PROGRAM REVIEW

Computer Information Systems

Jan 2019

Contents

1. Program/Discipline overview

Computer Information Systems (CIS) are a necessary and vital component of our modern life. The CIS program prepares students for careers in the field of Information Technology (IT) by providing education in the foundations of the discipline as well as training in the programming languages, tools and technologies used in today's IT industry. CIS classes are taken by students who are new to IT as well as by IT professionals who are interested in updating or expanding their skill set.

After completing a CIS degree, students are prepared for entry-level jobs such as computer support specialist, help desk representative, and assistant network administrator. While we are a career and technical education (CTE) program, we also support students interested in transferability with the Oregon Tech (formerly OIT) and Southern Oregon University (SOU) as the main choices of transfer students.

In addition, CIS courses support other programs at PCC including Computer Science, Computer Applications and Office Systems, and Business Administration. Three CIS courses (CIS120, 121, and 122) continue to meet the general education requirement in the Math and Sciences area for the AAS, AS, and AGS degrees at PCC.

In the face of the constantly changing field of IT, we emphasize the development of enduring skills and knowledge in the students, and an attitude of constant learning. To keep up with the fast-paced changes in IT, we have developed very close ties with industry, including an advisory board made up of representatives from industry and a full-time employment specialist. We have a co-op program that provides the students with valuable industry experience while pursuing their education. Our strong cohort of part-time faculty, most of whom are currently employed in the IT industry, help keep CIS courses relevant and fresh with the latest practices and technologies used in industry.

The major development in our program in the past five years is our emphasis on cyber security. This mirrors the concern in our world for cyber security as more and more of our institutions have had the integrity of their data compromised.

A. Educational objectives and national guidelines

The fundamental goals of the CIS program are to enable students to develop

1. the skill sets to be employed in the computer industry
2. enduring foundational knowledge
3. competency with present-day technologies
4. a facility for learning new skills as the IT field continually advances.

To this end, CIS degrees and courses integrate the foundational knowledge of the field with languages and technologies currently in use.

This emphasis is in line with national guidelines. The Association for Computing Machinery (ACM), the world's largest educational and scientific computing society, has produced curricular guidance for associate-degree IT programs. The guidance consists of 50 core learning outcomes in technical and soft skill domains, along with associated assessment rubrics. According to the ACM, these core IT learning outcomes are intended to be adaptable, not overly technology specific, and have reasonable staying power.

The table in Appendix section 1 maps CIS courses against the ACM recommended core IT outcomes. As the table shows, CIS courses cover nearly all the outcomes listed.

B. Summary of changes since last review

Since the last program review in 2014, the CIS program has undergone the following changes:

- Development of a cyber-security certificate approved as NSA and DHS's designation for a Center of Academic Excellence 2-Year (CAE2Y). CAE2Y is a designation given by the Department for Homeland Security / National Security Agency (DHS/NSA) to recognize:
    - excellence in the institutional approach to cybersecurity
    - excellence of the academic program
    - broad inculcation of cybersecurity in all facets of the institution
    - broad awareness of cybersecurity issues across the campus
    - faculty and staff development
    - the institution's outreach to the community.[1]

  Currently, an Associate's degree in cyber security is being developed, and expected to be in place by Fall 2019.
- Development of a capstone class for the CIS degree, Real World Programming. This class was recommended by our industry advisory board and mentioned in our last Program Review. It gives our students the experience of working together in teams to program a term long project using an Agile framework.
- Working more closely with Computer Applications / Web Technology (CAWT) to coordinate the web program at PCC. Web programs have grown up in both CIS and CAWT. Both departments are working together to develop a cohesive program that plays to the strengths of each department
- The Health Informatics program has been discontinued. Although Health Informatics looked to be a field that held great promise in the last Program Review, the job prospects never materialized for two year students, and it was discontinued due to insufficient enrollment

[1] https://www.c5colleges.org/index.php/cae2y

2. Outcomes and Assessment

A. Course-Level Outcomes:

i. What is the SAC process for review of course outcomes?

Information Technology is a rapidly changing field, so our course content and outcomes are updated frequently. Most of the outcomes we teach are skills-oriented, and those outcomes are updated and reviewed to enable assessment via practical demonstrations of hands-on tasks (for example, configuring a network router or writing an application that meets a requirements specification). More conceptual outcomes are written in terms of activities that the student will perform in order to demonstrate attainment of the outcome. For example, an outcome related to understanding the concept of "closures" in JavaScript would be written as: "Create anonymous functions and closures, and use them to store and access local data" (from the CIS 233W CCOG). Other outcomes related to mastery of factual knowledge are written in terms of assessments (such as tests, papers, and discussion postings) that the student will create to demonstrate attainment of the outcome. For example, "Communicate effectively with database professionals regarding the rules of normalization" (from the CIS 275 CCOG).

Course outcomes and CCOGs are reviewed periodically by appropriate subcommittees of the SAC (e.g., the Programming Subcommittee, Database Subcommittee, Networking Subcommittee, Cybersecurity Subcommittee, etc.). Changes to outcomes that are developed by the subcommittees are brought forward to the SAC as a whole and are discussed and voted on. This SAC-level oversight provides the opportunity to ensure that all outcomes are observable and measurable.

The CIS SAC recently (Winter/Spring of 2018) reviewed the course outcomes for all CIS courses and updated the CCOGs to reflect current practices in the industry.

ii. Identify and give examples of changes made in instruction

CIS has many sequential courses that build and develop skills over the sequence. One example of changes made in instruction to improve students' attainment of course outcomes was the revision of CIS 122, our "Software Design" course. Our upper-level programming instructors, including both CIS instructors and instructors from other departments, such as CAS and EET, determined that students were completing CIS 122 with varying levels of preparation for success in more advanced programming courses. We determined that a large part of this variance in outcomes was due to the wide range of programming languages and instructional materials that different instructors were using to teach the course. We also determined that CIS 122 was placing too great an emphasis on good software design principles before the students had enough practical programming experience to understand the importance of the design principles. As such, the Programming Subcommittee decided to revise the course outcomes and course content for CIS 122, to provide a more uniform experience for all CIS 122 students, and to focus on more foundational programming skills instead of higher-level design skills. The course was renamed from "Software Design" to "Introduction to Programming Logic," we agreed on a standard introductory language that would be used for all sections of the class (Python), selected a new textbook (Tony Gaddis, "Starting out with Programming Logic and Design"), and reimplemented the course shell to focus on more skill-building exercises. Since the redesigned course shell was widely adopted by CIS 122 instructors starting in Winter, 2015, it's too early to definitively state that these changes have contributed to student success rates. However, we hope to revisit this topic in future review cycles.

Another example of refining our teaching practice based on student attainment of course outcomes is the current project to add instruction in Version Control Software to all of our introductory and advanced programming courses. In our capstone course, CIS 234A, we determined that the one issue students were struggling with the most was the difficulty in using Version Control Software appropriately. Though some of our programming courses included use of git (a popular Version Control System), the instruction in git prior to CIS 234A was uneven and not appropriately layered or sequenced into our programming courses. On discussion with the CAS and CS SACs, we found that there was a widespread, cross-disciplinary desire to integrate this content throughout our curricula. As a result, we have identified beginning, intermediate, advanced, and capstone skills that will be taught in: CIS 120, CIS 121 and CIS 122 (beginning); CIS 133J, CIS 133W, CIS 133N, CIS 135M, CIS 195P (intermediate); CIS 233J, CIS 233W, CIS 233N, CIS 295P (advanced); and CIS 234A (capstone). We are currently working with instructors from CS and CAS on the development of shared learning modules that can be layered into our course shells, and have a project with IT to create a relationship with github.com, an industry leader in cloud-based repository hosting.

In the past 4 years PCC has been part of the pilot MSC (Multi-State Collaborative) Assessment Project. CIS faculty have actively participated in creating, norming and guiding college-wide resources on the Quantitative Literacy rubric, which forms a large part of the DSAC Rubric for Science, Math and Computer Science, and the related Quantitative Reasoning outcome for that Discipline Area. The CIS SAC will be one of the SACs who are piloting the new Quantitative Reasoning Rubric in Winter, 2019 in CIS 122.

B. College Core Outcomes

i. Update the Core Outcomes Mapping Matrix.

Please see the attached document "CIS Core Outcomes Mapping Matrix."

C. Assessment of Degree and Certificate (CTE) Outcomes

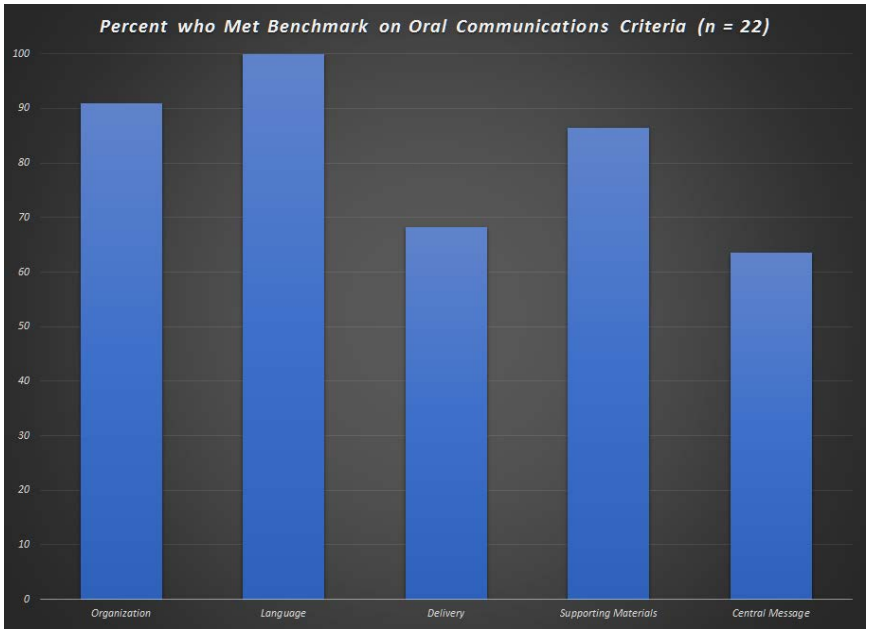
i. Brief summary of one or two of your best assessment projects

We began teaching CIS 234A, our new Capstone course, in Spring of 2015. Students were required to prepare and deliver a final project presentation for members of the SAC, our division dean, and industry representatives of the CIS Advisory Board. After the presentations, both full-time and part-time instructors met to assess the student work. We score all students using a checklist, with separate dimensions for Oral Communication, including: Organization, Content, Delivery, Supporting Material, and Central Message; and for Applied Knowledge, including: Defined Problem, Identified Strategies, Proposed Solutions/Hypothesis, Implemented Solutions, and Evaluated Outcomes. Overall, students scored significantly better on Applied Knowledge than they did on Oral Communication. Oral Communication aligns with the degree outcome: "Personal and Interpersonal Communicate effectively in both oral and written form. Work effectively in teams. Manage time, tasks and projects. Take ownership of IS career by adapting and learning new skills" (from the AAS CIS Degree), and also several of our certificate outcomes, including:

- "Communicate and problem solve effectively in teams and with others in developing information systems, project plans and to achieve common business or information technology goals" (CIS One-Year Certificate)
- "Demonstrate an ability to communicate potential software solutions to peers" (C# Application Programming Certificate, less than one year)

- "Demonstrate an ability to convert user requests into SQL queries that provide users with what they need" (Database Design and SQL Certificate, less than one year)
- "Demonstrate an ability to understand user needs and implement a database that solves all user requests" (Database Design and SQL Certificate, less than one year)
- "Demonstrate an ability to communicate potential software solutions to peers" (Java Application Programming Certificate)

Based on this determination, we decided to "close the assessment loop" by adding additional content and instruction on Oral Communication to our capstone course, and by re-assessing that outcome in 2018. We also adopted the LEAP VALUE Rubric for Oral Communication as a standard for assessing student attainment of the benchmark skill level (2 or greater on all dimensions in the LEAP VALUE Rubric). Assessment results are presented in the graph below:



As we see from the results above, students performed well in the areas of Organization, Language, and Supporting Materials, but not as well in Delivery and Central Message.

ii. Evidence that the changes made were effective by having reassessed the same outcome

During our initial assessment of Oral Communication in 2015-2016, we determined that 62.5% of our students met the benchmark score for Delivery. In our 2017-2018 reassessment, we determined that this number had increased to 68.2%. However, given the small sample sizes (n = 8 in 2015-2016 and n = 22 in 2017-2018), it's unsafe to draw any conclusions from this difference. As such, we plan to continue reassessing Oral Communication on a two-year cycle, and are discussing additional opportunities we can provide for our students to practice the Delivery skill.

iii. Evaluate SAC's assessment cycle processes.

Prior to 2015, our assessment process was diffuse and spread over multiple courses. Our CIS Networking AAS degree was well organized and assessed within our advanced operating systems classes (CIS 240L and CIS 240M). However, the outcomes for our AAS CIS and Certificates were aligned with a large number of programming, systems analysis, and database courses. Those courses were both diverse in

terms of content, and also taught by a large group of instructors. That made gathering any kind of aggregate data on student attainment of program-level outcomes challenging.

In 2015, we developed the CIS 234A capstone course, and made it a degree requirement for the AAS CIS degree. We also began work on aligning all of our non-CIS Networking AAS outcomes to assessments conducted in the capstone course, beginning with the focal outcomes of Oral Communication and Teamwork. We filed a new Multi-Year Plan with the Learning Assessment Council which maps all of our degree and certificate outcomes to PCC Core Outcomes, and created a schedule for assessing all of those outcomes via the capstone course. See attached appendix for our current Multi-Year Assessment plan.

We are also in the process of creating a capstone course for our CIS Networking AAS, and intend on using that for our assessment of those degree outcomes (rather than assessing them in both CIS 240L and CIS 240M).

iv. Assessment challenges

Our subject area aligns well with the PCC Core Outcomes of Communication, Critical Thinking and Problem Solving, and Professional Competence. Most of our courses address course-level learning outcomes that align with all three of those outcomes. In addition, some of our courses address course-level learning outcomes that align relatively well with Self Reflection and Community and Environmental Responsibility. Relatively few of our courses address Cultural Awareness in a meaningful way (often, we touch on topics related to Cultural Awareness, but relatively few courses actually assess student learning on that outcome).

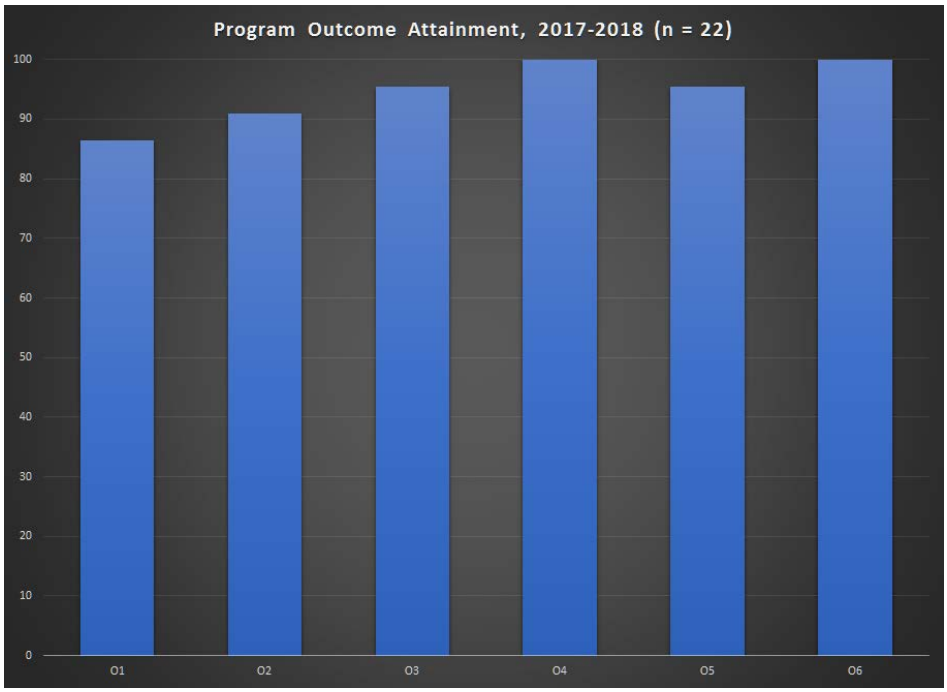
The main challenge for us is time – the workload in our classes is high, and adding additional instruction and course content on these outcomes will inevitably reduce the amount of time available to cover the more central outcomes. As an example, in CIS 135M (our Mobile App Development course), we teach students how to localize their apps for different regions and languages, and we also teach them that there is a large market for properly localized apps (8 out of 10 of the largest markets for Android apps are in non-native English speaking countries). However, teaching the specifics of language and the nuances of making an app culturally appropriate for a range of cultures would reduce the amount of time available to teach the programming skills required to create an Android app. We prefer for our students to meet those learning outcomes through their GenEd coursework.

v. Evidence that students are meeting your Degree and/or Certificate outcomes.

In addition to our assessment of Oral Communication as described above, we also assessed the following 6 program outcomes in 2017-2018:

- O1 - Develop and evaluate system requirements.
- O2 - Design, implement and deploy systems. Translate simple business problems or requests into workable programming algorithms, test solutions and complete coding.
- O3 - Evaluate, test, debug and troubleshoot systems.
- O4 - Create effective databases and user interfaces. Use diagramming software to design simple but effective relational databases through the use of business rules Relational Database Management System to create and Entity Relationship Diagrams and uses MS Access tables and relationships that enforce referential integrity; forms; queries; and reports.
- O5 - Develop small programs.
- O6 - Select appropriate technology tools by recognizing tool capabilities and limitations.

Our results were as follows:



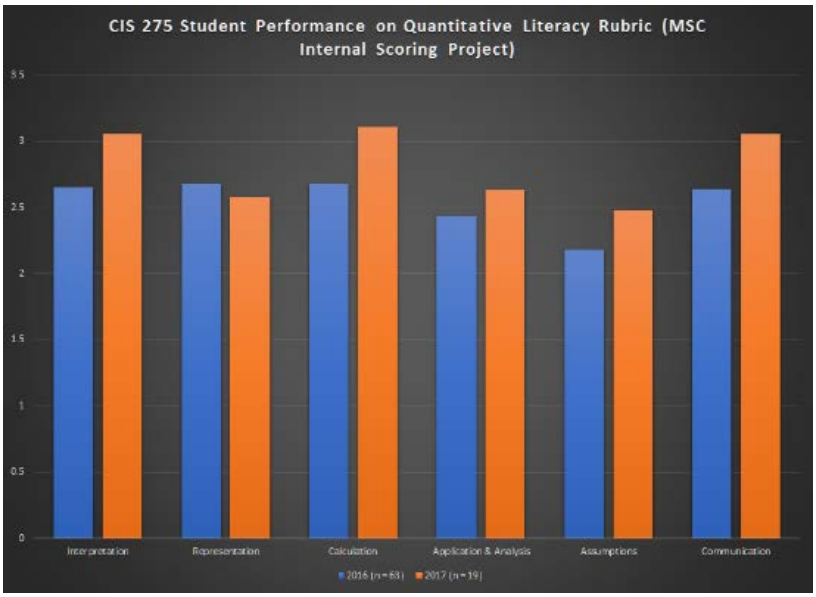
Over 90% of all students assessed met the benchmark skill level for all outcomes, except for O1 (Develop and Evaluate System Requirements, where 86.3% met the benchmark).

We also annually assess the following outcomes for our state Technical Skills Attainment reports:

- Identify and describe hardware and software networking components.
- Troubleshoot and maintain networking systems.
- Install & configure operating systems.
- Install & configure networking components.
- Integrate security practices into the design, installation, configuration and management of networking system

In 2017, we assessed 41 students in CIS 279L and 81 students in CIS 288M. 68.3% of students in CIS 279L met the benchmark in all of the above outcomes, while 51.8% of the students in CIS 288M met the benchmarks.

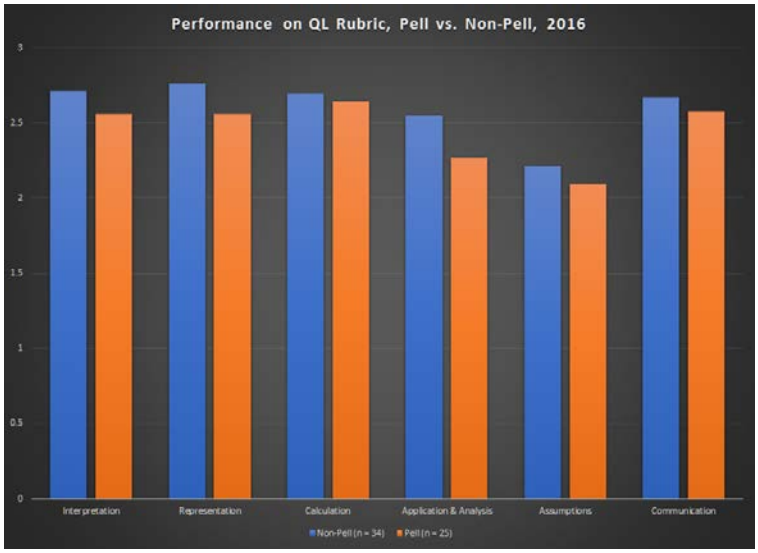
Finally, in 2016 and 2017 the CIS SAC participated in PCC's pilot study on an internal version of the Multi-State Collaborative Assessment project. We supplied student artifacts in the area of Quantitative Literacy for internal scoring. The overall results on each of the 6 criteria in the Quantitative Literacy rubric were as follows:



Note that while it looks like the SAC has improved student learning between 2016 and 2017, this is most likely reflecting a change to the way student artifacts were sampled in the pilot. In 2016, all student artifacts were scored, but only a small sample was scored in 2017, and we believe that the criteria used to select student artifacts in 2017 accounts for the increase in student scores. It is also possible that changes to how the norming process was conducted for the pilot could have had an affect on the final scores. The remainder of the discussion will focus only on the 2016 data, since that was the most complete sample set.

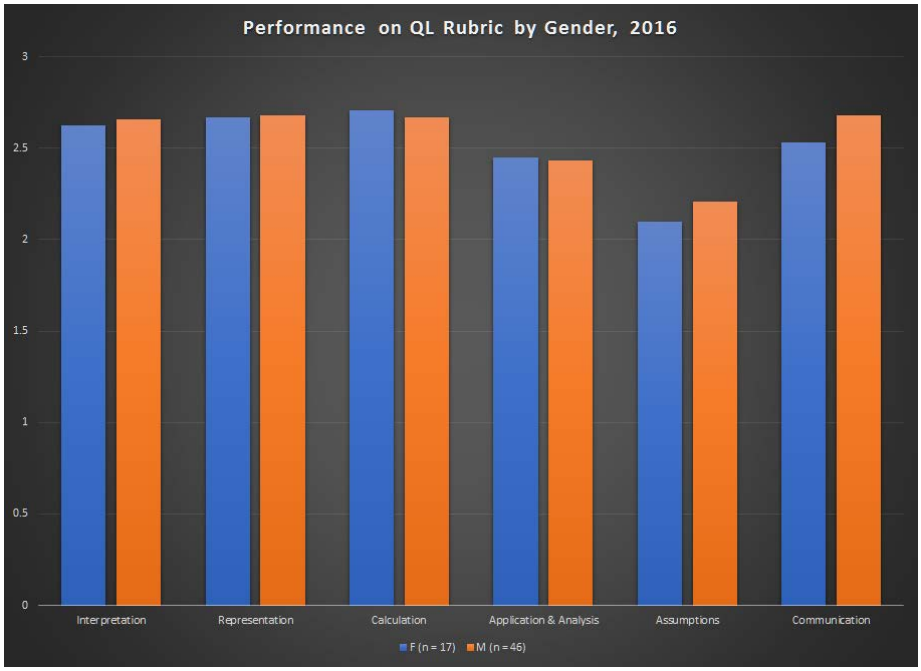
We attempted an analysis of the 2016 data based on Ethnic Group. However, the sample size was very small (n less than or equal to 5 for each group other than white), and no meaningful conclusions could be drawn.

However, we did observe a difference in performance for Pell vs. Non-Pell students across all criteria in the QL rubric, as presented below:



Since Pell status is an indicator of socioeconomic status, this is an important indicator of the "digital divide" where students without access to modern computers and high-speed internet can face additional challenges when studying in IT and computing fields. We have attempted to address this divide by providing extended lab hours in a dedicated CS/CAS/CIS computer lab, but we see that there is still an achievement gap that should be addressed. We note that the sample size is still relatively small, and there is only a 60.4% probability that there is a difference between the two samples, with a 95% confidence interval.

We also examined achievement broken out by gender, as presented in the following chart:



Here, we saw very little difference in achievement between our male and female students. A comparison of means test did not find a statistically significant difference for any of the above criteria (probability of a difference is only 16.5% with a 95% confidence interval).

We also looked at performance by birth year, after breaking our student population into quartiles. Here too, the differences were not statistically significant.

3. Other Instructional Issues

A. Course Enrollment Trends

PCC

FTE Totals by Subject Area and Percent Difference from Previous Year

	Year									
	2013-14		2014-15		2015-16		2016-17		2017-18	
Campus	FTE	Percent Ch..	FTE	Percent Ch..	FTE	Percent Ch..	FTE	Percent Ch..	FTE	Percent Ch..
Collegewide	27,734	-5.4%	25,886	-6.7%	23,896	-7.7%	23,384	-2.1%	22,737	-2.8%
Cascade	6,369	-7.3%	5,701	-10.5%	4,937	-13.4%	4,841	-1.9%	4,729	-2.3%
RockCreek	7,541	-5.8%	7,200	-4.5%	6,796	-5.6%	6,797	0.0%	6,767	-0.4%
Southeast	2,861	5.4%	3,015	5.4%	2,745	-9.0%	2,722	-0.8%	2,530	-7.0%
Sylvania	10,963	-6.5%	9,969	-9.1%	9,224	-7.5%	8,871	-3.8%	8,580	-3.3%

CIS

FTE Totals by Subject Area and Percent Difference from Previous Year

	Year									
	2013-14		2014-15		2015-16		2016-17		2017-18	
Campus	FTE	Percent Change	FTE	Percent Change	FTE	Percent Change	FTE	Percent Change	FTE	Percent Change
Collegewide	831.0	-5.4%	710.7	-14.5%	628.4	-11.6%	580.0	-7.7%	585.7	1.0%
Sylvania	831.0	-5.4%	710.7	-14.5%	628.4	-11.6%	580.0	-7.7%	585.7	1.0%

As evidenced by the above tables, FTE in CIS has declined in the past 5 years.

- In 2013-14, the percent decrease mirrored the downward trend in the college
- In 2014-17, the percent decrease was significantly worse than the college trends
- In 2017-18, CIS increased in FTE while the college declined

Development of new courses, certificates and degrees, in the ever-changing IT field, can attract new students. The cyber security degree and the courses that go with it will hopefully attract new students. The college can assist us by publicizing these courses, certificates and degrees.

CIS ranks as the fifth highest declared majors. See Appendix Table 3.A

Many factors influence enrollment trends within CIS. First, the forecast for jobs and wages related to CIS courses remains strong and that attracts current and future labor force participants exploring potential career opportunities. Second, a significant majority of CIS-students are non-degree seeking. They take a limited number of courses for professional development to apply to their current employment situation to maintain or develop skills, knowledge and abilities on the job. Third, as a professional technical program, CIS offers courses that degree-holders or job-seekers can use to make themselves more marketable in a competitive job market and to earn higher wages. Fourth, students self-select to earn their General Education credits in CIS, because the students believe CIS courses more relevant and useful to their professional, educational, and academic goals (than more academic disciplines). Fifth, the College identifies internships and job vacancy through a targeted list-serve delivered to declared majors.

B. Grades awarded for courses in program

Seem Appendix table 3.B CIS pass rates

CIS 121 (Computer Concepts II) and CIS133X (Intro to Programming where X indicates the language type) have had significantly lower pass rates than other classes. This is not necessarily a bad thing, since IT in general and programming in particular require a certain aptitude that not everyone has. Failing early can discourage a student from spending a lot of money in pursuit of a career that is not attainable.

Nonetheless, we have reorganized 121 which seems to have influenced pass rates if you compare 2012 – 2015 pass rates to 2016 – 2018 rates. We have also vastly changed CIS 122 (now called Intro to Programming Logic) which is now a hard prerequisite to our CIS 133 courses and it seems to have influenced CIS133 pass rates.

The CIS SAC strives for continuous quality improvement to address factors that promote student success. For example, CIS has a tutoring center dedicated to CIS/CS students. This tutoring center supplements other College tutoring resources and helps fill the gaps caused by schedule conflicts and the need for specialized knowledge. For another example, the on-going interactions between students, advisors, faculty members, and the employer advisory group allow the CIS Program to be agile and response to address emerging trends in technology and curriculum development.

C. On-Line versus On-Campus Courses Comparison

In 2014 we offered 61% online courses. Over the past 4 terms (Winter 2018 - Fall 2018) we ran 195 sections, of which 57 were CLWEB and 138 were WEB, so 71% online.

In AY 2012-2013, the pass-rate for web-course was 73.1%.
Since then, the pass-rate has climbed steadily to achieve 79.3% in AY 2017-2018.

On campus success rate is typically approximately 81% (plus/minus two percent).

This is not significantly different.

In AY 2017, 96% of CIS courses are offered via Online Learning.
That showed an increase of 33.5% since AY 2014.
It is possible to earn both CIS AAS degrees by taking only Online Learning courses

D. Curricular Changes as a Result of Educational Initiatives

Although individual instructors have explored various areas, we have made no curricular changes as a result of educational initiatives.

E. Dual Credit Courses Offered to High Schools

As a direct consequence of the AY 2013-2014, CIS Program Review's recommendation, the CIS faculty introduced courses for dual credit in AY 2015-16. For the first time, in the CIS SAC has begun to offer dual credit courses for eligible high school students. Three different high schools: Aloha, Franklin, and Sherwood offer three different CIS courses. The courses include CIS 145 Microcomputer Hardware, CIS 122 Intro to Programming Logic, and CIS 133J Java Programming 1.

The tables in the appendix show the trends in the CIS Program's growth in terms of dual-credit course offerings. Effective AY 2018-2019, the College deactivated CIS 133J Java Programming from our program and discontinued its eligibility for dual credit.

Ongoing since their implementation, these dual credit high school courses and their instructors have fulfilled and maintained their academic standards for accreditations purposes. Through performance audits and other observations, the CIS Program evaluates courses' instructor's qualifications, syllabus, schedules, outcomes, curriculum, materials, and students' work-products.

For consistency, the CIS Program has a designated one liaison for dual credit, Larry Lam, a long-time adjunct faculty member from Portland Community College. He maintains regular contact with the local high school instructors.

F. Course Evaluations

As a tool for continuous quality improvement, the CIS SAC applies the data derived from the course evaluations and instructors' observations. Likewise, instructors apply methods of continuous quality improvement derived from professional development activities. Ongoing through dynamic processes during routine meetings (such as regular Department, In-Service), the CIS SAC as a whole considers course evaluations' impacts on courses, the program, the discipline and the College. Likewise, in sub-committees organized by subject area specialties (e.g., Gen Ed CIS 120-121, Networking, Programming, etc.), the CIS engage in the same considerations triggered by trends in student-surveys.

There are 3 CIS SAC specific questions:

- What did you learn in this class?
- What helped your learning?
- What got in the way of your learning?

Subcommittees can share results to learn:

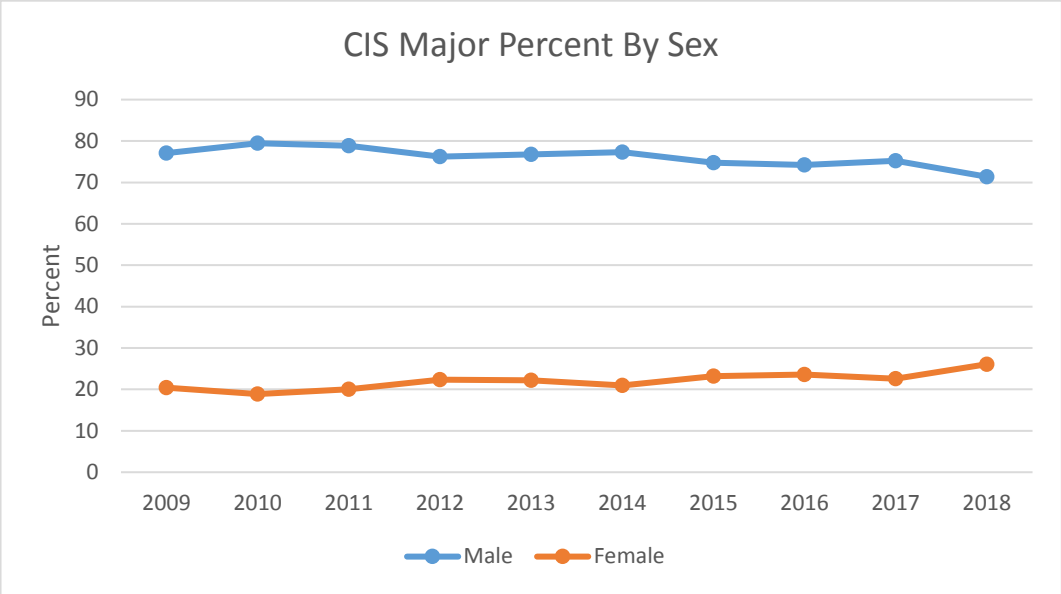
- Are students learning what we try to teach?
- Effective ways to get help learning
- Possible problems, like the book, that may inhibit learning

4. Needs of Students and the Community

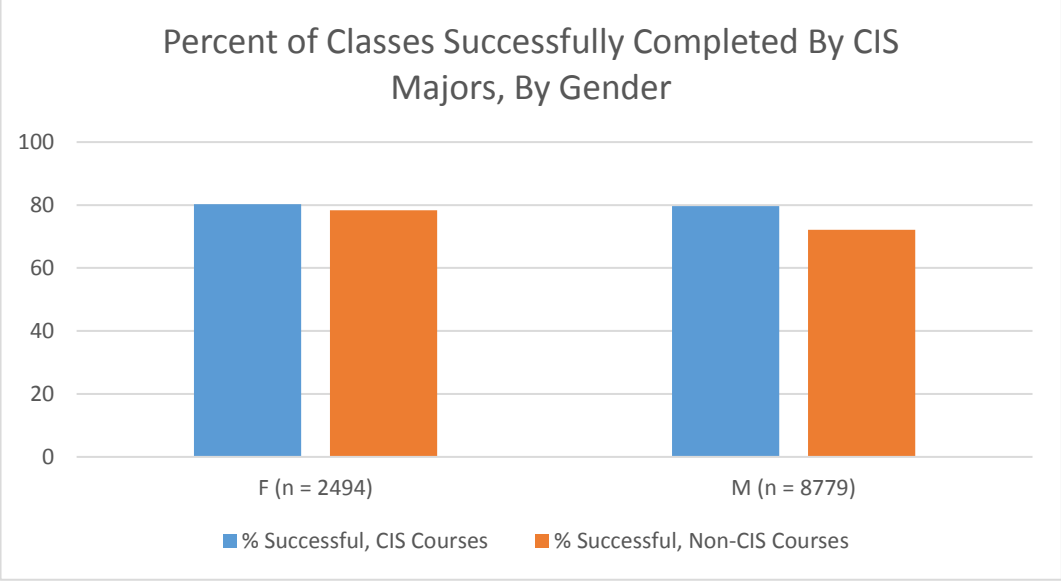
A. Changes in the demographics of the student populations

Demographics by Gender

Since 2009, the percentage of female students who choose CIS for their major has steadily increased, as shown in the graph below (accounting for about a 6% increase in female CIS majors between 2009 and 2018).



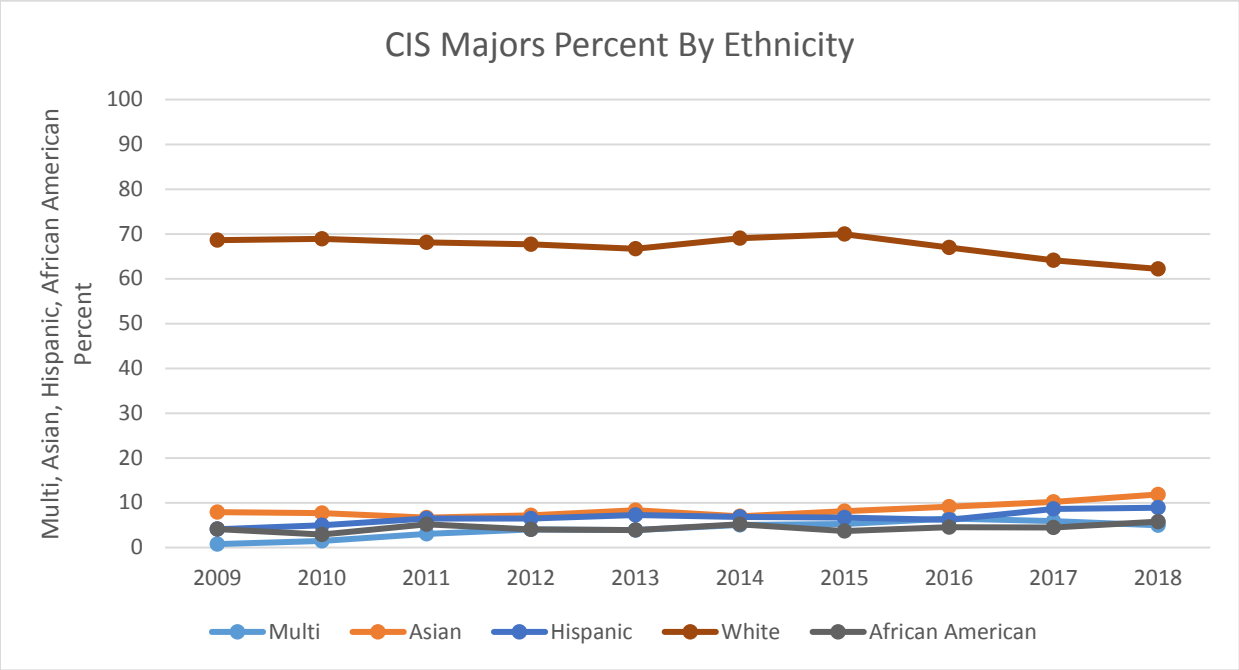
In addition, there is no statistically significant difference between the percentage of CIS classes successfully completed by female vs. male students (however, we note that female CIS students tend to do better overall in non-CIS classes than their male counterparts).



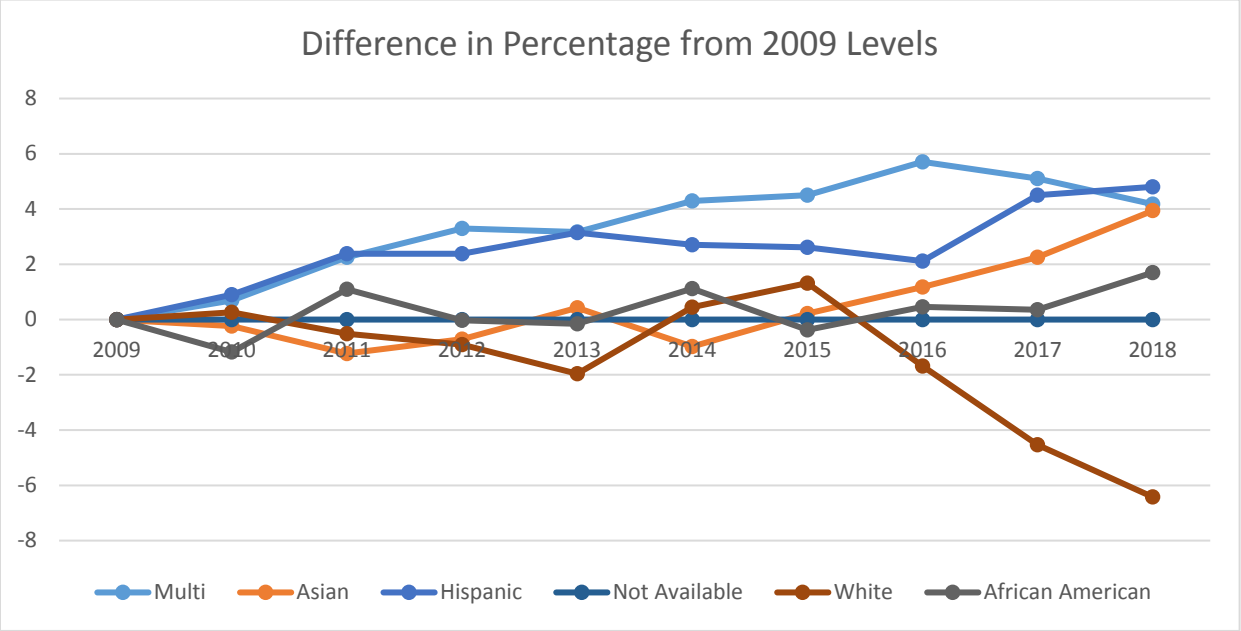
We believe that some of this change is related to an increase in awareness of equity issues among our faculty, and some of the program-level changes that have been made, as discussed under “Diversity of faculty” in Section 5.

Demographics by Race / Ethnicity

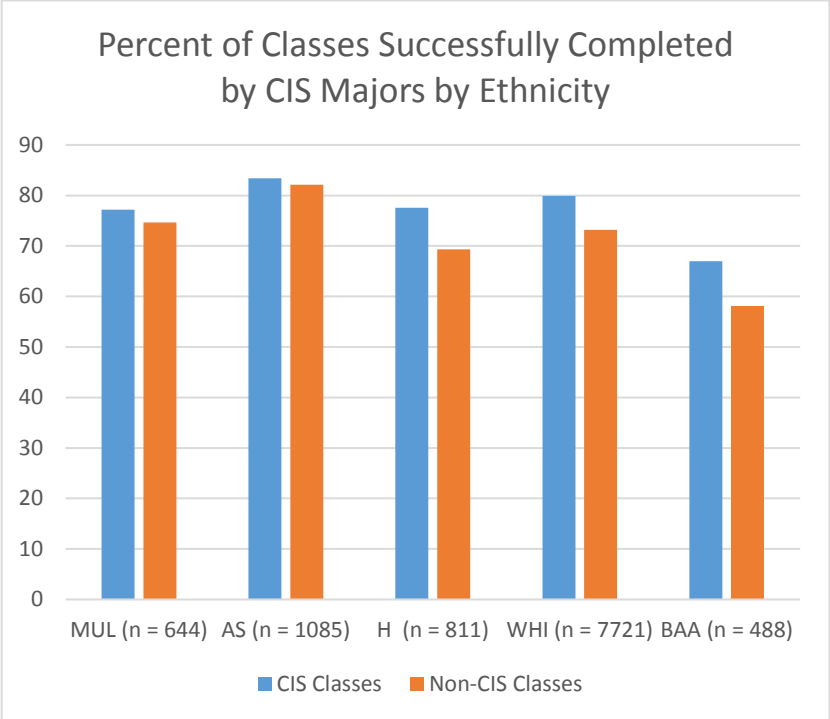
We have also seen an increase of approximately 6.4% in the percentage of Multiracial, Hispanic, African American, and Asian students who choose CIS for their major over the same time period, with a corresponding decrease in the percentage of white CIS majors.



This difference is easier to see if we plot the change in percent for each group from 2009 forward:



There is, however, still an achievement gap in successful course completion for some groups. In the chart below, we see that achievement in CIS class is higher than in non-CIS classes for all groups, but that there is about a 12% achievement gap for African American students vs. White students in CIS courses, and a 15% achievement gap for African American students vs. White students in non-CIS classes.



B. Strategies to facilitate success for students with disabilities

Facilitating success for students with disabilities is a routine part of CIS department meetings. This includes providing up-to-date information regarding policies and procedures from the office of disabilities services. Faculty are encouraged to reach out disability services when they have questions or concerns. Faculty have reported overall success when seeking help from disability services. Issues addressed have included arranging proctoring and clarification on accommodation specifics.

CIS faculty reported both online and on campus classes have difficulty finding note takers. The financial incentives have not been enough to bring out volunteers. Working with students who misinterpret the nature of their accommodation can be challenging. The most common item where accommodation misinterpretation occurs is with Consideration for Deadline Adjustments.

C. Strategies for online student success

Monthly department meetings are used to keep faculty informed and provide training for teaching including teaching online. We exchange ideas and share experiences. We hve implemented 8-minute ted talk presentations into our meetings. The talks are presented by faculty and cover a variety of topic including using Zoom for online class and office hour sessions.

D. Feedback used to make curriculum and instructional changes

In a rapidly changing field like CIS, local industry feedback is vital. This feedback provides the department with insight regarding what we curriculum should encompass well as future trends in technology. A topic of continued interests includes integrating security across most every course in the program, from programming to operating systems.

Instructional changes are typically generated from the review of student feedback. CIS faculty routinely review student feedback at the end of each term. This has led to major the use of instructional videos for hands on assignments as well clarifications of challenging topics. Faculty have gathered direct feedback on assignments to determine ease of understanding, how to improve areas that students routinely find difficult. In order to increase responsiveness, some CIS faculty integrate real-time feedback into their courses by asking questions in class or via Brightspace.

5. Faculty: composition, qualifications, and development

CIS has:

- nine full-time CIS faculty positions
- two full-time faculty shared with Business who teach 1 CIS class per term
- five multi-year contract (MYC) part-time faculty
- approximately 20 additional part-time faculty

Two of the nine full-time positions are unfilled as of January 2019.
Filling these positions is critical to maintaining the quality of the CIS program.

A. Diversity of faculty

The CIS department has been working to further our faculty's inter-cultural competence and creation of a shared understanding about diversity, equity, and inclusion (DEI). For example, we have relevant presentations at department meetings, share resources, and encourage professional development.

Specific examples in this area include:

- Various faculty have attended DEI training and then offered a summary and tips at faculty department meetings so that all can benefit.
    - One CIS faculty attended the Teaching to Men of Color training at PCC and presented at a CIS department meeting on what was learned.
    - Multiple CIS faculty attended Lighthouse for CS training and one presented at a CIS department meeting on what was learned. Lighthouse for CS is an online course that presents proven strategies for recruiting and retaining diverse students in computing.
    - Two CIS faculty attended the NCWIT Summit on Women and IT in 2014 and brought back NCWIT resources to share with the department, such as copies of the Top 10 Ways to Engage Underrepresented Students in Computing, which were handed out and discussed at department meetings.
- One of our core degree courses that is also a gen ed course, CIS 122, was redesigned with the goal of making the course more friendly and inclusive of women and underrepresented students. We used principles from the NCWIT resources as well as those utilized by Harvey Mudd College to quadruple their number of female computer science majors (How one college went from 10% female computer-science majors to 40%). Specific changes we made included
    - Changing language to Python
    - Making the assignments more creative and open-ended

In a poll of CIS faculty which had 17 responses, 13 faculty said they had attended a training on diversity, equity, and inclusion. Of the 13, five indicated that the training resulted in a change in the classroom or curriculum of their courses, with two additional faculty indicating that they had already made changes prior to the training. Faculty responses on changes they had made as a result of the training include

- "...training provided research showing the importance of emphasizing a growth mindset. I now emphasize this more in my classes in the classroom or in online discussions."
- "I am aware that I need to always be open to new perspectives from a wide variety of students."

- "I have started to use more diverse 'real world' examples when I have questions & scenarios in activities. I also push students to consider diversity when researching assignments."
- "I made a point of having examples given in classroom to be more inclusive. Searched for images covering all races for online courses"
- "...training helps me understand my and my students' intrinsic biases. I recognize it more in myself and my students. It subtly changes how I address a whole spectrum of topics."

B. Changes the SAC has made to instructor qualifications since the last review

At the time of last program review, changes to instructor qualifications were proposed but not yet implemented. The changes have since been approved and implemented. CIS instructor qualifications are as follows:
Education: Bachelor's degree in Science, Technology, Engineering or Mathematics (STEM) or STEM-related bachelor's degree AND
Experience: 4 years full-time equivalent non-teaching industry experience in the field.

Related Instruction
CIS 120, 121 and 122 include embedded Related Instruction in Computation. In order to teach these courses, instructor must have completed college-level algebra or higher Math.

Currently, two of the seven full-time CIS faculty members have PhDs.

C. Professional development activities of the faculty

In addition to the professional development related to DEI already discussed above, other professional development activities contribute to the strength of the CIS program by informing and improving both curriculum and pedagogy.

A sampling of professional conferences attended by CIS faculty, in some cases including presenting at the conference, includes

- SIGCSE (ACM Conference on Computer Science Education)
- SIGITE (ACM Conference on Information Technology Education)
- 3CS (Community College Cyber Summit) - held in Portland in 2018, a number of CIS faculty attended, and one presented
- OSCON (Open Source Convention)
- SQL Saturday Oregon
- NICE Conference (National Initiative for Cybersecurity Education)
- Two-Year College Data Science Summit
- National Cyber Summit - four CIS faculty plus the Business & Computing dean attended as a result of PCC receiving the designation as a Center of Academic Excellence in Cyber Defense
- Cyber Education Workshop
- HI-TEC (High Impact Technology Exchange Conference)
- ICT Educator Conference

As indicated above, a number of the events attended are cybersecurity-related, and this has informed the development of our Cybersecurity Fundamentals certificate and the achievement of designation as a Center of Academic Excellence in Cyber Defense Two-Year Education. In addition, some of the DEI resources and trainings specific to computing mentioned in section A were first learned about at a professional conference.

In the fast-paced field of information technology, professional development is critical for faculty to keep up with the technologies that industry is using and that employers want to see in our graduates.

Of 17 CIS faculty who responded to a survey, 13 indicated that a business or industry event they attended resulted in a change in the classroom or curriculum of their courses.

Of 17 CIS faculty who responded to a survey, 10 indicated they had attended a training on teaching practices or pedagogy that resulted in a change in the classroom or curriculum of their courses. Faculty responses on changes they had made as a result of training include

- “Learned how to instruct online more efficiently”
- “IOYC class - Better coordination of CCOGs and course Learning Outcomes”
- “flipped classroom”
- “I attended a talk on the use of in-class quizzes using tools like PollEverywhere or Kahoot to check understanding and adjust on the fly based on responses. I now use Kahoot in my classes for this purpose.”
- “The quality matters coursework has changed how i approach course design and assessment. Specifically, I pay much closer attention to course outcomes and make sure i have alignment among activities and assessments.”
- “The importance of Small teachings emphasized the need for student self evaluation and allowing students to evaluate self and peer course work. So now they grade each other on PowerPoint presentations in class.”
- “... the importance of first and last 5 mins of class and how to make them effective. I use this time to say/discuss/emphasize the 'takeaways' of the day.”
- “Veterans do better with more structured instruction. Deadlines mean more to them than other students. Reducing flexibility and clarifying instructions has led to more satisfaction for many students.”

In the past five years, one CIS faculty member had a sabbatical. This included spending time visiting with companies to see how networking technology is being used, and bringing back the knowledge, latest practices, and anecdotes to benefit our students and our courses.

6. Facilities, Instructional, and Student Support

A. Classroom space, classroom technology, laboratory space, and equipment

Value of Computers in the Classroom

CIS instruction focuses on programming, database development, web development, networking, cybersecurity and data communications. Readily available computers allow students to apply what they read and hear about in class. Increasing computing hardware classroom access has enhanced our ability to support our students.

Classrooms

- All CIS courses require classrooms equipped with computers for student use. The limited number of these rooms results in sections often being scheduled at times that are difficult for CIS students to attend. With the evolution of the CIS program, adequate access to computerized classrooms has been challenging. Better access to computerized classrooms translates directly into more effective instruction and better learning
- All CIS classrooms now have electronic podiums with monitors, computers, and overhead projectors. These podiums include the ability for an instructor to plug in a laptop computer in order to provide highly customized content. The improved technology has helped provide consistent high-quality instruction. Students can see what's presented more clearly.
- Each classroom has at least some whiteboard space. Being able to spontaneously illustrate a concept is critical to classroom instruction. More whiteboard space would be better, but we seem to currently have an adequate amount.
- Our classrooms also provide two networks. The first is for traditional network usage and Internet access. The second network is isolated from the rest of the PCC network so any student server configuration changes won't threaten the performance of the rest of the PCC computing network. This gives students the freedom to experiment with minimal risk while on an active network.

Computer equipped classroom hardware

- CIS computer equipped classrooms had their computers replaced in the Fall of 2018 with Dell Precision Workstations, model T3620 MT with a 6th generation Intel® Core™ i7-6700 Quad Core 3.40GHz, 4.0Ghz Turbo, 8MB, and NVIDIA® Quadro® M2000 4GB video card. They include 32GB (2X16GB) 2400MHz DDR4 UDIMM Non-ECC memory and an M.2 512GB PCIe NVMe Class 40 Solid State boot Drive. They have an integrated Gigabit Ethernet NIC and both USB 2.0 and 3.0 ports on the front.
- We opted for a USB connected optical drive rather than a built-in model as well as a 6th generation processor rather than the most current 7th generation processor as a cost saving measure.
- For additional savings we opted to reuse our existing monitors from the last hardware upgrade 4 years ago. We push the capabilities of the hardware pretty hard. The amount of software we have on every computer is much greater than on a typical home computer, as we need a broad range of software to support a variety of classes. We use virtualization, especially in the Operating Systems classes, which is challenging with the limited RAM. Altogether, that puts a considerable strain on the processing power of these small machines. This is another reason why we need to continually upgrade the hardware.

- The monitor screen size and resolution limits what we can do, especially in the area of web development. We try to strike a balance between monitor cost and performance. The monitor stands are typically adjusted by every student in every class so stand quality has been a priority. Our most recent monitor stands are considerably better than earlier models so students can work more comfortably.
- IT support continues to be a challenge. The stated goal of IT is to have all PCs repaired within 24 hours, but this goal has seldom been reached. Communication between IT and the large number of faculty who use the labs can be problematic, especially since the labs are used by faculty from several different departments. We have tried several methods of standardizing and centralizing the reporting and follow-up of computer repair, but there is still room for improvement. IT support has improved since our last program review which has improved the student experience. When workstations are unavailable students have to double up, instruction suffers.
- During our last program review we made the case that we need more current computing hardware in our classrooms than is generally necessary for programs that don't specialize in computing, that a replacement cycle of every 2 years rather than every 3 years is more appropriate. The program evaluators agreed. Unfortunately, due to changes in the IT department there was a miscommunication of this need, so instead we waited 4 years before the computing hardware was updated. Poor performance computers result in poor results for our students.
- One of our challenges is that CIS computing students need access to the inner workings of their computers in order to learn how they work. Unfortunately, the IT department strives to limit student access to the inner workings of computers in order to improve security and limit a student's ability to cause computer and network problems. These two needs are at odds with one another. Students in the CIS department need more access to computer settings and their configuration. Without this access we have little need for the computers at all.

Servers

We have a small server room located adjacent to TCB 311 to support the Operating Systems classes, and a data communications closet in TCB 308 to provide isolated network services to TCB 308 and 307. Faculty members provide all support for these servers and network hardware including all software installations, backups, and repairs. Thus far we've been able to make do with low performance servers augmented by donated hardware. Even though having a dedicated server room increases the workload for faculty, it has significantly improved the flexibility and functionality of how we can deliver quality instruction, especially with regard to operating systems and data communications classes.

We also have two virtual database servers supported by a combination of PCC's IT department and faculty. This shared support model has improved significantly since our last program review. These database servers make it possible to teach our database classes.

Virtual Classroom

As business networking resources migrate to the cloud and as our students move to online learning, our computing resources must also migrate to the cloud. This will necessitate changing the focus of our computing investments to providing secure, flexible cloud servers to support Linux and Microsoft operating system instruction as well as data communication and security. These services can be provided either by PCC IT services or outsourced to third parties who are providing these services to other schools. Adequate cloud services will be equally available to both classroom and Online Learning students.

B. How students are using the library or other outside-the-classroom information

Library Resources

- Overall use of library resources has continued to evolve over the last five years. On-campus library resources are of decreasing value as our student population migrates toward a more distance learning approach to their education. Online publications are being used more. In particular, the EBSCOHOST online collection of periodicals sees a greater usage than most other collections as it focuses on technical content that is more relevant to our program. These resources are equally available to online and on campus students.
- The library has been willing to hold and check out reserved copies of CIS textbooks which has been of tremendous value for CIS students, especially those who have limited resources. Unfortunately, the library is unwilling or unable to buy the textbooks, so we are required to use unbudgeted department funds for the purchase. As department budgets have tightened, fewer books are purchased. Publishers are usually unwilling to provide free text books for this purpose.
- Administration of how textbooks are kept on reserve in the library continues to be a challenge. Library policies are often disconnected from how textbook access is needed, so books will move from reserved to general checkout without clear communication with the department. This sometimes results in a student being able to check out the text book for the entire term rather than having the text available to be shared with any student for a much shorter period of time. Better communication between the library and the department is needed.
- There has been a move by the library to provide more digital access to books and periodicals, but this has not applied to text books on reserve. There are technical and legal obstacles to providing this access but it's an important one to overcome.
- The Computer Resource Center and tutor center in the library are rarely used by CIS students because of the specialized computing requirements of CIS students.

CIS Tutoring and Computing Lab

- The CIS and CS departments offer a combined tutor lab in TCB 308. These 20 computers use the same hardware and software as those in our teaching classrooms. Paid student tutors who have experience with computer technologies, supervised by full time instructor Dave Schooler, provide specialized tutoring services for CS and CIS students during the day, evening, and weekends.
- Since our last Program Review our tutor lab has delivered over 7500 tutor sessions for a total of over 12,000 hours. See appendix 6
- In the Fall of 2018 we are again experimenting with providing online tutoring for CIS students. The challenge is to provide this added service without a significant increase in total number of tutor hours.

C. Academic Advising, Counseling, Student Leadership, and Student Resource Centers

Computer Information Systems Academic Advising

Students can start their CIS degrees or certificates in any term and complete their coursework as a part-time or full-time student. We have a wide variety of classes which allows students to customize their educational experience to meet their needs. For this reason, academic advising is crucial to ensure each

student has an academic plan that will progress them towards completion.
CIS is a somewhat complex program, so general advisers are often ill-equipped to provide the best support for CIS students. Because of this, the CIS department has an embedded Student Resource Specialist, Michele Maxwell, who provides academic advising to all CIS students, **typically 400 students each term**. She answers all email, phone calls, and drop-in requests for information from prospective CIS students, vocational counselors, and PCC partners, such as high schools. In addition, the Sylvania Resource Specialist represents the department at the annual High School Preview Day as well as at other events, where she presents the various certificates and degrees offered through the department.

- Traditional in-person advising appointments made in advance
- Online information sessions for new or prospective CIS students
- On-campus information sessions for new or prospective CIS students
- Advising appointments by Skype
- An active and up-to-date advising website (spot.pcc.edu/computers)
- Drop-in advising times
- In-class presentations

The non-traditional methods, such as advising via Skype or email, have allowed her to provide advising to students who cannot easily come to campus, such as students with disabilities, full-time working students, and students with young children.

Complicating this is that since CIS offers classes on all four campuses, the Student Resource Specialist provides academic advising for all campuses.

While it is difficult to quantify how advising has helped CIS students, students who do not take advantage of the help often have trouble negotiating the degrees and certificates we offer in an effective manner. We believe retention of students on academic probation is improved with more advising.
Dean Albert Lee reported in his September 26, 2018 newsletter that “The PSU staff (encourages our transfer students to meet) with (academic adviser) Michele Maxwell and that (they report that) she is absolutely amazing!”, she is the sole adviser with significant insight into how our program works, and has continued to be the sole adviser even as the program has continued to grow. Her position is critical to our program’s success. If our program is to continue to grow, she will need help soon.

Jobs and cooperative education advising
CIS is a Career Technical Education program, which means that our students are especially focused on getting a job on graduation. This means that maintaining a strong relationship with the business community and providing support for internships is a critical outcome for our program. We recognize that need and so have had a dedicated employment specialist in the division for many years.
The division Employment Specialist advises CIS students about career and cooperative education opportunities. She manages a database of about 2,000 employers that she is in contact with at least once a term. She coordinates the CIS Advisory Board, making it one of the strongest and most effective for any department at PCC. She posts about 10 opportunities per day and provides in-person advising sessions with students to help them prepare for interviews. She gives presentations to regularly scheduled CIS classes on request. She provides information on how to use social media, the current state of resumes, labor market trends, and branding support.

Internships are critical to the success of CIS graduates, and the employment specialist also coordinates the internship program.
When our last employment specialist retired the division hired a part time interim employment specialist with the expectation that the position would be filled by a full-time employee by the Fall of 2018. Citing budget constraints, the division has delayed filling the full-time position and has asked the current part time employee to continue in the position. She has done an exceptional job of picking up the reins and committing the time and energy to do a thorough job, but it is unrealistic for us to expect a part-time, temporary employee to do the job of a full-time employee.

Counseling, Student Leadership, and Student Resource Centers

Faculty actively encourage students to take advantage of the free counseling services at PCC, both via their syllabi and in their interaction with students who they perceive to be struggling.
Veterans seem to be disproportionately attracted to computer technologies in general and CIS in particular. Because of that the veteran's centers have a greater visibility and are more often referenced in our classes.
We have a low percentage of female CIS students. This dearth of female student colleagues makes the Women's Resource Center even more important for students in CIS.
Our students' contact with the Multicultural Center seems to be growing as the percentage of students of color grows in the CIS department and as students from the Multicultural Center have been willing to visit our classes.
The Queer Resource Center is well represented by students in the CIS department.
Unfortunately, the information above is all anecdotal because information about student use of these services is either confidential, inconsistently tracked, or untracked.

Our biggest area of opportunity is with our Online Learning students. Online Learning students seem to be less connected to and less aware of student services than on-campus students. Because we have such a high percentage of distance learning students (almost 65%) we have a special interest in promoting these connections. More work needs to be done to find ways to provide better Student Services support for DL students.

7. CTE Programs

A. Impact of the Advisory Board

The CIS Advisory Board continues to be an active participant in helping us keep our program current to ensure we are graduating students that meet industry needs. The CIS Advisory Board has provided the CIS program with feedback and insight on several key initiatives:

- Instructor qualifications - the Advisory Board continues to make recommendations for instructor qualifications based on industry trends.
- Security - Understanding security is emphasized throughout the Advisory Board input. CIS continues to integrate security topics thought our curriculum. The Board has advised that students need to be security conscious in all fields of technology, from technicians, to programmers, to technical administrators and dedicated cybersecurity officers.
- Cybersecurity certificate – The Advisory boards input was invaluable to the addition of a new CIS Cybersecurity certificate.
- Cybersecurity degree – With the help and guidance of the Advisory Board, CIS is developing a new CIS Cybersecurity degree for the 2019-20 academic year.
- Center of Academic Excellence 2-Year (CAE2Y) – This institutional award is established by the National Security Agency (NSA) and the Department of Homeland Security (DHS), with the support of the National Science Foundation (NSF) and CyberWatch. With the encouragement and guidance of the Advisory Board, CIS completed the multi-year process to meet CAE2Y compliance. PCC and CIS personnel attended the National Cyber Summit last Spring where PCC was recognized as a CAE2Y institution.
- Industry Tools - At the advice of the Advisory board we continue to update course content with the latest industry tools such the source code control system GIT.
- Working to improve student soft skills - the Advisory Board continues to express the importance of students possessing soft skills, such as written and verbal communication, critical thinking skills, etc.
- Health Informatics degree – In discussions with the Advisory Board we learned that most Health Informatics job openings are filled internally with personnel who have years of experience learning the terminology and processes used in the health industry. At the Board's recommendation we deactivated the Health Informatics degree.

B. Current and projected demand

Table – Enrollment Patterns

Academic Year	FTE	Head Count	Percent change
2013-14	813	2,885	-5.4%
2014-15	710	2,333	-14.5%

2015-16	628	1,996	-11.6%
2016-17	580	1,791	-7.7
2017-18	585	1,807	+1.0%

As in past economic down turns, CIS saw a large spike in enrollment due to the great recession of 2008, with enrollment leveling off around the 2011-12 academic year. As the economy improved enrollment started to decrease in academic year 2012-13 and has continued through academic year 2016-17. But as can be seen in the Table above the decrease is leveling off and there was even a small increase in enrollment for the 2017-2018 academic year.

In response to the decrease in enrollment CIS has decreased the number of sections offered for some courses and how often other courses are offered. This has resulted in an increase in class sizes and a decrease in the number of class sections canceled due to low enrollment.

In addition, with the offering of a new Cybersecurity certificate and for the 2019-20 academic year a new CIS Cybersecurity degree, we anticipate attracting new students interested in cybersecurity jobs and related fields.

C. Students prepared for program entry

The CIS program is an open-entry program and any PCC student, who tests into WR 121 and MTH 20 or higher via the placement tests, can start the CIS program. The beginning CIS classes are offered every term, so students can enter the program in any given term and complete their coursework as a part-time or full-time student. For this reason, academic advising is crucial to ensure each student has an academic plan that will progress them towards completion. The CIS department has an embedded Student Resource Specialist who provides academic advising to all CIS students. This advisor works with approximately 300-350 students every term.

D. Job placement

The CIS employment specialist advises students on careers, internships and cooperative education and manages/updates a database of about 2,000 employers. Additionally, the specialist attends numerous IT networking events in the Portland area and develops new strategic partnerships for PCC. Focus for the specialist in 2018 has been on outreach to promote PCC's computing programs and its students. Coordination of the CIS Advisory Board remains with the specialist position due to outside relationship development efforts with the business community at large. Because of our strong relationships with area businesses, the CIS Advisory Board is one of the strongest and most effective of any department at PCC. See the Appendix Section 7 for advisory board membership information.

The CIS employment specialist posts at least 500 opportunities for jobs and internships monthly on a Google Group listserv. Additionally, the specialist provides in-person, phone and Skype advising sessions to help with resumes, interview preparation, and providing advice and resources for job search. The specialist also provides information on how to use social media, labor market trends, and professional

branding support. The specialist conducts classroom visits to provide a brief introduction of the services available to students. A 'how to' training session is being developed to assist students with hard skills for networking, career and professional growth. The first event was in August 2018; 66 students attended. Due to strong student interest and demand, the program was granted a modest budget for quarterly events.

Internship to Job Conversions

While PCC does not provide or track job/internship placements, CIS students and alumni often let us know about their post-college successes. Several CIS students have had twelve month paid internships at Intel, Nike, MDI Group with full-time hires after the internship. In 2018, the specialist developed a new strategic partnership with Milestone Systems, a subsidiary of Canon. Their projection is to hire ten interns yearly and convert two internships into full time positions.

There have been numerous success stories from current and former PCC students performing cooperative experiences. A sampling of employers who have hired our interns are ESCO, Oregon Coast Community College, Pacific Office Automation, Intel, Precision Castparts and Oregon Health Sciences University.

Academic Year	Co-op Placements	Total Credit Hours	Un-Paid Co-ops	Average Pay for Paid Co-ops
2013-14	20 co-ops	73 credits	8 unpaid	12 paid @ $26.38 average
2014-15	16 co-ops	58 credits	4 unpaid	12 paid @ $23.38 average
2015-16	17 co-ops	47 credits	5 unpaid	12 paid @ $25.39 average
2016-17	19 co-ops	52 credits	4 unpaid	15 paid @ $20.33 average
2017-18	15 co-ops	60 credits	6 unpaid	9 paid @ $19.97 average

E. Completion Counts, Degree/Certificates

See Appendix Section 7 for table of degree and certificate completion counts for past 5 years.

Barriers CIS students Face
Financial

Most CIS students take advantage of the Financial Aid services. In addition, the PCC Foundation offers four scholarships for CIS majors (details in appendix section 7).

Juggling work and family obligations with school

Most of the CIS students are non-traditional students. Many work part-time or full-time jobs while completing their CIS program, and a number of them are parents as well. These non-school obligations make it challenging for many of CIS students to attend daytime classes or to take advantage of many school resources.

As a result, the CIS department offers classes in the evenings, occasionally on Saturday mornings, and through Distance Learning. In fact, the AAS degree in Computer Information Systems, and the one-year Certificate in Computer Information Systems can all be completed entirely online.

As noted earlier, the Academic Advisors for the CIS program provide academic advising through a number of methods, including online orientations via Blackboard Collaborate/Zoom, Skype, email, and phone advising appointments. This has allowed them to provide advising to students who cannot come to campus during regular working hours.

Access to computers and software

Students who do not have access to a PC and current software are at a significant disadvantage when completing a CIS certificate or degree. To meet this challenge, the CIS department maintains a Tutoring Computer Lab that provides CIS students with the necessary tools to complete their class assignments. The lab is on the Sylvania Campus, TCB 308.

Student tutors are available for assistance and act as lab monitors. Many CIS instructors offer scheduled times in this lab for their students. While most CIS students have computers at home, there have been a few CIS students who have completed their entire program by accessing the resources in this lab

Dual Credit

Since our last program review, we've expanded the number of Dual Credit agreements for the CIS department. See appendix Section 7 Table B.

We are in frequent contact with our dual-credit instructors, including attendance at the annual dual-credit symposia, outside meetings for syllabus and course content reviews, assessment visits, and discussion of SAC changes to the CIS program. We are also working with the Beaverton School of Science and Technology on the development of a CTE Pathway of Study for Computer Programming and Software Development. Finally, we worked closely with a group of High School instructors along with PACTEC and the PCC Dual Credit Office on a National Alliance for Partnerships in Equity (NAPE) Program Improvement Process for Equity (PIPE) project on increasing awareness of CS/CIS as a career path and increasing participation in our programs for underserved and non-traditional students.
There are a few special challenges that the CIS department faces with Dual Credit. First, most HS dual credit instructors view their students as being four-year college bound and believe that CS credits are more valuable for their students than CIS credits, since the CS dual-credit offerings have better articulation to four-year programs. Second, as a CTE SAC, CIS places a high emphasis on industry experience for all our instructors, and our minimum instructor qualifications include 4 or more years of relevant industrial experience. That's a difficult bar to cross for many High School instructors who have significant educational experience but lack industrial experience. CIS has met with a number of Portland and Beaverton High School instructors, along with CS and representatives from the Dual Credit Office to discuss, relaxing some of our restrictions for High School instructors who wish to offer dual credit courses but don't meet the minimum qualifications for the CIS and CS departments.

Nature of TSA assessment and content covered

Courses CIS 288M and CIS 279L were chosen to perform the assessment. All student's working to earn a CIS Networking degree are required to take one of these two courses and many students take both courses.
As a final project for the term, students complete a written assignment where they are given a scenario, such as a request to design a computer network for a new startup business. As part of the scenario they are given general end user requirements, such as the number and types of end users. The scenario also includes general network requirements, such as internet access and web site presence, support for email, print services, etc.
See table in Appendix Section 7 – CTE for alignment assessment degree and certificate outcomes

Assessment completion

The assignment is given every term CIS 288M and CIS 279L are taught. All students in each class complete the assignment. The assessment results are submitted annually at the end of the academic year. Due to delay receiving the state issued test type ID code there are only two years of assessment data as follows:

Academic Year	Number Students	Pass Percentage
2016/2017	119	63%
2017/2018	102	66%

F. Perkins Funding allocation

The Perkins Funding for CIS is allocated to keep an Academic Adviser position in place. This position is invaluable, indispensable, and essential to our students and faculty members. The CIS program is an open-entry program and students come into the program with a variety of backgrounds, they need to meet with an adviser who has in-depth knowledge of the requirements for all programs to receive adequate guidance to successfully complete their program. The academic advising role is crucial to ensure each student has an academic plan that will progress them towards completion. Currently 300-350 students meet with their academic adviser each term.

G. Opportunities for continued education

Computer Information Systems, or IT, is considered a vocational or technical major and is therefore not a traditional transfer major. However, two Oregon universities have created transfer options for any student who has earned an Associate of Applied Science Degree:

- Southern Oregon University (SOU) has created a Bachelor of Applied Science degree in Management which can be completed entirely online

- Oregon Tech (formerly OIT) has created a Bachelor of Applied Science degree in Technology and Management which can be completed partly online and at their Wilsonville campus

8. Recommendations

General

- Make the Employment Specialist position a full time permanent position again.
- Provide additional support for the Perkins adviser that supports Computer Technologies.
- Increase ethnic diversity and percentage of women in student population.
- Continue redesign of CIS degree as needed.
- Grow our cybersecurity program to meet local industry needs

Faculty

- Continue to fill all vacant CIS FT positions
- Professional development funding for faculty - required for our fast-paced field
- IT should enable our education initiatives
- IT should consult us when changing IT policies
- Have an ongoing "Guest Lecture" series from people in industry targeted towards Faculty
- Get BrightSpace and CourseLeaf (read access) for Dual Credit instructors so that they can collaborate on SAC course shells and get access to the latest curricular changes in our CCOGs.
- Provide direct access to select banner reports to PCC instructors so that they can better study and understand the demographic composition and success rates of students in their CIS classes.

Facilities

- Technology upgrades (trying to get grant funding, but no guarantees)
- Considering the growth in the distance learning side of our program, increase support for CIS-specific distance learning computing resources
- Update computing resources every 2 years instead of every 4 years, as was agreed to at our last Program Review

Students

- Provide better support from the Student Resource Centers and Counseling center for Online Learning students.
- Pursue scholarship opportunities for our students (apply for grants such as C3P, SFS, S-STEM)
- Increase media features on STEM and CIS students to encourage recruitments of diverse student populations into the program.
- Work more closely with transfer partners like Oregon Tech, Southern Oregon University (SOU) and possibly Western Oregon University Information Systems degree
- Increase articulation of CIS Dual Credit courses with four-year colleges so that CIS Dual Credit is viewed as a more viable option for four-year college-bound High School students.
- Engage in preferential hiring practices for student-tutors at SE, Rock Creek, and Cascade, or students who have experience in computer technology programs and a familiarity with CIS120/121 because of the centralization of the CIS/CS Tutoring Center at Sylvania. Most DL students also enroll on campus-based courses.

Appendices

Appendix Section 1 - Executive Summary

Evaluation of CIS courses against the ACM's recommended core learning outcomes

ACM Learning Outcome	CIS Course(s) Addressing Outcome
Use communication, negotiation, and collaboration skills as a member of a diverse team.	122, 244
Carry out basic computer network troubleshooting techniques.	240L, 279L, 240M, 288M, 289M
Carry out troubleshooting strategies for resolving an identified end-user IT problem.	120, 225, 244, 240L, 279L, 240M, 288M, 289M
Demonstrate best practices for designing end-user computing interfaces.	122, 133N, 133W, 195P, 233N, 233J, 233W
Demonstrate professional behavior in response to an ethically-challenging scenario in computing.	120, 121, 243
Demonstrate the techniques of defensive programming and secure coding.	133W, 195P, 233N, 233J, 233W
Describe IT procurement processes for goods and services.	
Describe the attitudes, knowledge and abilities associated with quality customer service.	225, 243
Describe the data management activities associated with the data lifecycle.	125D, 275
Describe the layers, protocols and components of the OSI model.	279L
Diagram a database design based on an identified scenario.	121, 275
Diagram the components of an integrated IT system.	279L
Diagram the phases of the Secure Software Development Lifecycle.	120, 122, 244
Illustrate the activities of a digital media design process.	135M
Differentiate among a variety of technology-based sensory interactions.	120, 121, 243
Differentiate among data types, data transfer protocols and file characteristics specific to the targeted use.	120, 121, 133N, 133W, 195P, 233N, 233W, 279L,

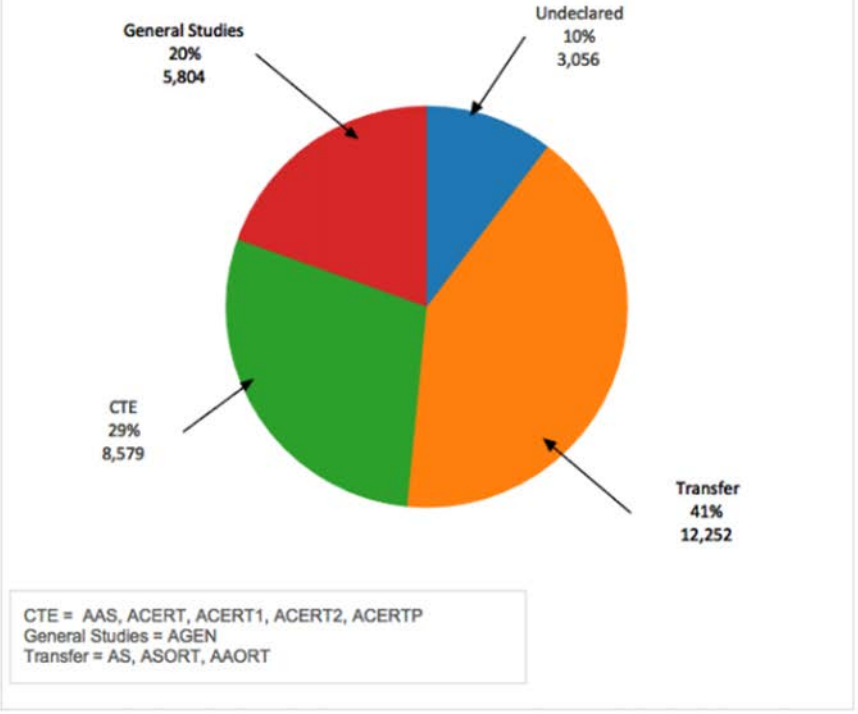
Differentiate among strategies for business continuity provisioning of IT resources at the enterprise level.	243
Differentiate among various computer networking models.	121, 179, 188, 189, 243, 278
Differentiate among various operating systems.	120, 121, 140M
Differentiate among various techniques for making a computer network secure.	284C
Differentiate between public and private data.	133N, 133J, 133W, 233N, 233W, 243
Discuss applications of data analytics.	243
Discuss data governance and its implications for users as well as IT professionals.	243
Discuss issues relevant to dealing with very large data sets, both structured and unstructured.	121, 195P, 243
Discuss significant trends and emerging technologies and their impact on our global society.	120, 243
Discuss software development methodologies.	122, 133N, 133J, 133W, 233W, 234A
Explain the process of authentication and authorization between end-user devices and computing network resources.	243
Identify a variety of assistive or adaptive technologies and universal design considerations.	120, 133W
Identify a variety of enterprise-level digital storage technologies.	120, 240L
Identify basic components of an end-user IT system.	120, 121, 225, 279L
Identify database administration tasks.	121, 195P, 275, 276
Implement a hardware and software configuration responsive to an identified scenario.	279L, 288M
Implement a variety of practices for securing end-user systems.	279L
Implement an application of virtualization.	120, 121
Implement communication principles into digital media design.	243
Modify a system to improve data confidentiality or regulatory compliance.	189, 284C, 287M
Produce technical documentation responsive to an identified computing scenario.	133N, 133J, 133W, 195P, 233N, 233J, 233W, 234A, 295P
Produce simple database queries.	121, 125D, 195P, 275, 276

Summarize life-cycle strategies for replacement, reuse, recycling IT technology and resources.	120
Summarize strategies to support or train users with their IT resources.	225
Summarize the differences among various programming languages.	121, 122, 133N, 133J, 133W, 195P, 233N, 233J, 233W, 234A, 295P
Summarize the flow of data through a computer network scenario.	179, 278, 279L
Summarize the implications of various cloud computing models.	279L
Summarize the role of IT in supporting the mission and goals of an organization.	120, 225
Summarize the security implications and risks for distributed IT systems.	243, 284C, 287M
Summarize the tenets of ethics and professional behavior promoted by international computing societies.	121
Use a programming or a scripting language to share data across an integrated IT system.	233N, 233J, 233W, 234A, 295P
Use a programming or a scripting language to solve a problem.	133N, 133J, 133W, 195P, 233N, 233J, 233W, 295P, 240L
Use a variety of practices for making end-user IT systems secure.	189, 284C
Use data analytics to support decision making for a given scenario.	
Use documentation or a knowledge base to resolve a technical challenge in an identified computing scenario.	133N, 133J, 133W, 195P, 233N, 233J, 233W, 234A, 240L, 279L, 295P, 240M, 288M, 289M

Appendix Section 3 – Course enrollment trends

Table 3. A PCC Declared Majors

PCC Students Declared Majors Fall 2016



PCC Fall 2016 Students Declared Majors sorted Highest to Lowest

Major	Title	Degree	Count
GEN	General Studies	AGEN	5,804
ASTR	Transfer Program	AS	5,751
OTRN	Oregon Transfer	AAORT	5,059
N/A	Undeclared	N/A	3,056
OTBU	Oregon Transfer - Business	ASORT	1,436
CIS	Computer Information Systems	AAS	633
ACCT	Accounting	AAS	535
CJA	Criminal Justice	AAS	429
EEES	Early Education & Family Studi	AAS	299

Table 3.B CIS Pass Rates

Source: Institutional Research (Alyssa Eggebrecht)

		Modality					
		Hybrid WEB/On-Campus		On-Campus/Face-to-Face		WEB/Distance Learning	
		Enrollments	Pass Rate	Enrollments	Pass Rate	Enrollments	Pass Rate
Academic Year	Course						
2012-13	CIS 120	.	.	632	70.6%	742	65.1%
	CIS 121	.	.	208	63.5%	384	52.9%
	CIS 122	.	.	479	74.5%	481	62.8%
	CIS 125D	.	.	25	64.0%	115	66.1%
	CIS 133B	.	.	63	54.0%	143	55.9%
	CIS 133J	.	.	83	80.7%	202	74.3%
	CIS 133W	.	.	20	80.0%	23	73.9%
	CIS 135M	.	.	18	50.0%	.	.
	CIS 135T	.	.	.	.	60	63.3%
	CIS 140M	.	.	88	52.3%	239	72.0%
	CIS 145	.	.	102	97.1%	.	.
	CIS 178	.	.	.	.	157	78.3%
	CIS 179	.	.	128	72.7%	207	74.4%
	CIS 187I	.	.	18	77.8%	.	.
	CIS 188	.	.	54	87.0%	.	.
	CIS 189	.	.	33	100.0%	.	.
	CIS 195P	.	.	.	.	47	74.5%
	CIS 199M	.	.	19	73.7%	.	.
	CIS 199X	.	.	12	100.0%	.	.
	CIS 225	.	.	.	.	66	87.9%
	CIS 233B	.	.	.	.	57	57.9%
	CIS 233J	.	.	27	88.9%	72	86.1%
	CIS 233S	.	.	.	.	43	76.7%
	CIS 234B	.	.	.	.	14	57.1%
	CIS 234J	.	.	.	.	24	62.5%
	CIS 234N	.	.	29	55.2%	.	.
	CIS 234S	.	.	.	.	18	88.9%
	CIS 240L	.	.	51	76.5%	74	77.0%
	CIS 240M	.	.	37	75.7%	132	85.6%
	CIS 243	.	.	.	.	89	76.4%
	CIS 244	.	.	67	92.5%	72	87.5%
	CIS 245	.	.	.	.	44	70.5%
	CIS 275	.	.	99	70.7%	167	74.9%
	CIS 276	.	.	32	81.3%	71	73.2%
	CIS 277O	.	.	.	.	33	60.6%

	CIS 277T	.	.	.	.	18	83.3%
	CIS 278	.	.	52	92.3%	.	.
	CIS 279L	.	.	17	76.5%	45	80.0%
	CIS 280D	.	.	16	87.5%	.	.
	CIS 284	.	.	17	82.4%	128	76.6%
	CIS 286	.	.	15	93.3%	25	72.0%
	CIS 287I	.	.	20	95.0%	.	.
	CIS 287M	.	.	48	85.4%	.	.
	CIS 288M	.	.	31	93.5%	28	85.7%
	CIS 289M	.	.	46	84.8%	55	78.2%
2013-14	CIS 120	.	.	595	75.8%	758	64.5%
	CIS 121	.	.	194	72.2%	347	61.7%
	CIS 122	.	.	410	73.7%	531	58.9%
	CIS 125D	.	.	21	76.2%	104	66.3%
	CIS 133B	.	.	18	50.0%	74	54.1%
	CIS 133J	.	.	93	76.3%	141	86.5%
	CIS 133W	.	.	37	81.1%	77	85.7%
	CIS 135T	.	.	.	.	53	62.3%
	CIS 140M	.	.	79	63.3%	261	68.6%
	CIS 145	.	.	119	95.0%	.	.
	CIS 178	.	.	.	.	113	82.3%
	CIS 179	.	.	118	83.9%	186	74.7%
	CIS 188	.	.	48	83.3%	.	.
	CIS 189	.	.	32	90.6%	.	.
	CIS 195P	.	.	.	.	51	84.3%
	CIS 225	.	.	.	.	64	92.2%
	CIS 233B	.	.	.	.	40	80.0%
	CIS 233J	.	.	30	73.3%	93	86.0%
	CIS 234B	.	.	.	.	19	73.7%
	CIS 234J	.	.	.	.	32	56.3%
	CIS 234N	.	.	15	80.0%	.	.
	CIS 240L	.	.	34	91.2%	79	86.1%
	CIS 240M	.	.	73	83.6%	134	76.1%
	CIS 243	.	.	.	.	109	83.5%
	CIS 244	.	.	20	85.0%	157	87.3%
	CIS 245	.	.	.	.	43	86.0%
	CIS 275	.	.	84	79.8%	187	75.4%
	CIS 276	.	.	37	64.9%	82	63.4%
	CIS 277O	.	.	.	.	13	53.8%
	CIS 277T	.	.	.	.	10	90.0%
	CIS 278	.	.	51	88.2%	.	.
	CIS 279L	.	.	12	91.7%	55	72.7%

	CIS 280D	.	.	17	82.4%	.	.
	CIS 284	.	.	11	81.8%	72	76.4%
	CIS 286	.	.	21	85.7%	24	79.2%
	CIS 287M	.	.	57	87.7%	.	.
	CIS 288M	.	.	26	80.8%	64	84.4%
	CIS 289M	.	.	25	84.0%	32	81.3%
2014-15	CIS 120	260	69.2%	245	76.7%	670	71.2%
	CIS 121	108	76.9%	58	58.6%	302	62.3%
	CIS 122	104	76.9%	99	69.7%	369	64.8%
	CIS 125D	20	80.0%	23	87.0%	146	77.4%
	CIS 133B	.	.	.	.	29	62.1%
	CIS 133J	51	84.3%	18	55.6%	162	79.6%
	CIS 133N	.	.	15	93.3%	53	83.0%
	CIS 133W	.	.	18	72.2%	66	84.8%
	CIS 135M	49	79.6%	.	.	.	.
	CIS 135T	.	.	.	.	37	59.5%
	CIS 140M	58	79.3%	44	72.7%	173	75.7%
	CIS 145	50	100.0%	95	93.7%	.	.
	CIS 178	.	.	.	.	95	85.3%
	CIS 179	49	79.6%	44	88.6%	161	78.3%
	CIS 188	50	78.0%	.	.	.	.
	CIS 189	28	100.0%	.	.	.	.
	CIS 195P	.	.	.	.	56	76.8%
	CIS 225	.	.	.	.	49	98.0%
	CIS 233B	.	.	.	.	10	70.0%
	CIS 233J	.	.	.	.	73	79.5%
	CIS 233N	.	.	.	.	19	73.7%
	CIS 233W	27	70.4%	.	.	.	.
	CIS 234A	11	72.7%	.	.	.	.
	CIS 240L	.	.	.	.	86	79.1%
	CIS 240M	25	84.0%	21	95.2%	117	72.6%
	CIS 243	.	.	.	.	91	82.4%
	CIS 244	.	.	13	84.6%	135	82.2%
	CIS 245	.	.	.	.	42	76.2%
	CIS 275	50	74.0%	24	91.7%	194	73.7%
	CIS 276	21	71.4%	.	.	79	55.7%
	CIS 277O	.	.	.	.	12	83.3%
	CIS 277T	.	.	.	.	19	63.2%
	CIS 278	23	91.3%	20	90.0%	.	.
	CIS 279L	.	.	.	.	39	79.5%
	CIS 280D	.	.	16	93.8%	.	.
	CIS 284	.	.	.	.	94	80.9%

	CIS 286	.	.	22	95.5%	.	.
	CIS 287M	.	.	.	.	57	77.2%
	CIS 287X	21	90.5%	.	.	.	.
	CIS 288M	.	.	28	78.6%	54	88.9%
	CIS 289M	25	88.0%	.	.	52	75.0%
2015-16	CIS 120	373	75.6%	.	.	587	73.9%
	CIS 121	84	54.8%	.	.	288	64.2%
	CIS 122	131	71.0%	.	.	333	64.9%
	CIS 125D	22	68.2%	.	.	82	86.6%
	CIS 133J	24	79.2%	.	.	173	76.3%
	CIS 133N	21	76.2%	.	.	66	84.8%
	CIS 133W	39	69.2%	.	.	48	89.6%
	CIS 135M	.	.	.	.	56	83.9%
	CIS 140M	106	72.6%	.	.	165	81.2%
	CIS 145	136	96.3%	.	.	.	.
	CIS 178	.	.	.	.	63	77.8%
	CIS 179	98	86.7%	.	.	153	79.7%
	CIS 188	48	85.4%	.	.	.	.
	CIS 189	29	93.1%	.	.	.	.
	CIS 195P	.	.	.	.	71	78.9%
	CIS 225	.	.	.	.	48	95.8%
	CIS 233J	26	96.2%	.	.	54	81.5%
	CIS 233N	.	.	.	.	29	72.4%
	CIS 233W	19	78.9%	.	.	16	81.3%
	CIS 234A	12	100.0%	.	.	11	81.8%
	CIS 240L	21	71.4%	.	.	65	87.7%
	CIS 240M	71	81.7%	.	.	96	81.3%
	CIS 243	.	.	.	.	65	70.8%
	CIS 244	19	78.9%	.	.	163	79.1%
	CIS 245	.	.	.	.	19	84.2%
	CIS 275	61	91.8%	.	.	169	84.0%
	CIS 276	25	72.0%	.	.	74	68.9%
	CIS 277O	.	.	.	.	13	38.5%
	CIS 277T	.	.	.	.	14	85.7%
	CIS 278	59	93.2%	.	.	.	.
	CIS 279L	14	92.9%	.	.	20	85.0%
	CIS 280D	.	.	19	100.0%	.	.
	CIS 284	.	.	.	.	90	85.6%
	CIS 286	.	.	.	.	49	75.5%
	CIS 287M	.	.	.	.	45	80.0%
	CIS 288M	26	76.9%	.	.	48	81.3%
	CIS 289M	30	86.7%	.	.	50	80.0%

	CIS 295P	.	.	.	.	16	62.5%
2016-17	CIS 120	321	76.3%	.	.	585	70.3%
	CIS 121	90	80.0%	.	.	281	69.8%
	CIS 122	171	70.8%	.	.	310	67.1%
	CIS 125D	20	95.0%	.	.	80	86.3%
	CIS 133J	23	91.3%	.	.	160	83.1%
	CIS 133N	17	64.7%	.	.	66	83.3%
	CIS 133W	29	86.2%	.	.	77	83.1%
	CIS 135M	.	.	.	.	51	86.3%
	CIS 140M	92	70.7%	.	.	155	83.9%
	CIS 145	95	91.6%	.	.	.	.
	CIS 178	.	.	.	.	42	76.2%
	CIS 179	86	87.2%	.	.	147	84.4%
	CIS 188	26	84.6%	.	.	.	.
	CIS 189	25	88.0%	.	.	.	.
	CIS 195P	.	.	.	.	74	81.1%
	CIS 225	.	.	.	.	73	90.4%
	CIS 233J	20	85.0%	.	.	48	72.9%
	CIS 233N	.	.	.	.	22	81.8%
	CIS 233W	.	.	.	.	26	88.5%
	CIS 234A	4	75.0%	.	.	19	89.5%
	CIS 240L	18	88.9%	.	.	67	80.6%
	CIS 240M	65	80.0%	.	.	90	87.8%
	CIS 243	.	.	.	.	42	90.5%
	CIS 244	18	83.3%	.	.	145	84.1%
	CIS 275	44	84.1%	.	.	171	79.5%
	CIS 276	.	.	.	.	73	69.9%
	CIS 278	44	90.9%	.	.	.	.
	CIS 279L	17	88.2%	.	.	23	73.9%
	CIS 280D	.	.	19	100.0%	.	.
	CIS 284	.	.	.	.	62	88.7%
	CIS 286	.	.	.	.	47	89.4%
	CIS 287M	.	.	.	.	51	100.0%
	CIS 288M	30	80.0%	.	.	49	81.6%
	CIS 289M	28	89.3%	.	.	61	82.0%
2017-18	CIS 120	127	75.6%	.	.	266	73.3%
	CIS 121	47	66.0%	.	.	120	75.0%
	CIS 122	64	70.3%	.	.	160	69.4%
	CIS 125D	.	.	.	.	53	75.5%
	CIS 133J	.	.	.	.	87	78.2%
	CIS 133N	20	65.0%	.	.	15	53.3%
	CIS 133W	19	68.4%	.	.	25	80.0%

CIS 135M	.	.	.	.	25	84.0%
CIS 140M	22	95.5%	.	.	61	90.2%
CIS 145	44	95.5%	.	.	.	.
CIS 179	43	95.3%	.	.	47	68.1%
CIS 195P	.	.	.	.	28	82.1%
CIS 225	.	.	.	.	24	87.5%
CIS 233J	.	.	.	.	48	77.1%
CIS 233N	.	.	.	.	13	76.9%
CIS 233W	17	76.5%	.	.	.	.
CIS 234A	8	100.0%	.	.	.	.
CIS 240L	.	.	.	.	22	72.7%
CIS 240M	25	68.0%	.	.	48	83.3%
CIS 244	.	.	.	.	76	86.8%
CIS 275	21	85.7%	.	.	73	82.2%
CIS 276	.	.	.	.	22	72.7%
CIS 278	15	100.0%	.	.	.	.
CIS 280D	.	.	8	75.0%	.	.
CIS 284	.	.	.	.	22	95.5%
CIS 284C	15	66.7%	.	.	.	.
CIS 286	.	.	.	.	22	86.4%
CIS 287M	.	.	.	.	49	85.7%
CIS 288M	30	90.0%	.	.	.	.
CIS 289M	.	.	.	.	48	87.5%

Appendix 2: Multi-Year Assessment Plan and Core Outcome Mapping Matrix

Multi-Year Assessment Plan

Outcomes assessed every year

Identify and describe hardware and software networking components.	CT&PS, PC
Troubleshoot and maintain networking systems.	C, CT&PS, PC
Install & configure operating systems.	CT&PS, PC
Install & configure networking components.	CT&PS, PC
Integrate security practices into the design, installation, configuration and management of networking system	CT&PS, PC
Defines basic components of an operating system and can: Install Windows and/or Linux OS; format and partition hard drives; organize directory/folder structures for easy access' use basic OS utilities; configure desktop and operating environment for individual users' work effectively in Command Line and/or GUI to scan directories, copy or move files, rename or change file/folder attributes.	PC

Each of these outcomes is assessed in CIS 279L and CIS 288M. They are assessed using locally developed and scored performance assessment, and are fully TSA reported.

Outcomes assessed in 2018-2019

Process Develop and evaluate system requirements. Design, implement and deploy systems. Evaluate, test, debug and troubleshoot systems.	CT&PS, PC
Personal and Interpersonal Communicate effectively in both oral and written form. Work effectively in teams. Manage time, tasks and projects. Take ownership of IS career by adapting and learning new skills.	C, PC, SR
Communicate and problem solve effectively in teams and with others in developing information systems, project plans and to achieve common business or information technology goals.	C

These outcomes are assessed in CIS 234A, our capstone course, using performance assessments.

Outcomes assessed in 2019-2020

Apply computer technology to address business information system needs.	PC
Technology Create effective databases and user interfaces. Develop small programs. Use network concepts and terminology to communicate with vendors and users. Select appropriate technology tools by recognizing tool capabilities and limitations.	CT&PS, PC
Information Systems in Business Apply operational business knowledge in addressing information systems needs.	CT&PS
Translate simple business problems or requests into workable programming algorithms, test solutions and complete coding.	PC

These outcomes are also assessed in CIS 234A, our capstone course.

Outcomes assessed in 2020-2021

Interpret, analyze and evaluate complex technical and professional documents and visuals and use current programs to produce business and technical communication.	CT&PS
Create simple web sites using the latest xhtml standards and which include cascading style sheets, links, images, forms and canned script.	PC
Use diagramming software to design basic home or business networks that includes clients and servers, routers, switches, hubs and access points and configures wireless networks for security.	PC
Use diagramming software to design simple but effective relational databases through the use of business rules Relational Database Management System to create and Entity Relationship Diagrams and uses MS Access tables and relationships that enforce referential integrity; forms; queries; and reports.	PC

These outcomes are also assessed in CIS 234A.

Core Outcomes Mapping

Mapping Level Indicators:

0: Not Applicable.

1: Limited demonstration or application of knowledge and skills.

2: Basic demonstration and application of knowledge and skills.

3: Demonstrated comprehension and is able to apply essential knowledge and skills.

4: Demonstrates thorough, effective and/or sophisticated application of knowledge and skills.

Core Outcomes:

1. Communication.
2. Community and Environmental Responsibility.
3. Critical Thinking and Problem Solving.
4. Cultural Awareness.
5. Professional Competence.
6. Self-Reflection.

Course #	Course Name	CO1	CO2	CO3	CO4	CO5	CO6
CIS 120	Computer Concepts I	2	2	2	2	1	1
CIS 121	Computer Concepts II	2	2	2	2	2	1
CIS 122	Software Design	2	1	3	1	1	0
CIS 125D	Database Application Development I	2	2	2	0	1	0
CIS 133J	Java Programming	2	2	3	0	1	0
CIS 133N	Introduction to Programming Using C#.NET	2	2	3	0	1	0
CIS 133W	JavaScript for Web Developers	2	2	3	0	1	0
CIS 135M	Mobile Application Programming	2	2	3	0	1	0
CIS 135T	XML and HL7	3	1	3	0	2	0
CIS 140M	Operating Systems: Microsoft	2	0	4	0	3	0
CIS 145	Microcomputer Hardware and Troubleshooting	2	2	3	1	3	1
CIS 178	Introduction to Internet	2	0	3	0	3	0
CIS 179	Data Communication Concepts I	2	0	3	0	3	0
CIS 188	Intro to Wireless Networking	2	2	3	1	3	1
CIS 189	Wireless Security	2	2	3	1	3	1
CIS 195P	PHP Web Development I	2	1	2	0	2	1
CIS 225	End User Support	3	1	2	0	2	0
CIS 233J	Java Programming II	2	2	3	0	3	0
CIS 233N	Intermediate C#.NET Programming	2	2	3	0	3	0
CIS 233W	JavaScript for Web Developers II	2	2	3	0	3	0
CIS 234A	Real-World Programming	3	3	4	1	4	2
CIS 240L	Linux Installation and Configuration	2	0	3	0	3	0
CIS 240M	Managing a Windows Server Environment	2	0	3	0	3	0
CIS 243	E-ssentials of E-Commerce Information Systems	3	2	2	3	2	1
CIS 244	Systems Analysis	2	0	3	0	3	0
CIS 245	Project Management Information Systems	4	4	4	3	3	2
CIS 275	Data Modeling and SQL Introduction	3	1	3	0	2	0
CIS 276	Advanced SQL	3	1	1	0	3	0
CIS 277D	Database Security	1	3	3	0	2	0
CIS 277O	Advanced Database Concepts in Oracle	2	1	3	0	3	0
CIS 277T	Web Business Intelligence Application Development	3	1	3	0	3	0
CIS 278	Data Communication Concepts II	3	0	3	0	3	0

CIS 279L	Linux Network Administration	3	0	4	0	4	0
CIS 280D	Cooperative Education: Application Development	3	2	4	0	4	3
CIS 284	Network Security	2	2	4	0	3	0
CIS 284C	Cybersecurity Concepts	2	3	4	0	3	0
CIS 286	Computer Forensics	2	2	3	0	3	0
CIS 287M	Microsoft Server Security	2	0	4	0	3	0
CIS 288M	Microsoft Network Administration	2	0	4	0	3	0
CIS 289M	Microsoft Active Directory Administration	3	0	4	0	3	0
CIS 295P	PHP Web Development II	3	1	4	1	3	4

Table 3.E Number of Dual Credit Courses Taught

Academic Year	# High Schools	Faculty	# Courses
2013-2014	0	0	0
2014-2015	0	0	0
2015-2016	2	2	3
2016-2017	2	2	3
2017-2018	3	2	3
2018-2019 - Signed Agreement	4	2	2
Change in 5 Years	**100%**	**0%**	**-33%**

Appendix Section 4 - Needs of students and the community

Table 4.A Ethnicity by Course Detail

Count of Students	Academic Year Filter				
Campus Filter	2012-13	2013-14	2014-15	2015-16	2016-17
Cascade	**235**	**184**	**140**	**33**	**23**
CIS 120	**134**	**108**	**83**	**33**	**23**
Asian	4	6	4	1	
Black, non-Hispanic	26	12	12	7	2
Caucasian, non-Hispanic	72	66	41	20	15
Foreign National	2	2	5	2	
Hispanic	9	9	11		2
Multiracial	9	3	4	1	1
Native American/Alaskan	3	2	2		
Not Reported	8	7	4	2	3
Pacific Islander	1	1			
CIS 121	**40**	**38**	**38**		
Asian	1	3	2		
Black, non-Hispanic	8	4	2		
Caucasian, non-Hispanic	23	26	25		
Foreign National		1	2		
Hispanic	5	2	4		
Multiracial	3		1		
Not Reported		1	2		
Pacific Islander		1			
CIS 122	**61**	**38**	**19**		
Asian	3	1	2		
Black, non-Hispanic	7	3	3		
Caucasian, non-Hispanic	41	24	14		
Foreign National		1			
Hispanic	3	2			
Multiracial		1			
Native American/Alaskan	2	1			
Not Reported	4	5			
Pacific Islander	1				
Newberg				**27**	**18**
CIS 120				**27**	**18**
Asian				1	
Black, non-Hispanic				1	
Caucasian, non-Hispanic				18	13
Hispanic					3

Multiracial				3	1
Not Reported				4	1
Rock Creek	**265**	**242**	**172**	**63**	**54**
CIS 120	**121**	**130**	**127**	**63**	**54**
Asian	5	18	15	4	2
Black, non-Hispanic	2	6	4	3	3
Caucasian, non-Hispanic	75	71	70	39	32
Foreign National	3	2	3	1	1
Hispanic	11	14	15	5	6
Multiracial	5	5	8	5	6
Native American/Alaskan	1	1		1	
Not Reported	18	12	11	4	4
Pacific Islander	1	1	1	1	
CIS 121	**64**	**57**	**45**		
Asian	4	11	6		
Black, non-Hispanic	1	5	1		
Caucasian, non-Hispanic	44	27	30		
Foreign National	3	2	1		
Hispanic	4	2	3		
Multiracial	1	3	3		
Not Reported	6	6	1		
Pacific Islander	1	1			
CIS 122	**80**	**55**			
Asian	11	10			
Black, non-Hispanic	3	5			
Caucasian, non-Hispanic	34	31			
Foreign National	8	2			
Hispanic	9	1			
Multiracial	4	3			
Native American/Alaskan	1				
Not Reported	10	3			
Southeast	**70**	**77**	**76**	**67**	**41**
CIS 120	**70**	**77**	**76**	**67**	**41**
Asian	6	7	11	8	4
Black, non-Hispanic	9	9	5	10	5
Caucasian, non-Hispanic	39	39	47	35	19
Foreign National	2	3	3	2	3
Hispanic	6	6	2	6	2
Multiracial	2	6	3	3	3
Native American/Alaskan			1	1	2
Not Reported	6	7	4	2	2
Pacific Islander					1

Appendix Section 7 – CTE

Table 7.A List of Dual credit instructors

School	Instructor	Course
Sherwood High School	Terrel Smith	CIS 122
Sherwood High School	Terrel Smith	CIS 145
Southridge High School	Daniel Velasquez	CIS 122
Franklin High School	Joseph Rowe	CIS 145
Sunset High School	Cody Geer	CIS 120
Sunset High School	Cody Geer	CIS 145
Aloha High School	Terry Richesin	CIS 122
Aloha High School	Terry Richesin	CIS 145

PCC Computer Information Systems Advisory Board

10/12/2017

Board Attendees:
- Doug Mathias – WebMD Health Services
- Percival De Oliveira – CODA, Inc.
- Rand Zoborowski – Decision Consulting
- Rick Slavin – NIKE, Inc.
- Suketu Pandya – NIKE, Inc.
- Suzanne Stockard – Kaiser Permanente

PCC Faculty & Staff:
- Albert Lee – Dean
- Dan Dougherty – Faculty/SAC Chair
- Dave Schooler – Faculty
- Dr. Cara Tang – Faculty/Co-Chair
- Franklin Roberts – Faulty/Co-Chair
- Gary Coleman – Staff/Program Facilitator
- Michele Maxwell – Staff/Academic Adviser
- Mike Mostafavi – Faculty
- Scott Quinn – Faculty

Welcome & Introduction of New Dean
- Gary Coleman & Albert Lee
- Tom Birch – Advisory Board Chair out of town

New Vice Chair selected:
- Rick Slavin

"What's New" Roundtable:
- WebMD went private which simplifies compliance needs
- Hiring products people/not tech currently
- Can't find people phase with hiring closing quickly
- Opoid crisis big spike in PDX with 120% increase in 911 calls in last year
- Using Cisco VoiP products & Oracle Business Intelligence helps with forecasting ability
- Working on middle/high school partnerships
- Healthcare industry in upheaval
- Must be resilient & sustainable
- Avoiding big investments
- Talked about analytics & accounting systems

Center for Academic Excellence presentation: Dr. Cara Tang
- Application deadline is January 15, 2018
- Asked Board if willing to provide guidance for the cybersecurity program
  - **Board voted UNANIMOUS support**

Labor Market Pulse In Tech Marketplace? Gary Coleman

- A clear distinction between PCC & 4 year college grads
- Dev Ops big area of hiring (development/operations combo)
- Need scripting & coding skills
- Some thought need people who could work on small software projects & take ownership in building & maintaining
- Need initiative, coding skills & development samples
- Write reliable & secure code & experience with AWS
- Systems people who automate code development
- Able to deal with fast change – adaptable

Update on Coding School Hiring? Gary Coleman
- Historically only hire 4-yr grads; those with coding schools would still need degree + experience
- Federal dollars require 4-yr degree to comply with huge penalties for non-compliance
- Gatekeepers pre-screen on contractor hiring
- We just want someone who can code (coding school or not)
- Need 4 yr degree, not necessarily in field

What about foreign degrees? Gary Coleman
- Will accept with extensive review

Will Industry Automation/Innovation Effect Curriculum? Gary Coleman
- Jenkins automation tool is being useful
- Ability to work remotely & collaborate essential
- The basics are the basics – hard to predict changing technology
- Train people to use BI and to collaborate & focus on adaptability
- Must be able to work on multiple projects simultaneously
- Must be able to creatively problem solve using multiple external tools
- Cybersecurity is big

What up with Internet of Things? Gary Coleman
- Data privacy is big, especially in Europe & Asia
- Should know how to use Big Data, Server Computing & Amazon
- Security is ramping up
- Still focused on “ease of use”
- Don’t use Kaskpersky
- Online & cell services are mixing business & personal contacts – is problem
- Learn SQL skills & big data applications
- Biostatistitions have varied backgrounds
- Automated queries without analysis

Closing Items: Gary Coleman
- Invited Board to Attend CIS Capstone class presentation: Dan Dougherty
- October is Cyber Security Awareness Month!
- Gary Coleman presented CAKE for years of service as Program Facilitator, as he retires in December

Advisory Board Minutes - Winter Term 2018 (meeting date 1/25/2018)

Round Table Topics

Functional Programming
- Greg Jackson said he would help us if we want to offer a course in this or integrate it into our other programming courses

Security of Health devices - Suzanne
IoT security
Data pipline / data lake (Doug)
Petabytes of data
Need people who know how to program in Python; expected to learn version control in a week if you don't know it.
Elixir
Brian Ventura
- interested in starting ISSA student chapter, broader than PCC
- 3 people on security team at City of Portland, of ~6000 employees

Ethics

Weave it in
Codes of Ethics from professional orgs - ACM
Ethics in Technology course (Marc)
Cyber

Use Kali linux (Rick)
Ethical hacking (Greg)

Advisory Board

- ongoing conversation outside meetings (Suzanne)
- tool like confluence or slack

Genarlist vs Specialist

- need to know 1 lang well, but other technologies - db, etc
- SQL essential
- need ability to learn

Gen Ed

- communicate technical content in _writing_
  - distributed teams
- know how to talk on WebEx

Git/GitHub

PACStar - just migrated to Git from Subversion
Nike - use Git & BitBucket
    - look at job candidates repos, code test
InsideTrack - Git
Intel - Gerrit (code reviews), Git
Need for networking? not so much
Introduce Git early - like the idea

Appendix 6 Lab Tutor Hours

CIS Class	Tutor Hours	Total Lab Hours	Lab Only Hours
122	958	1294	336
120	1000	1188	188
121	680	909	229
240M	246	743	497
140M	364	742	378
133J	403	562	159
289M	210	502	292
288M	207	449	242
287M	135	353	218
278	111	338	227
133N	174	323	149
275	182	312	130
233J	237	302	65
179	102	293	191
240L	102	231	129
279L	9	200	191
195P	88	175	87
244	71	146	75
188	28	138	110
133W	80	122	42
276	73	119	46
125D	53	76	23
284C	40	65	25
284C	9	65	56
145	29	64	35
189	4	60	56
234A	29	53	24
233W	10	48	38
178	45	46	1
225	9	31	22
287X	5	31	26
286	18	30	12
233N	23	26	3
135M	5	26	21
135T	4	4	0
277O	1	1	0
280D	0	0	0

Advisory Board
2018 April 19

Dean's Welcome – Franklin Roberts
- Wrapping up hiring of 2 positions for Fall
- PCC received CAE2Y designation

Roundtable
Laurie Cremona Wagner – SAP – new member

Tom Birch
- Intel tightening belt, not as energized about hiring
- looking at outsourcing elements of IT

Rick Slavin
- Building an engineering team around commerce/finance
- Data analytics is the big thing – building lots of data, trying to figure out what it means for the company

Frank Taylor
- Keeping up with security requirements DoD is pushing onto their vendors
- Dealing with spam, getting people to stop clicking on stuff they shouldn't

Brian Ventura
- Phishing, city is getting inundated, hit with average 5 campaigns / day

Suzanne Stockard
- Making lab systems secure when they are really complex
- Is the next generation of IT workers going to be global? Can we make that work?

Kathy Terman
- PGE – has a new CIO, anxiety in dept
- Putting in a new customer system – big change

Kathy Stone-DeBerry, PGE, manages an application team
- (Kathy is her boss)
- Trying to change business model, revamp IT to support new & different way of getting power to customers

Bonnie Melins – Micro Systems Technologies, new member, (non-tech; education: psychology)
- Hires tech people, has hired PCC students
- Culture: "everyone must work in office" – makes it tough to get good people who want options to work from home

Percival De Oliveira
- Clientele has increased dramatically due to opioid crisis
- Tech side: fairly stable, biggest challenge is how to deal with all the data

Dave Johnson (?)
- Tech staffing
- Challenges: hiring qualified people
- Big challenge in company: cybersecurity

Rand Zobrowski
- They never have to let people go for lack of technical skills; always soft skills

Ava Stevens
- Putting together a tech panel – industry experts to come talk to students

Program Review & Assessment – Marc
- Advisory board helps with program outcomes
- Week of June 11: final presentation from capstone course
- CIS Program Review: oral presentation will be a Friday in January 12-2pm

Impact of students' presentation skills in hiring process – Mike
- Online students often don't get much practice with presentation skills
- Many students don't want to make presentations
- How important are presentation skills?

Advisory board comments:
- Hiring is just the beginning of needing presentation skills – sitting in an interview & presenting to the panel
- People that communicate well go so much further in tech
- Communication gets more important as you progress up the ladder professionally
- As you get higher up you need to talk more to others
- Online presentations are very common – showing a powerpoint slide or sharing a desktop over WebEx & talking to it
- Have communication a part of each class, done in slices
- Need to be able to whiteboard what they're talking about
- Easier to teach tech skills than soft skills
- Builds confidence in students that can help them in an interview
- Presentation skills in the sense of good communication happens all the time & is important

Economy changes – Mike
- Are changes over last 6 months affecting hiring needs?

Advisory board comments:
- There is plenty of work for people who already have skills

- Less work available for entry-level skills
- Intel – easier to get money for interns than for new employees
- Opportunity for students: internships – they are cut more slack and get a foot in the door
- Small businesses may not have the in-house knowledge to hire interns (legalities, etc.) even if they want to
- Market is tough

Diversity in high tech, chance of minorities for hiring – Mike
- Are gender, ethnicity, other factors important in hiring?

Advisory board comments:
- Diversity is a focus at PGE; the most diverse group at PGE is IT
- PGE has "business resource groups" that connect them with various minority communities
- "Say Hey" from Partners in Diversity
- Intel has a big effort for diversity

Wrap-up – Tom
- Intel requires all employees to go through ethics & compliance training every year
- What is the role of each industry member on the board?
- Can help new members know what the board is about, expectations
- Small group to draft: Tom, Rick, Dave
- We also don't have terms for chair / vice-chair position, election procedures, guidance for makeup of the board
- Small group led by Tom will draft these things
  - Charter, board makeup
  - Roles & responsibilities of board members

Completion counts by degree and certificate, last 5 years

Degree/Cert	2013-14	2014-15	2015-16	2016-17	2017-18
CIS (AAS)		67	68	72	72
CISH (AAS Deactivated)	8	8	5	1	
CISN (AAS)		41	30	29	22
CIS ACERT1	35	21	30	54	
ECOM ACERT1 (Deactivated)		1			
JAV ACERT			18	14	11
JAV ACERTP	19	4			
LIN ACERT			21	33	13
LIN ACERTP	56	26	9		
NET ACERTP (Deactivated)	18	7	1		
ORA ACERTP (Deactivated)	5	5	3		
SER ACERT			9	44	33
SER ACERTP	36	38	20	2	
SQL ACERT			23	30	35
SQL ACERTP	76	37	16		

UNI ACERTP (Deactivated	7	7	2	1	
VB ACERTP	17	6	1		
WEB ACERT			9	10	9
WEB ACERTP	1				
WIN ACERTP (Deactivated)	8	9	4		

Perkin TSA Annual Assessment Alignment with Degree Outcomes

Degree Outcomes	Assessment Alignment with degree outcome
Identify and describe hardware and software networking components.	As a class project student is to write a report that includes the following: ▪ a network design, ▪ a list of all hardware and software components, including o make, model, version and pricing for hardware o software package name, version and pricing.
Install & configure networking components.	As a lab assignment, student installs and configure at least three networked systems consisting of the following components: ▪ System configured as Router/Firewall between internal network and external/Internet. ▪ System configured as network server ▪ System configured as network client
Install & configure operating systems.	Student install and configure the necessary operating system and software to create two local area networks that are connected via a third system that functions as a router.
Troubleshoot and maintain networking systems.	Student maintain their network as they add software services throughout the course. Troubleshooting problems as they arise.
Integrate security practices into the design, installation, configuration and management of networking system.	Include a firewall as part of the network design and explain in the written report how the firewall is configured to protect the network.