



Rio Salado College

Computer Technology Program Review

Review Period: Academic Years 2016-2020

Review Conducted: AY2020-21

Rio's Academic Program Review Process is an essential component of the College's Strategic Plan. The 2020-2023 work is guided by the following college-wide goals:

Rio Strategic Goal 1: Increase student goal attainment 23% by 2023 with innovative and world-class experiences

Rio Strategic Goal 2: Offer 23 new micro-credentials by 2023

Rio Strategic Goal 3: Foster a culture of diversity, equity, inclusion, and belonging

Data relating to successful course completion, persistence, credentials awarded, and equity in program- and college-level outcomes across all student populations are aligned with the college-wide Key Performance Indicators that measure progress toward achieving the goals of the College's Strategic Plan.

I. Degrees and Certificates in the Computer Technology Program

AAS in Computer Technology

Description: The Associate in Applied Science (AAS) in Computer Technology program is designed to provide information and training on the use, application, and technological developments of computers in a changing electronic environment. Course work is aimed primarily at students interested in developing skills in the business or personal computing environment. Specifically, the courses provide instruction in the following areas: computer applications in the business environment and current trends and developments in computers; graphical applications; electronic spreadsheets; database; word processing; and computer operating systems.

CCL in Computer Usage and Applications:

Description: The Certificate of Completion (CCL) in Computer Usage and Applications program is designed to provide an overview on the use, application, and technological developments of computers in a changing electronic environment. Courses focus on training the student in the basic use of software applications including the computer operating system, word processing, electronic worksheets, database management, presentation graphics, and the Internet.

CCL in Advanced Computer Usage and Applications:

Description: The Certificate of Completion (CCL) in Advanced Computer Usage and Applications program is designed to provide the skills necessary for office professionals in the use, application, and technological developments of computers. Courses focus on training the student in advanced features of software applications commonly used in the workplace including word processing, electronic worksheets, database management, presentation graphics, web development, and business communication skills.

CCL in Digital Design:

Description: The Certificate of Completion (CCL) in Digital Design program is designed to prepare students to work with and design personal or professional graphic imagery. Courses focus on training the student in Adobe Photoshop, Illustrator, InDesign, graphic design and publishing, multimedia technology, and project management.

CCL in Networking: Design and System Support:

Description: The Certificate of Completion (CCL) in Networking: Design and System Support program is designed to provide the basic skills necessary for students planning to specialize in the networking field. Courses focus on training the student in Local Area Networks (LANs), computer setup and maintenance, network and information security, advanced operating systems, and customer service skills for IT professionals.

CCL in Web Design: User Interface:

Description: The Certificate of Completion (CCL) in Web Design: User Interface program is designed to prepare students to work with and design personal or professional web pages. Courses focus on training the student in HTML/XHTML/CSS web development languages, web design and publishing, graphics design, multimedia technology, project management, and development of a portfolio.

II. Program Purpose and Mission

The Computer Technology Program at Rio Salado College is designed to provide students with knowledge and skills required for employment in the field of computer information systems. The program provides information and training on the use, application, and technological developments of computers in a rapidly changing environment. Its purpose and mission directly support the college's mission as it relates to anticipating the needs of future workforce, as the Computer Technology Program prepares students to enter the workforce with the current skills required in the field.

Computer Technology courses and programs were offered to incarcerated students until the spring 2017 term. Removing the program from the prison became necessary in order to add programs that prepared students for jobs once released. Since the job placement for previously incarcerated students with a certificate or degree in Computer Technology was dismal, allowing those students to enroll in the aforementioned programs did not support the college and program missions. In addition, several required courses in the program could not be offered in an incarcerated environment, resulting in repeated requests for course substitutions. Effective spring 2017, incarcerated students could no longer earn a certificate or degree in Computer Technology.

During the 2019-20 Academic Year, the Computer Information Systems Instructional Council began participating in a District-wide Guided Pathways initiative. During this initiative, all computer programs across the Maricopa Community College District were "mapped" as shared programs; individual colleges were no longer permitted to have unique, non-shared programs. As a result of the Guided Pathways initiative, Rio's Computer Technology Program was put on moratorium in the fall 2020 term and replaced with newly mapped, shared programs. Information regarding the new programs is included in section XI.c. of this review.

III. Student Population of the Computer Technology Program

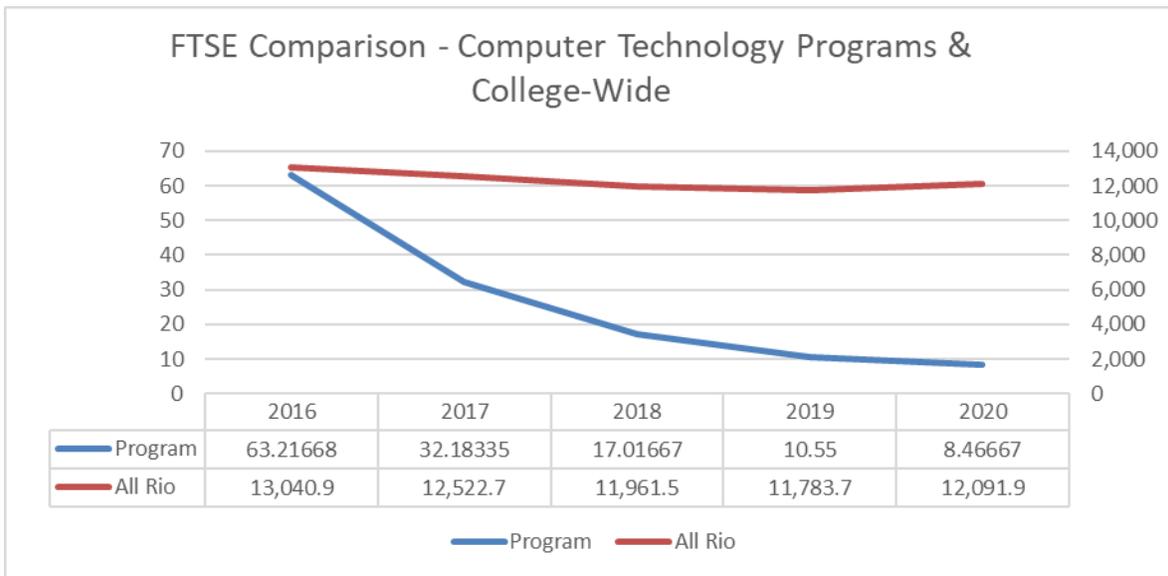
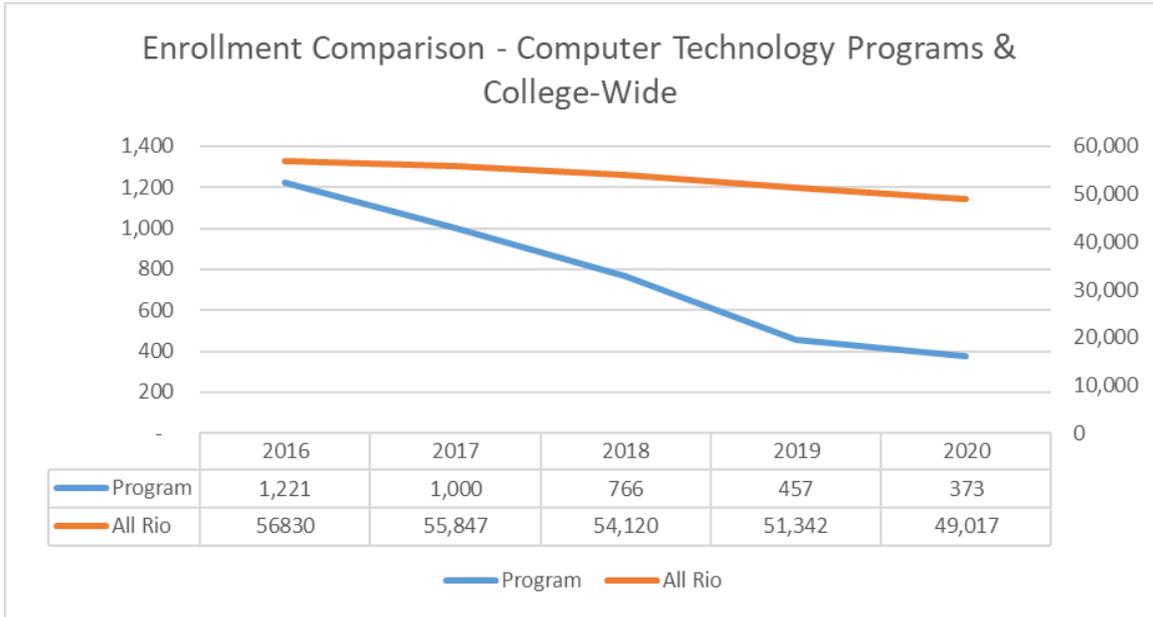
a. Student Data Analysis

As shown in the following table, the student population is predominantly female, Caucasian and Latino, between the ages of 20-39. It is encouraging to note that overall program enrollments for students of color increased from 47.6% in 2019 to 57.6% in 2020.

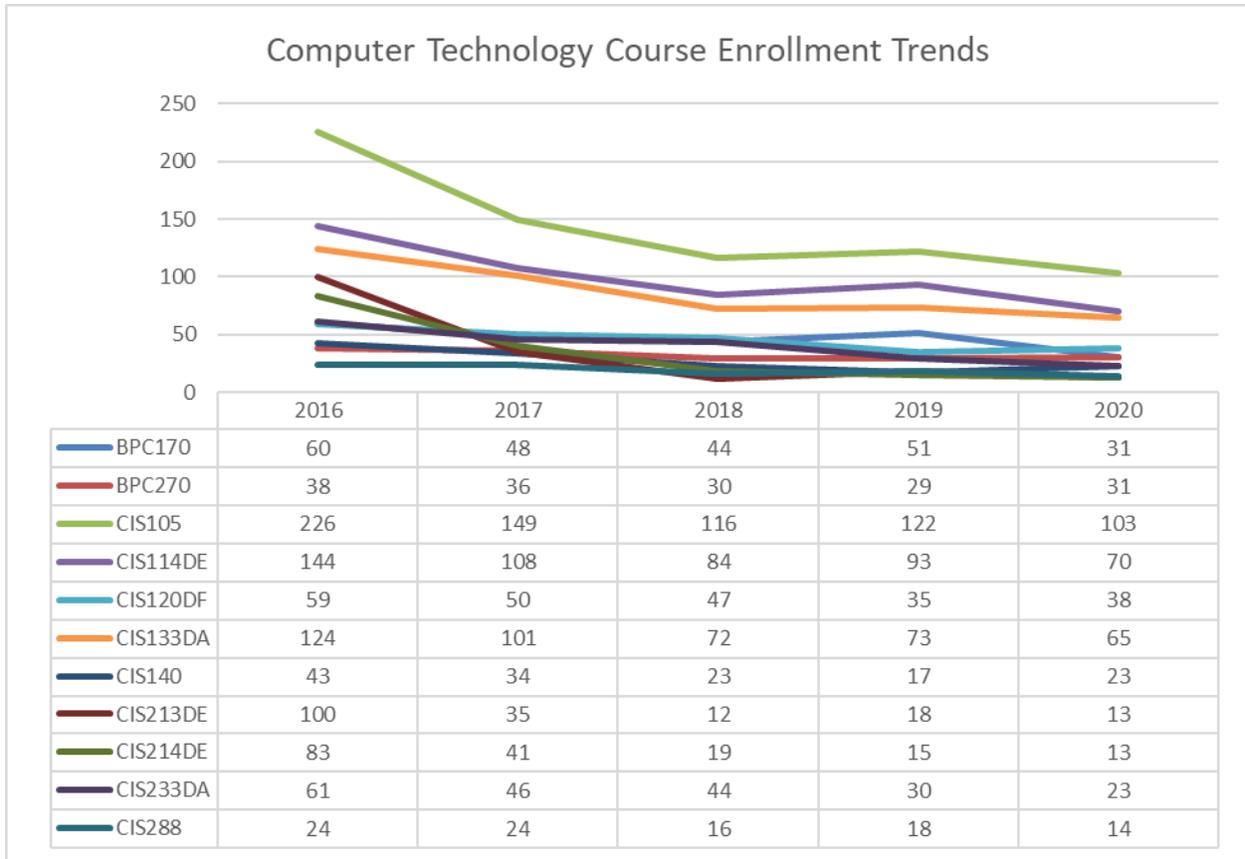
| | 2016 | | 2017 | | 2018 | | 2019 | | 2020 | |
|--------------------------------|------|-------|------|-------|------|-------|------|-------|------|-------|
| | N | % | N | % | N | % | N | % | N | % |
| Gender | | | | | | | | | | |
| Female | 740 | 69.2% | 536 | 70.1% | 400 | 81.2% | 191 | 79.4% | 142 | 72.7% |
| Male | 463 | 28.6% | 444 | 28.2% | 358 | 16.5% | 261 | 19.0% | 225 | 27.3% |
| Other/Not Specified | 18 | 2.3% | 21 | 1.7% | 9 | 2.4% | 5 | 1.6% | 6 | 0.0% |
| Ethnicity | | | | | | | | | | |
| American Indian | 41 | 3.8% | 22 | 1.7% | 19 | 1.2% | 12 | 0.0% | 7 | 1.5% |
| Asian | 21 | 3.0% | 23 | 3.4% | 19 | 5.9% | 15 | 7.9% | 9 | 9.1% |
| Black or African American | 130 | 12.8% | 113 | 9.4% | 83 | 10.6% | 75 | 7.9% | 55 | 1.5% |
| Hawaiian | 4 | 0.0% | 4 | 0.0% | 4 | 0.0% | | 0.0% | 2 | 1.5% |
| Hispanic or Latino | 243 | 14.3% | 225 | 22.2% | 178 | 21.2% | 115 | 30.2% | 88 | 40.9% |
| White or Caucasian | 730 | 59.4% | 568 | 58.1% | 429 | 60.0% | 224 | 52.4% | 197 | 42.4% |
| Other/Not Specified | 52 | 6.8% | 45 | 5.1% | 34 | 1.2% | 16 | 1.6% | 15 | 3.0% |
| Age Group | | | | | | | | | | |
| 19 and under | 34 | 1% | 37 | 3.6% | 33 | 4.2% | 26 | 5.5% | 10 | 2.6% |
| 20-29 | 371 | 31% | 299 | 29.3% | 229 | 29.1% | 174 | 36.7% | 132 | 34.6% |
| 30-39 | 467 | 43% | 373 | 36.6% | 271 | 34.4% | 137 | 28.9% | 127 | 33.2% |
| 40-49 | 268 | 15% | 211 | 20.7% | 167 | 21.2% | 89 | 18.8% | 75 | 19.6% |
| 50 and over | 112 | 10% | 99 | 9.7% | 87 | 11.1% | 48 | 10.1% | 38 | 9.9% |
| First Generation | | | | | | | | | | |
| Yes | 752 | 61.4% | 627 | 62.7% | 472 | 61.6% | 278 | 60.8% | 228 | 61.1% |
| No | 470 | 38.4% | 370 | 37.0% | 279 | 36.4% | 164 | 35.9% | 129 | 34.6% |
| Other/Unknown | 2 | 0.2% | 3 | 0.3% | 15 | 2.0% | 15 | 3.3% | 15 | 4.0% |
| Financial Aid Recipient | | | | | | | | | | |
| Yes | 563 | 43.1% | 467 | 44.1% | 357 | 45.1% | 222 | 47.1% | 165 | 43.3% |
| No | 742 | 56.9% | 592 | 55.9% | 434 | 54.9% | 249 | 52.9% | 216 | 56.7% |

b. Enrollment Trends

The Computer Technology courses and programs were offered to incarcerated students until the spring 2017 term; the incarcerated students had access to a computer lab with all software applications, as well as the required textbooks. Removing the program from the prison became necessary in order to add programs that prepared students for jobs once released; the job placement for previously incarcerated students with a certificate or degree in Computer Technology was dismal. Removing the courses and programs from the prison negatively impacted course enrollment, FTSE, and program completion numbers.



The highest enrollment programs in the prison were the Computer Usage and Advanced Computer Usage CCLs and the AAS degree; this drop in enrollment is reflected in several of the required courses in these programs, such as CIS105, CIS114DE, CIS213DE and CIS214DE, in the table below.

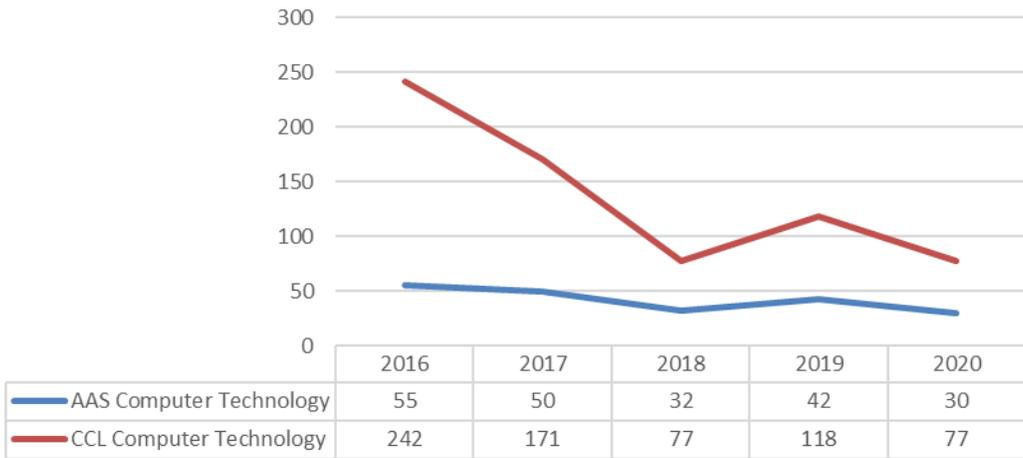


c. Student Graduation Data

The Computer Technology courses and programs were offered to incarcerated students until the spring 2017 term. Removing the program from the prison became necessary in order to add programs that prepared students for jobs once released; the job placement for previously incarcerated students with a certificate or degree in Computer Technology was dismal.

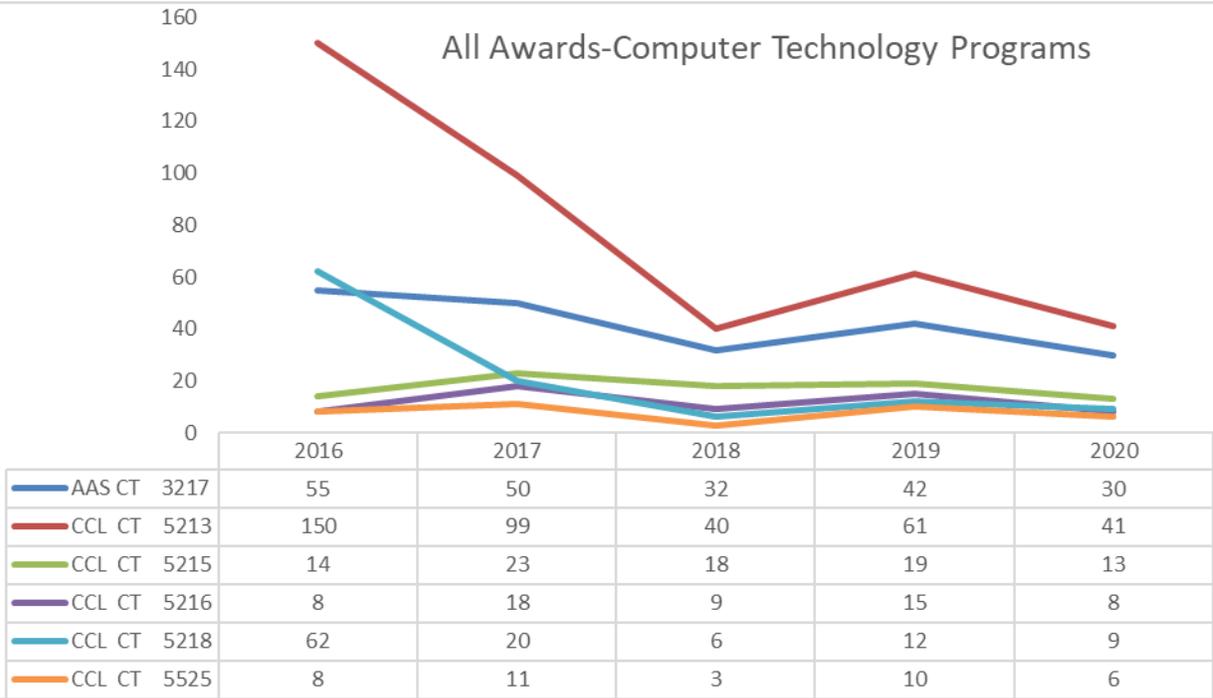
Removing the Computer Technology programs from the prison negatively impacted program completion numbers; however, more relevant programs, such as Plumbing and Electrical, were added for this population of students.

All Awards - Computer Technology Programs



— AAS Computer Technology — CCL Computer Technology

All Awards-Computer Technology Programs



IV. Retention and Persistence

Successful retention remains low in some of the more difficult courses. CIS105 is a “survey” course that covers both theory concepts and the use of all four MS Office applications; the course was revised to be bookless, which includes many original tutorials and practice activities, in the fall 2020 term. Also, the content is now delivered in modules, which presents the information in more manageable “chunks,” which may help student learning.

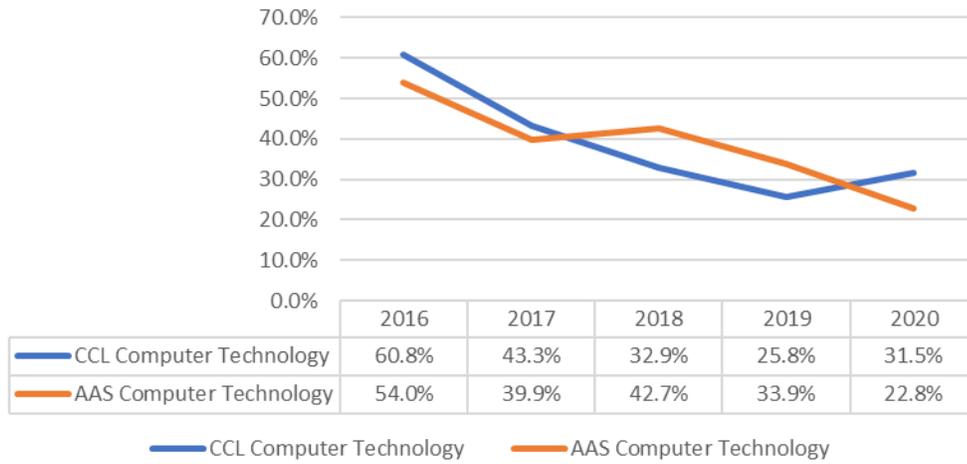
CIS133DA is an introductory web-design course, but was revised by the Instructional Council in the fall 2019 term to include several advanced topics. When the comps were revised, the course was revised to be bookless and delivered in modules. We still have work to do here to make the content more digestible for students.

| | 2016 | | 2017 | | 2018 | | 2019 | | 2020 | |
|--------------|----------------|----------------------|----------------|----------------------|----------------|----------------------|----------------|----------------------|----------------|----------------------|
| | Retention Rate | Successful Retention |
| BPC170 | 94.1% | 60.4% | 97.2% | 70.8% | 96.0% | 62.0% | 79.6% | 68.5% | 94.3% | 88.6% |
| BPC270 | 100.0% | 83.1% | 87.1% | 82.9% | 100.0% | 84.6% | 84.4% | 53.1% | 94.3% | 91.4% |
| CIS105 | 95.4% | 69.0% | 93.9% | 64.9% | 91.3% | 61.4% | 63.9% | 59.0% | 58.7% | 52.9% |
| CIS114DE | 97.9% | 79.5% | 99.3% | 71.7% | 98.9% | 70.3% | 67.7% | 61.3% | 76.2% | 70.2% |
| CIS120DF | 96.6% | 80.9% | 97.4% | 84.4% | 98.2% | 83.9% | 83.8% | 67.6% | 83.0% | 78.7% |
| CIS133DA | 94.7% | 74.0% | 95.1% | 77.5% | 91.4% | 69.1% | 77.0% | 74.3% | 71.8% | 59.0% |
| CIS140 | 98.6% | 84.3% | 96.7% | 90.0% | 100.0% | 80.6% | 90.5% | 85.7% | 100.0% | 100.0% |
| CIS213DE | 96.8% | 83.9% | 97.5% | 92.5% | 100.0% | 72.2% | 88.5% | 88.5% | 93.8% | 87.5% |
| CIS214DE | 100.0% | 90.2% | 94.5% | 90.9% | 96.6% | 79.3% | 94.4% | 94.4% | 92.3% | 92.3% |
| CIS233DA | 95.3% | 81.3% | 88.2% | 69.9% | 95.6% | 77.9% | 86.1% | 77.8% | 93.5% | 93.5% |
| CIS288 | 96.4% | 89.3% | 95.3% | 93.8% | 85.2% | 74.1% | 100.0% | 100.0% | 91.7% | 91.7% |
| Total | 94.2% | 78.3% | 94.0% | 77.4% | 95.2% | 71.9% | 77.0% | 69.6% | 79.0% | 73.6% |

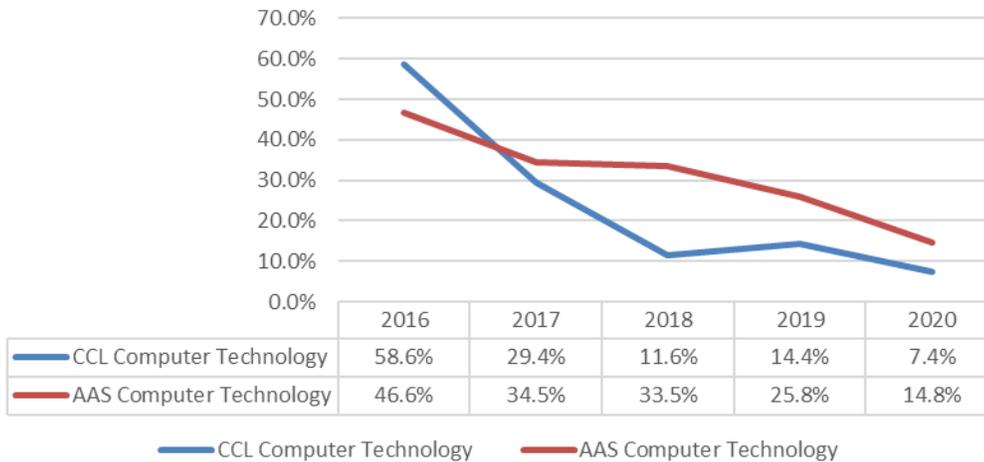
Persistence seems to be declining, but could be a result of students not declaring early on in their academic journey.

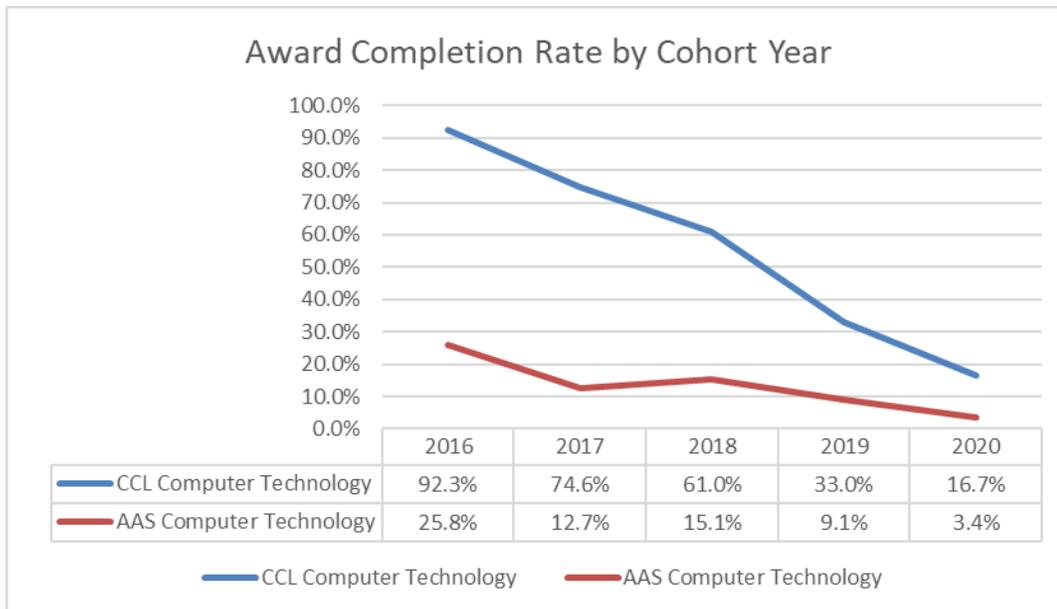
Note: The following graphs represent student cohorts based on when students first declared their academic program. For example, students who declared their program in Summer 2015, Fall 2015, and Spring 2016 are grouped into cohort year 2016.

First to Second Term Persistence Rate by Cohort Year



First to Second Year Persistence Rate by Cohort Year





RioPACE (Progress And Course Engagement) is a predictive analytics tool that displays a red, yellow, or green icon on the roster to indicate each student’s likelihood of success based on their online behaviors. Instructors use the icon to alert them of students who need early intervention, and they also review student gradebooks weekly. Department policy states to reach out to students, via Message Center and email, regarding missing/late work in an effort to keep them on track. In Computer Technology courses, the PACE icon only displays for instructors. The roll out of the student view of RioPACE will be reviewed in the 2021-22 academic year.

V. Program Learning Outcomes

AAS in Computer Technology Learning Outcomes:

CCL in Advanced Computer Usage and Applications (5218)

1. Define terms related to microcomputer usage and applications. (CIS105, CIS113DE, CIS114DE, CIS117DM, CIS121AE)
2. Identify microcomputer hardware and software components. (CIS105, CIS121AE)
3. Apply microcomputer operation skills: care and handling of diskettes, powering up the computer, keyboarding (required speed development: 25 words per minute), and powering down the computer. (CIS105)
4. Evaluate and select microcomputer hardware and software for specific applications. (CIS105)
5. Describe basic graphics, sound, process control, and other special capabilities of a microcomputer. (CIS105, CIS118AB)

6. Demonstrate skills for using commercial software programs including electronic spreadsheets, micro word processing, and database management. (CIS113DE, CIS114DE, CIS117DM)
7. Demonstrate use of a computer operating system. (CIS121AE)
8. Use suitable software to generate charts, graphs and graphics for business use. (CIS118AB)
9. Explain the use of various Internet communication, resource discovery, and information retrieval tools. (CIS133AA, CIS133BA, CIS133CA, CIS133DA)
10. Use enhanced word processing software features such as math functions, columns, macros, style libraries, graphics, outlines and table of contents. (CIS213DE)
11. Utilize PowerPoint software to incorporate sound and time-based data into presentations. (CIS118BB)
12. Demonstrate advanced use of an operating system. (CIS122AE)
13. Use project management software to plan and schedule a project. (CIS124AA, CIS124BA)
14. Describe the process for modifying, tracking, updating, and consolidating projects. (CIS124BA)
15. Demonstrate advanced spreadsheet skills including importing/exporting data, formatting techniques and macros. (CIS214DE)
16. Utilize advanced database concepts such as database design, key selection, and table relationships. (CIS217AM)
17. Differentiate between crosstab, parameter, and action query. (CIS217AM)
18. Design and create presentations using the World Wide Web authoring hypertext markup language (HTML). (CIS233DA)
19. Summarize effective techniques for internal and external business communications. (GBS233)

OR

CCL in Digital Design (5525)

1. Define terms related to microcomputer usage and applications. (CIS105, CIS113DE, CIS114DE, CIS117DM, CIS121AE)
2. Identify microcomputer hardware and software components. (CIS105, CIS121AE)
3. Apply microcomputer operation skills: care and handling of diskettes, powering up the computer, keyboarding (required speed development: 25 words per minute), and powering down the computer. (CIS105)

4. Evaluate and select microcomputer hardware and software for specific applications. (CIS105)
5. Describe basic graphics, sound, process control, and other special capabilities of a microcomputer. (CIS105, CIS118AB)
6. Demonstrate skills for using commercial software programs including electronic spreadsheets, micro word processing, and database management. (CIS113DE, CIS114DE, CIS117DM)
7. Demonstrate use of a computer operating system. (CIS121AE)
8. Use suitable software to generate charts, graphs and graphics for business use. (CIS118AB)
9. Explain the use various Internet communication, resource discovery and information retrieval tools. (CIS133AA, CIS133BA, CIS133CA, CIS133DA)
10. Utilize electronic techniques to create, manipulate, and edit images, text, abstract art, graphic design, color graphics, and business charts. (CIS120DB, CIS120DF)
11. Use project management software to plan and schedule a project. (CIS124AA, CIS124BA)
12. Describe the process for modifying, tracking, updating, and consolidating projects. (CIS124BA)
13. Create, design, and publish various desktop publications using Adobe InDesign. (CIS138DA)
14. Define multimedia technology. (CIS/MMT140)
15. Describe various hardware devices and software tools used in developing and delivering multimedia. (CIS/MMT140)
16. Describe the process of analysis and design of a multimedia application. (CIS/MMT140)
17. Use advanced features of Adobe Photoshop, including filters, typography, painting, image compilation, and color and text manipulation. (CIS220DF)
18. Design and publish an electronic portfolio, showcasing one's best work and providing evidence of one's knowledge, skill, and learning. (CIS288)

OR

CCL in Networking: Design and System Support (5215)

1. Define terms related to microcomputer usage and applications. (CIS105, CIS113DE, CIS114DE, CIS117DM, CIS121AE)
2. Identify microcomputer hardware and software components. (CIS105, CIS121AE)

3. Apply microcomputer operation skills: care and handling of diskettes, powering up the computer, keyboarding (required speed development: 25 words per minute), and powering down the computer. (CIS105)
4. Evaluate and select microcomputer hardware and software for specific applications. (CIS105)
5. Describe basic graphics, sound, process control, and other special capabilities of a microcomputer. (CIS105, CIS118AB)
6. Demonstrate skills for using commercial software programs including electronic spreadsheets, micro word processing, and database management. (CIS113DE, CIS114DE, CIS117DM)
7. Demonstrate use of a computer operating system. (CIS121AE)
8. Use suitable software to generate charts, graphs and graphics for business use. (CIS118AB)
9. Explain and use various Internet communication, resource discovery and information retrieval tools. (CIS133AA, CIS133BA, CIS133CA, CIS133DA)
10. Explain technical aspects of the computer including the system setup and basic hardware/software configuration troubleshooting. (BPC170, BPC270)
11. Describe basic computer architecture. (BPC170, BPC270)
12. Demonstrate installation and troubleshooting techniques. (BPC170, BPC270)
13. Demonstrate the process for completing hardware, operating systems, peripherals, mobile devices, networking, and security repairs. (BPC270)
14. Identify and describe components of a customer-focused organization. (CIS102)
15. Demonstrate advanced use of an operating system. (CIS122AE)
16. Identify current issues, terminology and products related to local area networks. (CIS190)
17. Describe network security threats, vulnerabilities, attacks, and strategies (CIS270).

OR

CCL in Web Design: User Interface (5216)

1. Define terms related to microcomputer usage and applications. (CIS105, CIS113DE, CIS114DE, CIS117DM, CIS121AE)
2. Identify microcomputer hardware and software components. (CIS105, CIS121AE)

3. Apply microcomputer operation skills: care and handling of diskettes, powering up the computer, keyboarding (required speed development: 25 words per minute), and powering down the computer. (CIS105)
4. Evaluate and select microcomputer hardware and software for specific applications. (CIS105)
5. Describe basic graphics, sound, process control, and other special capabilities of a microcomputer. (CIS105, CIS118AB)
6. Demonstrate skills for using commercial software programs including electronic spreadsheets, micro word processing, and database management. (CIS113DE, CIS114DE, CIS117DM)
7. Demonstrate use of a computer operating system. (CIS121AE)
8. Use suitable software to generate charts, graphs and graphics for business use. (CIS118AB)
9. Explain and use various Internet communication, resource discovery, and information retrieval tools. (CIS133AA, CIS133BA, CIS133CA, CIS133DA)
10. Practice basic animation techniques for creating, manipulating, and editing flash animation graphics. (CIS120DC)
11. Utilize electronic techniques to create, manipulate, and edit images, text, abstract art, graphic design, color graphics and business charts. (CIS120DF)
12. Use project management software to plan and schedule a project. (CIS124AA)
13. Define multimedia technology. (CIS/MMT140)
14. Describe various hardware devices and software tools used in developing and delivering multimedia. (CIS/MMT140)
15. Describe the process of analysis and design of a multimedia application. (CIS/MMT140)
16. Design and create presentations using the World Wide Web authoring hypertext markup language (HTML). (CIS233DA)
17. Summarize e-Commerce, its uses and common components in web sites. (CIS235)
18. Design and publish an electronic portfolio, showcasing one's best work and providing evidence of one's knowledge, skill, and learning. (CIS288)

CCL in Computer Usage and Applications Learning Outcomes:

1. Define terms related to microcomputer usage and applications. (CIS105, CIS113DE, CIS114DE, CIS117DM, CIS121AE)
2. Identify microcomputer hardware and software components. (CIS105, CIS121AE)

3. Apply microcomputer operation skills: care and handling of diskettes, powering up the computer, keyboarding (required speed development: 25 words per minute), and powering down the computer. (CIS105)
4. Evaluate and select microcomputer hardware and software for specific applications. (CIS105)
5. Describe basic graphics, sound, process control, and other special capabilities of a microcomputer. (CIS105, CIS118AB)
6. Demonstrate skills for using commercial software programs including electronic spreadsheets, micro word processing, and database management. (CIS113DE, CIS114DE, CIS117DM)
7. Demonstrate use of a computer operating system. (CIS121AE)
8. Use suitable software to generate charts, graphs and graphics for business use. (CIS118AB)
9. Explain the use of various Internet communication, resource discovery and information retrieval tools. (CIS133DA)

CCL in Advanced Computer Usage and Applications Learning Outcomes:

1. Define terms related to microcomputer usage and applications. (CIS105, CIS113DE, CIS114DE, CIS117DM, CIS121AE)
2. Identify microcomputer hardware and software components. (CIS105, CIS121AE)
3. Apply microcomputer operation skills: care and handling of diskettes, powering up the computer, keyboarding (required speed development: 25 words per minute), and powering down the computer. (CIS105)
4. Evaluate and select microcomputer hardware and software for specific applications. (CIS105)
5. Describe basic graphics, sound, process control, and other special capabilities of a microcomputer. (CIS118AB, CIS105)
6. Demonstrate skills for using commercial software programs including electronic spreadsheets, micro word processing, and database management. (CIS113DE, CIS114DE, CIS117DM)
7. Demonstrate use of a computer operating system. (CIS121AE)
8. Use suitable software to generate charts, graphs and graphics for business use. (CIS118AB)
9. Explain the use of various Internet communication, resource discovery, and information retrieval tools. (CIS133AA, CIS133BA, CIS133CA, CIS133DA)
10. Use enhanced word processing software features such as math functions, columns, macros, style libraries, graphics, outlines and table of contents. (CIS213DE)

11. Utilize PowerPoint software to incorporate sound and time-based data into presentations. (CIS118BB)
12. Demonstrate advanced use of an operating system. (CIS122AE)
13. Use project management software to plan and schedule a project. (CIS124AA, CIS124BA)
14. Describe the process for modifying, tracking, updating, and consolidating projects. (CIS124BA)
15. Demonstrate advanced spreadsheet skills including importing/exporting data, formatting techniques and macros. (CIS214DE)
16. Utilize advanced database concepts such as database design, key selection, and table relationships. (CIS217AM)
17. Differentiate between crosstab, parameter, and action query. (CIS217AM)
18. Design and create presentations using the World Wide Web authoring hypertext markup language (HTML). (CIS233DA)
19. Summarize effective techniques for internal and external business communications. (GBS233)

CCL in Digital Design Learning Outcomes:

1. Define terms related to microcomputer usage and applications. (CIS105, CIS113DE, CIS114DE, CIS117DM, CIS121AE)
2. Identify microcomputer hardware and software components. (CIS105, CIS121AE)
3. Apply microcomputer operation skills: care and handling of diskettes, powering up the computer, keyboarding (required speed development: 25 words per minute), and powering down the computer. (CIS105)
4. Evaluate and select microcomputer hardware and software for specific applications. (CIS105)
5. Describe basic graphics, sound, process control, and other special capabilities of a microcomputer. (CIS105, CIS118AB)
6. Demonstrate skills for using commercial software programs including electronic spreadsheets, micro word processing, and database management. (CIS113DE, CIS114DE, CIS117DM)
7. Demonstrate use of a computer operating system. (CIS121AE)
8. Use suitable software to generate charts, graphs, and graphics for business use. (CIS118AB)
9. Explain the use of various Internet communication, resource discovery, and information retrieval tools. (CIS133AA, CIS133BA, CIS133CA, CIS133DA)

10. Utilize electronic techniques to create, manipulate, and edit images, text, abstract art, graphic design, color graphics, and business charts. (CIS120DB, CIS120DF)
11. Use project management software to plan and schedule a project. (CIS124AA, CIS124BA)
12. Describe the process for modifying, tracking, updating, and consolidating projects. (CIS124BA)
13. Create, design, and publish various desktop publications using Adobe InDesign. (CIS138DA)
14. Define multimedia technology. (CIS/MMT140)
15. Describe various hardware devices and software tools used in developing and delivering multimedia. (CIS/MMT140)
16. Describe the process of analysis and design of a multimedia application. (CIS/MMT140)
17. Use advanced features of Adobe Photoshop, including filters, typography, painting, image compilation, and color and text manipulation. (CIS220DF)
18. Design and publish an electronic portfolio, showcasing one's best work and providing evidence of one's knowledge, skill, and learning. (CIS288)

CCL in Networking: Design and System Support Learning Outcomes:

1. Define terms related to microcomputer usage and applications. (CIS105, CIS113DE, CIS114DE, CIS117DM, CIS121AE)
2. Identify microcomputer hardware and software components. (CIS105, CIS121AE)
3. Apply microcomputer operation skills: care and handling of diskettes, powering up the computer, keyboarding (required speed development: 25 words per minute), and powering down the computer. (CIS105)
4. Evaluate and select microcomputer hardware and software for specific applications. (CIS105)
5. Describe basic graphics, sound, process control, and other special capabilities of a microcomputer. (CIS105, CIS118AB)
6. Demonstrate skills for using commercial software programs including electronic spreadsheets, micro word processing, and database management. (CIS113DE, CIS114DE, CIS117DM)
7. Demonstrate use of a computer operating system. (CIS121AE)
8. Use suitable software to generate charts, graphs and graphics for business use. (CIS118AB)
9. Explain and use various Internet communication, resource discovery and information retrieval tools. (CIS133AA, CIS133BA, CIS133CA, CIS133DA)

10. Explain technical aspects of the computer including the system setup and basic hardware/software configuration troubleshooting. (BPC170, BPC270)
11. Describe basic computer architecture. (BPC170, BPC270)
12. Demonstrate installation and troubleshooting techniques. (BPC170, BPC270)
13. Demonstrate the process for completing hardware, operating systems, peripherals, mobile devices, networking, and security repairs. (BPC270)
14. Identify and describe components of a customer-focused organization. (CIS102)
15. Demonstrate advanced use of an operating system. (CIS122AE)
16. Identify current issues, terminology and products related to local area networks. (CIS190)
17. Describe network security threats, vulnerabilities, attacks, and strategies (CIS270).

CCL in Web Design: User Interface Learning Outcomes:

1. Define terms related to microcomputer usage and applications. (CIS105, CIS113DE, CIS114DE, CIS117DM, CIS121AE)
2. Identify microcomputer hardware and software components. (CIS105, CIS121AE)
3. Apply microcomputer operation skills: care and handling of diskettes, powering up the computer, keyboarding (required speed development: 25 words per minute), and powering down the computer. (CIS105)
4. Evaluate and select microcomputer hardware and software for specific applications. (CIS105)
5. Describe basic graphics, sound, process control, and other special capabilities of a microcomputer. (CIS105, CIS118AB)
6. Demonstrate skills for using commercial software programs including electronic spreadsheets, micro word processing, and database management. (CIS113DE, CIS114DE, CIS117DM)
7. Demonstrate use of a computer operating system. (CIS121AE)
8. Use suitable software to generate charts, graphs and graphics for business use. (CIS118AB)
9. Explain and use various Internet communication, resource discovery, and information retrieval tools. (CIS133AA, CIS133BA, CIS133CA, CIS133DA)
10. Practice basic animation techniques for creating, manipulating, and editing flash animation graphics. (CIS120DC)
11. Utilize electronic techniques to create, manipulate, and edit images, text, abstract art, graphic design, color graphics and business charts. (CIS120DF)

12. Use project management software to plan and schedule a project. (CIS124AA)
13. Define multimedia technology. (CIS/MMT140)
14. Describe various hardware devices and software tools used in developing and delivering multimedia. (CIS/MMT140)
15. Describe the process of analysis and design of a multimedia application. (CIS/MMT140)
16. Design and create presentations using the World Wide Web authoring hypertext markup language (HTML). (CIS233DA)
17. Summarize e-Commerce, its uses and common components in web sites. (CIS235)
18. Design and publish an electronic portfolio, showcasing one's best work and providing evidence of one's knowledge, skill, and learning. (CIS288)

The program learning outcomes are assessed throughout the associated courses using objective and/or subjective assessments. The Final Exams / Final Exam Projects are comprehensive, and scores on those assessments are evidence of student achievement of the program outcomes:

| CCL in Advanced Computer Usage and Applications (5218) | | | |
|--|----------------------|---------------|--------------------------|
| Learning Outcome | Assessment Method | Student Count | Students @ College Level |
| 1 | CIS105; Final Exam | 15 | 91% |
| | CIS113DE; Final Exam | 15 | 90% |
| | CIS114DE; Final Exam | 17 | 89% |
| | CIS117DM; Final Exam | 20 | 97% |
| | CIS121AE; Final Exam | 19 | 95% |
| 2 | CIS105; Final Exam | 15 | 91% |

| | | | |
|----|-------------------------|----|------|
| | CIS121AE; Final Exam | 19 | 95% |
| 3 | CIS105; Final Exam | 15 | 91% |
| 4 | CIS105; Final Exam | 15 | 91% |
| 5 | CIS105; Final Exam | 15 | 91% |
| | CIS118AB; Final Exam | 21 | 92% |
| 6 | CIS113DE; Final Exam | 15 | 90% |
| | CIS114DE; Final Exam | 17 | 89% |
| | CIS117DM; Final Exam | 20 | 97% |
| 7 | CIS121AE; Final Exam | 19 | 95% |
| 8 | CIS118AB; Final Exam | 21 | 92% |
| 9 | CIS133DA; Final Exam | 22 | 94% |
| 10 | CIS213DE; Final Exam | 25 | 85% |
| 11 | CIS118BB; Final Exam | 33 | 92% |
| 12 | CIS122AE; Final Project | 2 | 100% |

| | | | |
|----|-----------------------|----|-----|
| 13 | CIS124AA; Final Exam | 15 | 95% |
| | CIS124BA; Final Exam | 18 | 95% |
| 14 | CIS124BA; Final Exam | 18 | 95% |
| 15 | CIS214DE; Final Exam | 28 | 93% |
| 16 | CIS217AM; Final Exam | 15 | 93% |
| 17 | CIS217AM; Final Exam | 15 | 93% |
| 18 | CIS233DA; Final Exam | 37 | 85% |
| 19 | GBS233; Final Project | 4 | 97% |

| CCL in Digital Design (5525) | | | |
|------------------------------|----------------------|---------------|--------------------------|
| Learning Outcome | Assessment Method | Student Count | Students @ College Level |
| 1 | CIS105; Final Exam | 15 | 93% |
| | CIS113DE; Final Exam | 24 | 89% |
| | CIS114DE; Final Exam | 22 | 90% |
| | CIS117DM; Final | 26 | 91% |

| | | | |
|---|----------------------|----|-----|
| | Exam | | |
| | CIS121AE; Final Exam | 21 | 95% |
| 2 | CIS105; Final Exam | 15 | 93% |
| | CIS121AE; Final Exam | 21 | 95% |
| 3 | CIS105; Final Exam | 15 | 93% |
| 4 | CIS105; Final Exam | 15 | 93% |
| | CIS118AB; Final Exam | 22 | 95% |
| 5 | CIS113DE; Final Exam | 24 | 89% |
| | CIS114DE; Final Exam | 22 | 90% |
| | CIS117DM; Final Exam | 26 | 91% |
| 6 | CIS121AE; Final Exam | 21 | 95% |
| 7 | CIS118AB; Final Exam | 22 | 95% |
| | CIS133DA; Final Exam | 20 | 95% |
| 9 | CIS120DB; Final Exam | 23 | 92% |
| | CIS120DF; Final Exam | 16 | 96% |

| | | | |
|----|-----------------------|----|-----|
| | Exam | | |
| 10 | CIS124AA; Final Exam | 12 | 97% |
| | CIS124BA; Final Exam | 14 | 93% |
| 11 | CIS124BA; Final Exam | 14 | 93% |
| 12 | CIS138DA; Final Exam | 6 | 83% |
| 13 | CIS140; Final Exam | 23 | 97% |
| 14 | CIS140; Final Exam | 23 | 97% |
| 15 | CIS140; Final Exam | 23 | 97% |
| 16 | CIS220DF; Final Exam | 25 | 96% |
| 17 | CIS288; Final Project | 35 | 96% |

| CCL in Networking: Design and System Support (5215) | | | |
|---|----------------------|---------------|--------------------------|
| Learning Outcome | Assessment Method | Student Count | Students @ College Level |
| 1 | CIS105; Final Exam | 27 | 92% |
| | CIS113DE; Final Exam | 45 | 90% |

| | | | |
|---|----------------------|----|-----|
| | CIS114DE; Final Exam | 47 | 90% |
| | CIS117DM; Final Exam | 51 | 90% |
| | CIS121AE; Final Exam | 43 | 95% |
| 2 | CIS105; Final Exam | 27 | 92% |
| | CIS121AE; Final Exam | 43 | 95% |
| 3 | CIS105; Final Exam | 27 | 92% |
| 4 | CIS105; Final Exam | 27 | 92% |
| 5 | CIS105; Final Exam | 27 | 92% |
| | CIS118AB; Final Exam | 52 | 94% |
| 6 | CIS113DE; Final Exam | 45 | 90% |
| | CIS114DE; Final Exam | 47 | 90% |
| | CIS117DM; Final Exam | 51 | 90% |
| 7 | CIS121AE; Final Exam | 43 | 95% |
| 8 | CIS118AB; Final Exam | 52 | 94% |

| | | | |
|----|----------------------|----|-----|
| 9 | CIS133DA; Final Exam | 45 | 95% |
| 10 | BPC170; Final Exam | 42 | 79% |
| | BPC270; Final Exam | 60 | 76% |
| 11 | BPC170; Final Exam | 42 | 79% |
| | BPC270; Final Exam | 60 | 76% |
| 12 | BPC170; Final Exam | 42 | 79% |
| | BPC270; Final Exam | 60 | 76% |
| 13 | BPC270; Final Exam | 60 | 76% |
| 14 | CIS102; Final Exam | 9 | 98% |
| 15 | CIS122AE; Final Exam | 13 | 88% |
| 16 | CIS190; Final Exam | 12 | 75% |
| 17 | CIS270; Final Exam | 43 | 75% |

| CCL in Web Design: User Interface (5216) | | | |
|--|------------|---------------|--------------------|
| Learning | Assessment | Student Count | Students @ College |

| Outcome | Method | | Level |
|---------|----------------------|----|-------|
| 1 | CIS105; Final Exam | 28 | 93% |
| | CIS113DE; Final Exam | 36 | 91% |
| | CIS114DE; Final Exam | 33 | 92% |
| | CIS117DM; Final Exam | 38 | 96% |
| | CIS121AE; Final Exam | 40 | 96% |
| 2 | CIS105; Final Exam | 28 | 93% |
| | CIS121AE; Final Exam | 40 | 96% |
| 3 | CIS105; Final Exam | 28 | 93% |
| 4 | CIS105; Final Exam | 28 | 93% |
| 5 | CIS105; Final Exam | 28 | 93% |
| | CIS118AB; Final Exam | 37 | 95% |
| 6 | CIS113DE; Final Exam | 36 | 91% |
| | CIS114DE; Final Exam | 33 | 92% |
| | CIS117DM; Final Exam | 38 | 96% |

| | | | |
|----|----------------------|----|-----|
| | Exam | | |
| 7 | CIS121AE; Final Exam | 40 | 96% |
| 8 | CIS118AB; Final Exam | 37 | 95% |
| 9 | CIS133DA; Final Exam | 31 | 96% |
| 10 | CIS120DC; Final Exam | 28 | 91% |
| 11 | CIS120DF; Final Exam | 36 | 98% |
| 12 | CIS124AA; Final Exam | 20 | 97% |
| 13 | CIS140; Final Exam | 39 | 97% |
| 14 | CIS140; Final Exam | 39 | 97% |
| 15 | CIS140; Final Exam | 39 | 97% |
| 16 | CIS233DA; Final Exam | 41 | 93% |
| 17 | CIS235; Final Exam | 25 | 96% |
| 18 | CIS288;Final Project | 47 | 96% |

| CCL in Computer Usage & Applications (5213) | | | |
|---|----------------------|---------------|--------------------------|
| Learning Outcome | Assessment Method | Student Count | Students @ College Level |
| 1 | CIS105; Final Exam | 175 | 83% |
| | CIS113DE; Final Exam | 142 | 89% |
| | CIS114DE; Final Exam | 133 | 90% |
| | CIS117DM; Final Exam | 151 | 93% |
| | CIS121AE; Final Exam | 137 | 95% |
| 2 | CIS105; Final Exam | 175 | 83% |
| | CIS121AE; Final Exam | 137 | 95% |
| 3 | CIS105; Final Exam | 175 | 83% |
| 4 | CIS105; Final Exam | 175 | 83% |
| 5 | CIS105; Final Exam | 175 | 83% |
| | CIS118AB; Final Exam | 147 | 94% |
| 6 | CIS113DE; Final Exam | 142 | 89% |
| | CIS114DE; Final | 133 | 90% |

| | | | |
|---|------------------------------|-----|-----|
| | Exam | | |
| | CIS117DM; Final Exam | 151 | 93% |
| 7 | CIS121AE; Final Exam | 137 | 95% |
| 8 | CIS118AB; Final Exam | 147 | 94% |
| 9 | CIS133DA; Final Exam Project | 135 | 99% |

The percentage of students scoring at a college level on each of the program learning outcomes listed above approached or exceeded 80%, so no interventions are planned at this time.

In addition to the end of course Final Exams / Final Exam Projects, learning is also assessed in CIS105 with a pre and post-test. CIS105 is a required course in the first CCL in the program, Computer Usage and Applications. As shown in the CIS105 Pre / Post-Test table below, students' knowledge of basic computer knowledge increased after the completion of CIS105.

| Program | Student Count | CIS105 Pretest Avg Score | CIS105 Posttest Avg Score | % Change |
|---------|---------------|--------------------------|---------------------------|----------|
| 5213 | 46 | 67.1% | 87.1% | 20.0% |
| 5215 | 15 | 68.4% | 83.6% | 15.2% |
| 5216 | 16 | 70.8% | 80.4% | 9.6% |
| 5218 | 6 | 62.2% | 84.4% | 22.2% |
| 5225 | 9 | 66.7% | 86.7% | 20.0% |

VI. College-wide Student Learning Outcomes

In addition to the program-level outcomes addressed above, Rio Salado College places a high priority on developing core competence in the following areas:

1. **Critical Thinking:** The student will demonstrate the ability to analyze information, evaluate material, use inference to draw conclusions, and use deductive reasoning and inductive reasoning at a college level
2. **Information Literacy:** The student will demonstrate the ability to determine an information need, access successfully and evaluate critically the needed information, and organize and apply the information appropriately to accomplish a given research task.
3. **Oral Communication:** The student will demonstrate the ability to prepare and present oral communication in a variety of contexts as a college-level speaker.
4. **Reading:** The student will demonstrate the ability to comprehend a variety of materials by determining the central idea and providing textual evidence, drawing inferences or valid conclusions, analyzing the author’s purpose and bias, and applying the text to a given task or course content.
5. **Writing:** On a written assignment, the student will demonstrate the ability to generate relevant and sufficient content; organize his or her thoughts coherently; adhere to the conventions of correct mechanics and sentence structure; and use correct terminology and rich vocabulary in the fulfillment, at the college level, of his or her writing assignments.

For more information: <http://www.riosalado.edu/about/teaching-learning/assessment/Pages/SLO.aspx>

| Class | Critical Thinking | Reading | Information Literacy | Oral Communication | Writing |
|----------|-------------------|---------|----------------------|--------------------|---------|
| CIS102 | Y | Y | Y | Y | Y |
| CIS105 | | Y | Y | | Y |
| CIS114DE | Y | Y | Y | | Y |
| CIS120DF | | Y | Y | | Y |
| CIS133DA | | Y | Y | | Y |
| CIS140 | | Y | Y | | Y |
| CIS213DE | | Y | Y | | Y |
| CIS214DE | Y | Y | Y | | Y |
| CIS233DA | | Y | Y | | Y |
| CIS288 | Y | | | | Y |

Data were collected in CIS102 for the Oral Communication student learning outcome, but the course was discontinued after Guided Pathways mapping. Data from fall 2018 through fall 2020 show that students are not performing at a college-level in oral communication.

CIS102 has been replaced with CIS102DA, a new course for Rio that is required in the new shared programs, and a new data collection cycle will begin after the spring 2021 term. An Oral Comm rubric category has been added to the course, via the following HD ticket on 1/7/21:

Please add an "Oral Communication (Oral Delivery)" category to the Lesson 2 Project in CIS102DA. The breakdown should be as follows:

Completeness = 8 points

Knowledge/App = 28 points

Oral Communication (Oral Delivery) = 4 points

VII. Impact of Co-curricular Programs

| Learning Outcome | All Student Activities | Activities at College Level | Percent of Activities at College Level | Co-Curricular Activities | CC Activities at College Level | Percent of CC Activities at College Level |
|-------------------------|-------------------------------|------------------------------------|---|---------------------------------|---------------------------------------|--|
| Critical Thinking | 36 | 32 | 88.9% | 2 | 2 | 100.0% |
| Information Literacy | 1438 | 1216 | 84.6% | 138 | 119 | 86.2% |
| Oral Communication | | | | | | |
| Reading | 1438 | 1216 | 84.6% | 138 | 119 | 86.2% |
| Writing | 2062 | 1716 | 83.2% | 209 | 175 | 83.7% |

According to the data, students who participate in co-curricular activities (Honors, PTK, NSLS) perform at a higher level than students who do not. For this reason, it would be in the best interest of students to participate in such activities/groups.

CIS220DF and CIS233DA are both offered as "Honors Only" courses. Students enrolled in the Honors Only section of these courses are required to complete 15-20 hrs of additional coursework. For CIS220DF, this includes additional requirements in the advanced Photoshop projects; for CIS233DA, this includes an additional web site that requires a topic to be researched.

VIII. Effective Teaching

The Computer Technology Dept holds All Faculty Meetings (AFM) every fall and spring; during the AFM, the entire Department meets to discuss high-level processes and requirements, in addition to "content-specific" meetings with Lead Faculty members. This allows adjuncts to interact with the Dept admins, as well as their Lead Faculty member and peers in their subject area.

Also, the Computer Technology Dept has Lead Faculty members over each content/course area (CIS105, MS Office general, MS Office Access/Excel, Web & Graphic Design, and Hardware & Networking) who conduct “section reviews” on all live online courses. These reviews occur at the beginning, middle, and end of each section; Lead Faculty members review each section to ensure each instructor is following Dept policies. In the beginning review, items reviewed include Announcements, Lesson Preview Pages, and Welcome messages. In the middle review, assessment feedback and message center communication is reviewed, as well as each instructor’s handling of Roster Management and Due Date Change Requests. The end review is conducted after the majority of the students have been graded out; items reviewed are the handling of Final Exam Project grading, final grade postings, and communication with students.

In addition to “section reviews,” all adjunct faculty members receive peer evaluations every 1-3 yrs. During this process, issues are discussed with the adjunct faculty member and additional training is provided, as needed.

Below are the results of student end-of-course surveys.

1. My instructor communicated the course policies and procedures.
2. My instructor communicated his/her expected response time for messages and grading assignments.
3. My instructor responded to messages within the stated time frame.
4. My instructor graded assignments within the stated timeframe.
5. My assignment feedback explained why I earned or lost points.
6. My instructor’s feedback on assignments helped to increase my understanding of the course content.
7. My instructor provided complete responses to my questions.

| Course | Total Surveys = 815 | | | | | | |
|--------------------|---------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 |
| BPC170 | 4.63 | 4.49 | 4.28 | 4.24 | 4.30 | 4.08 | 4.13 |
| CIS105 | 4.54 | 4.51 | 4.32 | 4.39 | 4.39 | 4.15 | 4.25 |
| CIS114DE | 4.57 | 4.51 | 4.35 | 4.32 | 4.29 | 3.96 | 4.10 |
| CIS140 | 4.64 | 4.60 | 4.44 | 4.56 | 4.40 | 4.32 | 4.46 |
| CIS133DA | 4.58 | 4.53 | 4.39 | 4.53 | 4.25 | 4.08 | 4.22 |
| CIS233DA | 4.79 | 4.64 | 4.50 | 4.64 | 4.61 | 4.50 | 4.41 |
| BPC270 | 4.42 | 4.40 | 4.36 | 4.40 | 4.24 | 4.17 | 4.30 |
| CIS120DF | 4.56 | 4.40 | 4.27 | 4.29 | 4.33 | 4.23 | 4.22 |
| CIS213DE | 4.94 | 4.88 | 4.88 | 4.87 | 4.63 | 4.38 | 4.25 |
| CIS214DE | 4.94 | 4.94 | 4.94 | 4.88 | 4.88 | 4.82 | 4.82 |
| CIS288 | 4.44 | 4.44 | 4.44 | 4.44 | 4.44 | 4.44 | 4.38 |
| Grand Total | 4.58 | 4.52 | 4.36 | 4.41 | 4.37 | 4.16 | 4.25 |

Questions rated on a Likert-type scale, range from 1 (“Strongly Disagree”) to 5 (“Strongly Agree”)

Based on student evaluations, adjunct faculty members in the Computer Technology Dept are providing students with critical course information, timely, detailed assessment feedback, and helpful responses to questions.

IX. Evaluation of Curriculum

The Computer Technology Program held Advisory Council meetings annually to discuss program requirements; the members of the Council all work in the computer technology field and are considered subject matter experts. These meetings provided an opportunity to hear from experts in the field about the most important skills required for people entering the workforce. The Council members made recommendations for new courses, programs, and skills in the Computer Technology Program.

The above process changed during the 2019-20 Academic Year when the Computer Information Systems Instructional Council began participating in a Guided Pathways initiative. During this initiative, all computer programs across the Maricopa Community College District were “mapped” as shared programs; individual colleges were no longer permitted to have unique, non-shared programs. This initiative was done without input from experts in the local workforce, via Advisory Council meetings; workforce members were provided with updates during the process, but they were not involved from the beginning in order to provide valuable input. As a result of the Guided Pathways initiative, Rio’s Computer Technology Program was put on moratorium in the fall 2020 term.

In computer technology courses, changes are usually driven by software version and industry certification changes. When a new version of software is released, such as MS Office, courses that cover software applications must be revised for the new version; when a new version of a certification exam, such as CompTia’s A+ certification, is revised, courses that prepare students for the cert must be revised. This is an ongoing process for the Computer Technology program since the majority of the courses are software application or certification exam preparation courses.

During the Guided Pathways mapping process in the 2019-20 Academic Year, several microcredentials were created, including the following offered at Rio Salado College:

[Computer System Configuration and Support](#)

[Computer System Configuration and Support, Network](#)

[Computer System Configuration and Support, Security](#)

The CIS Instructional Council is committed to developing microcredentials where they make sense, like for industry certification preparation courses; if a course prepares students to sit for an industry credential, the Council feels it’s appropriate to grant a Certificate of Completion. At Rio Salado College, the following criteria will be used for microcredentials:

1. Number of credit hrs = 15 or less (16+ makes a CCL FA eligible);
2. Can be completed in two semesters or less.

X. Program Resources

The Computer Technology Program is supported by a f/t Chair, Manager, and Supervisor, in addition to five Lead Faculty members who work eight hours a week as liaisons between the Chair and adjunct faculty members. The program courses are offered in online, hybrid, dual enrollment, and partnership modalities, which all have different support needs.

In addition to personnel needs, there are costs associated with required software for students who wish to complete coursework in-person at one of our Computer Labs; these include costs for hardware in the labs, as well as software licensing for various applications.

Students in the Computer Technology Program utilize services in the Computer Labs and Tutoring, both remotely and in-person. There are four in-person Computer Labs available to students, which provide the required hardware and software for the courses, as well as in-person assistance for concepts/skills taught in the program. When students need individualized assistance, tutoring is recommended; this provides students with “one on one” assistance, covering a variety of topics instructed in the program.

XI. Program Recommendations, Decisions, and Action Plans

a. Program Best Practices

A best practice in the Computer Technology Program is the stackable format of the Certificates of Completion (CCLs) and AAS degree. Students are able to earn credentials along the way (two CCLs and AAS degree), which provides them with credentials prior to the completion of their degree.

In the fall 2020 term, all Maricopa Community College District computer programs were revised; they are now “shared” programs across all colleges with new course requirements and program titles. For this reason, the Computer Technology Program was put on moratorium and will no longer be available. The new, shared programs are also stackable so this best practice will continue.

b. Program Viability

Employment in computer and information technology occupations is projected to grow 11 percent from 2019 to 2029, much faster than the average for all occupations. These occupations are projected to add about 531,200 new jobs. Demand for these workers will stem from greater emphasis on cloud computing, the collection and storage of big data, and information security.

The median annual wage for computer and information technology occupations was \$88,240 in May 2019, which was higher than the median annual wage for all occupations of \$39,810.

Job Outlook¹

Employment of software developers is projected to grow 22 percent from 2019 to 2029, much faster than the average for all occupations.

The need for new applications on smartphones and tablets will help increase the demand for software developers.

The health and medical insurance and reinsurance carriers industry will need innovative software to manage new healthcare policy enrollments and administer existing policies digitally. As the number of people who use this digital platform increases over time, demand for software developers will grow.

Software developers are likely to see new opportunities because of an increase in the number of products that use software. For example, more computer systems are being built into consumer electronics and other products, such as cell phones and appliances.

Concerns over threats to computer security could result in more investment in security software to protect computer networks and electronic infrastructure. In addition, an increase in software offered over the Internet should lower costs and allow more customization for businesses, also increasing demand for software developers. Source: <https://www.bls.gov>

Job Prospects

Job prospects will be best for applicants with knowledge of the most up-to-date programming tools and for those who are proficient in one or more programming languages.

Source: <https://www.bls.gov>

Pay

The median annual wage for software developers was \$107,510 in May 2019. The median wage is the wage at which half the workers in an occupation earned more than that amount and half

¹ Software developers was used for this example because it was seen as the fastest growing occupation (**41%**) related to computer technology in Arizona.

earned less. The lowest 10 percent earned less than \$64,240, and the highest 10 percent earned more than \$164,590.

In May 2019, the median annual wages for software developers in the top industries in which they worked were as follows:

| | |
|--|-----------|
| Software publishers | \$122,110 |
| Manufacturing | 116,080 |
| Management of companies and enterprises | 107,640 |
| Computer systems design and related services | 103,670 |
| Insurance carriers and related activities | 100,980 |

Most software developers work full time and additional work hours are common.

Source: <https://www.bls.gov>

Industry Overview²

| Region | 2018 Jobs | 2019 Jobs | Change | %Change |
|---------|-----------|-----------|--------|---------|
| USA | 2,122,871 | 2,190,781 | 67,910 | 3.2% |
| Arizona | 36,350 | 38,494 | 2,144 | 5.9% |

Occupations Employed by this Industry

| Description | Employed in Industry (2020) | % of Total Jobs in Industry (2020) |
|---|-----------------------------|------------------------------------|
| Software Developers and Software Quality Assurance Analysts and Testers | 483,283 | 21.90% |
| Computer Systems Analysts | 175,067 | 7.90% |

² United States vs Arizona

| | | |
|---|---------|-------|
| Computer User Support Specialists | 154,267 | 7.00% |
| Computer and Information Systems Managers | 101,912 | 4.60% |
| Computer Occupations, All Other | 88,954 | 4.00% |

Source: <https://login.economicmodeling.com/login/login.php>

Projections for Employment³

In Arizona, the number of Computer Technology jobs are expected to grow at a faster rate than the overall average for all occupations (17%). Jobs for Computer Technology are expected to grow by 20%, or 59,627 jobs between 2018-2028.

| Estimated Employment and Projected Growth* | | | | | |
|--|----------------------|----------------------|----------------|----------------|----------------|
| Geographic Area (Estimated Year-Projected Year) | Estimated Employment | Projected Employment | Numeric Change | Percent Change | Job** Openings |
| Arizona (2018-2028) | 55,613 | 69,041 | 13,428 | 20% | 59,627 |

*Software Developers, Applications
 Software Developers, Systems Software
 Web Developers
 Network and Computer Systems Administrators
 Computer Network Architects
 Computer Network Support Specialists, Graphic Designers
 ** Includes due to separation, due to transfers and growth

c. Action Plans

In the fall 2020 term, all Maricopa Community College District computer programs were revised; they are now “shared” programs across all colleges with new course requirements and program titles. For this reason, the current Computer Technology Program was put on moratorium and will no longer be available. The program is being replaced with the following shared degrees and certificates of completion:

³ Jobs associated with Computer Technology.

AAS degrees:

Information Technology – Major Code [3196](#)

· With only the following specialization areas / CCLs offered:

Specialization 3: Desktop Support CCL (19 credits) – Major Code [5043](#)

Specialization 5: Web Foundation CCL (21 credits) – Major Code [5984](#)

Specialization 10: MS Office Professional CCL (21 credits) – Major Code [5132](#)

Web Design/Development – Major Code [3185](#)

· With only the following specialization areas / CCLs offered:

Web Foundations CCL (21 credits) – Major Code [5984](#)

Web Design CCL (15-16 additional credits – Web Foundation CCL embedded) – Major Code [5986](#)

Additional CCLs:

Microsoft Office Specialist CCL – Major Code [5137](#)

Computer System Configuration and Support – Major Code [5038N](#)

Computer System Configuration and Support, Network – Major Code [5044N](#)

Computer System Configuration and Support, Security – Major Code [5040N](#)

Data Analytics – Major Code [5884](#)

d. Assessment Team Recommendation

Continue program and implement stated action plan. Next review due {3-5 years}.

Continue program, implement stated action plan, and address comments listed below. Spotlight follow-up report due {1-2 years}.

Refer to college administration to determine program viability.

Discontinue program.

Comments:

As indicated in this review, the current Computer Technology Program has been discontinued. The new Information Technology and Web Design/Development degrees with the embedded certificates listed above will be reviewed in the 2025-26 academic year.