TO: The Academic Senate
FROM: Committee on Instruction and Curriculum (CIC)
SUBJECT: 16-17 CIC 40: Revision request for B.S. Computer Science
PURPOSE: Information to the Academic Senate
ACTION REQUESTED: That the Senate accept the information that the revision request for bachelors of science in Computer Science has been approved by CIC.

BACKGROUND INFORMATION:
The Senate process for approving transformed degree programs for the semester calendar is defined by 14-15 CIC 36. The Committee discussed the B.S. in Computer Science at its November 14 meeting, which was attended by a representative of the Department: Kevin Brown. It was approved by CIC unanimously with the acknowledgement that some non-substantive changes may occur in the Catalog copy. The proposal may be viewed within Curriculog; the summary is attached as a PDF document per ExCom’s request.
Bachelor's Degree Computer Science

2. Semester Conversion Request for Approval of Revision of the Undergraduate Degree Program/Major

General Catalog Information

***READ BEFORE YOU BEGIN***

Use this form to request a revision to your Undergraduate Degree Program/Major and its concentration(s).

To **change the title of your degree** program, a narrative will need to be submitted to APGS for review by CIC and the state chancellor's office. Click here to submit your narrative.

To **move an existing degree to online**, complete form #7.Semester Conversion Request for Online/Hybrid Program Modification.

To **elevate an option to a degree or change the degree type**, a narrative will need to be submitted to APGS for review by CIC and the state chancellor's office, Click here to submit your narrative.

**Turn on Help Text** by clicking the Show Help Text icon above this section of the form.

Effective Term: Fall 2018       Catalog: 2018-2019

Select **Shared Core** unless otherwise instructed by APGS

Select **SHARED CORE**

- Program
- Shared Core

**Notes:** If you want to move an existing degree program to online (i.e. 50% or more of the program can be completed online (a hybrid course counts as .50 online), elevate an option to a degree, or change the degree type, please e-mail Donna Wiley, Interim Associate Vice President, Academic Programs and Graduate Studies; and copy Sarah Aubert, Catalog and
Curriculum Specialist, Academic Programs and Graduate Studies, for additional instructions as soon as possible.

<table>
<thead>
<tr>
<th>Department:*</th>
<th>Department of Computer Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full and exact title of Major including degree earned:*</td>
<td>Bachelor’s Degree Computer Science</td>
</tr>
<tr>
<td>Has your program received transformation funding?*</td>
<td>Yes</td>
</tr>
</tbody>
</table>

If the program received transformation funding, please summarize the transformative changes made:
The B.S. Computer Science degree has been transformed with the goal of aligning the program with the ABET/CSAB accreditation standards. Changes include requiring a year of a lab science, increasing the number of courses required by all majors, and increasing the number of programming languages to which students are exposed. Required courses now include: CS 301 Software Engineering, CS 311 Programming Languages, CS 211 Computer Organization and Assembly Language, CS 321 Architecture, CS 441 Computer Networks, and CS 231 Computers and Social Responsibility. Courses are grouped in the following categories: required math and science, required lower division, required upper division, and breadth and depth electives. At a minimum, students will gain experience programming in Assembly, Python, C++, and Java. The Software Engineering and Computer Network options were folded into the degree requirements so that all students gain mastery of these subjects. The Computer Engineering option is discontinued due to the B.S. Computer Engineering program offered by the Engineering department.

Most courses in the new curriculum are 3 units. However, to allow students more time and practice developing their programming skills, we have added instructional laboratory component to four of our programming intensive courses: CS 100 Computer Science I, CS 201 Computer Science II, CS 301 Data Structures, and CS 401 Software Engineering. Courses that were previously cross-listed with engineering such as Assembly language and Computer Architecture will now have a CS prefix, while Digital Signal Processing and Architecture II will have the prefix CMPE. We have eliminated all tiered and dual-listed courses.

Previously, the Computer Science Department did not offer General Education (GE) courses. At this time we are submitting four courses for GE consideration: CS 100 Programming for Everyone, CS 180 Computer Literacy, CS 231 Computers and Social Responsibility, and CS 400 Programming for Science.

In addition, we have introduced several new service courses to support a certificate program with Health Sciences. These include CS 100 Programming for Everyone, CS 200 Advanced Programming for Everyone, and CS 350 Databases for Health Science.

Program Learning Outcomes (PLO’s) were also modified and new curriculum maps and assessment plans were completed for the degree program.
B.S. in Computer Science

Program Description

The Department of Computer Science offers study leading to a Bachelor of Science degree or minor in Computer Science. This program is designed to prepare students for employment in the technology sector or for advanced study in Computer Science. The curriculum provides a solid foundation of theoretical knowledge as well as experience with practical application in hardware and software.

Computer Science is the study of algorithms for addressing, processing, storing, and transmitting information. It encompasses a broad perspective that includes what constitutes a computer, computer uses and applications, and theoretical approaches to what can or can't be computed. The core curriculum in Computer Science, involving a blend of theory and practice, offers opportunities for problem solving in many areas and provides experience with a variety of computer languages and software packages. A typical student's experience includes programming through software engineering, hardware through operating systems, and can include data solutions, web design, networking, mobile computing, artificial intelligence, hardware design, and graphic implementations ranging from interface design to computer vision. The breadth of subject material is important as many students can expect to have a number of different job classifications throughout their careers.

Students interested in the B.S. degree program in Computer Science should contact the Computer Science Department's undergraduate advisor and visit the department's webpage:
http://www.csueastbay.edu/csci/departments/cs/index.html

Student Learning Outcomes

Students graduating with a B.S. in Computer Science will be able to:

- Apply knowledge of mathematics and computational theory to analyze problems in computer science, and identify and define the resources and requirements needed for its solution.
- Design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.
- Recognize and distinguish the mechanisms, components and architecture of computing systems.
- Employ current techniques, skills, and tools necessary for computing practice, and recognize the need for continuing professional development.
- Identify professional, ethical, legal, and security issues and responsibilities and the impact of computing on individuals, organizations and society.
organizations and society. Perform successfully on teams to accomplish a common goal, and communicate effectively in written and oral form.

Career Opportunities

Software/Application Engineer
Game Designer
Network Systems Engineer
Web/Multimedia Developer
Mobile Developer
Systems Analyst
Network Security Administrator
Cloud Engineer
Systems Manager/Programmer
Network Administrator
Database Applications Programmer/Administrator
Big Data Analyst
Information Technology (IT) Administrator
Technical Writer
Teacher

Features

The University supports Computer Science with a variety of resources. Wireless access is available throughout the campus. Smart classrooms are equipped with a computer and projector, and there are multiple instructional laboratories equipped with 24-35 computers. Students may also use computers in open-access labs. Lab and classroom computers are equipped with a variety of operating systems and devices. The department’s industry board provides insight for linking industrial practices with academia. The department has an active computing club, which hosts academic and social events, hackathons, and presentations from researchers and members of industry. Cal State East Bay’s proximity to Silicon Valley provides opportunities for internships and employment in the
high-tech companies in the area. The department is committed to a program rich in diversity, and encourages women, minorities, and international students to apply.

Admission

To apply for admission to the Bachelor of Science program in Computer Science, students must submit the proper forms, fees and transcripts to the university’s Office of Admissions, which reviews each application. Information about the Computer Science major, Degree Roadmap, and answers to frequently asked questions are available on the department website.

High school students who are interested in Computer Science should take a minimum of Algebra, Trigonometry, and Pre-calculus, and a programming course if available. Community college students who are planning to transfer to Cal State East Bay should take Calculus I and II, Linear Algebra, Discrete Structures, Computer Organization and Assembly Language, and a two course sequence in a high level programming language.

Scholarships

Each year the department awards a number of scholarships covering a portion of the fees for the subsequent year. Scholarship applications may be filed during the fall semester.

Click here to see instructions before completing the following Major Requirements field.

I. Mathematics and Science (17 units)
Students must complete all of these courses with a grade of C- or above.

MATH 130 Calculus I (4)
MATH 131 Calculus II (3)
MATH 225 Numerical Algorithms and Linear Algebra for Computer Science (3)
STAT 316 Statistics for Science and Engineering (3)
PHYS 135 Physics for Scientists and Engineers (4)

II. Required Lower Division Computer Science (17 units)

Students must complete all of these courses with a grade of C- or above.

CS 101 Computer Science I (4)
CS 201 Computer Science II (4)
CS 211 Discrete Structures (3)
CS 221 Computer Organization and Assembly Programming (3)
CS 231 Computers and Social Responsibility (3)

III. Required Upper Division Computer Science (26 units)

Students must complete all of these courses with a grade of C- or above.

CS 301 Data Structures (4)
CS 311 Programming Language Concepts (3)
CS 321 Computer Architecture (3)
CS 401 Software Engineering (4)
CS 411 Automata and Computation (3)
CS 413 Analysis of Algorithms (3)
CS 421 Operating Systems (3)
CS 441 Computer Networks (3)

IV. Upper Division Breadth Computer Science (6 units)

Students must complete two courses out of the following:

CS 351 Website Development (3)
CS 431 Database Architecture (3)
CS 453 Mobile Programming (3)
CS 455 Computer Graphics (3)
CS 461 Artificial Intelligence (3)
CS 471 Security and Information Assurance (3)

V. Electives (6 units)

Students must take two courses with the CS prefix numbered 300 or above. Courses must not be the same as those used in sections I - IV. Please note 1-3 units of CS 498 Cooperative Education and/or 1-3 units of CS 490 Independent Study may be used to fulfill the Electives category.

Total Units Required

<table>
<thead>
<tr>
<th>Quarter Based Program:</th>
<th>180</th>
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<tbody>
<tr>
<td>Semester Based Program:</td>
<td>120</td>
</tr>
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</table>

Total Units should not exceed 120 Semester Units unless previously approved by Chancellor's Office for exemption.

**B.A. Programs**: Major requirements are a minimum of 24 units with at least 12 upper division units.

**B.S. Programs**: Major requirements are a minimum of 36 units with at least 18 upper division units.

See Unit Calculator for assistance.

If the program has a similar transfer model curriculum (TMC), please e-mail Kyle Burch, Articulation Officer, Academic Programs and Graduate Studies, to verify that the revised program meets the TMC requirements prior to submitting the program revision request form.
Is the major approved as a "similar" degree under the STAR Act (SB 1440)?*

- Yes
- No
- I'm not sure (Articulation Office will contact you)

If yes, explain how this modification will affect the "similar" degree agreement

All required CS courses numbered 231 and below may be transferred to CSUEB from a community college.

Were any concentrations (options) discontinued?*

- Yes
- No

If yes, please explain below. If no, please enter "N/A" or "not applicable."*

The Software Engineering and Computer Networks options were eliminated due to lack of student interest.

The Computer Engineering option is discontinued due to the B.S. Computer Engineering program offered by the Engineering dept.

Is this major approved as an online degree program?*

- Yes
- No

If no, is there any pathway in the revised degree that is more than 50% online?

- Yes
- No

Resource implications of the proposed revision, if any:
Computer labs are needed to support programming courses

Relationship of Revised Program to requirements for teaching credentials, accreditation, and/or licensing, if any:

Consultation with other affected departments and programs:

<table>
<thead>
<tr>
<th>The following department(s) has (have) been consulted and raised no objections:*</th>
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<tbody>
<tr>
<td>Department of Health Sciences</td>
</tr>
<tr>
<td>Department of Mathematics</td>
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<tr>
<td>Department of Statistics and</td>
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<tr>
<td>Biostatistics</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>The following department(s) has (have) been consulted and raised concerns:</th>
</tr>
</thead>
</table>

Attachments

Please scroll to the top of this form and select the Files icon to attach the following documents to your proposal:

- Bachelor's Degree Roadmap
- Curriculum Map 1 - PLOs to Courses
- Curriculum Map 2 - PLOs to ILOs
- Five Year Assessment Plan

Did you attach your Curriculum Maps, Five Year Assessment Plan

- Yes
- No
or other supporting documents to this proposal?

### Catalog Item Types

<table>
<thead>
<tr>
<th>Degree Type*</th>
<th>Bachelor of Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Type*</td>
<td>Bachelor</td>
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</table>
Attachments for Bachelor's Degree Computer Science

**FinalBS CS-bacc-degree-roadmap.xls** (uploaded by Matt Johnson, 5/10/2016 10:18 am)

**FinalBSCompScicurr-mapILO_PLO-2.docx** (uploaded by Matt Johnson, 5/10/2016 10:18 am)

**FinalBSComputerSciencefive-year-plan.docx** (uploaded by Matt Johnson, 5/10/2016 10:18 am)

**FinalPLOGrid4-26-16.xlsx** (uploaded by Matt Johnson, 5/10/2016 10:18 am)
Comments for Bachelor's Degree Computer Science

Mitch Watnik
12/6/2016 11:20 am
Approved unanimously by CIC on November 14. Documented as 16-17 CIC 40.

Donna Wiley
7/7/2016 9:44 am
"its" should be "their" in the first PLO.

Maureen Scharberg
6/24/2016 9:24 am
If possible, could you please consider moving the lower division C courses to the first two years?

Stephanie Matsuda
6/10/2016 3:22 pm
Added comment to clarify that Computer Engineering concentration was discontinued by COS due to B.S. Computer Engineering program offered by the Engineering dept. Advised CS chair that we will need Form 8, Semester Conversion Request to Discontinue Quarter-System Programs, for each discontinued option.

Anne Kotchevar
5/13/2016 10:22 am
Unanimously approved by the College of Science curriculum committee

Leann Christianson
5/3/2016 1:43 pm
Five year assessment needs to be attached.

Decision Summary for Bachelor's Degree Computer Science

Committee on Instruction and Curriculum

Status: Working

Step Summary
This step requires 100% approval from all participants to move forward.
<table>
<thead>
<tr>
<th>Participants</th>
<th>Totals</th>
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<tbody>
<tr>
<td>▲ Academic Senate</td>
<td>Users Approved: 1</td>
</tr>
<tr>
<td>Sophie Rollins *</td>
<td>Users Rejected: 0</td>
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<tr>
<td>▲ CIC</td>
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<tr>
<td>CIC 11/14</td>
<td></td>
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<tr>
<td>Sophie Rollins *</td>
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<tr>
<td>✔ Mitch Watnik *</td>
<td>12/6/2016 11:20 AM</td>
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