California State University Channel Islands

Program Modification

Program modifications must be submitted by October 15, 2010, and finalized by the end of the fall semester for catalog production.
Enter data in YELLOWED areas.

Date (Change date if modified and update the file name with the new date): 9/12/11
Program Area: COMPUTER SCIENCE
Semester /Year First affected: FALL 2012

Instructions: Please use this Program Modification form for changes to existing program requirements, units, outcomes, emphases or options, or for other programmatic concerns. For minor changes (faculty or address changes, additions of approved electives, minor editing for clarity, and other minor updates) use the Program Update form, available at the Curriculum website.

Paste the latest approved version of your entire program in the left AND right boxes below. Make your deletions in the LEFT column by using the strikeout feature in Word or underlining, and highlight. Insert new language or other changes to the program on the RIGHT and highlight in YELLOW for easy identification. If possible, please align the two columns so that changes appear side-by-side with the original text.

CURRENTLY APPROVED PROGRAM	**PROPOSED PROGRAM**
COMPUTER SCIENCE Programs Offered • Bachelor of Science in Computer Science • Minor in Computer Science • Minor in Computer Game Design & Development • Master of Science in Computer Science • Bachelor of Science in Information Technology (see Information Technology) The Computer Science degree offers the latest cutting edge education for various industrial and applied fields. Students are given a strong background in computer hardware and software, as well as a substantial amount of "hands-on" experience. The program stresses interdisciplinary applications in other sciences and business	COMPUTER SCIENCE Programs Offered • Bachelor of Science in Computer Science • Minor in Computer Science • Minor in Computer Game Design & Development (see Computer Game Design and Development) • Minor in Robotics Engineering • Master of Science in Computer Science • Bachelor of Science in Information Technology (see Information Technology) The Computer Science degree offers the latest cutting edge education for various industrial and applied fields. Students are given a strong background in computer hardware and software, as well as a substantial amount of "hands-on" experience. The program stresses interdisciplinary applications in other sciences and business

and prepares students for graduate studies.

Careers

The program prepares students for careers in high-tech, computer and Internet-driven industries, where interdisciplinary, dynamic and innovative professionals trained in the latest technologies are increasingly sought.

Program Learning Outcomes

Students graduating from the Computer Science program will be able to:

- Demonstrate critical thinking and problem solving skills by identifying, evaluating, analyzing and presenting fundamental software solutions and their applications;
- Demonstrate the knowledge of current computing practices and broad technology use in industry and society, including a working knowledge of software development techniques;
- Be cognizant of emerging new technologies and industrial practices connected to the computer industry;
- Demonstrate communication, research and cooperation skills by working effectively with others in interdisciplinary group settings - both inside and outside the classroom; and
- Demonstrate a sense of exploration that enables them to pursue rewarding careers in high-tech and bio-tech industries with life-learning.

Faculty

William J. Wolfe, Ph.D.
Professor of Computer Science
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Peter Smith, Ph.D.
Professor of Computer Science
Interim Chair, Computer Science Program
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Andrzej A. J. Bieszczad, Ph.D.
Associate Professor of Computer Science
Director of the Masters Program

and prepares students for graduate studies.

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Associate Professor of Computer Science
Director of the Masters Program

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aj.bieszczad@csuci.edu

Contact Information

http://compsci.csuci.edu

Bachelor of Science in Computer Science - (123 units)

Special Grade Requirement

A grade of C- or better is required in all pre-requisite courses in the major

Lower Division Required Major Courses	42
Upper Division Required Major Courses	29
Upper Division Elective Major Courses	12
Elective Courses	6
General Education	28
American Institutions Requirement	6
TOTAL	**123 units**

Note: General Education Included in Major Requirements 14

Lower Division Requirements - 42 units

COMP	150	Object-Oriented Programming, GE B4 . 4
COMP	151	Data Structures and Program Design . 4
COMP	162	Computer Architecture and Assembly Language . 3
COMP	232	Programming Languages . 3
COMP	262	Computer Organization and Architecture 3
MATH	150	Calculus I, GE B3 . 4
MATH	151	Calculus II . 4
MATH	230	Logic and Mathematical Reasoning, GE A3, B3 . 3
MATH	240	Linear Algebra . 3

Science

Choose either:

a. Physics 200 General Physics I (*4*), Physics 201 General Physics II (*4*) and a course from GE section B2 (*3*).

or

b. Physics 200 General Physics I (*4*), Biology 200 Principles

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COMP 151 Data Structures and Program Design . 4
COMP 162 Computer Architecture and Assembly Language . 3
COMP 232 Programming Languages . 3
COMP 262 Computer Organization and Architecture 3
MATH 150 Calculus I, GE B3 . 4
MATH 151 Calculus II . 4
MATH 230 Logic and Mathematical Reasoning, GE A3, B3 . 3
MATH 240 Linear Algebra . 3

Science
Choose either:
a. Physics 200 General Physics I (*4*), Physics 201 General Physics II (*4*) and a course from GE section B2 (*3*).
or
b. Physics 200 General Physics I (*4*), Biology 200 Principles

of Organismal and Population Biology (*4*), Biology 212
Neurobiology and Cognitive Science (*3*) GE B1 and B2

Upper Division Requirements - 41 units

Major Requirements - 29 units

COMP	350	Introduction to Software Engineering 3
COMP	362	Operating Systems 4
COMP	447	Societal Issues in Computing, GE B4, D, INTD.....3
COMP	454	Automata, Languages and Computation....3
COMP	491	Capstone Preparation.....1
COMP	499	Capstone Project.....3
MATH	300	Discrete Mathematics 3
MATH	352	Probability and Statistics.....3
MATH	354	Analysis of Algorithms.....3

Choose three units from the following:

COMP	420	Database Theory and Design.....3
COMP	464	Computer Graphic Systems and Design I 3

Electives - 12 units

Choose 12 Elective units from:

COMP	345	Digital Image Processing, ...3 (MATH/PHYS) GE B1, B4, INTD
COMP	351	Distributed Computing 3
COMP	420	Database Theory and Design.....3
COMP	421	Unix for Programmers.....3
COMP	424	Computer System Security.....3
COMP	425	Computer Game Programming 3
COMP	429	Computer Networks 3
COMP	445	Image Analysis & Pattern Recognition, (MATH/PHYS), GE B1, B4, INTD.....3
COMP	451	Advanced Object Oriented Programming3
COMP	452	Computational Bioinformatics (MATH) ..4
COMP	462	Embedded Systems.....3
COMP	464	Computer Graphic Systems and Design I 3
COMP	469	Artificial Intelligence/Neural Nets 3
COMP	490	Topics in Computer Science.....3
COMP	492	Internship..... 1-3
COMP	494	Independent Research..... 1-3

of Organismal and Population Biology (*4*), Biology 212
Neurobiology and Cognitive Science (*3*) GE B1 and B2

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COMP	454	Automata, Languages and Computation....3
COMP	491	Capstone Preparation.....1
COMP	499	Capstone Project 3
MATH	300	Discrete Mathematics 3
MATH	352	Probability and Statistics.....3
MATH	354	Analysis of Algorithms.....3

Choose three units from the following:

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COMP	420	Database Theory and Design.....3
COMP	421	Unix for Programmers.....3
COMP	424	Computer System Security.....3
COMP	425	Computer Game Programming 3
COMP	429	Computer Networks 3
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COMP	469	Artificial Intelligence/Neural Nets 3
COMP	490	Topics in Computer Science.....3
COMP	492	Internship.....1-3
COMP	494	Independent Research 1-3

COMP	497	Directed Studies	3
ENGL	482	Technical Writing	3
MATH	429	Operations Research	3
MATH	448	Scientific Computing, GE B3, B4, INTD	3

Proposed Course of Study

Freshman Year - 31 units

COMP	150	Object-Oriented Programming, GE B4	4
COMP	151	Data Structures and Program Design	4
COMP	162	Computer Architecture and Assembly Language	3
ENGL	105*	Composition and Rhetoric, GE A2	3
MATH	150	Calculus I, GE B3	4
MATH	151	Calculus II	4
MATH	230	Logic and Mathematical Reasoning, GE A3, B3	3
		GE Section A or C	3

* **or** ENGL 102 and 103 6

Sophomore Year - 23-24 units

COMP	232	Programming Languages	3
COMP	262	Computer Organization & Architecture	3
MATH	240	Linear Algebra	3
MATH	300	Discrete Mathematics	3

Science

Choose either:

a. Physics 200 General Physics I (*4*), Physics 201 General Physics II (*4*) and a course from GE section B2.

or

b. Physics 200 General Physics I (*4*), Biology 200 Principles of Organismal and Population Biology (*4*), Biology 212 Neurobiology and Cognitive Science (*3*) GE B1 and B2

Junior Year - 19 units + GE

COMP	350	Introduction to Software Engineering	3
COMP	362	Operating Systems	4
COMP	421	Unix for Programmers	3
COMP	454	Automata, Languages, & Computation	3
MATH	352	Probability and Statistics	3
MATH	354	Analysis of Algorithms	3

COMP	497	Directed Studies	3
ENGL	482	Technical Writing	3
MATH	429	Operations Research	3
MATH	448	Scientific Computing, GE B3, B4, INTD	3

Proposed Course of Study

Freshman Year - 31 units

COMP	150	Object-Oriented Programming, GE B4	4
COMP	151	Data Structures and Program Design	4
COMP	162	Computer Architecture and Assembly Language	3
ENGL	105*	Composition and Rhetoric, GE A2	3
MATH	150	Calculus I, GE B3	4
MATH	151	Calculus II	4
MATH	230	Logic and Mathematical Reasoning, GE A3, B3	3
		GE Section A or C	3

* **or** ENGL 102 and 103 6

Sophomore Year - 23-24 units

COMP	232	Programming Languages	3
COMP	262	Computer Organization & Architecture	3
MATH	240	Linear Algebra	3
MATH	300	Discrete Mathematics	3

Science

Choose either:

b. Physics 200 General Physics I (*4*), Physics 201 General Physics II (*4*) and a course from GE section B2.

or

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COMP	350	Introduction to Software Engineering	3
COMP	362	Operating Systems	4
COMP	421	Unix for Programmers	3
COMP	454	Automata, Languages, & Computation	3
MATH	352	Probability and Statistics	3
MATH	354	Analysis of Algorithms	3

Senior Year - 19 units + GE

COMP	420	Database Theory and Design	3
COMP	424	Computer System Security	3
COMP	429	Computer Networks	3
COMP	447	Societal Issues in Computing, GE B4, D, INTD	3
COMP	469	Artificial Intelligence/Neural Nets	3
COMP	491	Capstone Preparation	1
COMP	499	Capstone Project	3

General Education Courses Included in Major Requirements - 14 units

COMP	150	Object-Oriented Programming, GE B4	4
COMP	447	Societal Issues in Computing Sciences, GE B4, D	3
MATH	150	Calculus I, GE B3	4
MATH	230	Logic and Mathematical Reasoning, GE A3, B3	3

Minor in Computer Science
(20-23 units)

The Computer Science minor teaches the fundamentals of computer systems and programming. This minor includes the fundamentals of computer programming, including design, implementation, and testing of object-oriented programs. It also teaches the basic architecture of the computer hardware, including the fundamental components of a computer system and the logical reasoning that it is based upon. Since these computer skills are extremely useful in most other disciplines, enhancing the students knowledge of technology no matter which major they have chosen.

Careers

Computer Programmer; Computer Systems Analyst; Any career that requires a basic knowledge of computer systems and programming

Requirements 20-23 units

Lower Division Requirements

Senior Year - 19 units + GE

COMP	420	Database Theory and Design	3
COMP	424	Computer System Security	3
COMP	429	Computer Networks	3
COMP	447	Societal Issues in Computing, GE B4, D, INTD	3
COMP	469	Artificial Intelligence/Neural Nets	3
COMP	491	Capstone Preparation	1
COMP	499	Capstone Project	3

General Education Courses Included in Major Requirements - 14 units

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COMP	447	Societal Issues in Computing Sciences, GE B4, D	3
MATH	150	Calculus I, GE B3	4
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The Computer Science minor teaches the fundamentals of computer systems and programming. This minor includes the fundamentals of computer programming, including design, implementation, and testing of object-oriented programs. It also teaches the basic architecture of the computer hardware, including the fundamental components of a computer system and the logical reasoning that it is based upon. Since these computer skills are extremely useful in most other disciplines, enhancing the students knowledge of technology no matter which major they have chosen.

Careers

Computer Programmer; Computer Systems Analyst; Any career that requires a basic knowledge of computer systems and programming

Requirements 20-23 units

Lower Division Requirements

11-14 units

COMP 105 Computer Programming Introduction 3

**This course is waived for students with equivalent programming experience*

COMP 150 Object Oriented Programming 4
COMP 151 Data Structures and Program Design ...4
COMP 162 Computer Architecture and Assembly...3

Upper Division Requirements - 9 units

<u>Three</u> upper-division courses from the CS program approved by the advisor.

11-14 units

COMP 105 Computer Programming Introduction 3

**This course is waived for students with equivalent programming experience*

COMP 150 Object Oriented Programming 4
COMP 151 Data Structures and Program Design ...4
COMP 162 Computer Architecture and Assembly...3

Upper Division Requirements - 9 units

<u>Three</u> upper-division courses from the CS program approved by the advisor.

Minor in Robotics Engineering
(23 units)

After completing the courses in the minor, students will be able to explain the interaction between hardware and software. They will be able to describe the role of an operating system in managing the resources of a computer. On the hardware side they will be able to build, test and use analog and digital circuits. They will be able to demonstrate the role of electronics in data acquisition, metrology and control of devices. On the software side they will be able to design, implement and test algorithms in both C and a representative assembly language. They will **build one or more robotics systems**, directly experiencing the challenges and solutions such an implementation requires.

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Requirements 23 units

Required Courses (17 units)

COMP 162 Computer Architecture and Assembly ...3
COMP 362 Operating Systems ……..4
PHYS 310 Electronics ……3
COMP 462 Embedded Systems ……3
COMP 491 Capstone Preparation ……1
COMP 499 Capstone ……..3

Master of Science in Computer Science

(Offered through CI Extended University Program)

The MS in Computer Science prepares students for advanced careers in high-tech, computer-driven industries, including applications to business, aerospace, education, military, and government where interdisciplinary, dynamic and innovative professionals trained in latest technologies are increasingly sought. Students develop a strong background in computer theory, software and hardware, as well as skills to conduct applied research. The program stresses interdisciplinary applications while preparing students for a wide range of industry, academic, and research positions.
~~http://www.cs.csuci.edu/MSCS/~~

Admission

Students seeking admission are expected to have an undergraduate degree in Computer Science. ~~Graduates of other majors will be considered on a case-by-case basis and may be provisionally accepted with potential additional remedial requirements (e.g., a selection of Computer Science and Math undergraduate courses).~~ Applicants will be evaluated according to the program guidelines which will consider the applicants in the context of the total applicant pool using our general admission standards, including all academic work, GPA, standardized test scores (such as GRE), personal statement of purpose, reference letters, relevant work experience, and other factors that may have a bearing on the individual's potential for success. The current guidelines and admission procedures are described on the program Web pages at http://compsci.csuci.edu.

Elective Courses (6 units)

Choose two courses from

MATH	437	Mathematics for Games, Simulations and Robotics GE B3, INTD ……3
COMP	445	Image Analysis & Pattern Recognition, (MATH/PHYS), GE B1, B4, INTD……3
COMP	469	Artificial Intelligence and Neural Nets ……3

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(Offered through CI Extended University Program)

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Candidates with undergraduate degrees from other disciplines will be considered on a case-by-case basis and may be provisionally accepted. The conditions will usually include a selection of foundation Computer Science and Math courses as determined by the admission committee.
The current guidelines and admission procedures are described in detail on the

Graduation

To obtain the degree, the student must complete each course with a minimum grade of B, and successfully defend a thesis before an examination committee.

~~Required Courses - 32 units~~

~~COMP 599 Graduate Seminar.....2~~
~~COMP 597 Thesis.....6~~
~~Electives (minimum of *18* units must be COMP).....24~~

Electives - 24 units

~~*A minimum of 18 units must be COMP*~~

~~COMP 510 Algorithms.....3~~
COMP 520 Advanced Database Systems 3
COMP 524 Security.....3
COMP 529 Network Computing 3
COMP 549 Human-Computer Interaction 3
COMP 550 Advanced Software Engineering 3
COMP 566 Geometry and Computer Graphics 3
COMP 569 Artificial Intelligence.....3
COMP 571 Biologically Inspired Computing.....3
COMP 572 Neural Networks.....3
COMP 575 Multi-agent Systems 3
COMP 578 Data Mining 3
COMP 581 Mathematical Methods in Artificial Intelligence.....3
COMP 590 Special Topics in Computer Science.....3
~~MATH 510 Probabilistic Methods & Measure Theory .....3~~
~~MATH 511 Functional Analysis .....3~~
~~MATH 555 Actuarial Sciences.....3~~
~~MATH 565 Research In Mathematics Education ....3~~
~~MATH 582 Number Theory And Cryptography .....3~~
~~MATH 584 Algebraic Geometry & Coding Theory...3~~
~~MATH 587 Markov Chains & Markov Processes ....3~~
~~MATH 588 Stochastic Analysis .....3~~
~~PHYS 510 Advanced Image Analysis Techniques .3~~
~~PHYS 546 Pattern Recognition.....3~~

program Web pages at http://compsci.csuci.edu.

Graduation

To obtain the degree, the student must complete each course with a minimum grade of B, and successfully defend a thesis before an examination committee.
NOTE: Any remedial courses are in addition to the following graduation requirements.

Required Coursework - 32 units

Graduate Seminar.....2
Master Thesis.....6
Electives 24

Required Courses - 8 units

COMP 599 Graduate Seminar 1
COMP 597 Master Thesis.....1-3

Electives - 24 units

COMP 510 Advanced Image Analysis Techniques (PHYS) 3
COMP 520 Advanced Database Systems 3
COMP 524 Security 3
COMP 529 Network Computing 3
COMP 546 Pattern Recognition (PHYS) 3
COMP 549 Human-Computer Interaction 3
COMP 550 Advanced Software Engineering.....3
COMP 554 Algorithms (MATH) 3
COMP 566 Geometry and Computer Graphics 3
COMP 569 Artificial Intelligence 3
COMP 571 Biologically Inspired Computing 3
COMP 572 Neural Networks 3
COMP 575 Multi-agent Systems 3
COMP 578 Data Mining 3
COMP 581 Mathematical Methods in Artificial Intelligence (MATH) 3
COMP 590 Special Topics in Computer Science 3

To accommodate the need to acquire multidisciplinary experience and knowledge beneficial to their research, MSCS students may take up to 6 units of any other course upon obtaining authorization from the MSCS program director in consultation with the Master Thesis advisor.

Graduate students may also get credit for taking 400-level courses under some

Graduate Writing Assessment Requirement Writing proficiency prior to the awarding of the degree is demonstrated by successful completion of COMP 597 Masters Thesis with a grade of B or higher. Continuous Registration Requirement A student, who is not on an Academic Leave of Absence, must register every semester until graduating. If all other course requirements have been satisfied, a student should register in one unit of COMP 597 to satisfy the requirement.	exceptional circumstances. Permission to take such a course has to be granted by the program director in consultation with the Master Thesis advisor and the course instructor prior to enrolling into the course. No more than 9 units can be credited in this way. Graduate Writing Assessment Requirement Writing proficiency prior to the awarding of the degree is demonstrated by successful completion of COMP 597 Masters Thesis with a grade of B or higher. Continuous Registration Requirement A student, who is not on an Academic Leave of Absence, must register every semester until graduating. If all other course requirements have been satisfied, a student should register in one unit of COMP 597 to satisfy the requirement.

SUMMARY OF CHANGES

Added Minor in Robotics Engineering
Rephrased the “Admission” section in Master program.
Updated course list for MSCS.
Extended set of acceptable courses for MSCS

JUSTIFICATION

Minor approved in 2011 to begin in Fall 2012
The new description of the admission process better reflects the current practice and provides details about the required background.
The changes to the list of courses reflect cross-listing of some COMP, MATH, and PHYS courses.
MSCS students will be able to take any two non-COMP courses now (including MATH) accepted by the program director upon recommendation of the student academic advisor.

Peter Smith_____9/12/11
Proposer of Program Modification Date

Program: COMPUTER SCIENCE

Program Chair		
	Signature	Date

Curriculum Chair		
	Signature	Date

Dean of Faculty		
	Signature	Date