westmont College	N		

A Curriculum model for CSUCI based on Four-Year Curriculum Model (page B.5) in
CE2004: <http://www.eng.auburn.edu/ece/CCCE/CCCE-FinalReport-2004Dec12.pdf>
(Schedule for GE courses is arbitrary. Required new courses in italics. [n] = Note n)

<i>Course</i>	<i>Description</i>	<i>Credit</i>	<i>Course</i>	<i>Description</i>	<i>Credit</i>
Semester 1			Semester 2		
MATH 150	Calculus I GE: B3	4	MATH 151	Calculus II	4
PHYS 200	General Physics I	4	PHYS 201	General Physics II	4
COMP 150	Object-Oriented programming [1] GE: B4	4	COMP 151	Data Structures and Program. Design [2]	4
ENGL 105	Composition and Rhetoric GE: A2	3	COMM 101	Public Speaking GE: A1	3
	GE: C1	3			
<i>Total Credit Hours</i>		18	<i>Total Credit Hours</i>		15
Semester 3			Semester 4		
MATH 3xx	Differential Equations for Engineering [3]	3	MATH 240	Linear Algebra	3
CHEM 121/123	Chemistry I GE: B1	4	COMP 162	Computer Architecture + Assem. Language	3
MATH 354	Analysis of Algorithms	3	<i>ELE 202</i>	<i>Circuits and Systems [5]</i>	4
<i>ELE 201</i>	<i>Digital Logic [4]</i>	4		GE: B2	3
MATH 230	Logic and Mathematical Reasoning GE: A3	3	MATH 331	History of Mathematics GE: D (UDIGE)	3
<i>Total Credit Hours</i>		17	<i>Total Credit Hours</i>		16
Semester 5			Semester 6		
MATH 300	Discrete Mathematics	3	MATH 352	Probability and Statistics	3
COMP 262	Computer Organization and Architecture	3	COMP 462	Embedded Systems I	3
PHYS 310	Electronics	4	COMP 429	Computer Networks	3
ENGL 482	Technical Writing	3	<i>ELE 302</i>	<i>Digital Signal Processing [6]</i>	3
COMP/PSY 449	Human-Computer Interaction GE:E (UDIGE)	3		GE: C2	3
<i>Total Credit Hours</i>		16	<i>Total Credit Hours</i>		15
Semester 7			Semester 8		
<i>COMP 4xx</i>	<i>Embedded Systems II [7]</i>	3	COMP 499	Senior Project	3
COMP 477	Computers and Society GE: D (UDIGE)	3		Technical Elective	3
COMP 495	Senior Project Preparation	1		Technical Elective	3
	GE: C3a	3		GE: C3b	3
	GE: D	3		GE: D	3
	Title V – Pol. Sc.	3		Title V - History	3
<i>Total Credit Hours</i>		16	<i>Total Credit Hours</i>		18

Total Units: 131

Notes

- [1] May be a new course (e.g., CE150) using C++ rather than Java or a special section of Comp 150 for Computer Engineers. If a new course, needs to be approved for GE credit
- [2] May be a new course (e.g., CE151) using C++ rather than Java or a special section of Comp 151 for Computer Engineers.
- [3] Section of Math 350 Differential Equations and Dynamical Systems:
- [4] New course: ELE 201 Digital Logic (4) 3 units lecture plus 3 units in the lab per week.
Prerequisite: Math 230
Description:
- [5] New course: ELE 202 Circuits and Systems (4) 3 units lecture plus 3 units in the lab per week.
Prerequisite:
- [6] New course: ELE 302 Digital Signal Processing (3)
Prerequisite:
Description:
- [7] New course: Comp 4xx Embedded Systems II (3)
Prerequisite: Comp 462
Description