

Oklahoma City Community College

Program Review Self-Study Year: FY 2018	
Division of Business and Information Technology	
Computer Science: Associate in Science (106) Options : Management Information System (106I) Computer Science Option-Transferring to UCO and Colleges with similar patterns (106B) Software Development-Transferring to OU (106D)	
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I. Introduction

This section should reference the general process of the review and any unique features of the review (such as the use of outside consultants or conducting the review in relation to an accreditation visit).

If the program has been reviewed previously, this section should include a brief summary of prior recommendations and how they were addressed.

The Computer Science AS programs had last completed this review in 2012. In November 2015, OCCC was re-designated by DHS/NSA as a National Center for Academic Excellence in Cyber Defense Education (CAE2Y) for the period of 2016-2021.

Some of the concerns that were highlighted in the last review process by external reviewers were concerns related to difficulty hiring faculty related to inequitable salaries compared to industry/business and the proximity to retirement for a large portion of the faculty. Students have some difficulty obtaining class materials as early in the semester as would be optimal related to financial assistance availability.

The concern regarding the difficulty of hiring faculty and staff was addressed by advertising the openings in more places, including online job sites; the program explored other ways to encourage qualified applicants to consider OCCC and refined the job description to attract a larger pool of applicants.

From the positions that have been advertised in the last five years, there were only 2 successful searches while the number of candidates may have increased slightly. The program faculty believe the salary is the core problem due to disparity with IT market salaries. In the past 5 years, there have been 4 retirements, and only 2 positions have been filled.

Another concern was that some students faced difficulty obtaining class materials early in the semester. The program encourages students to enroll early and apply for Financial Aid earlier. This would help them purchase the required material before the start of the semester. There are copies of the textbook available for reference in the Library and Student Computer Center before the start of the semester. There are agreements with the book publishers to allow the students to have a trial code for the first 2 weeks of class, by which time they should be able to purchase their student code that is required for the class.

A concern that was brought about internally was that faculty did not receive notification of the withdrawal of students. After it was brought to the attention of the concerned staff, the faculty now receive email notification when students are added and withdrawn from a section.

Training of the staff of the Student Computer Center was another concern. A few of the staff join the class as audit students to maintain proficiency. In the present, the number of staff in the Student Computer Center is not sufficient for them to be able to allow a student to audit classes.

A secure testing environment in the Student Computer Center was another concern. It is a proud accomplishment that there is now a Testing Lab, which offers students a quiet and secure place to test. The Testing Lab is monitored by camera in addition to Student Computer Center staff.

II. Executive Summary

The Executive Summary will include the program's connection to the institution's mission, program objectives, and the strengths and areas for improvement of the program. It will also include the key findings and recommendations of the internal or external reviews with regard to the Program Review Principles and Program Review Criteria.

The CS Associate in Science programs continue to fit well with the college's mission of providing education and training leading directly to employment in the field. The faculty members of the Computer Science department believe that the continued development and implementation of the AS programs are integral parts for the growth and purpose of the college. The program exists to serve the educational and career needs of the citizens and employers in the community. The Computer Science faculty have the responsibility to assure employers that they are getting potential employees who are detail-oriented, competent, creative, eager to solve problems, and dedicated to staying current in the field. The ultimate responsibility is to assist students in growing and learning as unique individuals, active citizens of the community, and as competent computer professionals. Strengths include the faculty working to keep the program at the highest level of performance; hardware and software in the labs are current and comparable to what the students will use in the workforce after graduation. Full-time and adjunct faculty all strive to provide an excellent learning environment for students. Other strengths include the Student Computer Center, the Testing Lab, the Network Lab, class offerings in multiple formats on campus and online, support from the college, and credit for IT Industry Certifications. Program strength is supported by the recognition of the program as a National Center of Academic Excellence in Information Assurance. Relationships with other four-year institutions promote easy and seamless transfer for additional education.

The department is still challenged with hiring qualified faculty. Other concerns relate to limited recruitment and promotion efforts to attract future students, better contact with alumni and their employers, obtaining required materials for class by the current students, continued training of Student Computer Center staff, and replacement of hardware in a timely manner.

The curriculum of three options of the Associate in Science in Computer Science was updated by removing the faculty approval requirement on the selection of the humanities electives.

In spring 2015, the department proposed a new option code for the Computer Science AS degree transferring to the OU program, along with the new option name "Software Development." In that year's curriculum, the Computer Science AS degree transferring to the OU program and the Computer Science AS degree transferring to the UCO program share one option code, but they had always been treated as two different programs since the late 1990s.

There is regular communication with local four-year schools like OU, UCO, and OSU-IT to help direct students in the AS degree path for easier transfer of courses taken at OCCC.

III. Analysis & Assessment

This section will include a complete review and analysis of the Program Review Criteria based on the internal or external team's review. It will also assess developments since the last program review in the context of the current recommendations of the internal review and any recommendations.

A. Centrality of the Program to the Institution's Mission

An assessment and written analysis as to the centrality of the program to the institution's mission and in the context of the institution's academic plan are required. The purpose of the mission of an institution is to indicate the direction in which the institution is going now and in the future. The mission defines the fundamental reason for the existence of the institution.

Together with the planning principles and goal statements, the mission reveals the philosophical stance of the institution with respect to education and learning while at the same time providing a framework for the maintenance of institutional integrity and development.

Describe how the program is central to the institution's mission:

The faculty of the Computer Science department believe that the continued development and implementation of the program is an integral part of the growth and purpose of the college. The computer science program at OCCC provides high-quality education to students who wish to continue their education at four-year institutions. The program exists to serve the educational and career needs of the citizens and employers in the community.

B. Vitality of the Program

Vitality of the program refers to the activities and arrangements for insuring its continuing effectiveness and efficiency. To maintain its vitality and relevance, a program must plan for the continuous evaluation of its goals, clientele served, educational experiences offered, educational methods employed, including the effective incorporation of technology, and the use of its resources. This vital principle or force can best be observed by examining the past and present initiatives to insure the vitality of the faculty, students, and program.

1. List Program Objectives and Goals

Students will successfully complete a common core of at least one class in each of the following categories: Beginning Programming with a grade of C or higher, Programming Language with a grade of C or higher, and an advanced level math course. Students will complete 62 credit hours.

2. Quality Indicators

Quality indicators may vary by institutional mission; however, institutions should measure the efforts and quality of their programs by: faculty quality, ability of students, achievements of graduates of the program, curriculum, library, access to information technology resources including efficiencies and improved learner outcomes through appropriate use of this technology and appropriate use of instructional technology to achieve educational objectives, special services provided to the students and/or community, and other critical services.

As appropriate, institutions should evaluate the program against industry or professional standards utilizing internal or external review processes. Institutions must provide specific documentation of student achievement. Such documentation should include program outcomes assessment data consistent with the State Regents' *Assessment Policy*. Program quality may also be reflected by its regional or national reputation, faculty qualifications, and the documented achievements of the graduates of the programs. This includes a program self-review that provides evidence of student learning and teaching effectiveness that demonstrates it is fulfilling its educational mission and how it relates to Higher Learning Commission Criteria and Components listed below:

- a. The program's goals for student learning outcomes are clearly stated for each educational program and make effective assessment possible. List of the student learning outcomes.

1. Students will be able to use the proper control structure to solve a process. (FY 14)
2. Students will be able to subdivide a complex problem into appropriate program modules, with parameter passing. (FY15)
3. Students will be able to perform input/output processing involving creation and modification of files. (FY16)
4. Students will be able to write object-oriented programs. (FY12)
5. Students will be able to perform necessary operations to compile and execute programs. (FY13)

Well-defined criteria for measurement and how the criteria were used in the program.

Outcome 1: Students in CS 1143 – Beginning Programming will be assessed on their understanding of the use of a For or a While statement when a loop is required. The “Algorithm Design and Programming” question from Test 2 will be used to assess this criterion. The loop control structure assessment verifies a student’s ability to recognize the need for a particular control structure, their knowledge of the loop control structure, and their ability to apply it correctly. At least 70% of students assessed will perform at an acceptable level (70%) or higher on the assessment.

Outcome 2: Students in CS 1143 – Beginning Programming will be assessed on a homework set in which students will write two complex programs, each with multiple functions and parameters passed by both value and reference. At least 70% of the students assessed will demonstrate understanding by scoring 70% or more on the measured competency.

Outcome 3: Students in CS 2163 - Java will be assessed on their performance on a given problem requiring them to be able to write object-oriented programs. At least 70% of assessed students will perform at least a 70% level on the assessment.

Outcome 4: Students in CS 2453 - Visual Basic will be assessed on their performance on a given problem requiring them to write an object-oriented program.
Students in CS 2163 - Java will be assessed on their performance on a class assignment requiring the use of object-oriented programming.
At least 70% of assessed students will perform at a minimum of 70% level on the assessment.

Outcome 5: Students in CS 1143 – Beginning Programming will be assessed on their performance on problems requiring necessary operations to compile and execute programs. At least 70% of the students assessed will demonstrate understanding by scoring 70% or more on the measured competency.

The evaluation, results, and recommendations based upon the criteria used.

Outcome 1: 238 students in all sections of CS 1143 were assessed. 71% (170) students assessed demonstrated proficiency by scoring 70% or more on the measured competency. Test 2 is followed by eight more weeks of instruction, which reinforces the three control structures introduced in CS 1143. The assessment is used as an early measure of the students' understanding of the most complex control structure. Instructors can then adjust class pacing to allow control structure remediation.

Outcome 2: 126 students in all sections of CS 1143 were assessed. 80% (158) students assessed demonstrated proficiency by scoring 70% or more on the measured competency. As the outcomes were satisfactory, faculty will continue to use the same successful teaching methods in class to ensure that students continue to meet or exceed the agreed upon metrics.

Outcome 3: 109 students in CS 2163 were assessed. 76.1% (83) of the students assessed demonstrated proficiency by scoring 70% or more on the measured competency. The result shows that the current approach of teaching students to write objected-oriented programs is working well, and faculty will continue to use the same successful teaching methods in class to ensure that students continue to meet or exceed the agreed upon metrics.

Outcome 4: 25 students in CS 2453 were assessed. 76% (19) of the students assessed demonstrated proficiency by scoring 70% or more on the measured competency. Since the last time this measure was assessed, the percentage of students demonstrating proficiency is on the rise. After the last time of measurement, the module was moved up a few weeks in the course calendar of CS 2453. This enabled faculty to have more time to give students to understand the topic. They also gave them more time to ask questions if they needed to.

78 students in CS 2163 were assessed. 84.6% (66) of the students assessed demonstrated proficiency by scoring 70% or more on the measured competency. The overall passing average of 84.6% indicates that it is suitable to introduce the concept of Object-Oriented Programming in the third week of CS 2163, which is right after the review lessons for method, loop statement, and conditional statement.

Outcome 5: 89% of the assessed students in CS 1143 "Beginning Programming" class demonstrated the ability to compile and execute programs by scoring 70% or more on the measured competency. The compile and execute assessment verifies the students' ability to iteratively design, develop, and debug code. Faculty will continue to try to increase the understanding.

The process of assessing the outcomes allows the faculty of the department to assess each outcome in the various courses and the degree to see if there are any individual course changes or even modifications to the degree plan. Some of the courses are multi-section courses taught by one or more faculty. This tool allows the department to make very objective assessments in such cases.

The General Education Core

General Education at Oklahoma City Community College is an integral component of each student's experience. Every student receiving an Associate Degree (AAS, AA, or AS) must complete at least one course from each of the following areas, indicating a general understanding of that area.

- Human Heritage, Culture, and Institutions
- Public Speaking
- Writing
- Mathematical Methods
- Critical Thinking

Strategy:

The General Education Committee will create five interdisciplinary teams with members from multiple divisions. Each team will consist of five members with two members specifically teaching in one of the General Education Core Areas. Also, at least one team member will be a representative of the General Education Committee.

Twice a year these teams will evaluate one hundred artifacts from students having attained at least 35 hours of General Education Courses from OCCC. Reports, recommendations, and actions created from the General Education Assessment Process will be stored on the General Education Committee Website.

General Education Assessment Plan

Objective:

To assess and recommend actions for the general education component of Oklahoma City Community College's curriculum.

Method:

Developed rubrics will provide common criteria for assessing "artifacts" gathered from various courses. Artifacts may include, but are not limited to, recorded performances, PowerPoint Presentations, essays, lab reports, research projects, service-learning projects, or any assignment pre-existing in a faculty's course.

Nevertheless, the underlying principle of this method is (1) to reduce the intrusive nature of assessment within faculty courses, (2) to create a real environment of student performances within a classroom setting instead of a contrived environment of a forced examination (*i.e.* CAAP exams not counting for a classroom grade), and (3) to collect artifacts already designed and administered by our professional faculty at OCCC.

Data Collection:

The Office of Institutional Effectiveness will identify each semester students completing at least 35 credit hours in General Education Courses.

Program Response to General Education Assessment Data

General Education requirements represent just over sixty percent of each Associate of Science or Associate of Arts degree, making the careful assessment of these broad competencies OCCC considers essential for all graduates very important. All programs (terminal or transfer) to be evaluated contain at least 18 general education hours within the curriculum. OCCC has five general education learning outcomes that we expect all of our students to be proficient in upon graduation, they are: human heritage, culture, and institutions; writing; public speaking; mathematical methods; and critical thinking. Provide evidence that shows your participation in submission of artifacts, what types of artifacts are being submitted, and how you have used the general education assessment data to inform curricular refinement and to achieve these general education outcomes in your students in your program.

The CS faculty conduct an annual review and alignment with receiving transfer institutions to be sure General Education requirements for OCCC and the Oklahoma State Regents for Higher Education are being met. Student success in CS courses is being enhanced by general education courses. All CS courses include writing, mathematical methods, and critical thinking general education components. Presentation of projects in class fosters the general education speaking component. Program faculty will work on finding more course assignments appropriate for artifact submission. The following table gives a summary of how the general education components are integral to classes in the area:

Course Number	Course Title	Human heritage culture, and institutions	Writing	Public Speaking	Mathematical methods	Critical thinking	How the outcomes are included in the course?
CS1103	Intro to Computers/Applications		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Assignments and classwork that require documents to be created, formulae to be used in spreadsheets and databases and presentations that are to be presented in class
CS1143	Beginning Programming		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Assignments and classwork that require the students to write programs that demonstrate the use of critical thinking to design algorithms, and mathematical formulae to implement those algorithms.
CS2113	Computer-Based Info Systems		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Assignments and classwork that require documents to be written and databases and spreadsheets to be created that incorporate logical and critical methods and/or mathematical methods.
CS2163	Java		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Assignments and classwork that require programs and documents to be written that incorporate logical and critical methods and/or mathematical methods, plus presentation to be delivered in class.
CS2363	C++		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Students write several reports over the course of the semester. Students give a group presentation of their semester project at the end of the semester. Assignments require the use of critical thinking to design algorithms and mathematical formulas to implement those algorithms.
CS2453	Visual Basic		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Assignments and classwork that require programs to be written that incorporate logical and critical methods and/or mathematical methods
CS2463	Advanced Java		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Students write several reports over the course of the semester. Students give a group presentation of their semester project at the end of the semester. Assignments require the use of critical thinking to design algorithms and mathematical formulas to implement those algorithms
CS2553	Advanced VB		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Assignments and classwork that require programs to be written that incorporate logical and critical methods and/or mathematical methods
CS2563	C#		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Assignments and classwork that require programs to be written that incorporate logical and critical methods and/or mathematical methods

b. The program values and supports effective teaching.

Faculty Performance Review and Evaluation

Faculty will be evaluated on the basis of the established standards of performance and objectives established in the person's contract and any subsequent memorandums of agreement established for the position/person. Faculty are defined as employees who primarily perform teaching and instruction-related duties and who are employed on the basis of a written contract setting forth the duties to be performed and the compensation to be paid. The performance appraisal for each faculty member will be conducted by the Division Dean or Director as appropriate.

Course and Faculty Evaluation

The Student Input on Instruction process is a means of gathering student perceptions of instruction at the college. The results are intended to be used by you and your dean in identifying ways to improve instruction.

Students will receive an email during the 6th and 7th week for the first 8- week classes, and during the 14th and 15th week for the second 8-week/16-week courses and 16-week c. The email will include the information to evaluate each course. The window for replying to these surveys will be closed at the end of the designated weeks. Faculty will not have access to their SII results until after grades have been turned in.

c. The program creates effective learning environment.

Computer Science courses are offered in a variety of formats to include on campus and online offerings. Courses may be offered as 16-week, 8-week, 4-week, or 2-week sessions. A variety of methodologies are used, including hands-on lab modules in class, online programming practice tools, robot kits to program, hands-on PC breakdown, and building classroom units. There are about 7 classrooms, and the maximum class size is set to 20-23 students. All classrooms are computer-equipped classrooms.

Current technology is supplied as appropriate for the course and is continually upgraded to teach the most recent versions of software. Good replacement cycles for computers have been honored in the budget cycle. WiFi allows students to work throughout the campus. Acquired mobile devices that include iPads, Android tablets, Mac minis, wireless routers, and Network interface cards are used across courses to teach in class.

The software required for some of the classes, including those teaching Microsoft languages, can be distributed to students because of the alliance with Microsoft. This enhances student learning as they can practice at home. Most faculty also upload class material on Moodle, which makes it easily accessible by the students

The Student Computer Center has 120 computers available from 7:30 am - 9:00 pm (Mondays-Thursdays), 7:30am – 5pm (Fridays), and 9am – 3pm (Saturdays) for students to use. Tutors are available in the Student Computer Center for all CS courses for individual assistance. Supplemental Instructors are made available in some upper-level courses.

The Center for Learning and Teaching has provided excellent training and development to contribute to the learning environment. The faculty are continually pursuing professional development opportunities to keep courses current.

- d. The program's learning resources support student learning and effective teaching.

Learning among Computer Science students is enhanced through the usage of the Student Computer Center, software that is accessible for them to use at home, free Internet materials, and reference textbooks placed in the Library and the Student Computer Center. Students are expected to work on their own. Faculty and students both rely on the Internet and other Library resources for material and information. The Library Liaison to the division attends the monthly division meetings and works closely with the division faculty to facilitate services provided by the Library.

Instruction and Reference

Reference librarians (currently 3.5 FTE) provide instruction and reference assistance to OCCC students. In the past two years, the number of librarian positions decreased from 6.5 to 4.5 positions, including one that is currently vacant. Many students receive hands on instruction for using library resources and selecting and evaluating sources as part of the required Success in College and Life course. Additional instruction is also provided to a variety of other classes, with a focus on the appropriate resources for that discipline or a specified assignment.

Librarians are available at the Library Assistance Desk 40 hours per week, a decrease from 65 hours two years ago. Students may also request additional research help outside those hours. Video tutorials and LibGuides on the Library's website supplement instruction by providing guidance for students who are off campus.

Online and Print Resources

Librarians select and purchase computer science related materials, as well as maintain a broad collection of resources to support the overall OCCC curriculum. Students use library-provided resources in many of their Gen Ed courses, as well as occasional research related to specific CS course projects. The collection includes materials on computer applications, operating systems, network security, programming languages, as well as materials looking at the social aspects and future of computer technology. The collection is weeded periodically to maintain currency. Ebooks are also purchased to provide alternative formats and as options for off campus access.

Course textbooks are available at the Library Circulation Desk for in-library use. Texts for the CS courses are well utilized.

Some print periodicals have been retained, though electronic periodicals make up the bulk of the periodical collection. Students can utilize EBSCOhost to find computer science related articles, specifically within the Computer Source database and the multidisciplinary databases MasterFILE Premier and Academic Search Premier. Students can also utilize many other database options within EBSCOhost to find resources supporting CS and general education courses.

Streaming academic and scholarly videos are available through Films on Demand, and documentary and feature films are offered through Swank Digital Campus. Both resources are utilized on and off campus by both faculty and students. Another tool is ImageQuest, a database of millions of copyright-cleared images for student and faculty projects and presentations.

The Library also strives to support the professional development of faculty. The book collection is updated with materials on teaching, learning, classroom technology and curriculum development. Additionally, the Education Source and Professional Development Collection databases, available via EBSCOhost, provides faculty access to periodical literature on teaching.

In summary, the Library supports this program comprehensively and appropriately.

- e. The institution's curricular evaluation involves alumni, employers, and other external constituents who understand the relationship among the course of study, the currency of the curriculum, and the utility of the knowledge and skills gained.

OCCC has established specific curriculum patterns for transfer programs leading to the Associate in Arts (A.A.) or Associate in Science (A.S.) degrees. Describe program coordination efforts, partnerships and relationships with transfer institutions.

CS and MIS faculty meet with OU and UCO annually to align curriculum. There is coordination with the receiving institutions throughout the year on individual course content to assure transferability of courses. Faculty attend OSRHE transfer meetings and update the transfer grid. There are articulation agreements with UCO in CS.

- f. The organization learns from the constituencies it serves and analyzes its capacity to serve their needs and expectations.

Student Input on Instruction forms are reviewed by faculty. Input is taken from Advisory Board meetings from industry members. Even though the meetings are for AAS, all faculty attend, and there is some commonality of courses. Faculty development plans were made and executed each year. Student satisfaction survey results are monitored. The schedule building process is attuned to student demand. Faculty keep up-to-date on computer software and hardware. Student assessment of learning is conducted. Graduation survey results are reviewed each year.

3. Minimum Productivity Indicators

The following are considered to be the minimum standards for degree program productivity (averaged over five years). Programs not meeting these standards may be identified for early review as low producing programs. Institutions will be notified of programs not meeting either one of the two standards listed below and other quantifiable measures in this section.

- a. Number of degrees conferred (averaged over five years, minimum standard: AA/AS/AAS 5)

FY 2013 - AS - 13
FY 2014 - AS - 14
FY 2015 - AS - 26

FY 2016 - AS - 31

FY 2017 - AS - 32

Five year average for AS: 23.2

	FY 13	FY14	FY15	FY16	FY17
AS Computer Science/Management Information Systems Emphasis	7	4	12	6	7
AS Computer Science/Software Development	0	0	0	4	8
AS Computer Science-Cyber/Information Security	0	1	1	1	0
AS CS/Computer Science Emphasis (Transferring to OU)	3	3	5	4	5
AS CS/Computer Science Emphasis (Transferring to UCO)	3	6	8	16	12

b. Number of majors enrolled (averaged over five years, minimum standard: AA/AS-25 AAS-17)

FY 2013 - AS - 55

FY 2014 - AS - 63

FY 2015 - AS - 85

FY 2016 - AS - 77

FY 2017 - AS - 81

Five year average for AS: 72.2

	FY 13	FY14	FY15	FY16	FY17
AS Computer Science/Management Information Systems Emphasis	9	9	15	11	14
AS Computer Science/Software Development	0	0	22	28	33
AS Computer Science-Cyber/Information Security	3	8	4	7	2
AS CS/Computer Science Emphasis (Transferring to OU)	27	29	16	0	0
AS CS/Computer Science Emphasis (Transferring to UCO)	16	17	28	31	32

4. Successful Course Completion

a. Report the successful completion rates of all major courses in the program.

Course	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
CS-1143	47.7%	49.7%	50.7%	59.3%	60.3%
CS-1153	72.1%	79.5%	75.9%	80.6%	83.0%
CS-1333	90.2%	88.2%	60.8%	73.6%	74.6%
CS-1343	57.1%	74.3%	68.2%	80.6%	75.0%
CS-1353	81.0%	89.3%	80.2%	78.2%	73.2%
CS-1363	81.6%	81.4%	96.2%	77.8%	90.0%
CS-1413	82.5%	90.9%	81.5%	83.1%	71.6%
CS-2113	85.0%	86.8%	90.0%	87.3%	86.9%
CS-2153	78.6%	86.7%	76.5%	84.9%	82.5%
CS-2163	42.4%	60.3%	79.3%	65.0%	58.2%
CS-2173	77.8%	85.7%	75.0%	NA	NA
CS-2183	72.2%	69.2%	80.8%	63.2%	64.9%
CS-2283	NA	NA	NA	90.9%	76.9%
CS-2303	81.5%	83.3%	85.0%	72.4%	76.8%
CS-2363	60.7%	59.5%	77.5%	63.3%	66.7%

CS-2403	77.8%	80.0%	84.6%	100.0%	100.0%
CS-2413	42.7%	73.5%	68.4%	52.6%	70.0%
CS-2433	94.7%	100.0%	94.1%	95.0%	94.4%
CS-2443	61.8%	70.0%	62.2%	45.0%	69.4%
CS-2453	59.5%	72.7%	72.9%	74.5%	60.7%
CS-2463	43.8%	94.7%	71.4%	76.9%	62.9%
CS-2503	93.0%	83.3%	77.1%	78.8%	72.7%
CS-2513	61.5%	57.1%	100.0%	85.7%	69.2%
CS-2563	70.6%	50.0%	59.5%	76.0%	87.5%
CS-2613	100.0%	NA	NA	100.0%	NA
CS-2623	66.7%	72.2%	93.8%	64.3%	68.8%
CS-2713	67.2%	65.3%	79.8%	85.1%	76.4%
CS-2723	85.7%	87.5%	78.3%	84.8%	84.6%
CS-2743	87.9%	86.5%	86.5%	88.9%	92.7%
CS-2763	88.6%	96.8%	94.4%	95.2%	91.2%
CS-2783	90.5%	90.5%	100.0%	96.4%	92.3%

b. Report the successful completion rates of all general education courses in the program.

Course	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
CS-1103	62.8%	66.70%	67.4%	69.3%	67.6%
MATH-1513	67.2%	70.38%	73.7%	72.5%	74.4%
MATH-1533	58.4%	55.32%	62.7%	61.4%	63.2%

c. Describe program student success initiatives.

Some of the initiatives that were incorporated included more hands-on approaches in the classrooms and labs. Students enrolled in online classes were encouraged to use the Student Computer Center, the Network Lab, and the Cyber Security Lab. More lab simulations were included in the hardware and operating systems. Students were given labs where they could break down a PC unit. Labs were incorporated in the Cyber Forensics Lab. Programming classes incorporated online programming practice tools, cumulative final assignments, class presentations, individual and group assignments, and lab modules. Some programming classes took a more project and example-based approach in class to foster group work and more discussion among students. Supplemental instructors and tutors were hired to help students in the Student Computer Center and the Network Lab.

d. Describe results from success initiatives and future plans to increase student success based on success initiative results.

The initiatives that were incorporated did show some success as student exam scores improved. Cumulative averages that were collected for Outcomes Assessment are also proof of the success. Students felt more confident about their class material. Students also learned to work in groups for projects and assignments. Students were asked to present research assignments and final projects in classes, which also helped boost confidence in public speaking.

5. Other Quantitative Measures

a. The number of courses taught exclusively for the major program for each of the last five

years and the size of classes for each program level listed below:

Courses taught - 1000 level

2017 - 52
2016 - 49
2015 - 47
2014 - 49
2013 - 48

Courses taught - 2000 level

2017 - 75
2016 - 68
2015 - 70
2014 - 67
2013 - 77

Average class size major 1000 level

2017 - 16.8
2016 - 16.9
2015 - 14.3
2014 - 12.8
2013 - 13.1

Average class size major 2000 level

2017 - 15.9
2016 - 15.5
2015 - 14.6
2014 - 14.7
2013 - 13.3

- b. Student credit hours by level generated in all major courses that make up the degree program for five (5) years.

Credit hours major courses - 1000 level

2017 - 6,072
2016 - 6,552
2015 - 6,330
2014 - 6,087
2013 - 6,972

Credit hours major courses - 2000 level

2017 - 4,227
2016 - 4,113
2015 - 3,540
2014 - 3,480
2013 - 3,786

- c. Direct instructional cost for the program for the review period.

Technology use in the classroom continues to expand to meet the needs of our students. 190 of our classrooms are equipped with permanent multimedia equipment with the availability of mobile carts to increase the number of high tech classrooms to 100%. The cost incurred with this multiyear effort was \$1.55 Million. A faculty committee submitted a proposal for a classroom design that supports flexibility

in classroom functionality including thin clients, a smaller folding presentation station, and moveable furniture. This committee's proposal was adopted and supported by the Academic Affairs' Deans and President's Cabinet. Through a multi-department effort a total of \$400,000 were spent to redesign 8 classrooms to support active learning and cooperative learning formats of instruction as well as a more traditional lecture style.

Faculty members are continuing to utilize student response software, interactive whiteboards and projectors, tablets, and network computing devices in classrooms. OCCC continues to support the utilization of technology in the classroom so faculty can continue to engage students. The Center for Learning and Teaching offers multiple learning opportunities for faculty related to strategies for incorporating technology into instruction effectively as well as the use of the College's Learning Management System, Moodlerooms. The CLT team has strategically worked to meet the needs of our 144 full-time faculty as well as the 428 adjunct faculty members. They support them through organized workshops, online training modules, and individual faculty consultations conducted via phone, email, or in person. The consultations focus on instructional strategies, course design/redesign, assessment construction, selection and use of instructional technology, and aspects of using the College's LMS.

- d. The number of credits and credit hours generated in the degree program that support the general education component and other major programs including certificates.

CS 1103 Introduction to Computers and Applications (3 credits)
 General Education course hours generated = 2,895

- e. A roster of faculty members including the number of full-time equivalent faculty in the specialized courses within the curriculum.

5 full-time faculty members:

Chen, Haining
 Goulden, John
 Ji, Haifeng
 Mathew, Sara
 McHenry, Jon

Current adjunct faculty:

Arnold, Neal
 Ashby, Thomas
 Bailey, Randy
 Bell, Matthew
 Brunski, Katarina
 Crittenden, Brian
 DeSplinter, Jill
 Fosdick, Paul
 Gibson, Vicki
 Golden, Aimee
 Hyde, Christopher
 Nielsen, Roy
 Ouardi, Mohamed-Reda
 Pierce, Karla
 Voss, Jimmie
 Wolbert, Daniel

COMPUTER SCIENCE	CS-2113	42
	CS-2153	9

AS, AAS, C FTE: 7.5	CS-2163	27
	CS-2183	9
	CS-2283	3
	CS-2303	6
	CS-2363	6
	CS-2403	3
	CS-2413	15
	CS-2433	3
	CS-2443	9
	CS-2453	9
	CS-2463	12
	CS-2503	6
	CS-2513	3
	CS-2563	9
	CS-2623	3
	CS-2713	21
	CS-2723	9
	CS-2743	9
	CS-2763	6
CS-2783	6	

- f. If available, information about employment or advanced studies of graduates of the program over the past five (5) years.

This is a transfer program, and hence there is very limited job market data information at this level of degree completion. Some students may choose to work before they transition to a four-year institution or even while they pursue their bachelor's degree. Out of the graduate survey responses received in 2016, 64.2% of them said that they were working in a job related to their education. Some of the places that hired alumni are listed below:

Computer Science – AS

Job Title	Company
	Tick Tock
Computer Specialist	Tinker Air force Base
I.T Intern	ACG Materials
I.T Specialist	Univex Corporation
Linux Engineer	
Project Manager	OU IT
Software Engineer	
System Support Technician	City of Norman Municipal Buildings
Tech Support	Chickasaw Nation

Students are currently enrolled for advanced studies at UCO, OU, OSU/IT, OSU, OCU, and Tulsa University. In meetings with OU and UCO CS faculty, it is reported that in advanced studies OCCC students excel in the pursuit of their bachelor's degree. Out of the 23 graduate survey responses received in 2016, 18 of them said that they were continuing their education.

- g. If available, information about the success of students from this program who have transferred to another institution.

Institutional Effectiveness has provided support data obtained via surveys of OCCC Computer Science graduates from years 2015 - 2016. Graduates from each year were asked to indicate on a 1- 10 scale their preparation at OCCC for continuing their education. Average results from those responding to the survey for each year were:

2016: 8.67

6. Duplication and Demand

- a. Demand from students, taking into account the profiles of applicants, enrollment, completion data, and occupational data.

The program serves a number of traditional students, reverse transfer students, co-enrolled students at UCO and OU, concurrent high school students, industry employees, and military students, as well as people who are seeking a career transition.

- b. Demand for students produced by the program, taking into account employer demands, demands for skills of graduates, and job placement data.

Some projections for the local area include :

OKLAHOMA CITY - FIVE COUNTY METRO AREA JOB STATISTICS AND PROJECTIONS					
Description	Avg. Hourly Earnings	Annual Openings	Regional Completions (2013)	2016 Jobs	2021 Jobs
Computer Systems Analysts	\$34.35	64	205	1,788	1,987
Information Security Analysts	\$29.63	11	455	319	351
Web Developers	\$22.14	28	455	891	972
Software Developers, Applications	\$39.18	72	162	2,246	2,438
Computer Programmers	\$32.33	33	237	1,235	1,215
Computer Operators	\$20.22	2	0	261	254
Forensic Science Technicians	\$28.42	7	33	93	106
Computer and Information Systems Managers	\$46.32	47	299	1,626	1,760
Computer Hardware Engineers	\$50.51	4	25	93	100
Database Administrators	\$36.22	15	143	459	484
Computer Network Architects	\$37.90	9	455	382	400
Computer User Support Specialists	\$21.03	72	276	3,436	3,566
Computer Network Support Specialists	\$30.09	14	276	694	719

- c. Demand for services or intellectual property of the program, including demands in the form of grants, contracts, or consulting.

Some of the services include UCO's CS Advisory board, InfraGard Advisory board, school board K-12 district, National Center for Academic Excellence in Information Assurance for 2-year institutions, CAE2Y-NSA, and Department of Homeland Security 5 year designation.

- d. Indirect demands in the form of faculty and student contributions to the cultural life and well-being of the community.

OCCC has hosted InfraGard meetings, participated in National Cyber League Competitions, CAE Virtual Career Fair, and the Cyber Security Faculty Shortage Survey.

OCCC's Cyber Security students had the opportunity to obtain internships in organizations such as FBI, Oklahoma City Government, Oklahoma State Government, and Moore Public Schools.

Groups of students were taken by faculty to tour the OSU-IT campus.

Cyber/STEM summer camps were offered through College for Kids.

A Cyber Student Club was formed, and regular meetings were held in order to boost more networking among students and also as a forum where guest speakers spoke about various information technology and cyber security topics.

Talks and discussions were held to present "A Day in the Life of CS Professionals" with OU. Small Business Association meetings sponsored by NSA were also held for the college community to talk about CS.

The faculty participated in talks to discuss career choices in eighth grade and Native American College visits. Faculty have given presentations at various local schools on career days.

Faculty and students have donated services and items to local non-profit organizations, United Way annual fundraisers, and Faculty Association fundraisers for scholarships.

- e. The process of program review should address meeting demands through alternative forms of delivery.

The classes are offered in various formats: intersession, online, summer, and individual-paced. Students in the military and outside the state have been allowed to take exams using proctors.

Virtual machines have been used to allow for multiple operating systems and software in a classroom.

Videos and E-books have been used to enhance learning across classroom platforms. Class material and supplemental material are all hosted on Moodle to make material easily available for students.

Network versions of the software are purchased so that it can be shared across classrooms and labs. CS classrooms are shared with other departments if the need arises. Computers are usually reassigned to other non-CS areas when they are recycled out of CS classrooms and labs.

7. Effective Use of Resources

The resources used for a program determine, in part, the quality of the educational experiences offered and program outcomes. Resources include financial support (state funds, grants and

contracts, private funds, student financial aid); library collections; facilities including laboratory and computer equipment; support services; appropriate use of technology in the instructional design and delivery processes; and the human resources of faculty and staff. The efficiency of resources may be measured by cost per student credit hour; faculty/student ratio; and other measures as appropriate. The effective use of resources should be a major concern in evaluating programs. The resources allocated to the program should reflect the program's priority consistent with the institution's mission statement and academic plan.

Computer Science (AS, AAS, and Certificate)

Program Average

FY 2017: 7.5 FTE Faculty

Average class size:

Average Class size major 1000 level

2017 – 16.8

2016 – 16.9

2015 – 14.3

2014 – 12.8

2013 – 13.1

Average Class size major 2000 level

2017 – 15.9

2016 – 15.5

2015 – 14.6

2014 – 14.7

2013 – 13.3

Average Credit hours:

Credit hours major courses - 1000 level

2017 – 6,072

2016 – 6,552

2015 – 6,330

2014 – 6,087

2013 – 6,972

Credit hours major courses - 2000 level

2017 – 4,227

2016 – 4,113

2015 – 3,540

2014 – 3,480

2013 – 3,786

Courses taught - 1000 level

2017 - 52

2016 - 49

2015 - 47

2014 - 49

2013 - 48

Courses taught - 2000 level

2017 - 75

2016 - 68

2015 - 70

2014 - 67

2013 - 77

Five full-time professors provide instruction in the curriculum. There are unfilled positions because of the retirements. Professors teach 15 credit hours as a full-time load and may teach additional classes as adjuncts.

Approximately fifteen adjunct instructors are used each semester in the Computer Science department with each teaching one to two classes. The maximum that an adjunct can teach is three classes. Their credentials can be found in the Division of Information Technology office

The full-time faculty serve as lead teachers and mentors for the adjuncts.

There are 7 computer-equipped classrooms used by the CS department.

A Student Computer Center with 120 computers is available for all OCCC students. For CS students, there are 2 lab assistants and 1 technician/lab assistant. 1 federal work student and 5 tutors are also available.

There are also a Cyber-Security lab, Network lab, and Testing Center in addition to the Student Computer Center.

IV. Program Review Recommendations

This section is a description of recommendations that have been made as a result of the review and of actions that are planned to implement these recommendations. Recommendations should be clearly linked and supported by the information and analyses that were articulated in the previous sections and should contain a realistic strategy for implementation of any changes.

A. Describe the strengths of the program identified through this review.

Faculty: The current faculty are experienced and dedicated to maintaining the excellence of the program and success of the students. They maintain a knowledge base in their area of expertise and demonstrate a flexibility to explore new emerging areas. Two new excellent CS faculty – Dr. John Goulden and Jon McHenry – were hired. There are also outstanding adjunct faculty who enrich the department with their knowledge base and vast on-the-job experience.

Equipment: The hardware and software have consistently been updated in both the classrooms and labs. This ensures the students will be up to date when they graduate and enter the workforce.

Excellent support to and from college: There is a great learning environment for students with classrooms, the Student Computer Center, Library, College Union, Bookstore, and other such resources. The department is well supported by the college, and the faculty also represent the department in various capacities in college committees and student clubs. Faculty also help with advising students in the Admissions and Advising Offices.

Student Computer Center: The SCC continues to provide a friendly and efficient location for students to continue the learning process outside the classroom. Excellent lab tutors and supplemental instructors have been hired to help students while they work in the SCC.

Schedules: On-campus and online classes have been increased due to demand by students.

Recognition: The program continues to be recognized as a National Center of Academic Excellence in Information Assurance.

Relationships: There is close cooperation with OU, UCO, and OSU/IT. This greatly enhances transfer opportunities for students. A student pursuing an AAS degree in Computer Programming was awarded a scholarship and accepted to the Cyber Degree Program at the University of Tulsa.

Credit for IT Industry certifications: Advanced standing college credit may be awarded by Oklahoma City Community College for individuals who achieve a passing score on selected industry certification examinations. The exams include, but are not limited to, the CompTIA A+ Certification, the Microsoft MOS Access, and Excel examinations.

B. Describe the concerns regarding the program that have been identified through this review.

Hiring faculty – The department is now at 50% of its strength 5 years ago mainly because of retirements. The offered salary is not competitive with market trends.

Recruitment and Promotion – college recruitment, promotion, and advertising efforts need to be improved. The program dean and faculty will work on promoting the degrees more aggressively.

Learning Material - Many students do not have course materials at the beginning of class mainly due to financial reasons.

Student Computer Center – The staff of the Student Computer Center should be encouraged to attend classes as per faculty recommendation to help them maintain proficiency in subject areas.

Equipment - The equipment has to be updated on a regular basis, which can be difficult with budget concerns.

Alumni contact – There should be a better system to contact alumni.

- C. Develop a list of recommendations for action that addresses each of the identified concerns and identify planned actions to implement recommendations.

Hiring faculty: Advertise the openings in more places, including online job sites. Explore other ways to encourage qualified applicants to consider OCCC and find ways of providing salaries competitive to the business job market.

Recruitment and Promotion: The Office of Recruitment and Admissions should communicate with the faculty to let them know of the planned recruitment activities. This could help faculty attend and also prepare material for the recruitment activities. To raise awareness, the programs should also be promoted on local media.

Learning materials: Encourage a procedure on campus to allow students to obtain materials for class by first day of class.

Student Computer Center: Additional funds should be allocated to hire more tutors and supplemental instructors and to establish a system to use scheduled lab hours to have lab personnel sit in on a class at least once a year per faculty recommendation.

Equipment: Budget allocations should continue to be made to update hardware in the classrooms and the Student Computer Center on a regular basis.

Alumni contact: Communication with alumni should not be limited to the annual graduate survey. Instead, alumni should be contacted to find out about job placement, transfer to 4-year institutions, employers, and industry demands. Alumni could also be asked to come and speak to current students at club meetings and lunch brown-bag sessions.

- D. Provide institutional recommendations as the result of the program review and planned actions to implement recommendations.

1. The department has been asked to find ways by which more Computer Science courses can provide artifacts for the General Education Committee in multiple general education outcome categories. Program faculty will work with the General Education Committee to find more artifacts for submission.
2. The department has been asked to find ways to transfer CS courses and degrees to four-year colleges and to work specifically on Cyber transfer pathways. The program will work on Cyber pathways and other transfer agreements. The program will establish more articulation agreements with more institutions in Oklahoma.
3. The department has been asked to work on partnership opportunities to work with business and industry partners to encourage degrees and careers in STEM fields and allow students to get internship and employment. The program will work on partnerships with industries.

APPENDIX

Program Curriculum: Computer Science: Associate in Science Options : Computer Science - Management Information System (MIS) Computer Science - Computer Science Transferring to UCO(C_UCO) Computer Science - Software Development Transferring to OU (C_OU)

Program Requirements

Minimum Required Hours: 62

Major Courses		
Prefix & Number	Course Title	Credit Hours
CS 1143	Beginning Programming (MIS, C_UCO, C_OU)	3
CS 2113	Computer-based Information Systems (MIS)	3
CS 2163	Java (MIS, C_UCO, C_OU)	3
CS 2363	C++ (C_UCO)	3
CS 2453	Visual Basic (MIS, C_UCO)	3
CS 2463	Advanced Java (C_UCO, C_OU)	3
CS 2553	Advanced Visual Basic (C_UCO)	3
CS 2563	C# (C_UCO, C_OU)	3
Total Credit Hours: (MIS: 9 Credit Hours, C_UCO: 15 Credit Hours, C_OU: 12 Credit Hours)		

General Education Courses		
Prefix & Number	Course Title	Credit Hours
CS 1103	Introduction to Computers and Applications (MIS)	
ENGL 1113	English Composition I (MIS, C_UCO)	3
ENGL 1213	English Composition II (MIS, C_UCO)	3
COM 2213	Intro to Public Speaking (C_UCO, C_OU)	3
HIST 1483	U.S. History to the Civil War (MIS, C_UCO)	3
HIST 1493	US History since the Civil War (MIS, C_UCO)	3
MATH 1513	College Algebra for Business, Life Sciences and Social Sciences (MIS)	3
MATH 1533	Pre-Calculus and Analytic Geometry (C_UCO, C_OU)	3
MATH 1613	Trigonometry (C_UCO, C_OU)	
MATH 1743	Calculus I for Business, Life Sciences, and Social Sciences (MIS)	3
MATH 2104	Calculus and Analytic Geometry I (C_UCO, C_OU)	3
MATH 2214	Calculus and Analytic Geometry II (C_UCO, C_OU)	
POLSC 1113	American Federal Government (MIS, C_UCO, C_OU)	3
PSY 1113	Introduction to Psychology (MIS, C_UCO)	
SOC 1113	Introduction to Sociology(MIS)	3
BIO 1114	General Biology (Non-Majors) (C_OU)	4
BIO 1204	History of Life on Earth (C_OU)	4
CHEM 1115	General Chemistry I (C_OU)	5
GEOL 1114	General Geology(C_OU)	4
ASTR 1514	General Astronomy with Lab(C_OU)	4

BUS 2033	Business Communication (C_OU)	3
PHYS 2014	Engineering Physics (C_OU)	4
PHYS SC	Physical Science chosen from ASTR, PHYS, CHEM or GEOL prefixes(Note: at least one science course must include a laboratory component) (M, C_UCO)	3-4
BIO	Any biological science except BIO 1023(MIS)	3-4
HUM	Humanities Elective(MIS, U_UCO, U_OU)	6
Total Credit Hours: (MIS: 37 Credit Hours, C_UCO: 45 Credit Hours, C_OU: 47 Credit Hours)		

Support Courses		
Prefix & Number	Course Title	Credit Hours
ACCT 2113	Accounting I/Financial (MIS)	3
ACCT 2123	Accounting II/Managerial (MIS)	3
ECON 2123	Principles of Microeconomics (MIS)	3
ECON 2143	Principles of Macroeconomics (MIS)	3
ECON 2023	Statistics for Business and Economics (MIS)	3
MATH 2123	Calculus II for Business, Life Sciences and Social Sciences(MIS)	3
BUS 2023	Business Statistics (MIS)	3
ELEC	Elective (C_UCO, C_OU)	1-2
Total Credit Hours: (MIS: 15 Credit Hours, C_UCO: 1 Credit Hour, C_OU: 2 Credit Hours)		

Life Skills Courses		
Prefix & Number	Course Title	Credit Hours
SCL 1001	Success in College and Life (MIS, C_UCO, C_OU)	1
Total Credit Hours: (MIS:1 Credit Hour, C_UCO: 1 Credit Hour, C_OU: 1 Credit Hour)		