California State University Channel Islands
Program Modification
Program modifications must be submitted by October 15, 2010 for priority catalog review

Date (Change if modified and update the file name with the new date): 2011 2012 Catalog Copy; rev 11.24.10
Program Area: Computer Science
Semester /Year First affected: Fall 2011

Instructions: Please use this <u>Program Modification</u> 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 <u>Program Update</u> 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, <mark>and highlight</mark>. Insert new language or other changes to the program on the RIGHT and highlight in <mark>YELLOW</mark> 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	COMPUTER SCIENCE
Programs Offered • Bachelor of Science in Computer Science • Minor in Computer Science • Minor in Computer Game Design and Development • Master of Science in Computer Science • Bachelor of Science in 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.	Programs Offered • Bachelor of Science in Computer Science • Minor in Computer Science • Minor in Computer Game Design and Development • Master of Science in Computer Science • Bachelor of Science in 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

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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 4
		GE-B4
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..4
		GE-B3
MATH	151	Calculus II 4
MATH	230	Logic and Mathematical Reasoning........ 3
		GE-A3, B3
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.

   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 (MATH/PHYS) GE-B1, B4, INTD	3
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
COMP 497   Directed Studies 3
ENGL   482   Technical Writing..................................3
MATH   429   Operations Research.............................3
MATH   448   Scientific Computing 3
               GE B3, B4, INTD

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 3*
               GE-A2
MATH   150   Calculus I..4
               GE-B3
MATH   151   Calculus II...4
MATH   230   Logic and Mathematical Reasoning 3
               GE-A3, B3
               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

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

Minor in Computer Science
(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 - 23 units
Lower Division Requirements - 14 units

COMP	105	Computer Programming Introduction 3
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
Three upper-division courses from the CS program approved by the advisor.

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/

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
Three upper-division courses from the CS program approved by the advisor.

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, mathematics, engineering, or science. Other majors will be considered on a case by case basis. The applicant is expected to have a 2.7 or higher cumulative undergraduate grade point average (GPA). A GRE report is also required for applicant whose GPA is less than 3.0.

Graduation

To obtain the degree, the student must complete each course with a minimum grade of B, and 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	590	Special Topics in Computer Science	3
COMP	581	Mathematical Methods in Artificial Intelligence (MATH)	3
COMP	597	Master Thesis	1-6
COMP	599	Graduate Seminar	1
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

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.

Bachelor of Science in Information Technology

Programs Offered

- Bachelor of Science in Information Technology

This BSIT program is specifically designed to provide an avenue of advancement for students with associate's degrees in a technology discipline such as networking (e.g.: Moorpark College's Associate in Science Degree in Computer Network Systems Engineering). This new program gives the student the opportunity to complete a Bachelor of Science degree in Information Technology. The course work will provide a foundation in mathematics, programming, networking, databases, web, computer architecture and information systems. The BSIT sits between a BS in Computer Science and a BS in Management Information Systems, emphasizing the fastest growing segments of the both: Web Systems, Databases, and Networks. For a foundation, the BSIT program draws from both camps: mathematics, science, and computer programming from Computer Science, and business organization and project management from Management Information Systems. From there it adds depth in Web Programming and Technology.

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 COMP597 to satisfy the requirement.

This BSIT program prepares students for careers in Information Technology such as Computer Systems Integrator, Computer Systems Manager, Information Technology Designer, Information Technology Support, Database Systems Manager, Database Systems Designer, Data Communications Analyst, Network Manager, Network Designer, Web Technology Manager and Web Technology Support.

In addition to serving CSUCI freshmen, the program provides an avenue of advancement for students with associate's degrees in a technology discipline such as networking gained at a two-year institution (e.g.: Moorpark College's Associate in Science Degree in Computer Network Systems Engineering).

The coursework will provide a foundation in mathematics, programming, networking, databases, web systems, computer architecture and information

Program Learning Outcomes and Contact Information
http://www.cs.csuci.edu/

Bachelor of Science in Information Technology - (121 units)

Lower Division Requirements

Students entering this program are expected to have completed an associate's degree (or equivalent) in a technology area, including:
1. Statistics
2. One semester of a Laboratory science (Physics, Chemistry, or Biology).
3. First course in Java programming language.
4. First course in Computer Architecture and Assembly Language.
5. CSU GE Certification or courses fulfilling the CI lower division general education requirements.
6. A minimum of 10 units of lower division coursework in a technology area (computer technology, electronics technology, manufacturing technology, engineering, computer science, etc.).

Students who have not completed these *60* units prior to their admission to the program will be required to complete them at CI or a community college. Course substitutions for these requirements may be made with the approval of the program chair.

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systems. The BSIT covers the interdisciplinary ground between a BS in Computer Science and a BS in Management Information Systems, emphasizing the fastest growing segments of both: web systems, databases, and networks. This interdisciplinary program draws from both Computer Science and Management Information Systems: mathematics, science, and computer programming from Computer Science, and business organization and project management from Management Information Systems. From there it adds depth in Web Programming and Technology, Database Theory and Design, and Data Communications and Networking, while allowing for further depth in these or related areas such as e-Commerce, Computer Security, and Multimedia

Program Learning Outcomes and Contact Information
http://www.cs.csuci.edu/

Bachelor of Science in Information Technology - (121 units)

Special Grade Requirement

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

Lower Division Requirements..18
Core Courses 29
Upper Division Electives 15
Technology Electives..9 – 10
Capstone 4
General Education and Title V 42
University Electives...4 – 5
Total   121 units

Lower Division Requirements (18 units)

Remaining Requirements - 61 units

Mathematics and Science Requirements
7 units
  MATH   301   Discrete Mathematics for IT 3
  Lab Science II-Physics, Chemistry or Biology 4

Core Courses - 26 units
  COMP 151   Data Structures and Program Design ...4
  COMP 262   Computer Organization and Architecture .3
  COMP 362   Operating Systems...................................4
  COMP 420   Database Theory and Design................3
  IT   280   Web Programming 3
  IT   429   Computer Networks for IT.......................3
  MIS   310   Management Information Systems........3
  MGT   307   Management of Organizations 3

As a graduation requirement, all CI students must complete

Upper Division Interdisciplinary GE - (9 units)

48 units of General Education. Nine of the *48* units must be resident upper division, interdisciplinary courses numbered in the 330-349 or 430-449 ranges.

Electives 15 units

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1. Statistics (3 units)
MATH 201 Elementary Statistics (3), OR
MATH 329 Statistics for Business and Economics (3), OR
MATH 202 Biostatistics (3)

2. Two semesters of a Laboratory science: Physics, Chemistry, or Biology (8 units)

BIOL 200 Principles of Organismal and Population Biology (4) AND
BIOL 201 Principles of Molecular and Cellular Biology, OR

CHEM 121 General Chemistry I (4) AND
CHEM 122 General Chemistry II (4), OR

PHYS 100 Introduction to Physics (4) AND
PHYS 101 Introduction to Physics II (4)

3. First course in Java programming language (4 units)
COMP 150 Object-Oriented Programming (4)

4. First course in Computer Architecture and Assembly Language (3 units)
COMP 162 Computer Architecture and Assembly Language (3)

Note: appropriate community college courses may meet these requirements.

Core Courses (29 units)

    MATH 300   Discrete Mathematics 3
Or MATH 301   Discrete Mathematics for IT ………… 3
    COMP 151   Data Structures and Program Design 4
    COMP 262   Computer Organization and Architecture....3
    COMP 362   Operating Systems 4
    COMP 420   Database Theory and Design....................3
    IT   280   Web Programming.....................................3
    IT   429   Computer Networks for IT 3
    MIS 310   Management Information Systems...........3
    MGT 307   Management of Organizations..................3

Upper Division Electives (15 units)

Choose 15 units from the following:

Note: 9 units of the15 units must be taken in IT courses

ART	324	Communication Design Technology: Web Design	3
ART	326	Digital Media Art: 3D Computer Animation	3
COMP	232	Programming Languages	3
COMP	337	Survey of Computer Gaming	3
COMP	345	Digital Image Processing (MATH/PHYS)	3
COMP	350	Introduction to Software Engineering	3
COMP	425	Computer Game Programming	3
COMP	447	Societal Issues in Computing	3
COMP	449	Human Computer Interaction (PSY)	3
COMP	452	Computational Bioinformatics (MATH)	4
IT 400		e-Commerce	3
IT 401		Web Intelligence	3
IT 402		Advanced IT Programming	3
IT 424		Computer System Security for IT	3
IT 464		Computer Graphics for IT	3
IT 469		Artificial Intelligence/Neural Networks for IT	3
IT 490		Special Topics for IT	3
MATH	137	Strategies and Game Design	3
MATH	330	Mathematics and Fine Arts	3
MATH	437	Mathematics for Game Programming	3

(Additional electives to be added based on faculty availability).

Capstone - 4 units

MGT	471	Project Management	3
IT	499	BSIT Capstone Project	1

BSIT Summary - 121 units

Lower Division Requirements 60

Mathematics and Science Requirements 7

Choose 15 units from the following:

Note: 9 units of the15 units must be taken in IT or COMP courses

ART	324	Communication Design Technology: Web Design	3
ART	326	Digital Media Art: 3D Computer Animation	3
COMP	232	Programming Languages	3
COMP	337	Survey of Computer Gaming	3
COMP	345	Digital Image Processing (MATH/PHYS)	3
COMP	350	Introduction to Software Engineering	3
COMP	425	Computer Game Programming	3
COMP	447	Societal Issues in Computing	3
COMP	449	Human Computer Interaction (PSY)	3
COMP	452	Computational Bioinformatics (MATH)	4
IT 400		e-Commerce	3
IT 401		Web Intelligence	3
IT 402		Advanced IT Programming	3
IT 424		Computer System Security for IT	3
IT 464		Computer Graphics for IT	3
IT 469		Artificial Intelligence/Neural Networks for IT	3
IT 490		Special Topics for IT	3
MATH	137	Strategies and Game Design	3
MATH	330	Mathematics and Fine Arts	3
MATH	437	Mathematics for Game Programming	3

(Additional electives to be added based on faculty availability).

Technology Electives (9 – 10 units)

For a listing of suitable CI courses, see the BSIT program advisor

Capstone (4 units)

MGT	471	Project Management	3
IT	499	BSIT Capstone	1

General Education and Title V (42 units)

GE (36 units)

Title V (6 units)

University Electives (5 – 6 units)

Proposed Course of Study

Proposed Course of Study

Freshman Year
Fall - 15 units
ENGL 105 Composition and Rhetoric…………………… 3*
MATH 201 Elementary Statistics ……………………….. 3
MATH 230 Logic and Mathematical Reasoning (GE A3) .. 3
General Education …………………………………………6
* or ENGL 102 and 103 …………………………….…… 6

Spring - 13 units
COMP 150 Object-oriented programming …………….. 4
Title V ……………………………………………………. 3
General Education …………………………………… 6

Sophomore Year
Fall - 16 units
COMP 162 Computer Architecture and Assembly …….. 3
Title V ………………………………………………….. 3
General Education ………………………………….. 7
University elective …………………………………… 3

Spring - 16 units
Lab Science (Bio 200 or Chem 121 or Phys 100) …………… 4
University elective …………………………………… 3
General Education ……………………………….. 9

Junior Year
Fall - 17 units
Lab Science II (Second semester Bio, Chem, or Phys).......4
   ENGL   330   Interdisciplinary Writing.........................3

Junior Year
Fall - 17 units
Lab Science II (Second semester Bio, Chem, or Phys) 4
   ENGL   330   Interdisciplinary Writing.........................3

COMP	151	Data Structures 4
COMP	262	Computer Organization and Architecture .3
MATH	301	Discrete Mathematics for IT 3

Spring - 16 units

COMP	447	Societal Issues in Computing 3
COMP	362	Operating Systems...............................4
COMP	420	Database Theory and Design................3
IT	280	Web Programming.................................3
MGT	307	Management of Organizations 3

Senior Year
Fall - 15 units

IT	400	eCommerce...3
IT	402	Advanced IT Programming....................3
IT	429	Computer Networks for IT......................3
MGT	471	Project Management..............................3
MIS	310	Management Information Systems........3

Spring - 13 units

COMP	449	Human Computer Interaction (PSY)......3
IT	424	Computer System Security for IT 3
IT	401	Web Intelligence....................................3
IT	490	Special Topics for IT 3
IT	499	BSIT Capstone.......................................1

COMP	151	Data Structures 4
COMP	262	Computer Organization and Architecture .3
MATH	301	Discrete Mathematics for IT 3

Spring - 16 units

COMP	447	Societal Issues in Computing 3
COMP	362	Operating Systems 4
COMP	420	Database Theory and Design................3
IT	280	Web Programming.................................3
MGT	307	Management of Organizations 3

Senior Year
Fall - 15 units

IT	400	eCommerce 3
IT	402	Advanced IT Programming....................3
IT	429	Computer Networks for IT 3
MGT	471	Project Management..............................3
MIS	310	Management Information Systems 3

Spring - 13 units

COMP	449	Human Computer Interaction (PSY) 3
IT	424	Computer System Security for IT 3
IT	401	Web Intelligence 3
IT	490	Special Topics for IT 3
IT	499	BSIT Capstone.......................................1

SUMMARY OF CHANGES

1. Modification to the Minor in Computer Science: Comp 105 is not required if a student has equivalent experience
2. MS Program: modification to thesis defense wording
3. MS Program: addition of language on continuous registration requirement

4. BSIT reworded so clear that it is open to native students; clarified requirements; fixed typo in name of Capstone
5. Added C- requirement in prerequisites to BSIT for consistency with BSCS

JUSTIFICATION
1. Requested by Advising
2. Clarification of need for thesis defense to be successful
3. Implementation of Senate Policy SP-09-09 "Policy on Continuous Enrollment and Educational Leave for Master's Degree Students"
4. Requested by Advising
5. Many courses in common between BSCS and BSIT, need consistency in prerequisite filter.

A. J. Bieszczad, Peter Smith   11/24/10
Proposers of Program Modifications   Date

Program: COMPUTER SCIENCE

Program Chair		
	Signature	Date

Curriculum Chair		
	Signature	Date

Dean of Faculty		
	Signature	Date