

# Program Modification

Program modifications must be submitted by November 3, 2008 for priority catalog review

Date (Change if modified and update the file name with the new date): 12/5/08; REV 2.10.09; rev 2.17.09

Program Area: Computer Science

Semester /Year First effected: Fall 2009

**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 **GREY** 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
<p><b>Programs Offered</b></p> <ul style="list-style-type: none"><li>• Bachelor of Science in Computer Science</li><li>• Minor in Computer Science</li><li>• Master of Science in Computer Science</li><li>• Bachelor of Science in Information Technology</li></ul> <p>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.</p> <p><b>Careers</b></p> <p>The program prepares students for careers in high-tech, computer and Internet-driven industries, where interdisciplinary, dynamic and innovative professionals trained in the latest</p>	<p><b>Programs Offered</b></p> <ul style="list-style-type: none"><li>• Bachelor of Science in Computer Science</li><li>• Minor in Computer Science</li><li>• Master of Science in Computer Science</li><li>• Bachelor of Science in Information Technology</li></ul> <p>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.</p> <p><b>Careers</b></p> <p>The program prepares students for careers in high-tech, computer and Internet-driven industries, where interdisciplinary, dynamic and innovative professionals trained in the latest</p>

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  
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## Program Learning Outcomes

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### Contact Information

<http://compsci.csuci.edu>

## Requirements for the Bachelor of Science in Computer Science

(122 units)

### 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	240	Linear Algebra (3) <b>COMP</b>
MATH	230	Logic (3); GE-A3, B3

**Science:** A two semester science sequence and an additional science course (with lab) in Physics, Biology, or Chemistry (11-12, GE B1 and B2)

### Contact Information

<http://compsci.csuci.edu>

## Requirements for the Bachelor of Science in Computer Science

(122 units)

### 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); 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	240	Linear Algebra (3)
MATH	230	Logic (3); GE-A3, B3

**Science:** Choose either

(a) Physics 200 General Physics I (4), Physics 201 General Physics II (4), and a course from GE section B-2.

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

(40 units)

### Major Requirements (31 units)

- COMP 350 Introduction to Software Engineering (3)
- COMP 362 Operating Systems (3)
- COMP 447 Societal Issues in Computing (3)  
(GE-B4, D, Interdisciplinary)
- COMP 454 Automata, Languages and Computation (3)
- COMP 499 Capstone Project (3)
- COMP 491 Capstone Preparation (1)
- MATH 300 Discrete Mathematics (3)
- MATH 352 Probability and Statistics (3)
- MATH 354 Analysis of Algorithms (3)
- ~~MATH 448 Scientific Computing, GE B3, B4,  
Interdisciplinary (3)~~

Choose three units from the following:

- COMP 420 Database Theory and Design (3)
- COMP 464 Computer Graphic Systems and Design I (3)

### Electives (9 units)

Choose nine Elective units from:

- COMP 345 Digital Image Processing (MATH/PHYS) (3); GE-B1, B4, INTD
- COMP 351 Distributed Computing (3)
- COMP 421 Unix for Programmers (3)
- COMP 422 Design of Compilers (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) (3); GE-B1, B4, INTD
- COMP 451 Advanced Object Oriented Programming (3)
- COMP 452 Computational Bioinformatics (MATH) (4)

## Upper Division Requirements

(40 units)

### Major Requirements (28 units)

- COMP 350 Introduction to Software Engineering (3)
- COMP 362 Operating Systems (3)
- COMP 447 Societal Issues in Computing (3)  
(GE-B4, D, Interdisciplinary)
- COMP 454 Automata, Languages and Computation (3)
- COMP 499 Capstone Project (3)
- COMP 491 Capstone Preparation (1)
- 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) (3); GE-B1, B4, INTD
- COMP 351 Distributed Computing (3)
- COMP 420 Database Theory and Design (3)**
- COMP 421 Unix for Programmers (3)
- COMP 422 Design of Compilers (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) (3); GE-B1, B4, INTD

COMP	462	Embedded Systems (3)
COMP	464	Computer Graphic Systems and Design I (3)
COMP	466	Computer Graphics Systems and Design II (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 Study (3)
ENGL	482	Technical Writing (3)
MATH	429	Operations Research (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 (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 (24 units)

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

Select a two semester science sequence, and an additional lab science course, in Physics, Biology, or Chemistry, GE-B1 and B2 (11-12)

COMP	451	Advanced Object Oriented Programming (3)
COMP	452	Computational Bioinformatics (MATH) (4)
COMP	462	Embedded Systems (3)
COMP	464	Computer Graphic Systems and Design I (3)
COMP	466	Computer Graphics Systems and Design II (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 Study (3)
ENGL	482	Technical Writing (3)
MATH	429	Operations Research (3)

MATH 448 Scientific Computing GE-B3-B4, UDIGE (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 (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 (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 B-2

OR

(b) Physics 200 General Physics I (4), Biology 200 Principles of Organismal and Population Biology (4), Biology 212 Neurobiology and Cognitive Science (3) (11-12, GE-B1 and B2)

**Junior Year (13 units + GE)**

- COMP 350 Introduction to Software Engineering (3)
- COMP 362 Operating Systems (3)
- COMP 454 Automata, Languages, & Computation (3)
- ~~COMP 491 Capstone Preparation (1)~~
- MATH 354 Analysis of Algorithms (3)

**Senior Year (24 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 464 Computer Graphic Systems and Design I (3)
- COMP 469 Artificial Intelligence/Neural Nets (3)
- COMP 499 Capstone Project (3)
- ~~MATH 448 Scientific Computing (3) GE B3, B4, INTD~~

**General Education Courses Included in Major**

**Requirements (18 units):**

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

**Requirements for the Bachelor of Science in Computer Science Degree (122 units)**

Lower Division Required Major Courses .....	42
Upper Division Required Major Courses .....	31
Upper Division Elective Major Courses .....	9
Elective Courses .....	6
General Education .....	28
American Institutions Requirement .....	6

**Junior Year (18 units + GE)**

- COMP 350 Introduction to Software Engineering (3)
- COMP 362 Operating Systems (3)
- COMP 454 Automata, Languages, & Computation (3)
- COMP 421 Unix for Programmers (3)
- ~~MATH 448 Scientific Computing (3) GE B3, B4, INTD~~
- MATH 354 Analysis of Algorithms (3)
- MATH 352 Probability and Statistics (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 464 Computer Graphic Systems and Design I (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 (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

**Requirements for the Bachelor of Science in Computer Science Degree (122 units)**

Lower Division Required Major Courses.....	42
Upper Division Required Major Courses .....	28
Upper Division Elective Major Courses.....	12
Elective Courses.....	6

Note: General Education Included in Major Requirements (18)

## Requirements for the 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

### Lower Division Requirements

(17 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)
- ~~MATH 230 Logic and Mathematical Reasoning (3)~~

### Upper Division Requirements

(6 units)

Two 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)

General Education .....28  
American Institutions Requirement .....6

Note: General Education Included in Major Requirements (14)

## Requirements for the 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)

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.

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A minimum of 18 units must be COMP

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- 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	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)

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

Offered through California State University Channel Islands Extended Education Program

#### 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, Database Theory and

### 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

Offered through California State University Channel Islands Extended Education Program

#### 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.

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

Potential career option for BSIT graduates include: 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, Web Technology Support.

## Program Learning Outcomes and Contact Information

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

## Requirements for the 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 (60 units)

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

Potential career option for BSIT graduates include: 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, Web Technology Support.

## Program Learning Outcomes and Contact Information

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## Requirements for the 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:

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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)**

MATH 301 Discrete Mathematics for IT (3)  
 Lab Science II-Physics, Chemistry or Biology (4)

**Core Courses (25 units)**

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

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

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.

**Electives (15 units)**

Choose 15 units from the following:

**Note:** 9 units of the 15 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 424 Computer System Security for IT (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)

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 Lab Science II-Physics, Chemistry or Biology (4)

**Core Courses (25 units)**

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 MIS 310 Management Information Systems (3)  
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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 424 Computer System Security for IT (3)  
 IT 402 Advanced IT Programming (3)  
 IT 424 Computer System Security for IT (3)  
 IT 464 Computer Graphics 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 (5 units)**

MGT 471 Project Management (3)  
 IT 499 BSIT Capstone Project (1)

**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**

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**

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)

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).

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Lower Division Requirements .....60  
 Mathematics and Science Requirements .....7  
 Core Courses .....25  
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 Upper Division Electives .....15  
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**Proposed Course of Study**

**Junior Year**

**Fall**

Lab Science II (Bio, Chem, or Phys) (4)

ENGL 330 Interdisciplinary Writing (3)  
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**Spring**

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)

<p><b>Senior Year</b></p> <p><b>Fall</b></p> <p>IT 400 e-Commerce (3)</p> <p>IT 402 Advanced IT Programming (3)</p> <p>IT 429 Computer Networks for IT (3)</p> <p>MGT 471 Project Management (3)</p> <p>MIS 310 Management Information Systems (3)</p> <p><b>Spring</b></p> <p>COMP 449 Human Computer Interaction (PSY) (3)</p> <p>IT 424 Computer System Security for IT (3)</p> <p>IT 401 Web Intelligence (3)</p> <p>IT 499 BSIT Capstone (1)</p>	<p><b>Senior Year</b></p> <p><b>Fall</b></p> <p>IT 400 e-Commerce (3)</p> <p>IT 402 Advanced IT Programming (3)</p> <p>IT 429 Computer Networks for IT (3)</p> <p>MGT 471 Project Management (3)</p> <p>MIS 310 Management Information Systems (3)</p> <p><b>Spring</b></p> <p>COMP 449 Human Computer Interaction (PSY) (3)</p> <p>IT 424 Computer System Security for IT (3)</p> <p>IT 401 Web Intelligence (3)</p> <p>IT 499 BSIT Capstone (1)</p>
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## SUMMARY OF CHANGES

The changes are only to the BS in Computer Science Program and the Minor in Computer Science. The other programs (MSCS and BSIT) remain unchanged.

1. Require C- or better in pre-requisite courses in the major.
2. Require two additional technical electives in the upper division (6 units), and move Math 448 (3) from "required" to "elective".
3. Revised Science requirement with more specific options.
4. Revised the Computer Science minor to have 9 units of upper division requirements.
5. Moved "Capstone Preparation" from Junior Year to Senior Year.
6. Fixed a typo: Extraneous "COMP" in the Lower Division Requirements was deleted.
7. Fixed a typo: The second "232" under Sophomore Year should be "262".

## JUSTIFICATION

1. **Require C-:** A crucial factor in student success is their level of preparedness for advanced courses in their major. A grade lower than C- indicates that the student has not sufficiently mastered the material necessary to move up to the next level of course work. A student who gets a grade lower than C- is better off retaking the course. This will also help the instructors of advanced courses because they will not have to do extensive amounts of review and will allow them to cover the advanced material in a proper manner.
2. **Six Additional Technical Elective Units:** The field of Computer Science is wide and deep. We feel that the current curriculum lays a solid foundation, but we also believe that the student needs more exposure to advanced topics to be sufficiently prepared for industry or graduate school. To obtain that experience the student must take a couple of additional upper division electives (6 additional units). These electives would be chosen from such courses as Computational Bioinformatics, Unix, Advanced Object Oriented Programming, Artificial Intelligence, Embedded Systems, Digital Image Processing, Operations Research, Technical Writing and other advanced topics in Computer Science. These additional courses will help solidify the depth and breadth of the student's undergraduate experience. To offset the increase in total units to the program, we also move Math 448 from a required course to an elective course. Since Math 448 is an Upper Division Interdisciplinary class and as such students will be inclined to take it as an elective choice anyway.
3. **Revised Science Requirement:** First of all, the current catalog wording for the science requirement is ambiguous. The phrase "with lab" is in parentheses, and students (and advisors) have difficulty making the correct associations. To clear that up, and to customize the requirements to more closely fit the needs of the computer science student, we have identified specific science courses that we feel have the most relevance to the computer science major, while also keeping the GE requirements in mind. To that end we identified two sets of science courses that would serve the needs of the CS student well: Physics I and II, plus one additional course from GE section B2; OR Physics I, Biology 200, and Biology 212. Either of these sequences would provide the CS major with an excellent science background while also satisfying GE requirements.
4. **Revised Computer Science Minor:** We have revised the CS minor to be in line with the required 9 units of upper division course work that is required of all minors, while retaining the same number of total units (23). We achieved this by removing the lower division Math 230 requirement and adding an additional upper division elective.

5. **Capstone Preparation:** We moved “Capstone Preparation” from the Junior Year (in the Proposed Course of Study) to the Senior year. The intention is for the Capstone Preparation to be taken during the Fall semester and Capstone Project the Spring semester of the senior year.

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Proposer of Program Modification	Date
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**Program:** Computer Science

Program Chair		
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Signature

Date

Curriculum Chair		
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Signature

Date

Dean of Faculty		
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Signature

Date