California State University Channel Islands

Program Modification

Program modifications must be submitted by November 2, 2009 for priority catalog review

Date (Change if modified and update the file name with the new date): 5.15.09, catalog copy; 1.26.10
Program Area: COMPUTER SCIENCE
Semester /Year First affected: FALL 2010

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.

<table>
<thead>
<tr>
<th>CURRENTLY APPROVED PROGRAM</th>
<th>PROPOSED PROGRAM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Computer Science</strong></td>
<td><strong>Computer Science</strong></td>
</tr>
<tr>
<td>Programs Offered</td>
<td>Programs Offered</td>
</tr>
<tr>
<td>• Bachelor of Science in Computer Science</td>
<td>• Bachelor of Science in Computer Science</td>
</tr>
<tr>
<td>• Minor in Computer Science</td>
<td>• Minor in Computer Science</td>
</tr>
<tr>
<td>• Minor in Computer Game Design and Development</td>
<td>• Minor in Computer Game Design and Development</td>
</tr>
<tr>
<td>• Master of Science in Computer Science</td>
<td>• Master of Science in Computer Science</td>
</tr>
<tr>
<td>• Bachelor of Science in Information Technology</td>
<td>• Bachelor of Science in Information Technology</td>
</tr>
</tbody>
</table>

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
Chair, Computer Science Program
Bell Tower West, Room 2225
(805) 437-8985
william.wolfe@csuci.edu

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Associate Professor of Computer Science
Director of the Masters Program
Sage Hall, Room 2127
(805) 437-2773
aj.bieszczad@csuci.edu

Contact Information

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Contact Information
Bachelor of Science in Computer Science - (122 units)

Lower Division Required Major Courses ............... 42
Upper Division Required Major Courses .............. 28
Upper Division Elective Major Courses .............. 12
Elective Courses ............................................. 6
General Education ............................................. 28
American Institutions Requirement .................. 6
TOTAL ........................................................... 122 units

Note: General Education Included in Major Requirements 14

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

Lower Division Requirements - 42 units
COMP 150 Object-Oriented Programming .............. 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
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.

Bachelor of Science in Computer Science - (122 units)

Lower Division Required Major Courses ............... 42
Upper Division Required Major Courses .............. 28
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Elective Courses ............................................. 6
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Lower Division Requirements - 42 units
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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
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


Upper Division Requirements - 40 units
Major Requirements - 28 units

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP 350</td>
<td>Introduction to Software Engineering</td>
<td>3</td>
</tr>
<tr>
<td>COMP 362</td>
<td>Operating Systems</td>
<td>3</td>
</tr>
<tr>
<td>COMP 447</td>
<td>Societal Issues in Computing</td>
<td>3</td>
</tr>
<tr>
<td>COMP 454</td>
<td>Automata, Languages and Computation</td>
<td>3</td>
</tr>
<tr>
<td>COMP 491</td>
<td>Capstone Preparation</td>
<td>1</td>
</tr>
<tr>
<td>COMP 499</td>
<td>Capstone Project</td>
<td>3</td>
</tr>
<tr>
<td>MATH 300</td>
<td>Discrete Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 352</td>
<td>Probability and Statistics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 354</td>
<td>Analysis of Algorithms</td>
<td>3</td>
</tr>
</tbody>
</table>

Choose three units from the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP 420</td>
<td>Database Theory and Design</td>
<td>3</td>
</tr>
<tr>
<td>COMP 464</td>
<td>Computer Graphic Systems and Design I</td>
<td>3</td>
</tr>
</tbody>
</table>

Electives - 12 units

Choose 12 Elective units from:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP 345</td>
<td>Digital Image Processing</td>
<td>3</td>
</tr>
<tr>
<td>COMP 351</td>
<td>Distributed Computing</td>
<td>3</td>
</tr>
<tr>
<td>COMP 420</td>
<td>Database Theory and Design</td>
<td>3</td>
</tr>
<tr>
<td>COMP 421</td>
<td>Unix for Programmers</td>
<td>3</td>
</tr>
<tr>
<td>COMP 424</td>
<td>Computer System Security</td>
<td>3</td>
</tr>
<tr>
<td>COMP 425</td>
<td>Computer Game Programming</td>
<td>3</td>
</tr>
<tr>
<td>COMP 429</td>
<td>Computer Networks</td>
<td>3</td>
</tr>
<tr>
<td>COMP 445</td>
<td>Image Analysis &amp; Pattern Recognition (MATH/PHYS)</td>
<td>3</td>
</tr>
<tr>
<td>COMP 451</td>
<td>Advanced Object Oriented Programming</td>
<td>3</td>
</tr>
<tr>
<td>COMP 452</td>
<td>Computational Bioinformatics (MATH)</td>
<td>4</td>
</tr>
<tr>
<td>COMP 462</td>
<td>Embedded Systems</td>
<td>3</td>
</tr>
</tbody>
</table>
### Proposed Course of Study

#### Freshman Year - 31 units

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP 150</td>
<td>Object-Oriented Programming GE-B4</td>
<td>4</td>
</tr>
<tr>
<td>COMP 151</td>
<td>Data Structures and Program Design</td>
<td>4</td>
</tr>
<tr>
<td>COMP 162</td>
<td>Computer Architecture and Assembly Language</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 105</td>
<td>Composition and Rhetoric</td>
<td>3*</td>
</tr>
<tr>
<td>MATH 150</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 151</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 230</td>
<td>Logic and Mathematical Reasoning</td>
<td>3</td>
</tr>
</tbody>
</table>

**GE Section A or C** | 3* |

* or ENGL 102 and 103 | 6 |

#### Sophomore Year - 23 - 24 units

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP 232</td>
<td>Programming Languages</td>
<td>3</td>
</tr>
<tr>
<td>COMP 262</td>
<td>Computer Organization &amp; Architecture</td>
<td>3</td>
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<td>MATH 240</td>
<td>Linear Algebra</td>
<td>3</td>
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<td>Discrete Mathematics</td>
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**Science: Choose either**

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

#### Proposed Course of Study

#### Freshman Year - 31 units

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<td>Discrete Mathematics</td>
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**Science: Choose either**

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

3.4.08 km²
### Junior Year - 18 units + GE
- COMP 350  Introduction to Software Engineering .... 3
- COMP 362  Operating Systems .......................... 3
- 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 CSU Channel Islands Extended Education 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. 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 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
Bachelor of Science in Information Technology

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, 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.
### Careers


### Program Learning Outcomes and Contact Information

http://www.cs.csuci.edu/

### 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 a computer programming language such as C, Java or C++. 
4. First course in Computer Architecture and Assembly Language. 
5. CSU GE Certification or courses fulfilling the CSUCI 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 CSUCI or a community college. Course substitutions for these requirements may be made with the approval of the program chair.

### Upper Division Requirements - 60 units

Mathematics and Science Requirements

7 units

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 301</td>
<td>Discrete Mathematics for IT</td>
<td>3</td>
</tr>
</tbody>
</table>

### Bachelor of Science in Information Technology - (120 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 a computer programming language such as C, Java or C++. 
4. First course in Computer Architecture and Assembly Language. 
5. CSU GE Certification or courses fulfilling the CSUCI 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 CSUCI or a community college. Course substitutions for these requirements may be made with the approval of the program chair.

### Upper Division Requirements - 61 units

Mathematics and Science Requirements

7 units

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<tr>
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<tbody>
<tr>
<td>MATH 301</td>
<td>Discrete Mathematics for IT</td>
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</tbody>
</table>
As a graduation requirement, all CSUCI students must complete 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.

**Upper Division Interdisciplinary GE - (9 units)**

Electives 15 units

**Note:** 9 units of the 15 units must be taken in IT courses

<table>
<thead>
<tr>
<th>Course</th>
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</thead>
<tbody>
<tr>
<td>ART 324</td>
<td>Communication Design Technology: Web Design</td>
<td>3</td>
</tr>
<tr>
<td>ART 326</td>
<td>Digital Media Art: Web Design</td>
<td>3</td>
</tr>
<tr>
<td>COMP 232</td>
<td>Programming Languages</td>
<td>3</td>
</tr>
<tr>
<td>COMP 337</td>
<td>Survey of Computer Gaming</td>
<td>3</td>
</tr>
<tr>
<td>COMP 345</td>
<td>Digital Image Processing (MATH/PHYS)</td>
<td>3</td>
</tr>
<tr>
<td>COMP 350</td>
<td>Introduction to Software Engineering</td>
<td>3</td>
</tr>
<tr>
<td>COMP 425</td>
<td>Computer Game Programming</td>
<td>3</td>
</tr>
<tr>
<td>COMP 447</td>
<td>Societal Issues in Computing</td>
<td>3</td>
</tr>
<tr>
<td>COMP 449</td>
<td>Human Computer Interaction (PSY)</td>
<td>3</td>
</tr>
<tr>
<td>COMP 452</td>
<td>Computational Bioinformatics (MATH)</td>
<td>4</td>
</tr>
<tr>
<td>IT 400</td>
<td>e-Commerce</td>
<td>3</td>
</tr>
<tr>
<td>IT 401</td>
<td>Web Intelligence</td>
<td>3</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Units</td>
</tr>
<tr>
<td>------------</td>
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</tr>
<tr>
<td>IT 424</td>
<td>Computer System Security for IT</td>
<td>3</td>
</tr>
<tr>
<td>IT 402</td>
<td>Advanced IT Programming</td>
<td>3</td>
</tr>
<tr>
<td>IT 464</td>
<td>Computer Graphics for IT</td>
<td>3</td>
</tr>
<tr>
<td>IT 469</td>
<td>Artificial Intelligence/Neural Networks for IT</td>
<td>3</td>
</tr>
<tr>
<td>MATH 137</td>
<td>Strategies and Game Design</td>
<td>3</td>
</tr>
<tr>
<td>MATH 330</td>
<td>Mathematics and Fine Arts</td>
<td>3</td>
</tr>
<tr>
<td>MATH 437</td>
<td>Mathematics for Game Programming</td>
<td>3</td>
</tr>
<tr>
<td>MGT 471</td>
<td>Project Management</td>
<td>3</td>
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<tr>
<td>IT 499</td>
<td>BSIT Capstone Project</td>
<td>1</td>
</tr>
</tbody>
</table>

BSIT Summary - 120 units

Lower Division Requirements ........................................ 60
Mathematics and Science Requirements ...................... 7
Core Courses ............................................................ 25
Upper Division Interdisciplinary GE ......................... 9
Upper Division Electives ............................................. 15
Capstone ........................................................................ 4

Proposed Course of Study

Junior Year

Fall - 17 units

Lab Science II (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 - 15 units

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

Senior Year

Proposed Course of Study

Junior Year

Fall - 17 units

Lab Science II (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 .............................. 3
IT 280    Web Programming ................................. 3
IT 420    Database Theory and Design for IT .......... 3
MGT 307   Management of Organizations ................. 3

Senior Year
**SUMMARY OF CHANGES**

A. These changes are the primarily the result of COMP 362 going from 3 units to 4 units. The ripple of units through the credit unit totals needed to be adjusted. Here is the list of changes:

1. "Core Courses" should have 26 units, not 25 units.

2. Under "Proposed Course of Study":
   
a) Junior Year Spring should be 16 units, not 15 units.

b) Senior Year Spring should be 13 units, not 11 units. (see note B.2 below concerning IT 490).

B. While checking all the total unit amounts it was noticed that:

1. The course IT 424 was accidentally listed twice in the list of electives, so one instance has been deleted.

2. The unit totals, and elective requirements, would not be met without an additional 3 unit elective in the "proposed course of study", so the course IT 490 Special Topics for IT was added to the spring of the senior year: add: "IT 490 Special Topics for IT 3" to the list of courses in Senior Year Spring.
JUSTIFICATION
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_William J. Wolfe__________________1/26/2010___________________
Proposer of Program Modification Date
Program:  

Program Chair

Signature  Date

Curriculum Chair

Signature  Date

Dean of Faculty

Signature  Date