

**CALIFORNIA STATE UNIVERSITY, CHICO**  
**ANNUAL PROGRAM ASSESSMENT REPORT**

March 29, 2021

**I. Assessment of Student Learning Outcomes**

**1. Program Name and Contact Information of Program Assessment Coordinator:**

B.S. in Computer Science

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**2. Student Learning Outcomes**

<https://www.csuchico.edu/csci/programs/bs-compsci.shtml> (needs to be updated!)

<https://www.csuchico.edu/ecc/program-portfolio/bs-csci/index.shtml> (needs to be updated!)

See <http://bit.ly/csci-cins-assessment-plan> for the latest information ...

**3. Course Alignment Matrix:**

<https://www.csuchico.edu/ecc/program-portfolio/bs-csci/bs-csci-matrix.pdf> (needs to be updated!)

See <http://bit.ly/csci-cins-assessment-plan> for the latest information ...

**4. What is your current Assessment Plan**

We follow a three-semester assessment cycle where half our student learning outcomes are assessed in the first semester, the other half on the second semester, and the third semester is used to focus on evaluation and to implement any changes. We follow an assess-evaluate-change cycle so we can quickly measure the impact of any potential assessment-driven changes we make to our curriculum.

For AY 2019-2020, we gathered embedded assessment data only in Spring 2020 per our Assessment Plan.

See <http://bit.ly/csci-cins-assessment-plan> for additional information.

**5. Learning Outcome(s) Assessed in AY 2019-2020:**

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.

## 6. Assessment Methodology Used:

We triangulate results from multiple direct and indirect assessment methods (identified below) to get meaningful measures of how well our students attain our student outcomes. We use a department-approved threshold of 70% to determine attainment for all outcomes. Sample sizes are always noted and whenever possible we keep track of the number of students from the sample who achieved the 70% benchmark or better.

### Embedded Assessment (Spring 2020 collection only)

- The program has an updated course alignment matrix that indicates which courses we gather embedded assessment data from. Our student outcomes are further divided into *performance indicators* to facilitate any potential actions for curricular changes. These performance indicators are associated with a particular artifact or deliverable in a course. The [ACM CS2013](#) learning outcomes were used to select potential performance indicators for the student outcome(s).
- A Google Form (see <http://bit.ly/embed-2020s>) was used to gather embedded assessment data from faculty. Data gathered includes the raw scores from participating students and the maximum possible score for the deliverable/activity so the scores can be normalized. Input to the forms were collected and are used as a data source for a dashboard (see <http://bit.ly/csci-cins-assessment-data>) designed to facilitate faculty conversations on potential curricular changes based on this data.

### Major Field Test (MFT) in Computer Science

- 60 CSCI majors took the MFT in Computer Science in AY 2019-2020. Our institutional mean total score was 152 – based on the 2020 Comparative Data Guide for the MFT in Computer Science, this translates to 75 percentile over all 200 institutions that took the test.
- The three (3) MFT assessment indicators were used as follows:

Assessment Indicator	Student Outcome
1: Programming and Software Engineering	2: Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
2: Discrete Structures and Algorithms	1: Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
3: Systems - Architecture/OS/Networking/Database	2: Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.

The Comparative Data Guide for the MFT form used last academic year was used to determine our students' aggregate performance relative to the performance of students around the country overall.

### ECC Graduating Senior Survey

- 50 CSCI majors took our ECC Graduating Senior Survey in AY 2019-2020 (39 in Fall and 11 in Spring).
- This survey's section on the self-reporting of students' perceptions of their level of attainment of student outcomes is still based on the prior (pre-2019) list of ABET CAC/EAC student outcomes. Since our process has transitioned to the new ABET CAC student outcomes, a mapping from the prior outcomes to the current outcomes was used to interpret this year's survey data. See <http://bit.ly/ABET-CAC-student-outcomes>
- The survey questions that pertain to this report are the major-specific questions regarding student outcomes. These are identified as Question IDs 129 a through k in the survey instrument.

## 7. Assessment Results:

Our annual assessment results are summarized here: <http://bit.ly/csci-cins-assessment-data>

According to CRA Job #654, in AY 2019-20 we had 416 CSCI majors.

*Table 1: B.S. in Computer Science assessment data sources for 2019-2020.*

Student Learning Outcome	Sample size	Measure	Students Meeting Benchmark
1: Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.	n=38 from CSCI 311	Project 1: implement Quick sort, Insertion sort and Selection sort algorithms for (1) sorting suffixes of a given string using the three algorithms, and (2) finding the k-th smallest suffix of a given string.	94.7% (36/38)
	n=64 from CSCI 550	Project 1: implement Camerini's divide-and-conquer algorithm that finds a minimum bottleneck spanning tree of a given graph in linear time.	100.0% (64/64)
	n=45 from CSCI 580	Given a particular application domain, determine which one of Simple K-Means or Hierarchical Clustering is a better approach to cluster a given dataset to discover unknowns about the data.	95.6% (43/45)
	n=2 from CSCI 490	Relevant project code for capstone project, supplemented by status meetings during the construction of the deliverable.	100.0% (2/2)
	n=33 from CSCI 490	Semester long individual capstone software project.	<b>66.7%</b> (22/33)
	n=60	MFT in Computer Science, Discrete Structures and Algorithms (47)	74.0% national percentile
	n=50	ECC Graduating Senior Survey, 129a (Apply knowledge of computing and mathematics at a level appropriate to the Computer Science discipline) indicating Very Prepared or Prepared	88.0% (44/50)
	n=50	ECC Graduating Senior Survey, 129b (Analyze a problem, and identify and define the computing requirements appropriate to its solution) indicating Very Prepared or Prepared	92.0% (46/50)
2: Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.	n=60	MFT in Computer Science, Programming and Software Engineering (57)	74.0% national percentile
	n=60	MFT in Computer Science, Systems: Architecture/Operating Systems/Networking/Database (46)	76.0% national percentile
	n=50	ECC Graduating Senior Survey, 129c (Design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs) indicating Very Prepared or Prepared	88.0% (44/50)
	n=50	ECC Graduating Senior Survey, 129i (Use current techniques, skills, and tools necessary for computing practice) indicating Very Prepared or Prepared	90.0% (45/50)
3: Communicate effectively in a variety of professional contexts.	n=48 from CSCI 301	Group assignment simulating the charge of advising the U.S. government as to what should be done and who should be in charge of	100.0% (48/48)

Student Learning Outcome	Sample size	Measure	Students Meeting Benchmark
		our Nation's Cyber Security and presenting their findings and recommendations.	
	n=1 from CSCI 490	Project presentation.	100.0% (1/1)
	n=2 from CSCI 490	Students deliver a presentation of their capstone project as well a conference-style poster.	100.0% (2/2)
	n=33 from CSCI 490	Final project presentation. It included: written slides of the project and an oral discussion and a demonstration of the software.	75.8% (25/33)
	n=50	ECC Graduating Senior Survey, 129f (Communicate effectively with a range of audiences) indicating Very Prepared or Prepared	80% (40/50)
4: Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.	n=55 from CSCI 580	Personal Review of "Healed through A.I. - The Age of A.I.," S1 E2 (Dec 2019).	100.0% (55/55)
	n=50	ECC Graduating Senior Survey, 129e (Understand professional, ethical, legal, security and social issues and responsibilities) indicating Very Prepared or Prepared	72.0% (36/50)
	n=50	ECC Graduating Senior Survey, 129g (Analyze the local and global impact of computing on individuals, organizations, and society) indicating Very Prepared or Prepared	<b>66.0%</b> (33/50)
	n=50	ECC Graduating Senior Survey, 129h (Recognize the need for and an ability to engage in continuing professional development) indicating Very Prepared or Prepared	84.0% (42/50)
5: Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.	n=18 from CINS 370	Project Contribution level - as observed during labs, indicated in peer evaluations, and explicit by lack of self-evaluation submissions.	94.4% (17/18)
	n=50	ECC Graduating Senior Survey, 129d (Function effectively on teams to accomplish a common goal) indicating Very Prepared or Prepared	84.0% (42/50)
6: Apply computer science theory and software development fundamentals to produce computing-based solutions. [CS]	n=50	ECC Graduating Senior Survey, 129j (Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices) indicating Very Prepared or Prepared	84.0% (42/50)
	n=50	ECC Graduating Senior Survey, 129k (An ability to apply design and development principles in the construction of software systems of varying complexity) indicating Very Prepared or Prepared	80.0% (40/50)

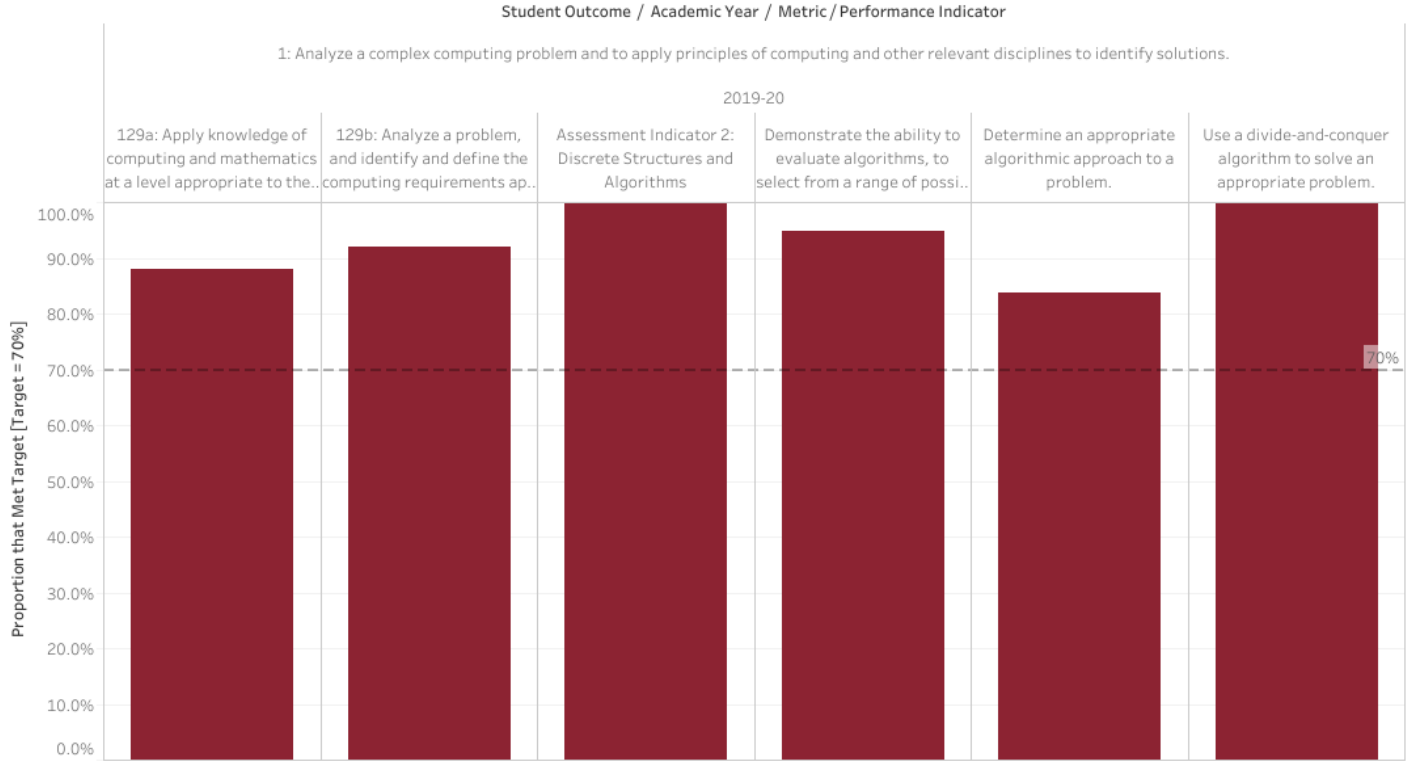
Program  
Computer Science, B.S.

Academic Year  
2019-20

Student Outcome  
1: Analyze a complex computing problem and to apply principles of computing and ot..

Assessment Method  
All

Results by Performance Indicator associated with a Student Outcome



Program  
Computer Science, B.S.

**Instructions:** Use the filters above the charts to set your viewing parameters. Hover your mouse over a column label/title to see the full information on that label/title. Hovering over each bar provides additional information on that outcome or indicator - data sources indicated by an "\*" mean multiple courses were used as a data source. The 70% reference line represents the department-approved benchmark for attainment of student outcomes.

Figure 1: Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

There appear to be a potential issue with student outcome 1 based on a direct assessment data source presented in Table 1. This is not evident in Figure 1 above due to CSCI 580 and the other section of CSCI 490 being additional direct assessment data sources that use the same performance indicator.

This appears to be a function of class size. The faculty need to re-evaluate how it assigns CSCI/CINS 490 senior capstone projects.

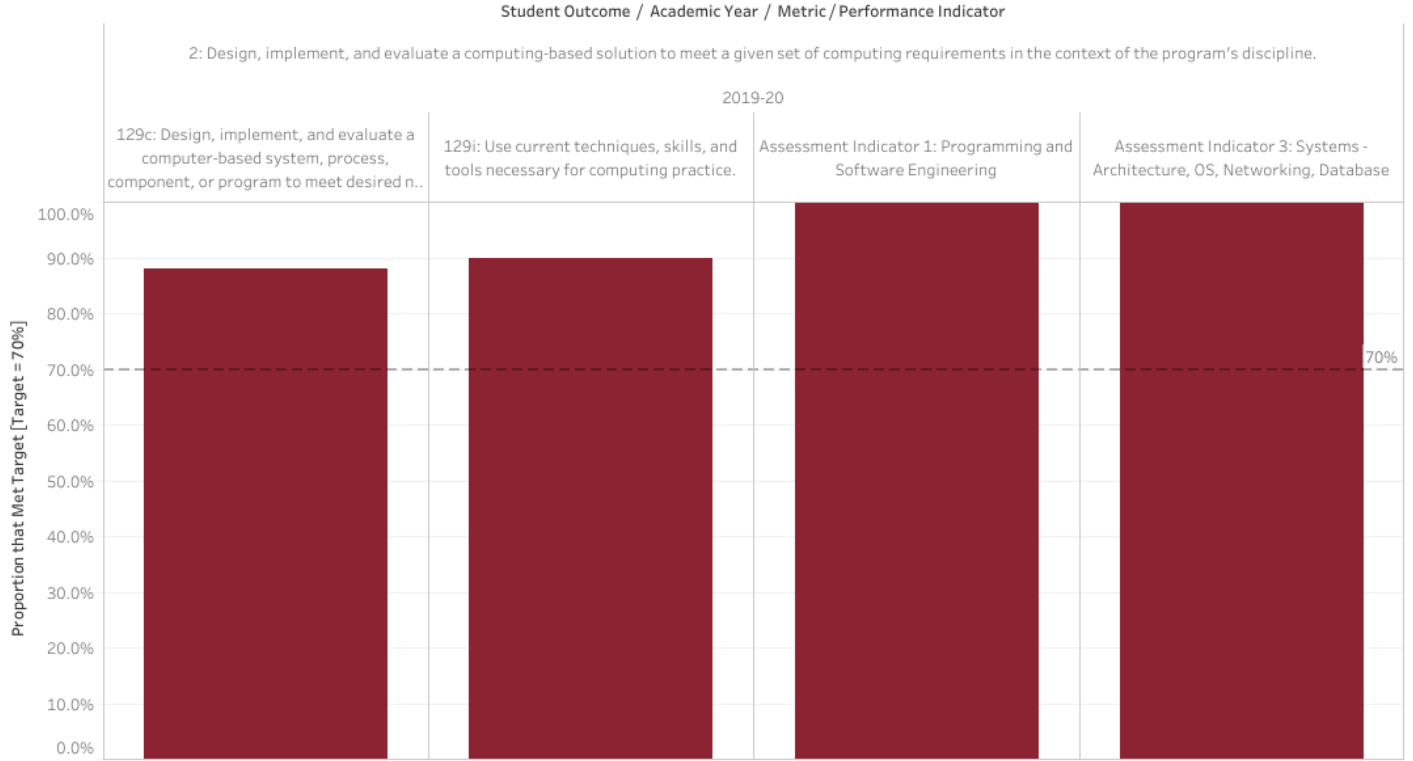
Program  
Computer Science, B.S.

Academic Year  
2019-20

Student Outcome  
2: Design, implement, and evaluate a computing-based solution to meet a given set ..

Assessment Method  
All

Results by Performance Indicator associated with a Student Outcome



Program  
Computer Science, B.S.

**Instructions:** Use the filters above the charts to set your viewing parameters. Hover your mouse over a column label/title to see the full information on that label/title. Hovering over each bar provides additional information on that outcome or indicator - data sources indicated by an "\*" mean multiple courses were used as a data source. The 70% reference line represents the department-approved benchmark for attainment of student outcomes.

Figure 2: Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.

There does not appear to be any potential issues to address with student outcome 2.

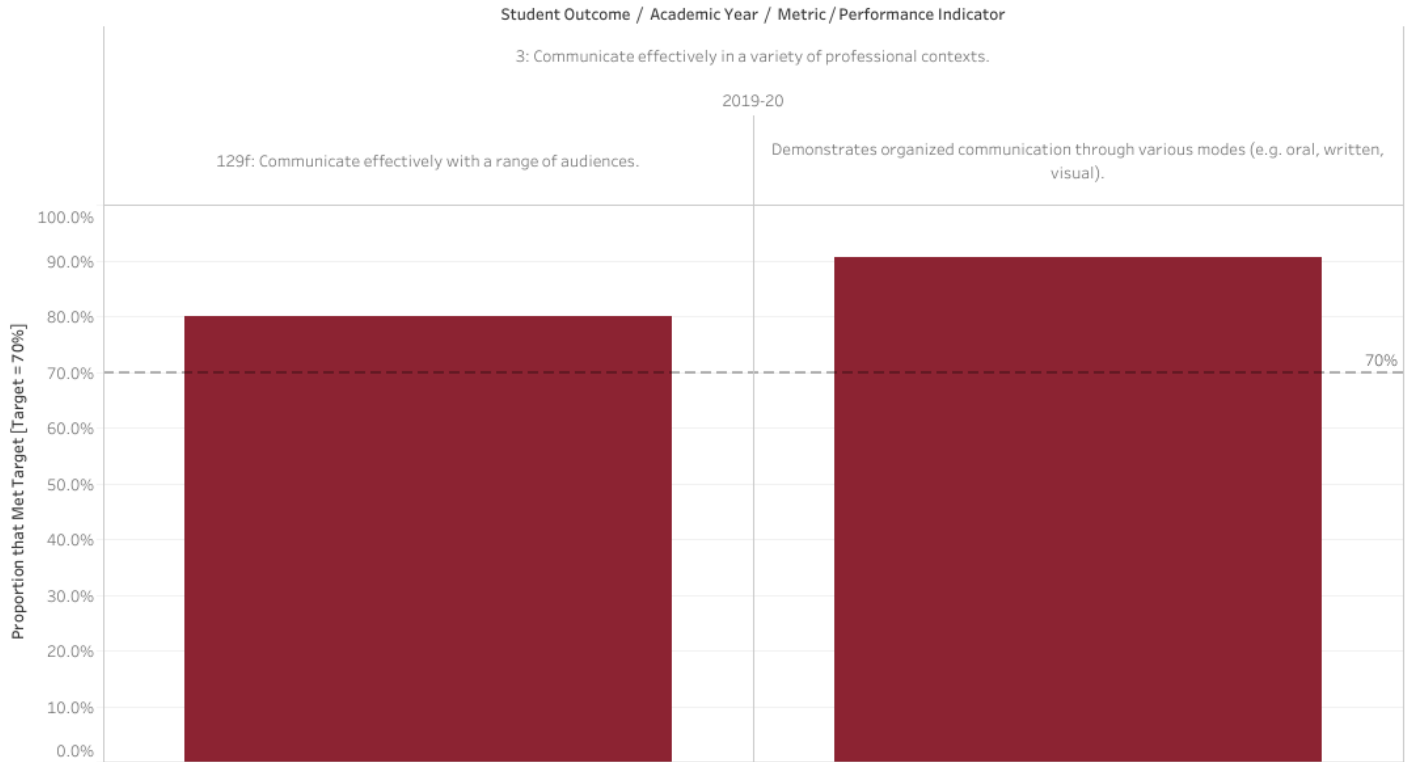
Program  
Computer Science, B.S.

Academic Year  
2019-20

Student Outcome  
3: Communicate effectively in a variety of professional contexts.

Assessment Method  
All

Results by Performance Indicator associated with a Student Outcome



Program  
Computer Science, B.S.

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Figure 3: Communicate effectively in a variety of professional contexts.

There does not appear to be any potential issues to address with student outcome 3.

The faculty will review the *ECC Graduating Senior Survey Supplemental/Major-specific* question 129f as to whether it should be broken up into two separate questions: one to address oral, and the other written, communication.

Program  
Computer Science, B.S.

Academic Year  
2019-20

Student Outcome  
4: Recognize professional responsibilities and make informed judgments in computi..

Assessment Method  
All

Results by Performance Indicator associated with a Student Outcome

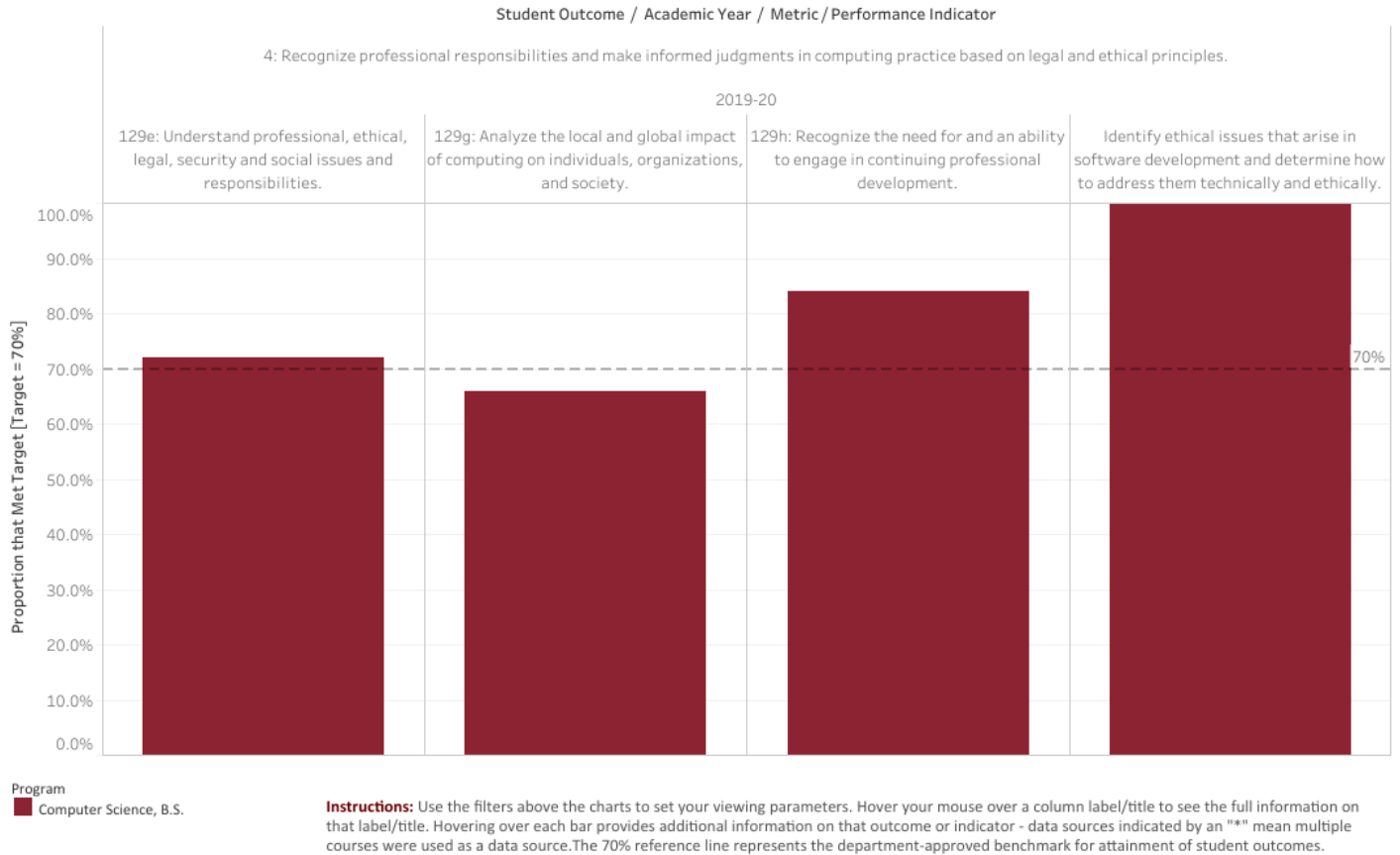


Figure 4: Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.

There appear to be a potential issue with student outcome 4 based on an indirect assessment data source: our ECC Graduating Senior Survey supplemental question 129g. This is an indication of our students' perception on how well they feel they can analyze local and global impacts of computing. Note the difference between this result (second from the left bar) and the direct assessment result (rightmost bar) in Figure 4 above.

The faculty will carefully consider and review where and how our CSCI majors are getting exposure/training on analyzing local and global impacts of computing.



Program  
Computer Science, B.S.

Academic Year  
2019-20

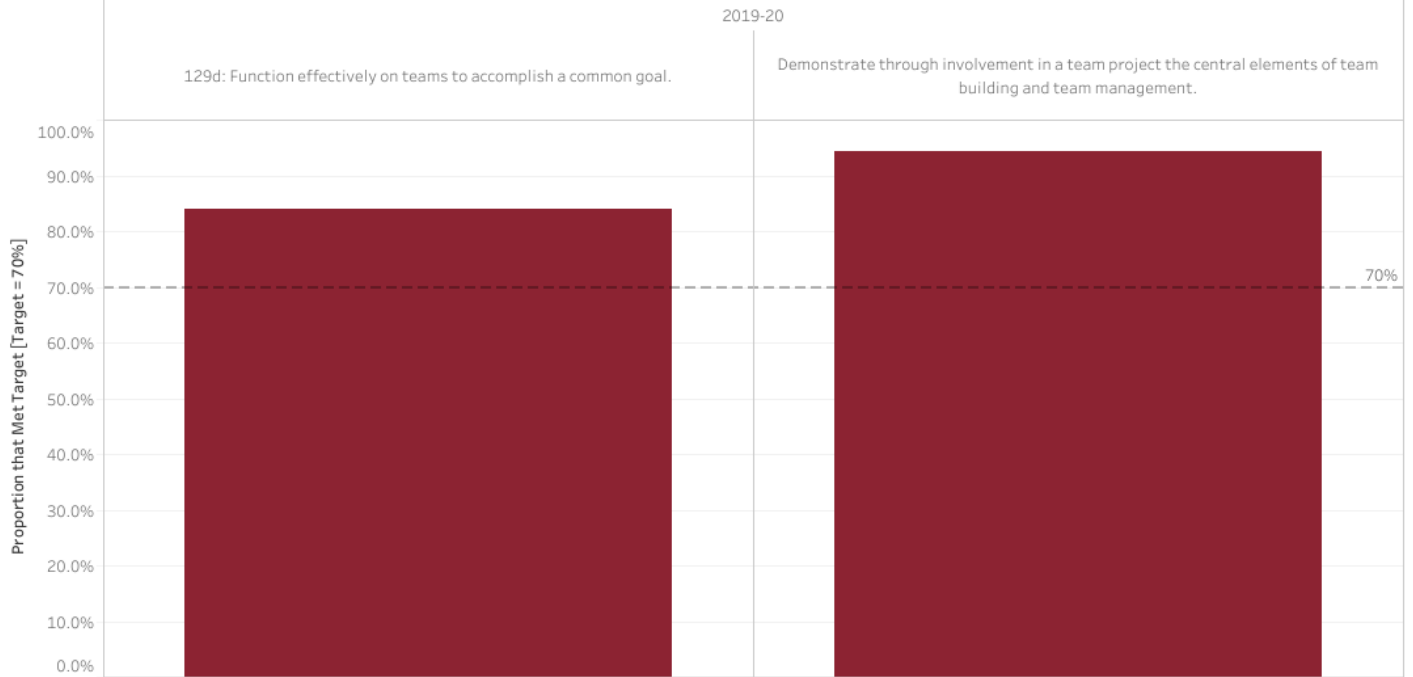
Student Outcome  
5: Function effectively as a member or leader of a team engaged in activities approp..

Assessment Method  
All

Results by Performance Indicator associated with a Student Outcome

Student Outcome / Academic Year / Metric / Performance Indicator

5: Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.



Program  
Computer Science, B.S.

**Instructions:** Use the filters above the charts to set your viewing parameters. Hover your mouse over a column label/title to see the full information on that label/title. Hovering over each bar provides additional information on that outcome or indicator - data sources indicated by an "\*" mean multiple courses were used as a data source. The 70% reference line represents the department-approved benchmark for attainment of student outcomes.

Figure 5: Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.

There does not appear to be any potential issues to address with student outcome 5.

Program  
Computer Science, B.S.

Academic Year  
2019-20

Student Outcome  
6: Apply computer science theory and software development fundamentals to produ.. All

Assessment Method  
All

Results by Performance Indicator associated with a Student Outcome

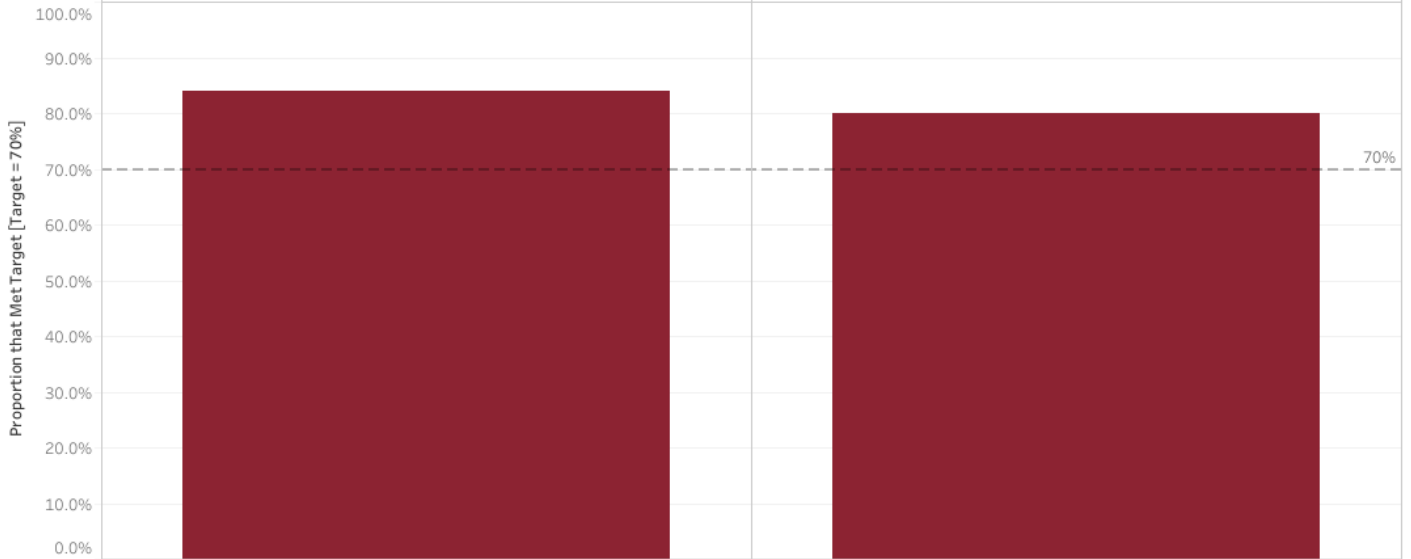
Student Outcome / Academic Year / Metric / Performance Indicator

6: Apply computer science theory and software development fundamentals to produce computing-based solutions. [CS]

2019-20

129j: Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.

129k: An ability to apply design and development principles in the construction of software systems of varying complexity.



Program  
Computer Science, B.S.

**Instructions:** Use the filters above the charts to set your viewing parameters. Hover your mouse over a column label/title to see the full information on that label/title. Hovering over each bar provides additional information on that outcome or indicator - data sources indicated by an "\*" mean multiple courses were used as a data source. The 70% reference line represents the department-approved benchmark for attainment of student outcomes.

Figure 6: Apply computer science theory and software development fundamentals to produce computing-based solutions.

There does not appear to be any potential issues to address with student outcome 6.

## 8. Analysis / Interpretation / Dissemination of Results

Our annual assessment results (see <http://bit.ly/csci-cins-assessment-data>) are available online and are shared with the faculty after the Assessment Committee has reviewed it and confirmed its accuracy. Draft annual program assessment reports (*i.e.* APASU and APAR) are shared with faculty to give them ample time to digest the information before the results are discussed at a department meeting. The faculty discuss and agree to any curricular adjustments that should be considered based on our annual program assessment results. The faculty vote to accept the annual program assessment reports before they are submitted.

All department assessment data and reports are stored in a shared folder in Box for department faculty access. The College of ECC maintains all prior annual program assessment reports submitted to campus in the [ECC-Shared](#) folder called [Program Improvement Reports](#) in Box.

## 9. Closing the Loop: Planned Program Improvement Actions

### a) Planned curriculum changes for improved learning outcomes.

The faculty will carefully consider and review where and how our CSCI majors are getting exposure/training on analyzing local and global impacts of computing.

### b) Planned Revision of Measures or Metrics (if applicable)

The faculty will review the ECC Graduating Senior Survey Supplemental/Major-specific question 129f as to whether it should be broken up into two separate questions: one to address oral, and the other written, communication.

### c) Planned Revisions to Program Objectives or Learning Outcomes (if applicable)

None.

### d) Changes to Assessment Schedule (if applicable)

The faculty is considering a move from a 3-semester cycle to a 2-year cycle, effective Fall 2021, so it can invest more time in the evaluation process.

## 10. Information for Next Year

We are evaluating assessment results and implementing any potential curricular changes in the Fall 2021 semester. Our assessment data gathering schedule will resume in Fall 2021.

See <http://bit.ly/csci-cins-assessment-plan> for additional information.

## II. Appendices (please include any of the following that are applicable to your program)

### A. Assessment Data Summaries (Details that elaborate on item 6, above.)

- The 2019-2020 ABET Computing Accreditation Commission (CAC) criteria is available online at <https://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-computing-programs-2019-2020/>

### B. Measurement Instruments (Rubrics, Surveys, etc.)

- A copy of the [Spring 2020 version](#) of the ECC Graduating Senior Survey is available from the [ECC-Shared](#) folder called [Graduating Senior Survey](#) in Box.
- Our online embedded assessment data submission form for Spring 2020 is available here: <http://bit.ly/embed-2020s>