

## CTE Program Review

Program Name: **Computer Information Science**

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Academic Year: **2016-2017**

Status: **Submitted for review**

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### 1. Description of Program

Provide a brief description of the program and how it supports the college's [College Mission and Diversity Statements](#), [CSM Strategic Goals 2013/14 to 2015/16](#), and other [Institutional Program Planning](#) as appropriate. What is the program's vision for sustaining and improving student learning and success over the next three years?

#### Description of Program

The Computer Information Science Department (CIS) offers 20-23 sections of 15-20 separate courses each semester, ranging from *Intro to Computer Information Science* through advanced programming, and *Web Programming* courses. The department has the following degrees and certificates:

Associate in Science  
Degrees

1. Computer and Information Science (60 units)
2. Computer Science Applications and Development
3. Web and Mobile Application Development (60 units)

Certificates of  
Achievement

1. Computer Science Applications and Development (31-34 units)
2. Web and Mobile Application Development (31-35 units)

Certificates of  
Specialization

1. C++ Programming (8 units)
2. Database Programming (14-15 units)
3. Data Science and Big Data (14-16 units)
4. DevOps (17 units) - NEW
5. Internet Programming (14-17 units)
6. Java Programming (8 units)
7. Web/Mobile App Development ( 15 units)

From the College Mission statement, CIS courses and programs directly support institutional priorities "Promote Academic Excellence" and "Promote Relevant, High-Quality Programs and Services." All courses are certificate-applicable, Associate Degree-applicable, and/or university-transferable. Additionally, one course meets the Information Competency and Career Exploration Associate Degree requirement. CIS also supports the institutional priority for "Student Success" by offering courses in both the distance and traditional mode and, where possible, in a predictable scheduling pattern.

## 2. Student Learning and Program Data

### A. Discuss Student Learning Outcomes Assessment

1. Reflect on recent SLO assessment results for courses and degrees and certificates offered by the program. Specify how SLO assessment informs curriculum development and changes to curriculum.

<b>CIS 110 Individual SLOs' Results and Assessment - Spring 2016</b>				
	Benchmark	Criterion Met	Results	Action
SLO 01	75% of the students will earn a score of 90-100%	YES	Eighty-five percent of the students achieved 75% or better. 80% of those who did not reach the target score did not turn in the assignment. The average score for this assignment was 81% This is an early assignment and many students do not yet have their text.	No action is required
SLO 02	75% of the students will earn a score of 90-100	YES	Eighty-two percent of the students achieved 75% or better. 71% of those who did not reach the target score did not turn in the assignment. The average score for this assignment was 84%.	No action is required
SLO 03	75% of the students will earn a score of 90-100	YES	Eighty-five percent of the students achieved 75% or better. 92% of those who did not reach the target score did not turn in the assignment. The average score for this assignment was 84%.	No action is required
SLO 04	75% of the students will earn a score of 90-100	YES	Seventy-eight percent of the students achieved 75% or better. 97% of those who did not reach the target score did not turn in the assignment. The average score for this assignment was 87%.	No action is required
SLO 05	75% of the students will earn a score of 90-100%	NO	Seventy-one percent of the students achieved 75% or better. 99% of those who did not reach the target score did not turn in the assignment. The average score for this assignment was 78%.	The lab will be rewritten to clarify instructor's expectations

SLO 06	Benchmark: 75% of the students will earn a score of 90-100%	NO	Eighty-one percent of the students achieved 75% or better. 94% of those who did not reach the target score did not turn in the assignment. The average score for this assignment was 82%.	The lab was rewritten from last year's assessment. There was a marked overall improvement.
SLO 07	Benchmark: 75% of the students will earn a score of 90-100%.	YES	Eighty-seven percent of the students achieved 75% or better. 100% of those who did not reach the target score did not turn in the assignment. The average score for this assignment was 85%.	No action is required

Evidence shows that those students who read the chapter and complete the labs are nearly 100% successful in accomplishing the student learning outcome(s). This suggests the instructional materials and teaching methodology are sound. Last year there appeared to be a problem is getting ALL students to engage in class assignments. This said, CIS 110, overall success rate is increasing and the online performance nearly matches that of the face-to-face sections. SLOs found in the first two weeks of the course are difficult to assess. Many students do not yet have their textbooks. It is a very unfortunate situation that Vets and financial aid students cannot get their books more readily. The instructors will continue to make copies available in the Learning Center and Library, but some course materials cannot be provided such as assess to the publisher's website.

#### CIS 114 JavaScript/Ajax Programming Spring 2016

SLO	Benchmark	Criterion Met	Results	Action
<b>SLO 1</b> <b>Develop interactive Web applications that integrate HTML with JavaScript using event handlers</b>	JavaScript program with a form and registered event listeners that process form elements.	75% of the students will meet or exceed this criterion.  Yes	100% of the students completing the assignment met the criterion	Continue with the current strategy
<b>SLO 2</b> <b>Explain object-based programming and the Document Object Model (DOM)</b>	Students must explain in their own words the DOM and its relationship to object-based programming.	75% of the students will meet or exceed this criterion.  Yes	100% of the students completing the assignment met the criterion	Continue with the current strategy
<b>SLO 3</b> <b>Create JavaScript applications that use cookies to track and save Web preferences</b>	Students write an application to create a cookie with a specified lifetime and retrieve cookie contents for customized display.	75% of the students will meet or exceed this criterion.  Yes	96% of the students completing the assignment met the criterion	Continue with the current strategy

<b>SLO 4</b> <b>Develop interactive Web applications that integrate client- and server-side programming using JavaScript and a server-side language</b>	Ajax program that uses PHP on the server side to retrieve stock quotes.	75% of the students will meet or exceed this criterion.  Yes	100% of the students completing the assignment met the criterion	Continue with the current strategy
<b>SLO 5</b> <b>Employ XMLHttpRequest to fetch XML, RSS, or JSON data asynchronously from the server</b>	Students create a JavaScript application that fetches iTunes JSON feeds and displays information about songs by an artist in different musical genres	75% of the students will meet or exceed this criterion.  Yes	100% of the students completing the assignment met the criterion	Continue with the current strategy
<b>SLO 6</b> <b>Explain Ajax design patterns and illustrate how they are used to create various Ajax applications</b>	Exam question about MV* design patterns	75% of the students will meet or exceed this criterion.  Yes	100% of the students completing the assignment met the criterion	Continue with the current strategy
<b>SLO 7</b> <b>Create an advanced project using the various Ajax technologies, with attention to security and performance</b>	Create employee directory app using Backbone.js, react and Twitter Bootstrap	75% of the students will meet or exceed this criterion.  Yes	100% of the students completing the assignment met the criterion	Continue with the current strategy

**CIS 135 Android Programming Spring 2016**

<b>SLO</b>	<b>Benchmark</b>	<b>Criterion Met</b>	<b>Results</b>	<b>Action</b>
<b>SLO 1</b> <b>Explain the Android OS architecture</b>	Midterm question	75% of the students will meet or exceed this criterion.  Yes	100% of the students met the criterion	Continue with the current strategy

<b>SLO 2</b> <b>Install and use appropriate tools for Android development, including IDE, device emulator, and profiling tools</b>	Installation of Android Studio	75% of the students will meet or exceed this criterion.  Yes	100% of the students met the criterion	Continue with the current strategy
<b>SLO 3</b> <b>Build user interfaces with fragments, views, form widgets, text input, lists, tables, and menus</b>	Students create a mobile app with fragments that works on phones and tables	75% of the students will meet or exceed this criterion.  Yes	100% of the students completing the assignment met the criterion	Continue with the current strategy
<b>SLO 4</b> <b>Employ advanced UI widgets for scrolling, tabbing, and layout control</b>	Android task list app with tabs and widgets	75% of the students will meet or exceed this criterion.  Yes	100% of the students completing the assignment met the criterion	Continue with the current strategy
<b>SLO 5</b> <b>Store application data on the mobile device, in internal or external storage locations</b>	Students create an Android app that downloads RSS news feeds and stores them as local text files	75% of the students will meet or exceed this criterion.  Yes	100% of the students completing the assignment met the criterion	Continue with the current strategy
<b>SLO 6</b> <b>Create an advanced mobile application employing sensors, camera, GPS, maps, geolocation and other features</b>	Students create a final project employing advanced features of Android	75% of the students will meet or exceed this criterion.  Yes	100% of the students met the criterion	Continue with the current strategy

**CIS 254 Into to Object-Oriented Program Design Spring 2016**

<b>SLO</b>	<b>Benchmark</b>	<b>Criterion Met</b>	<b>Results</b>	<b>Action</b>
<b>SLO 1</b> <b>Analyze and explain</b>	Students must trace program code and give expected output with	75% of the students will meet or exceed this criterion.	90.3% of the students met the criterion.	Continue with the current strategy

<b>the behavior of programs involving the fundamental program constructs</b>	an explanation of code behavior.	Yes		
<b>SLO 2</b> <b>Write short programs that use the fundamental program constructs including standard conditional and iterative control structures</b>	Students create a program using conditional statements and loops.	75% of the students will meet or exceed this criterion.  Yes	100% of the students completing the lab met the criterion.	Continue with the current strategy
<b>SLO 3</b> <b>Identify and correct syntax and logic errors in short programs</b>	Students must debug an entire program, documenting all bugs found with their corrections.	75% of the students will meet or exceed this criterion.  Yes	100% of the students completing the lab met the criterion.	Continue with the current strategy
<b>SLO 4</b> <b>Write short programs using arrays</b>	Students create a program with an array populated with random numbers.	75% of the students will meet or exceed this criterion.  Yes	100% of the students completing the lab met the criterion.	Continue with the current strategy
<b>SLO 5</b> <b>Design and implement a class based on attributes and behaviors of objects</b>	Students create a Rectangle class modeling the concept of a rectangle. Students also create a test program.	75% of the students will meet or exceed this criterion.  Yes	100% of the students completing the lab met the criterion.	Continue with the current strategy
<b>SLO 6</b> <b>Construct objects using a class and activate methods on them</b>	Students write a test program for a given class, creating objects of the class and employing accessor and mutator methods.	75% of the students will meet or exceed this criterion.  Yes	100% of the students completing the lab met the criterion.	Continue with the current strategy
<b>SLO 7</b> <b>Use static and instance members of a class properly</b>	Students design a class with instance and static fields and methods; then write a test program to employ the methods.	75% of the students will meet or exceed this criterion.  Yes	84% of the students met the criterion.	Continue with the current strategy

<b>SLO 8</b> <b>Identify and describe value, scope and lifetime of a variable.</b>	Students must trace code, giving values of variables at different stages of program execution.	75% of the students will meet or exceed this criterion.  Yes	86.3% of the students met the criterion.	Continue with the current strategy
<b>SLO 9</b> <b>Describe the parameter passing mechanisms and method overloading</b>	Students must explain in depth the concept of method overloading. Students must also describe how primitive and reference values are passed to methods	75% of the students will meet or exceed this criterion.  Yes	88.8% of the students met the criterion.	Continue with the current strategy
<b>SLO 10</b> <b>Analyze and explain is-a relationships among objects using a class hierarchy and inheritance</b>	Students use an existing class they created in a previous lab and add a toString method to override the Object class' version. Students must explain the relationship between their class and the Object class.	75% of the students will meet or exceed this criterion.  Yes	100% of the students completing the lab met the criterion.	Continue with the current strategy

**CIS 255 Programming Methods I: Java - Spring 2016**

	Benchmark	Criterion Met	Results	Action
SLO 01	Test questions about inheritance, encapsulation, polymorphism.  75% of the students will meet or exceed this criterion.	YES	92% of students answered these test questions correctly.	No action is required
SLO 02	Students design a class hierarchy based on UML class diagrams.  75% of the students will meet or exceed this criterion.	YES	83% of the students met the criterion.	No action is required
SLO 03	Students write an application using multiple classes consisting of 500-700 lines of code.  75% of the students will meet or exceed this criterion.	YES	90% of the students met the criterion.	No action is required

SLO 04	Students design an inheritance hierarchy. 75% of the students will meet or exceed this criterion.	YES	98% of the students completing the lab met the criterion.	No action is required
SLO 05	Students write a program employing various recursive methods. 75% of the students will meet or exceed this criterion.	YES	100% of the students completing the lab met the criterion.	No action is required
SLO 06	Exam question about sorting efficiency 75% of the students will meet or exceed this criterion.	YES	93.75% of the students met the criterion.	No action is required
SLO 07	Students use exception handling in a program performing file I/O. 75% of the students will meet or exceed this criterion.	YES	100% of the students completing the assignment met the criterion.	No action is required
SLO 08	Students create Javadoc comments for a medium-size program consisting of multiple classes. 75% of the students will meet or exceed this criterion.	YES	100% of the students completing the assignment met the criterion.	No action is required

**CIS 278 Programming Methods I: C++ - Spring 2016**

	Benchmark	Criterion Met	Results	Action
SLO 04	This SLO is assessed using a practical exam questions. 75% of the students will meet or exceed this criterion.	YES	91% of students answered these test questions correctly.	No action is required
SLO 05	This SLO is demonstrated with an assigned computer	YES	89% of the students	No action is



	project. 75% of the students will meet or exceed this criterion.		met the criterion.	required
SLO 06	This SLO is measured using a programming project. 75% of the students will meet or exceed this criterion.	YES	92% of the students met the criterion.	No action is required
	NOTE: 01, 02, 03 and 07 complete in 2015			

**CIS 279 Programming Methods II: C++ - DONE**

	Benchmark	Criterion Met	Results	Action
SLO 05	This SLO is assessed by completion of a non-trivial ADT class and application class. 75% of the students will meet or exceed this criterion.	YES	90% of the students met the criterion.	No action is required
SLO 06	This SLO is assessed on Exam 1. 75% of the students will meet or exceed this criterion.	YES	97% of the students met the criterion.	No action is required
SLO 07	Final exam question is used to assess this SLO. 75% of the students will meet or exceed this criterion.	YES	93% of the students met the criterion.	No action is required
	NOTE: 01, 02, 03 , 04 complete in 2015			

## Additional Assessment

ISSUES	PROPOSED SOLUTIONS
Difficult to get SLOs from adjunct faculty.	It is very difficult to get working professional adjuncts to do the SLOs. Thus our listing is incomplete.
Delayed funding for texts of Vets and financial aid students.	Perhaps the college can float these students a short term loan for such things as access to Publishers' Websites.

Life-long learners don't typically regard the grade as important.

The stats for CTE classes are often skewed because of a high percent of life-long learners. Nothing to do for this.

2. Comment on the success rates in the program SLOs that are aligned with specific course SLOs. What do the program SLO and course data reveal about students completing the program? Identify trends and discuss areas in need of improvement. Is the alignment between course and program SLOs appropriate and informative? Describe any additional methods used to assess program SLOs and reflect on the results of those assessments. See [course-to-program SLO alignment mapping](#).

### DEGREE mapping of course SLOs

The CIS department has Objectives and SLOs for A.S. degrees as shown below. The classes SLOs listed above are mapped into the A.S. degree SLOs. **Courses CIS 111, CIS 113, CIS 117, CIS 127, CIS 128, CIS 135, CIS 137, and CIS 380 have newly been added to this SMO mapping.**

#### Technical Competency

1. Apply computer science concepts to design and implement software solutions to problems:

SLO – Students will demonstrate the ability to use computer science concepts and program matching skills to design and implement software solutions to problems.

CIS 111 SLOs 4, 5, 7 -- CIS 113 SLOs 1, 2, 3, 6 -- CIS 114 SLOs 1, 4, 7 -- CIS 117 SLOs 2, 3, 4, 6 -- CIS 127 SLOs 1, 4, 7 -- CIS 128 SLOs 2, 3, 4, 6 -- CIS 135 SLO 6 -- CIS 137 SLO 6 -- CIS 254 SLOs 2, 4, 5 -- CIS 255 SLOs 3, 4 -- CIS 278 SLOs 4, 5 -- CIS 256/279 SLOs 5, 6, 7 -- CIS 380 SLOs 1, 5

2. Use a variety of software tools, operating systems and/or computer languages:

SLO – Students will have the ability to use a variety of software tools, operating systems, and/or computer programming languages.

CIS 111 SLOs 2, 3, 5, 7 -- CIS 113 SLOs 1, 5, 6 -- CIS 114 SLOs 1, 4, 5, 7 -- CIS 117 SLOs 1, 5, 6 -- CIS 127 SLOs 1, 2, 5, 6, 7 -- CIS 128 SLOs 2, 5, 6 -- CIS 135 SLOs 2, 3, 6 -- CIS 137 SLOs 2, 3, 6 -- CIS 254 SLOs 2, 9 -- CIS 255 SLOs 4, 5 -- CIS 278 SLOs 4, 5 -- CIS 256/279 SLOs 5, 7 -- CIS 380 SLOs 1, 4, 5

3. Acquire new technological skills by building upon discipline fundamentals:

SLO—Students will have an understanding of how to obtain information on computer concepts and discipline details. This understanding will provide them with the foundation necessary to pursue further learning.

CIS 110 SLOs 1, 2, 3, 4 -- CIS 111 SLOs 5, 7 -- CIS 113 SLOs 4, 6 -- CIS 114 SLO 7 -- CIS 117 SLOs 5, 6 -- CIS 127 SLOs 2, 3, 5, 6 -- CIS 128 SLOs 1, 6 -- CIS 135 SLOs 3, 4 -- CIS 137 SLOs 3, 4, 5, 6 -- CIS 380 SLOs 4, 5

#### **Interpersonal Skills**

4. Verbally communicate ideas and concepts clearly in an organized manner:

SLO – Students will demonstrate the ability to verbally communicate ideas and concepts clearly and in an organized manner.

CIS 110 SLOs 1, 5, 6 - CIS 255 SLO 8 -- CIS 256/279 SLO 8

5. Write clear system documentation, user documentation and research papers and/or posters:

SLO – Students will demonstrate the ability to write clear system documentation, user documentation, and research papers and/or posters.

CIS 114 SLO 7 -- CIS 254 SLO 5 -- CIS 255 SLO 2, 8 -- CIS 278 SLOs 4, 5 -- CIS 256/279 SLOs 5, 7

6. Work as a team member in a problem solving situation:

SLO – Students will demonstrate the ability to work as a team member in a problem-solving situation.

CIS 111 SLO 7 -- CIS 113 SLOs 5, 6 -- CIS 114 SLO 6 -- CIS 117 SLOs 5, 6 -- CIS 127 SLO 7 -- CIS 128 SLO 6 -- CIS 135 SLOs 5, 6 -- CIS 137 SLOs 5, 6 -- CIS 254 SLO 5 -- CIS 255 SLO 8 -- CIS 256/279 SLO 8 -- CIS 380 SLOs 4, 5

#### Professional Awareness

7. Be aware of their professional responsibilities regarding key ethical issues effecting computer science:

SLO – Student will be aware of key ethical issues affecting computer science and their responsibilities as computer science professionals.

CIS 110 7

3. For any courses in the program that satisfy a GE requirement, which GE SLOs are supported or reinforced by the course SLOs? What do assessment results for the course SLOs (and for the GE SLOs, if available) reveal about student attainment of the GE SLOs? See [GE SLO Alignment Summary Report](#) or [All Courses GE SLO Alignment Data](#).

CIS 110, 125, 135, 254, 255 and 278 satisfy the Communication and Analytical Thinking GE Area E2c. This aligns with the Effective Communication, Quantitative Skills and/or Critical Thinking GE SLOs. Assessment of the course SLOs that align with these GE SLOs indicate that the SLOs have been met.

#### Effective Communication

SLO	Assessment	Action
CIS 110 SLO 4	The average score for this assignment was 87%.	No action required
CIS 125 SLO 5	82% of the students achieved 75% or better.	No action required
CIS 254 SLO 5	100% of the students completing the lab met the criterion.	No action required
CIS 255 SLO 3	87% of the students met the criterion.	No action required

#### Quantitative Skills

SLO	Assessment	Action
CIS 125 SLO 5	82% of the students achieved 75% or better.	No action required
CIS 254 SLO 10	100% of the students completing the lab met the criterion.	No action required
CIS 255 SLO 5	99% of the students met the criterion.	No action required
CIS 278 SLO 8	90% of the students met the criterion.	No action required

#### Critical Thinking

SLO	Assessment	Action
CIS 110 SLO 7	The average score for this assignment was 85%.	No action required

CIS 125 SLO 5	82% of the students achieved 75% or better.	No action required - 2014/15
CIS 254 SLO 10	100% of the students completing the lab met the criterion.	No action required
CIS 255 SLO 8	99% of the students met the criterion.	No action required
CIS 278 SLO 8	88% of the students met the criterion	No action required

## B. Student Success Indicators

1. Review [Student Success and Core Program Indicators](#) and discuss any differences in student success indicators across demographic variables. Also refer to the [College Index](#) and other relevant sections of the [Educational Master Plan: Update, 2012](#), e.g., Student Outcomes and Student Outcomes: Transfer. Basic Skills programs should also refer to [ARCC](#) data.

The overall college success rate has increased by 3% over the past three years. CIS over the past three years has increased its success rate by 2%. While the current success percentage of CIS (66%) still lags behind the college's (72%) the gap is closing at an average of 2-3% a year. The Business/Technology Division success rate has also increased over the past three years. It currently tops the college's at 74%. Retention has remain more or less steady for the college and the division since 2011, hovering around 84-85%. CIS retention remains constant at around 80%.

STUDENT SUCCESS INDICATORS	Academic Year		
	13-14	14-15	15-16
Success %	64%	64%	66%
Retention %	77%	78%	78%
Withdraw	23%	22%	22%

2. Discuss any differences in student success indicators across modes of delivery (on-campus versus distance education). Refer to [Delivery Mode Course Comparison](#).

The college ratio of Distance mode classes to traditional is approximately 50/50. In CIS the ratio is higher with all courses available in the Distance or hybrid mode. All face-to-face and hybrid courses have a heavy web presence. The department's success and retention rates roughly mirror the College numbers in the Distance mode delivery. There are new data this year for courses 255, 256, 278, and 279. Success and retention were slightly lower in the Distance mode, but they still rank high in the college's overall Distance mode rankings.

COURSE	Distance	Traditional

CIS 110 %Success	68	74
%Retention	89	90
CIS 111 %Success	63	---
%Retention	65	---
CIS 113 %Success		No data yet.
%Retention		
CIS 114 %Success	43	---
%Retention	59	---
CIS 117 %Success		No data yet.
CIS 121 %Success	44	---
%Retention	66	---
CIS 125 %Success	44	---
%Retention	64	---
CIS 127 %Success	68	---
%Retention	79	---
CIS 128 %Success		No data yet.
%Retention		
CIS 132 %Success		No data yet.
%Retention		

CIS 151 %Success	66	---
%Retention	79	---
CIS 255 %Success	77	80
%Retention	86	80
CIS 256 %Success	80	88
%Retention	93	92
CIS 278 %Success	70	64
%Retention	78	76
CIS 279 %Success	84	100
%Retention	87	100
CIS 363 %Success	35	---
%Retention	59	---
CIS 379 %Success		No data yet.
%Retention		
CIS 380 %Success	54	---
%Retention	17	---

The overall department's rates are as follows. This represents a 2% increase in the Success rate. Retention and Withdraw has remained stable over the past few years.

STUDENT SUCCESS INDICATORS	Academic Year		
	13-14	14-15	15-16

Success %	64%	64%	66%
Retention %	77%	78%	78%
Withdraw %	23%	22%	22%

### C. Program Efficiency Indicators. Do we deliver programs efficiently given our resources?

Summarize trends in program efficiency as indicated in the [Student Success and Core Program Indicators](#) (LOAD, Full-time and Part-time FTEF, etc.)

In 2015 both the Business/Technology Division and CIS Department LOAD (615) were higher than that of the college's (499). This translates to a division and department increase over the college of 19%. The average class size is over 30.

Since 2014 the College full-time to part-time ratio has decreased 3%. During this same period the CIS ratio has decreased a staggering 15%. This specific drop is largely due to the retirement of Ron Brown. Starting fall 2016 this position was filled by the new hire of Kamran Eftekhari. Unfortunately the department has been operating at a faculty deficit since 2005 with the loss of Cathy Kennedy. During a period of 11 years we lost 4 full-time faculty members: Brown, Grant, Grasso, and Kennedy; and yet only one full-time person was hired, and not until 2016. Because of a pending June 2017 retirement, the College needs to hire two full-time faculty to return to the 2010 faculty level. Faculty paperwork will reflect the request to hire replacements

A full-time faculty shortage requires hiring many more adjunct faculty. This is extremely difficult partly due to the plethora of Bay Area jobs available to an individual with Computer Science degree. Also contributing is the discrepancy in salary between industry and education.

Percent Full-time	2013-2014	2014-2015	2015-2016
	49	58	43

## 3. Career Technical Education

### A. Career Technical Education Data (This information is required by California Ed. Code 78016.)

1. Review the program's available labor market data, as applicable. Here are two relevant links:

- [State Of California Employment Development Department, Labor Market Information Division](#) (the official source for California Labor Market Information)
- [Employment data](#) (by Program Top Code) from the State Chancellor's Office

Explain how the program meets a documented labor market demand without unnecessary duplication of other training programs in the area.

#### Career Technical Education

*"In 2004, the California Community Colleges Chancellor's Office was authorized by the state legislature to design and implement a*

performance measurement system that contained performance indicators for the system and for its colleges. This comprehensive system has become known as "ARCC" (Accountability Reporting for the Community Colleges). In 2007, the first report was published. Today, ARCC provides data for 7 student performance indicators (credit programs) for the system and for individual colleges." -- CSM ARCC Fast Facts

The CSM Fast Facts continues to say that in the *Spring 2012 Report CSM*, in most cases, compared favorably to the state averages on the 7 student performances measured. The Vocational Course Completion, which encompasses 65% of the CIS department courses, shows that CSM is at 78.8%, a 2.1% increase over the state average.

	State Rate	CSM Rate	Difference
Student Progress & Achievement	53.6%	58%	+4.4
Completed 30 or More Units	73.5%	75.2%	+1.7
Fall to Fall Persistence	71.3%	76.5%	+5.2
Vocational Course Completion	76.7%	78.7%	+2.1
Basic Skills Course Completion	62.0%	59.5%	-2.5
ESL Course Improvement	64.6%	52.5%	-12.1
Basic Skills Course Improvement	58.6%	60.2%	+1.6

On the PRIE External Community webpage, there is a document representing the *Top 50 Regional Occupations*. The table below provides a partial listing of the top 50 occupations located in the 5-County Bay Region, consisting of Alameda, Contra Costa, San Mateo, Santa Clara, and San Francisco counties. The occupational data includes the number of jobs in 2011; the projected number of jobs in 2017; the percent growth in jobs 2011 – 2017; and the annual number of openings projected 2011 – 2017; and the average hourly wage in 2012. The top eight occupations with the highest percent change are shown.

Computer Specialists come in eighth for percent of change at 17%. More importantly, the report shows there will be over 8000 annual openings with a high hourly wage of \$46.76. This has prompted the district to organize meetings with the District's computer science faculty. This group is assisted by an external consultant to establish a list of skills a Computer Specialist needs and how the current computer classes map into these skills. The District is also funding the exploration of local businesses to survey their needs in this area.

	Description	2011 Jobs	2017 Jobs	% Change	Annual Openings	2012 Avg Hourly wage



1	Librarians, Curators, and Archivists	6,294	7,878	25%	515	\$29.09
2	Nursing, Psychiatric, and Home Health Aides	37,300	45,345	22%	1,731	\$13.84
3	Life Scientists	14,562	17,507	20%	864	\$46.17
4	Other Personal Care and Service Workers	97,041	114,554	18%	5,199	\$12.12
5	Other Teachers and Instructors	37,452	44,029	18%	1,689	\$22.32
6	Financial Specialists	130,452	152,643	17%	5860	\$38.58
7	Sales Representatives, Services	76,643	89,597	17%	4,275	\$33.68
<b>8</b>	<b>Computer Specialists</b>	<b>182,792</b>	<b>213,453</b>	<b>17%</b>	<b>8,189</b>	<b>\$46.76</b>
...	.....	...	...	...	...	...
50	Primary, Secondary, and Special Education School Teachers	71,859	75,142	5%	2450	\$27.66

2. Summarize student outcomes in terms of degrees and certificates. Identify areas of accomplishment and areas of concern.  
[collegeofsanmateo.edu/institutionalresearch/degcert.asp](http://collegeofsanmateo.edu/institutionalresearch/degcert.asp)

3. Review and update the program's Advisory Committee information. Provide the date of most recent advisory committee meeting.

The CIS Advisory Board meets annually in the spring. The last meeting was April 24, 2014. It is typically well-attended and has the following distinguished members:

Advisory Members	Company
Zach Brown	Hitachi
Tom Burre	Appirio

Greg Doolittle	Apple
Moshe Gotesman	Google
Chris Heckart	IBM
Sandy Jones	Los Medanos College
Stormy Maddox	Information Security Office San Mateo County
William Paoli	Atlassian
Cory Putnam	Intuit
Josephine Wong	Intuit
Ex-Officio Members	
Kathy Ross	Dean Business and Technology
Ron Brown	CIS Faculty (Retired)
Stacey Grasso	CIS Faculty
Melissa Green	CIS Faculty
Zorigt Bazarragchaa	Instructional Aide II/CIS
Martha Tilmann	CIS Faculty
Stanley Isaacs	CIS Faculty (adjunct)

#### 4. Additional Factors

Discuss additional factors as applicable that impact the program, including changes in student populations, state-wide initiatives, transfer requirements, advisory committee recommendations, legal mandates, workforce development and employment opportunities,

community needs. See [Institutional Research](#) as needed.

## **CIS COMPUTER LAB**

The purpose of the CIS Computer Lab is to help CSM students of all backgrounds succeed in their courses. The CIS lab hosts regularly scheduled lab sessions for many CIS courses, and provides support to students enrolled in CIS, Architecture, Drafting, and Engineering courses. In addition, the lab is available so that students enrolled in these courses can complete their assignments and/or their required hour(s) by arrangement. The CIS lab has 43 PCs, 2 printers, and 30 MacBook Pros (obtained through grants in spring and summer 2016). There are also 112 Finch robots available for programming class labs.

CIS students can improve their programming and other skills during scheduled, instructor-led lab sessions. This helps to reinforce material introduced in lecture and allows the opportunity for instructors to ensure that students meet SLOs. CIS, Architecture, Drafting, and Engineering students use specialized software to complete their assignments and/or fulfill their hour by arrangement.

The CIS Computer Lab is now forced to close at 4:30 PM Monday through Thursday because there is no evening lab supervisor. In the past the lab closed at 10:00 PM and, more recently, 8:00 PM. This has created a hardship for many students. The Learning Center no longer supports current CIS software and the Business Lab now closes at 4:30 PM Monday through Thursday. Thus CIS students have nowhere to go after 4:30 PM to work on assignments. Additionally, students from Architecture, Drafting and Engineering who normally use our lab are also NOT accommodated elsewhere and thus cannot complete their work in the evening.

The CIS Computer Lab is available to all CSM students, but priority is given to CIS, Architecture, Drafting, and Engineering students. Four CIS courses and one Engineering course, several with multiple sections, have regularly scheduled lab sessions in the CIS Lab, while an additional twenty-two CIS courses use the CIS Lab.

Two Architecture, four Drafting, and three Engineering courses use the lab on a regular or occasional basis. All CSM students may use the lab, but only students with an account have printing privileges (with a limit of 10 pages). Accounts are created for CIS, Architecture, Drafting and Engineering students. The CIS Computer Lab is also used by the Nursing program for online exams several times per semester. Business students also use the CIS Computer Lab.

By offering this resource and by measuring student learning outcomes, the CIS Computer Lab serves to improve retention in CIS as well as other courses.

The CIS Computer Lab is a vital resource for the students and faculty in this department. Faculty members frequently teach in the lab on a regular basis, as many of the CIS and Engineering courses have lab components. In addition, CIS, Drafting, Engineering and Architecture students use the lab to work on projects and homework in an environment where they can frequently interact with faculty or the instructional aide for assistance. The forced evening closure of the lab has had a deleterious effect on students and faculty alike. There have been numerous student complaints about this closure.

Engineering classes also have regularly scheduled meetings in the lab. Although other departments do not have regularly-scheduled labs, students in Architecture and Drafting classes use the lab to complete assignments and/or the hour(s) by arrangement requirement. Those departments will occasionally reserve the lab for special sessions.

CIS courses (some with multiple sections) that hold regularly scheduled lab sessions in the CIS Computer Lab are CIS 254, 256, 278, and 279.

Other CIS courses with students using the CIS Computer Lab are CIS 110, 111, 113, 114, 117, 121, 125, 127, 128, 132, 133, 135, 137, 140, 151, 363, 364, 379, and 380. Students in the online or hybrid sections of CIS 110, 254, 255, 256, 278, and 279 also use the Computer Lab.

Architecture courses using the Computer Lab are ARCH 120 and 140.

Drafting courses using the Computer Lab are DRAF 110, 111, 121, and 122.

Engineering courses using the Computer Lab are ENGR 100, 210 and 215. ENGR 210 and 215 have regularly-scheduled meetings in the lab.

In addition, the Engineering Club uses the lab for club projects (Arduino, Solidworks) and both Architecture and Engineering students use the lab for individual work on assignments for other classes (e.g. writing up lab reports).

A survey administered to students using the CIS lab in spring 2016 asked the following questions:

Overall, how would you rate the quality of the lab's services you received?

85.2% of students answered that the quality of services was very good to excellent; while 14.8% responded that the quality of services was good.

To what extent did your work in this lab help your academic performance in courses linked to the lab or supported by the lab? 83.3% of students answered that the lab was very helpful. 12.5% of students said that the lab was somewhat helpful. Only one student found the lab not helpful.

When asked about achievement of each of the 12 Computer Lab learning objectives, from 75% to 100% of students responded that they have made major or moderate progress.

Note that students who completed the survey regularly used the computer lab.

**NOTE:** Now that there is not a separate Computer LAB Program Review, it is unclear where that information goes in this Program Review. It is here for now.

\*\*\*\*\*We should also mention the 30 new MacBook Pros we got for the CIS lab from outside grants obtained through the Mobile Apps Consortium and Sandy Jones, the ICT Deputy Sector Navigator.

### Demographics

The CIS student demographics closely mirrors that of the college in the area of Ethnicity. Approximately 27% White (a decrease), 28% Asian (an increase), and 9% Hispanic (a 6% decrease). The dominant college age range is between 20-24 with "19 or less" a close second. Most students at CSM are under the age of 30, just under 80%. CIS has fewer students in the under 30 group and more in the over 50 (14% versus college's 11%). Younger students are found in the fundamental classes that full fill GE requirements, and in the transfer core courses. CIS is substantially different from the college in the area of gender. CSM students are 56% female and 50% male, a near 1 to 1 ratio. In CIS there is 23% female to 74% male. These numbers are similar to the ratio in the computer industry. This reflects a cultural and social bias against women in science and technology.

### Transfer Issues

Somewhere in a CIS Program Review, one would expect to find a discussion on transfer success, but that is not possible because the Business/Technology Division is categorized as 100% CTE. This means, for CIS, Key Indicator columns like "% Transferable" and "% Degree Applicable" come up as 0% for CIS, which is completely inaccurate. CSM has an outstanding transfer core curriculum that is accepted at nearly all of the four year universities students attend when leaving (UC Berkeley being the exception). CSM's CIS transfer program stands stellar in the District. Skyline doesn't offer this curriculum and Canada has a difficult time staying current in the field. Canada students who transfer to CSM in CIS typically arrive underprepared. Categorizing CIS as 100% CTE leads to three issues: all department data is inaccurate and skewed; it does not recognize the CIS faculty for their contributions in this area; finally and perhaps most importantly, it does not give the department tools to assess and improve the curriculum based on real data.

### Generally Speaking

Additional factors that affect the CIS department and students include:

1. Students are often underprepared in the Math/Reading areas, and take courses before they are ready.
2. Non-traditional students may not have attended a college course in many years. It can be difficult for them to establish good study habits and structured learning.
3. The ever-changing nature of CIS requires constant retraining and rethinking of curricula.
4. By design, advanced, more specialized courses are often taught by industry professionals who can offer a 'real world' flavor to the material. The difficulty is finding good technical adjunct willing to teach.
5. All of the department's courses are offered in the distance mode. This requires additional attention and consideration so courses are engaging and taught at the same level as the face-to-face.

## 5. Planning

### A. Results of Program Plans and Actions

Describe results, including measurable outcomes, from plans and actions in recent program reviews.

NOTE: The proposed projected from last year are repeated here. The successful completion of each is recored in the "RESULTS - Fall 2016" sections below.

1. Learn **iOS/Swift Programming** and develop a new **iOS/Swift Programming** online course

#### DESCRIPTION

Swift Programming language is a new programming language for iOS and OS X apps that builds on the best of C and Objective-C, without the constraints of C compatibility. and software environment for statistical computing. Swift is widely used among apple developers and is an essential skill for web developers. A course in this technology will greatly enhance the *Web and Mobile Application Development* AS and certificate offerings in the CIS curriculum. Professional development will be needed to learn Swift and develop a new course was approved in spring 2016.

#### MEASURABLE OUTCOMES

The faculty will have enrolled and completed a course in iOS/Swift Programming. The official Course Outline and supporting materials will have been submitted and approved by COI.

#### RESULTS - Fall 2016 -----

**Last spring 2016 the faculty took CIS 128 *Mobile Web App Development* at CSM and CS 212 *iPhone Programming* at CCSF.**

**CIS 137 *iOS/Swift programming* was approved by COI in fall 2015. Faculty member is teaching this class for the first time in fall 2016.**

2. Develop a new **R Programming** online course to be taught by adjunct faculty

#### DESCRIPTION

R is a programming language and software environment for statistical computing. The R language is widely used among statisticians and data miners for developing statistical software and data analysis. R's popularity has increased substantially in recent years. A course in this technology will greatly enhance the Database Programming Certificate of Specialization in the CIS curriculum.

#### MEASURABLE OUTCOMES

The official Course Outline and supporting materials will have been submitted and approved by COI.

#### RESULTS - Fall 2016 -----

**The course CIS 140 *R Programming for Big Data* was approved by COI in fall 2015 and is currently being taught by Mounjed Moussalem in fall 2016.**

3. Research the development of a "Big Data" Certificate of Specialization.

#### DESCRIPTION

Ninety percent of the world's data has been created in the last two years. Managing and gaining insight of this data is paramount. Big data expands IT's scope of responsibility with new data types, new methods of analysis, new storage and processing platforms. Exploration of topic should determine if it is appropriate to consider for the CIS curriculum. This will be discussed at the annual CIS Advisory Committee meeting.

#### MEASURABLE OUTCOMES

A decision on whether the department should pursue this as a line of study at CSM.

**RESULTS - Fall 2016 -----**

The department has a new *Data Science and Big Data Certificate of Specialization* that was approved by COI in fall 2015 and is currently active as of fall 2016.

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**ADDITIONALLY DEVELOPED a new****DevOps Certificate of Specialization**

The Certificate of Specialization is designed to introduce students to DevOps fundamentals, including the core principles of the DevOps methodology. Students will learn to develop, deploy and maintain applications. They will also learn to use tools and common techniques for configuring and deploying systems. Students will also learn operations, monitoring, testing, security, and Cloud features. Several scripting languages are introduced, as well as UNIX and Linux. In addition, students will learn network services, topologies and protocols.

**There are 17 units in this certificate including two NEW courses**

**CIS 145 Introduction to Dev OPs**

**CIS 133 NoSQL Databases**

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## B. Future Program Plans and Actions

Prioritize the plans to be carried out to sustain and improve student success. Briefly describe each plan and how it supports the [CSM Strategic Goals 2013/14 to 2015/16](#). For each plan, list actions and measurable outcomes. Plans may extend beyond a single year. Describe the professional activities and institutional collaborations that would be most effective in carrying out the program's vision to improve student learning and success.

**FUTURE PLANS**

1. Develop curriculum and Certificate of Specialization for Unmanned Aerial Vehicle (UAV) or also known as DRONES.

**DESCRIPTION**

Develop three one unit courses to train students in the rules, regulations, and computer programming of drones. Unmanned aerial vehicles (UAVs) make up the aerospace industry's most dynamic growth sector. UAV spending is on pace to double during the next decade from current worldwide expenditures. Locally, UAV use is expected rise in areas such as small business (photographers, farmers) and hobbyists. CSM course(s) will be designed to meet the needs of both.

UAV: Foundations (Coverage to include Systems Operations, Robotics Technologies, and Sensing Systems)

UAV: Systems Programming (May be able to use existing Python class.)

**MEASURABLE OUTCOMES**

A new courses submitted to COI in time for the 2017-2018 catalog. Also a Certificate of Specialization submitted to COI. Program to start in fall 2017

2. Develop a Cyber Security curriculum and Certificate (size not yet determined).

**DESCRIPTION**

Research in Cyber Security started spring 2016. It will continue and ultimately end in a series of courses, that feed into layered certificates.

**MEASURABLE OUTCOMES**

While work will continue on this project, there are no "Measurable Outcomes" that can be promised at this time.

3. Research and develop course in the "Internet of Things" (IoT)

## DESCRIPTION

A new course in IoT (Internet of Things). This will involve quite a bit of research and in its final form may be an interdisciplinary course with Electronics.

## MEASURABLE OUTCOMES

While work will start on this project, there are no "Measurable Outcomes" that can be promised at this time.

## 6. Program Maintenance

### A. Course Outline Updates

Review the [course outline update record](#). List the courses that will be updated in the next academic year. For each course that will be updated, provide a faculty contact and the planned submission month. See the [Committee on Instruction](#) website for [course submission instructions](#). Contact your division's [COI representatives](#) if you have questions about submission deadlines. **Career and Technical Education courses must be updated every two years.**

Degrees/Certificates to UPDATE	Faculty Contact	Action	Submission Date
AS: Computer and Information Science	Tilman	No Action	----
AS: Web and Mobile Application Development	Green	No Action	----
AS: Computer Science Applications and Development	Tilman	No Action	----
CA: Web and Mobile Application Development	Green	No Action	----
CA: Computer Science Applications and Development	Tilman	No Action	----
CS: Web and Mobile Application Development (NEW)	Green	No Action	----
CS: Internet Programming	Green	No Action	----
CS: Database Programming (NEW)	Green	No Action	----

CS: C++ Programming	Tilman	No Action	----
CS: Java Programming	Tilman	No Action	----
CS: Data Science and Big Data	Green	No Action	----
CS: DevOps	Green	No Action	NEW

Courses to UPDATE		Faculty Contact	Submission Date
CIS 110	INTRODUCTION TO COMPUTER AND INFORMATION SCIENCE	M.Tilman	YR 16-17
CIS 111	INTRODUCTION TO INTERNET PROGRAMMING	M.Green	YR 16-17
CIS 113	RUBY Programming	M.Green	YR 16-17
CIS 114	JAVASCRIPT/AJAX Programming	M.Green	YR 16-17
CIS 117	PYTHON Programming	M.Green	YR 16-17
CIS 121	UNIX/LINUX	M.Tilman	YR 16-17
CIS 125	VISUAL BASIC I	M.Tilman	YR 16-17
CIS 127	HTML5 and CSS	M.Green	YR 16-17
CIS 128	MOBILE WEB APP DEVELOPMENT	M.Green	YR 16-17
CIS 132	INTRODUCTION TO DATABASES	M.Green	YR 16-17
CIS 151	NETWORKS AND DIGITAL COMMUNICATION	M.Tilman	YR 16-17
CIS 278	(CS1) PROGRAMMING METHODS C++	M.Tilman	YR 16-17
		M.Green	YR 16-17



CIS 363	ENTERPRISE DATABASE MANAGEMENT WITH MySQL		
CIS 379	XML	M.Green	YR 16-17
CIS 420	PROJECT MANAGEMENT	M.Tilmann	YR 16-17
CIS 479	NETWORK SECURITY FUNDAMENTALS	M.Tilmann	YR 16-17
CIS 489	COMPUTER FORENSICS	R.Brown	YR 16-17
CIS 490	COMPUTER FORENSICS: NETWORK ANALYSIS AND DEFENSE	R.Brown	YR 16-17
CIS 491	COMPUTER FORENSICS: SEARCH AND SEIZURE	R.Brown	YR 16-17
CIS 492	COMPUTER FORENSICS: WHITE COLAR CRIME	R.Brown	YR 16-17

## B. Website Review

Review the program's website(s) annually and update as needed.

The CIS website was last updated September 2016.

Faculty contact(s)	Date of next review/update
Melissa Green (Faculty Advisor)	Ongoing
David Chin (Department input person)	Updated as needed.

## C. SLO Assessment Contacts

Faculty contact(s)	Date of next review/update

Melissa Green	Spring 17, Ongoing
Kamran Eftekhari	Spring 17, Ongoing
Martha Tilmann	Spring 17
Jennifer Taylor-Mendoza, Dean, Academic Support	Ongoing

## 7. Dominant Themes Summary for IPC

Briefly summarize the dominant, most important themes or trends contained in this program review, for division deans to collect and forward to the Institutional Planning Committee. What are the key program issues that matter most? (Brief paragraph or bullet points acceptable).

### KEY POINTS

1. Since 2010 the department has operated at 75% full-time faculty. This level will fall to 50% if TWO full-time faculty are not hired spring of 2017.

2010	2010-16	2016-17	2017-18
- Ron Brown	- Stacey Grasso	- Kamran Eftekhari	- Kamran Eftekhari
- Stacey Grasso	- Melissa Green	- Melissa Green	- Melissa Green
- Melissa Green	- Martha Tilmann	- Martha Tilmann	??
- Martha Tilmann			??

2. There are three new programs under consideration: CyberSecuriy, Unmanned Aerial Vehicles (UAV) Programming, and Internet of Things (IoT)

3. Hiring adjuncts continues to be difficult.