**Computer Information Systems**

**Program Review**

**Self-Study Report Template**

**2011 - 2012**

**Department: Computer Information Systems**

**Program: All Computer Information Systems Current Degree and**

**Certificate Programs Excluding Semester Programs**

*“Sometimes you don’t know where you’re going until you know where you’ve been. But knowing where you’ve been at times can be more challenging than is commonly thought.” Reece Newman, Chair/Assistant Professor, Computer Information Systems*

**Section I: Overview of Department**

1. **Mission of the department and its programs**

*The purposes of the CIS Department and its Programs are:*

To educate, instruct and train students in the art, science and technology of (1) working with – investigating, securing, engineering, managing, administering, developing, supporting, maintaining, and networking – computer information systems and (2) supporting human and institutional users of computer information systems to help them attain their professional and personal academic and career goals.

*See Appendix (page 38) for the specific professional and personal academic and career goals.*

*Among the publics served by the CIS Program are: students, higher educational institutions, employers, the community, disciplines and professions.*

*See Appendix (page 38-40) for the specific student, higher educational institution, employer, community, discipline and profession publics.*

**What positive changes:**

**In students is the department striving to effect?**

* Competencies[[1]](#footnote-1),[[2]](#footnote-2),[[3]](#footnote-3) inGeneral Education; and
* A variety of improved abilities.[[4]](#footnote-4)

**In the community is the department striving to effect?**

* Improved educational, instructional, training, and productivity levels of students and graduates and other improved abilities of students.[[5]](#footnote-5)

**In disciplines/professions is the department striving to effect?**

* Improved effectiveness of disciplines/professions.[[6]](#footnote-6)

1. **Description of the self-study process**

*The process the CIS Department followed to examine its status and to prepare for this review involved these steps:*

* Former Chair of CIS met with Jared Cutler, Director of Curriculum & Assessment, to develop Environmental Scan on October 25, 2011;
* Current Chair of CIS met with Jared Cutler, Director of Curriculum & Assessment, to review Environmental Scan & Program Review on January 5, 2012;
* Introduced process at a meeting of full-time CIS faculty on January 13, 2012;
* Assigned Degree and Certificate Program review, examination, assessment and study preparation tasks to respectively qualified CIS full-time Faculty, making available previous Self-Study Reviews and Updates, and providing Environmental Scan as well as Research and Analytics Reporting (RAR) Data Set on shared drive accessible to all CIS full-time faculty;
* Individual faculty independently researched and wrote analyses, submitted draft documents electronically to the Chair of CIS, and Chair combined drafts of Degree and Certificate Program Self-Studies into one overall document;
* Discussed work progress and issues raised by Self-Study Template in Department Meetings of full-time CIS faculty on January 27, 2012, February 10, 2012, March 2, 2012, April 20, 2012, April 27, 2012, May 11, 2012, May 25, 2012, June 1, 2012;
* Met with Jared Cutler, Director of Curriculum and Assessment, to discuss Self-Study Template and what counts as evidence of student learning at Meeting of CIS Department full-time faculty on April 27, 2012.
* Reviewed document with all full-time tenured, tenure-track and annually contracted faculty, and modified it in light of faculty comments and suggestions for changes;
* Full-time faculty participated in CIS Department Faculty Retreat at Aileron on May 4, 2012 to engage in Appreciative Inquiry activity led by John Neff of the Sinclair Foundation and Compression Planning activity led by Karla Hibbert-Jones, Assistant Director of the Office of Grants, for the overall purpose of strategic planning and the development of an agreed-upon faculty action plan;
* During Faculty Learning Days for Fall Semester 2012 on August 16, 2012, CIS Faculty met to discuss CIS Department Program Review, CIS Department Continuous Improvement Annual Update, and implications of Annual Update for Department Program Review;
* Submitted document to Sue Merrell-Daley, PhD, Dean of Business and Public Services for review;
* Chair met with Dean Sue Merrell-Daley to discuss document and consider comments and suggestions on Tuesday, September 25, 2012;
* Chair modified overall document in light of Dean’s review comments;
* Submitted revised document to Sue Merrell-Daley, PhD, Dean of Business and Public Services for review;
* Chair re-modified overall document in light of Dean’s review comments and suggestions on Saturday, September 29, 2012; and
* Submitted document to Program Review Committee on October 3, 2012.

**Strengths**

* Division of labor according to areas of expertise and specialization in examination and preparation of reviews (those most familiar with the different degree programs, certificates and courses examined them);
* Distribution of statistical data sets to all CIS full-time Faculty;
* Because earlier review and some updates were made available, benchmarking progress and change became easier.
* Faculty collaboration to determine future structure of the Department and how it would impact the students, Department, Division, and the College;
* Regular meetings over two Quarters to discuss on Program Self-Study and Review;
* Historical reference documents made available; and
* Meetings with Jared Cutler, Director of Curriculum and Assessment, to discuss Environmental Scan, Self-Study, and what counts as evidence of student learning;
* CIS Faculty Retreat at Aileron to engage in Appreciative Inquiry and Compression Planning for purposes of developing a strategic plan for faculty action;
* CIS faculty discussion of Program Review and Annual Update during Learning Days in August 2012;
* Dean of Business and Public Services Sue Merrell-Daley’s comments on and suggestions for Program Review.

**What the CIS Department would do differently in its next five-year review**

* Do a more thorough job of defining processes for development of appropriate assessments, reviewing and sharing assessment results in developing opportunities in a strategic fashion;
* Do a more thorough job of expanding the use of assessment data (direct and indirect) to inform decision making;
* Regularly complete annual program review updates;
* Start sooner, especially start analyzing data sets, reflecting on Self-Study Review, and engaging in dialogue on Self-Study Review during the Summer and Fall preceding the next five-year Review;
* Seek more advice on and ask more questions of informed parties about how best to proceed with five-year review, especially with regard to gathering and analyzing evidence for claims staked;
* As a Department become more aware of Departmental Continuous Improvement Targets, goals, and analyses of environmental factors earlier in the process;
* Define and provide update on department goals;
* Design a process to solicit input on Program Review from contract faculty, part-time faculty, students, and Business Advisory Board members; and
* Since newer Faculty studies and analyses tend to be less in-depth than those done by more experienced Faculty, team newer faculty with senior faculty when doing reviews and writing analyses.

**Section II: Overview of Program**

1. **Analysis of environmental factors – Internal Analysis**

*See Appendix (pages 41-43) for Internal and External Analysis of environmental factors.*

**B. Statement of program learning outcomes and linkage to courses**

**Include the program outcomes for each program in Section**

*See Appendix (pages 44-52) for listings and outcomes of 7 degree and 16 certificate programs.*

**Admission requirements**

**List any admission requirements specific to the department/program(s).**

* There is open access of students to CIS Department degree programs, certificate programs, and courses.
* Pre-requisites are built into the programs and courses with basic College expectations for placement. For example,
  + Cyber Investigation Technologies Associate of Applied Science (CYIT.AAS) and Cyber Investigation Certificate (CYSEC.CRT) require: Department Approval and Background Check.

*See Appendix (page 53) for pre-requisites*.

**How well have these requirements served the goals of the department/program(s)?**

* The pre-requisites support the department’s goals and purposes effectively; and
* The overall effectiveness assessment of the pre-requisites is that these requirements are performing “moderately well.”

**Are any changes in these requirements anticipated?**

* No change to CIS degree program, certificate program, and course open-access is anticipated, with the exception that admissions to Cyber Investigation Technology degree and certificate programs will continue to require Department Approval and a Background Check.

**If so, what is the rationale for these changes?**

* None.

**Section III: Student Learning**

**Evidence of student mastery of general education competencies**

**What evidence does the department/program have regarding students’ proficiency in general education competencies?**

* To generally set the context, much work has been done as we revise the curriculum to include the general education competencies in all Computer Information System courses.
* CIS continues to require CIS-100 CIS Student Orientation for Success in all Degree Programs. Knowledge of the General Education Competencies is a major outcome and component of this course.
  + The retention statistics bear out that this is the right approach.
  + The course does help retain students.
* Computer Literacy Competency
  + Computer Literacy required in all CIS courses.
  + BIS-105 (Computer Concepts) pre-requisite for all degree options.
* Critical Thinking/Problem Solving Competency
  + Reinforced in every course.
  + CIS-111 Introduction to Problem Solving and Computer Programming in particular is geared towards logical problem solving, troubleshooting and critical thinking.
    - *See Appendix (pages 54-60) for CIS-111 Introduction to Problem Solving & Computer Programming Course Objectives, Learning Objectives, Related CIS Associate Degree Program Outcomes, Associated General Education Outcomes, and Sample Assignment.*
    - **CIS-111 Related Course Objectives**
      * Develop and apply problem solving skills.
        + Identify key components of a problem to be addressed in solving the problem.
        + Explain and apply the steps of the programming process.
        + Demonstrate knowledge of technical documentation associated with software development including: data definition; output design; and expected results.
      * Develop algorithms that analyze and solve programming logic problems.
        + Demonstrate how to read and understand a program specification.
        + Describe why and how data are organized.
        + Demonstrate knowledge of basic software design including: input and output; data types; constants; variables; expressions.
      * Understand the constructs of a computer program including:
        + Sequence structure;
        + Selection; and
        + Iteration (loops).
      * Successfully use design tools to specify the solution and debug introductory level programs.
    - **CIS-111 Related Learning Objectives**
      * Chapter 1 An Overview of Computers and Programming
        + Identify and appropriately use pseudo-code key words and indentation formats for input, processing, output and decisions.
      * Chapter 3 Understanding Structure
        + Describe the three basic structures of sequence, selection and repetition.
        + Use the three basic structures to draw flowcharts and to write pseudo-code.
      * Design of Event-driven Programs with Graphical User Interfaces (GUIs)
        + Create a modular logic program problem solution in pseudo-code.
    - **CIS-111 Related CIS Associate Degree Program Outcomes**
      * Develop and apply problem solving skills.
      * Design, document and implement computer program solutions given specifications of a problem.
    - **CIS-111 Related Associated General Education Outcomes**
      * Critical thinking/Problem solving: develop and apply problem solving skills.
      * Critical thinking/Problem solving: apply the program design process.
      * Critical thinking/Problem solving: apply the program development process.
    - 72.13% Average Annual Success and -1.50% Average Annual Change in Success from FY2007-08 through FY2011-12 in CIS-111 where Critical Thinking and Problem Solving are extensively used.
    - Note that the Sinclair Community College (SCC) Average Annual Success is 70% while the Average Annual Change in Success is -0.25%, and that the Business and Public Services (BPS) Division Average Annual Success is 72% while the Average Annual Change in Success also is

-0.25%.

* + - Thus the CIS-111 Average Annual Success is 2.13% higher than the SCC Average Annual Success and 0.13% higher than the BPS Division Average Annual Success from FY2007-08 through FY2011-12. This is indirect evidence that on average, students’ proficiency in the Critical Thinking/Problem Solving general education competency is slightly higher than that of SCC and roughly equal to that of the BPS Division.
    - However the Average Annual Change in Success for CIS-111 is -1.25% lower than SCC’s and the BPS Division’s.
* Information Literacy Competency
  + Synthesis and research are emphasized particularly in CIS Student Orientation for Success and CIS Capstone.
  + Legal and ethical use of information is emphasized in CIS Systems Analysis & Design and CIS Student Orientation for Success courses. Workplace ethics is emphasized in Capstone courses.
* Oral Communication Competency
  + Students are required to make presentations in more courses (especially the core CIS courses, the capstones [CIS-278], and the internships [CIS-270]).
  + All oral communication is assessed in CIS core courses and when applicable the general education rubrics are used.
* Written Communication Competency
  + Students are required to research and write papers in more courses (especially the core CIS courses, the capstones, and the internships).
  + All written communication is assessed in CIS core courses and when applicable the general education rubrics are used.
    - *See Appendix (pages 61-63) for CIS-278 CIS Capstone Sample General Education Outcomes Capstone Writing Assignment and Rubric for assessing Written Communication general education competency.*
    - 99.35% Average Annual Success and 0.00% Average Annual Change in success in CIS-278 CIS Capstone where Written Communication is emphasized for the period FY2007-08 through FY2011-12.
    - Note that the Sinclair Community College (SCC) Average Annual Success is 70% while the Average Annual Change in Success is -0.25%, and that the Business and Public Services (BPS) Division Average Annual Success is 72% while the Average Annual Change in Success also is

-0.25%.

* + - Thus the CIS-278 Average Annual Success is 29.35% higher than the SCC Average Annual Success and 27.00% higher than the BPS Division Average Annual Success from FY2007-08 through FY2011-12.
    - Moreover the Average Annual Change in Success for CIS-278 is 0.25% higher than SCC’s and the BPS Division’s.
    - The Average Annual Success in CIS-278 is indirect evidence that on average, students’ proficiency in the Written Communication general education competency is significantly higher than that of SCC and the BPS Division.
    - However a closer look reveals that, for example, in Spring 2012 CIS 278 53 CIS Capstone, the overall class average on the General Education Outcomes Capstone Writing Assignment was 79.22%. Although the top 3 student scores were 95%, 98%, and 100%, and bottom 3 student scores were 0%, 38%, and 61%. That is, the Rubric indicated that the bottom 3 students were unsuccessful in Written Communication.
    - Efforts are being made to improve this situation. In Spring 2012 students were not asked first to submit a rough draft of the General Education Outcomes Capstone Writing Assignment for comments and suggestions before submitting the final paper. Currently students are required to submit a first draft, and then allowed to rewrite the paper in view of the comments and suggestions made. It is hoped that doing this will begin to improve their competency in Written Communication.
* Values/Citizenship/Community Competency
  + Ethics topics are used heavily in CIS Student Orientation for Success and CIS Capstone.
  + SCOPE (Students Correcting Open-door PC Emergencies) office provides free PC repair to students, faculty and staff.
* *See Appendix for #1, #2 Course Success Percentages and #3 Course Success Rate by Grade.*



**Based on this evidence, how well are students mastering and applying general education competencies in the program?**

* Proficiency in general education competencies is required in all CIS courses for success.
* Average Annual Success % in courses where critical thinking and problem solving are extensively used in FY2007-08 thru FY2011-12 provide indirect evidence of students mastering and applying general education competencies. Note that the Sinclair Community College (SCC) Average Annual Success is 70% while the Average Annual Change in Success is -0.25%, and that the Business and Public Services (BPS) Division Average Annual Success is 72% while the Average Annual Change in Success also is -0.25%.
  + CIS-100: 62.67% Average Annual Success, lower than both those of SCC and BPS Division, and -0.25% Average Annual Change in Success, the same as those of both SCC and BPS Division.
  + CIS-107: 68.99% Average Annual Success, lower than both those of SCC and BPS Division, and -1.00% Average Annual Change in Success, four times those of both SCC and BPS Division.
  + CIS-111: 72.13% Average Annual Success, higher than that of SCC and slightly higher than that of BPS Division, and -1.50% Average Annual Change in Success, six times those of both SCC and BPS Division.
  + CIS-278: 99.35% Average Annual Success, significantly higher than both those of SCC and BPS Division, and 0.00% Average Annual Change in Success, also higher than those of both SCC and BPS Division.
* Note: The CIS faculty believe they need to add the same assessment of general education competencies in introductory and ending courses in order to measure mastery.

**Evidence of student achievement in the learning outcomes for the program(s)**

**What evidence does the department/program have regarding students’ proficiency in the learning outcomes for the program(s)?**

* Feedback from Coop/Internship employers rates our students as very good in technical skills; however, they need to do better in oral communication, written communication, and teamwork skills. Moreover, quantitative measures are needed here to validate qualitative feedback.
* Students have earned Cisco certificates in all four courses completed and passed with a score of 65% or above and are entitled to take the CCNA exam.
* Percentages listed in the following can be used as indirect evidence to assess students’ proficiency in the learning outcomes for the program(s):
  + *See Appendix for #1, #2 Course Success Percentages and #3 Course Success Rate by Grade.*

**Enrollment and graduation rates**

**Based on this evidence, how well are students mastering and applying the learning outcomes?**

* Students demonstrate abilities to research, select, use, and troubleshoot hardware and network components or connections appropriate to their areas of concentration including hands-on labs and final exams.
* Students apply programming, database, operating systems, and business application skills to solve and troubleshoot business and IT problems related to area of concentration through the successful completion of capstone projects and hands on final exams. For example the Cisco program requires hands on demonstration of all learning out comes.
* Students apply effective and flexible critical thinking, general business, and problem solving skills to typical business and technical problems associated with area of concentration.
  + For example, students download scripts with errors and troubleshoot the scripts.
* Students use oral and written communication skills and teamwork skills in the delivery of customer service, project planning, and project completion in the CIS business environment, although there is room for improvement in these skills.
  + Labs are done in groups/teams of 2 to 4 students each simulating a work environment.
* Percentages listed in the following can be used as indirect evidence to assess the level within which students master and apply learning outcomes:
  + *See Appendix for #1, #2 Course Success Percentages, #3 Course Success Rate by Grade,*

*#4 CORE Course Success Percentages,*

*#5 CYIT Course Success Percentages,*

*#6 MSSC Course Success Percentages,*

*#7 NEEN Course Success Percentages,*

*#8 NEMA Course Success Percentages,*

*#9 SODE Course Success Percentages,*

*#10 USSU Course Success Percentages,*

*#11 WEDE Course Success Percentages,*

*#12 INTERNSHIP & CAPSTONE Course Success Percentages*

* + *See Appendix for #13 Student Enrollment in Programs, #14 Student Enrollment by Course*
  + *See Appendix for #15 Degree Completion by Program*

**Based on the department’s self-study, are there any planned changes in program learning outcomes?**

* No, except that Network Management will be incorporating a larger variety of labs based on Microsoft testing criteria.

**Evidence of student demand for the program**

**How has/is student demand for the program changing?**

* The number of Tech Prep students is increasing.
  + In fall of 2011 423 students from IT Tech Prep Programs were enrolled at Sinclair Community College.
  + Less than half (180) were CIS or university parallel majors.
  + 40 are listed as personal interest/undecided, suggesting a need to increase the number who stay enrolled in IT pathways.

**Evidence of student demand:**

* Increased number of IT Tech Prep students staying enrolled in IT pathways.
* Increased interests and participation by those working in area industries, through marketing, outreach and short-term certificates, as well as through other agreements.
* Increased dual enrollment with 4 year universities like University of Dayton (UD) and Wright State University (WSU).
* Enrollment data in degree and certificate programs at or exceeding goals based on economic conditions and job cycle.

Traditionally enrollment is linked to job cycle (4 to 5 years).

* Number of degrees and certificates completed has increased from 2005 to 2012.
* Demand for CIS courses has remained strong from 2005 to 2011.
* From 2005 to 2011 the number of degrees and certificates completed has increased because courses are being taught days, evenings, and Saturdays with class sizes of approximately 15 to 20 students each.
* Lower course cancellation rates.
* Greater participation and marketing efforts in distance learning courses.
* Final project in introductory level web programming course (CIS-130) and advanced web programming course (CIS-223) required in every section demonstrated student learning.
* In core database management course (CIS-265), all students are required to complete a final project thereby allowing positive measures of student learning.
* Demand also is affected by changes in technology, operating systems and A+ certification exam version.
* Based on enrollment data from 2004 - 2011 to present, the current economic climate has been reflected in enrollment numbers.
* Additional programs have been added as well as degrees offered in conjunction with other departments to meet the changing face of IT and the demands of the workforce.
* *See Appendix for #13 Student Enrollment in Programs,*

*#14 for Student Enrollment by Course*

* *See Appendix for #15 Degree Completion by Program*
* *See Appendix for #16, #17, #18 Program Retention*

**Why?**

* The demand for entry-level Network Engineers has remained constant and Cisco is a reliable indicator of knowledge required to be a network engineer.
* Demand should stay constant but as we expand our Network Engineer curriculum to include Enterasys and CCNA Security demand will grow in those areas.
* Based on advisory committee discussions and other empirical data information security topics are of keen interest across all industries and disciplines.
* As public concerns over privacy and intellectual property rights continue to be debated in public forums, awareness of these topics continues to increase and, therefore, increased demand for those with IT skills addressing concerns in these areas most likely will increase enrollment in CIS programs.

**Should the department take steps to increase the demand?**

* Yes, perhaps by developing strategies and tactics for working more closely with Sinclair Community College Student Services and Marketing.

**Decrease the demand?**

* No.

**Eliminate the program?**

* No.

**What is the likely future demand for this program and why?**

* According to the Bureau of Labor Statistics ***Occupational Outlook Handbook***, Computer and Information Technology occupations are projected to grow anywhere from 12% to 30% from 2010 to 2020 depending on the specific occupation.[[7]](#footnote-7)
* The Cisco curriculum is constantly being monitored by its educational staff which coordinates with the Sales staff and business leaders on what is needed from Cisco programs.
* Those needs are then placed in the curriculum and made available to Cisco instructors throughout the world.
* Demand is likely to increase as, for example, public debates continue raising awareness of topics in Cyber Investigation and Microsoft Security Specialist tracks.
* Information technology continues to be adopted in all facets of our society driving continued interest in privacy and security.

**Evidence of program quality from external sources (e.g., advisory committees, accrediting agencies, etc.)**

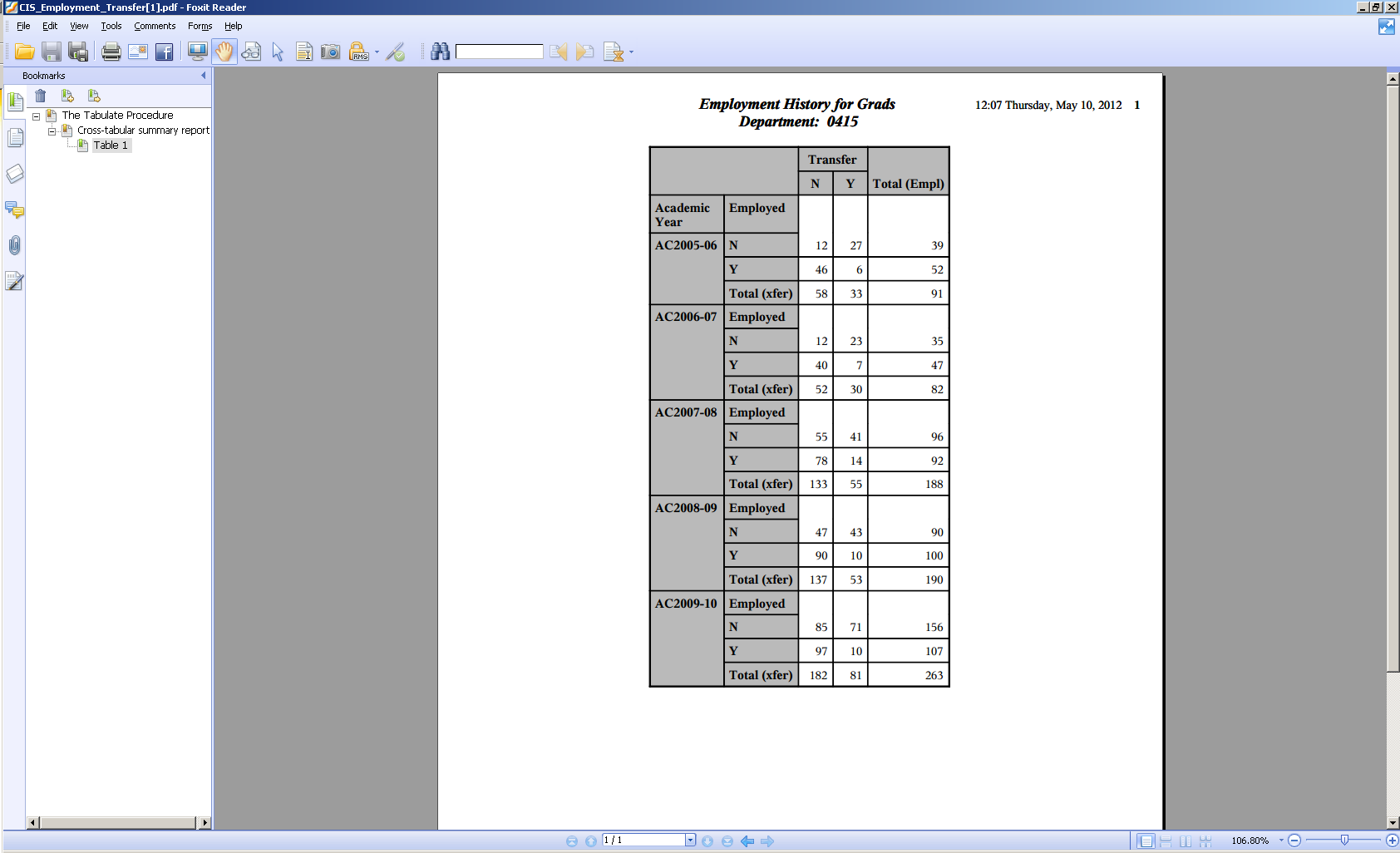
**What evidence does the department have about evaluations or perceptions of department/program quality from sources outside the department?**

* Sinclair has been designated as a National Center of Academic Excellence in Information Assurance (IA) 2-Year Education by the National Security Agency (NSA) and the Department of Homeland Security (DHS).
* Sinclair along with Air Force Institute of Technology (AFIT) hosted the Colloquium for Information Systems Security Education (CISSE) Preconference Workshops in 2011. The event took place at Sinclair. The Preconference Workshops attracted attendees from the West and East coasts.
* The number of articulation agreements which the department has with highly respected universities: University of Dayton (BA Criminal Justice and Cyber Security, WSU, Miami University, Miami University/Regional (Health Information Technology), Ohio University, and Franklin University.
* Bob Sherman was selected to be a Lead Expert for the Information Systems Services pathway for the Secondary Career Technical Articulation Initiative (SCTAI).
* Reece Newman was selected to be a Panel Expert for the Software Development pathway for SCTAI.
* More students are finding Internships. Summer of 2010 the CIS department had 2 Internship sites. Spring of 2012 there were 14 Internship sites. From 2006-2007 10 students enrolled in the Internship course. 2010-2011, 26 students enrolled in the Internships course. One instructor has been assigned to the Internship course and continually works with students and helps to identify internship sites. She also helps student rework their resumes. While traditionally most Internship sites have been for user support and networking concentrations, Riverside Research (new Fall 2010) and University of Dayton Research Institute (spring 2012) have added Software Development Internships.
* Since fall 2005 we have completed 83 CIS Capstone projects with external organizations and 25 of those projects were for repeating organizations.
* CIS faculty have been invited to participate in Technology First committees, Career Center Advisory Committees, Linux InstallFest, TechFest, ITWorks State Conference Planning Committee, Cisco Conference for Ohio Committee, and to judge Business Professionals of America High School competitions.
* The office of Displaced Workers in partnership with local job center (county and state workers), Trade Adjustment Act (TAA), and Workforce Investment Act (WIA) very apt to approve CIS programs for Displaced Workers.
* We Are IT conference has been an annual success for past 6 years.
  + Highest evaluations from lunch buddies, State of Ohio personnel, student attendees, sponsors.
  + Over 1500 9th and 10th grade girls have been exposed to careers in IT thru this conference
* Expansion of Capstone projects and clients – will potentially increase in semesters when we have longer courses.
* Newspaper stories about the College and how well it impacts the community.
* Constant calls from industry wanting Sinclair students as Interns for their programs and as potential employees.
* Positive feedback from graduates, Business Advisory Committees, Capstone clients and customers.
* The activity of the Business Advisory Committees has reflected a strong participation from the community and members affirm our quality and commitment to the community.
* Our Business Advisory Committees have been strategic in helping us craft meaningful and helpful courses leading to both employment and transition to 4-year higher educational institutions.
* In addition to off-campus sources, include perceptions of quality by other departments/programs on campus where those departments are consumers of the instruction offered by the department.
* Other divisions/departments use our courses in their programs/certificates such as BIS and GIS.
* Sinclair participation in the Career Center Advisory Committees and Technology First Committees.

**Evidence of the placement/transfer of graduates**

**What evidence does the department/program have regarding the extent to which its students transfer to other institutions?**

* Transfer data is from the National Student Clearinghouse.  The graduates are counted as transfers if they have enrollment records at another institution after their graduation date.



**How well do students from the department/program perform once they have transferred?**

* Not known officially by us.

**What evidence does the department have regarding the rate of employment of its graduates?**

* Employment is determined using data from the Ohio Department of Job and Family Services (ODJFS).  Only graduates working at organization that pay unemployment insurance are indicated.  Graduates working outside of Ohio, for non-profits, or directly for the federal government are not reported (see Employment History for Grads table above).

**How well do the graduates perform once employed?**

* Only known unofficially from increased employer demand for our students.

**Evidence of the cost-effectiveness of the department/program**

**How does the department/program characterize its cost-effectiveness?**

* The CIS Department remains cost effective by decreasing the cost per FTE from $4,425 to $3,208 per FTE from fiscal year 2007-2008 to fiscal year 2011-2012 compared to cost per FTE for the BPS Division from $3,875 to $3,427, overall a -7.7% annualized change for CIS compared to a -3.0% annualized change for BPS.
* In the same time period our revenue increased slightly from $5,308 to $5,330, overall an annualized change of 0.1% for CIS compared to a 0.0% annualized change for BPS.
* The contribution margin per FTE for the CIS Department has increased from $882 to $2,122 from fiscal year 2007-2008 to fiscal year 2011 to 2012, while the contribution margin per FTE for the BPS Division for the same period has increased from $1,650 to $2,102, overall an annualized change of 24.5% for CIS compared to an annualized change of 6.2% for BPS. Accordingly the CIS Department’s overall annualized change for the period is a large part of the explanation for the BPS Division’s annualized change in contribution margin per FTE.
* The CIS Department actual faculty ratio for full-time faculty was 69.4% in fiscal year 2007 to 2008 and 47.4% in fiscal year 2011 to 2012, a decrease of -22.1%, while the BPS Department actual faculty ratio for full-time faculty was 52.5% in fiscal year 2007 to 2008 and 46.7% for fiscal year 2011 to 2012, a decrease of -5.8%. That is to say, the decrease in the CIS Department for the actual faculty ratio for full-time faculty for the same period was almost 4 times greater at -22.1% than the decrease in the BPS Division of -5.8%.
* The CIS Department actual faculty ratio for part-time faculty was 30.6% in fiscal year 2007 to 2008 and 52.6% in fiscal year 2011 to 2012, an increase of 22.1%, while the BPS Department actual faculty ratio for part-time faculty was 47.5% in fiscal year 2007 to 2008 and 53.3% for fiscal year 2011 to 2012, an increase of 5.8%. That is, the increase in the CIS Department for the actual faculty ratio for part-time faculty for the same period was almost 4 times greater at 22.1% than the increase in the BPS Division of 5.8%.
* The actual contribution margin % for the CIS Department was 16.62% in fiscal year 2008, 28.87% in fiscal year 2009, 41.34% in fiscal year 2010, 45.67% in fiscal year 2011, with a budget of 39.81% in fiscal year 2012, almost 2 times what it was in fiscal year 2008.
* The actual contribution margin per FTE was $882 in fiscal year 2008, $1,402 in fiscal year 2009, $2,000 in fiscal year 2010, $2,433 in fiscal year 2011, with a budget of $2,122 in fiscal year 2012, an increase of $1240 from fiscal year 2008 to fiscal year 2012.

*See Appendix table of Cost Effectiveness for more specific details.*

**What would enhance the cost-effectiveness of the department/program?**

* Increasing census date enrollment in courses per full-time and part-time faculty.
* Strive to maintain a 50:50 ratio of full-time to part-time CIS faculty.

**Are there considerations in the cost-effectiveness of the department/program that are unique to the discipline or its methods of instruction?**

* Yes, since there are many vendors of networking equipment and the department teaches only those that are the most popular with industry and business.
* Yes, high demand for and low supply of IT professionals and technicians with the resultant high IT industry salaries makes recruitment of qualified full-time and part-time CIS faculty at prevailing Sinclair Community College salaries extremely difficult at best. This economic situation seems unique to the IT sector in comparison to low demand and high supply of professionals in other fields.
* Yes, since the “shelf-life” of knowledge and skills in IT is brief in such a rapidly changing field, professional development of existing faculty continues to be an on-going concern. In addition, it is imperative that CIS recruit part-time faculty from industry who currently are active in the IT industry.

**Section IV: Department/Program Status and Goals**

**List the department’s/program’s**

**Strengths**

* National Security Agency (NSA) and Department of Homeland Security (DHS) designation of Sinclair Community College as a National Center of Academic Excellence in Information Assurance (IA) 2 Year Education (CAE2Y).
* Pursuit of National Science Foundation (NSF) Grant ***Facilitating Creative Problem Solving Through Computer Programming Learning Objects***, although it was not awarded to Sinclair Community College.
* Pursuit of National Science Foundation (NSF) Grant ***Advanced Cyber Education Program*** in cooperation with Air Force Institute of Technology (AFIT) and its Director of Center for Cyberspace Research (CCR) Rick Raines, PhD. A decision is to be made by NSF in November of 2012.
* Partnership with Air Force Institute of Technology (AFIT).
* Pursuit and award of ~$12 million Depart of Labor (DOL) Grant ***Adapting and Adopting Competency-based IT Instruction to Accelerate Learning for TAA-eligible and Adult Learners.***
* Passion of full-time and part-time faculty for teaching.
* Dedication of full-time and part-time faculty to the vision and mission of the College.
* Adapt our curriculum to the most current trends in information technology that align themselves with our degree programs.
* Continuation of the Business Advisory Committees.
* Cisco Academy.
* Community outreach endeavors:
  + Girls In IT.
  + Tech/Prep High School Day.
  + High School Sinclair Day.
  + Saturday Guest Lecture Series.
* Linux Installfest.
* Career Day.
* 2 + 2 Degree Programs.
* Articulation agreements with colleges and universities.
* Ohio Board of Regents (OBOR) relationship.
* CIS scholarships to students (i.e. Larry Adkins).
* Technology First.
* Community and enterprise interest in degree programs.
* Continuous improvement of faculty through education.
* Industry literate and certified adjunct faculty.
* BPS Divisional recognition of adjunct faculty such as Mike Libassi and Kenneth Luke.
* CIS Faculty Retreat at Aileron.
  + *See Appendix for Computer Information Systems Strategic Planning.*
* CIS Faculty Learning Days for Fall Semester 2012.

**Weaknesses**

* Student retention CIS–107 (increase in number of students lacking computer concepts experience BIS-105).
* In the dynamic IT field, there is a large need for targeted professional development to ensure continued employability and transferability of CIS students.
* Ability to construct statistical data concerning student retention/job acquisition/connections of job acquisition to degree program, etc.
* Lack of access to marketing resources.
* Ethnic minority representation in tenure track positions.
* Mentoring Adjunct Faculty, although Professor Santoianni currently is developing a systematic Faculty Mentoring Plan for the CIS Department.

**Opportunities**

* There are many opportunities to explore, research and prioritize, including:
  + Inclusion of virtualization in courses.
  + Inclusion of mobile and wireless technology in courses.
  + Expanding Students Correcting Open-door PC Emergencies (SCOPE) lab in the areas of space and student involvement.
  + Activation of Dayton Public IT Tech Prep Program.
  + Expansion of Data Analytics program.
  + Addition of CCNA Security and Health Information Networking to our Cisco certifications.
  + Improved marketing and managing of our Internship programs.
  + Creation of CIS information link on <http://our.sinclair.edu> .

**Describe the status of the department’s/program’s work on any issues or recommendations that surfaced in the last department review.**

**Goals**

* Improve student learning and retention in core CIS courses
  + Working on improving student learning and retention in core CIS courses. Use of common Angel Shells is a great opportunity to do this – and it needs to be expanded to all core courses.
* Revise core courses to add more hands-on, active learning
  + Hands-on, active learning has been stressed in all courses. CIS faculty is aware of the various Visual, Aural, Read/write, and Kinesthetic sensory (VARK) learning styles and modalities and attempts to accommodate all via varied activities (watch, listen, read, and do).
* Create CIS student orientation class
  + Created CIS-100 CIS Student Orientation for Success.
* Assess student readiness for CIS courses
  + A consistent assessment for every faculty to use for all courses is needed for general education outcomes.
  + Consistent collection of these results would be helpful to identify areas of improvement.
  + Employer feedback (anecdotal) indicates our students have great technical skills, but area lacking in the “soft” skills.
* Offer classes at off-site locations (YMCA, Warren County)
  + Offered courses at Huber Heights Learning Center (HHLC), Courseview Campus Center (CVCC), Dayton Correctional Institute (DCI), and Warren County Career Center (WCCC).
* Offer more courses as distance.
  + Offered many on-line courses, including:
    - CIS-107 Introduction to Operating Systems.
    - CIS-112 Object-Oriented Concepts.
    - CIS-130 Introduction to Web Development.
    - CIS-137 Introduction to JavaScript.
    - CIS-147 Visual Basic Programming I.
    - CIS-210 Computer Systems Analysis.
    - CIS-233 C++ Programming I.
    - CIS-265 Database Management Systems.
* Create a Security degree option
  + Created the Microsoft Security Specialist Associate of Applied Science (MSSC.AAS) degree program.
* Update courses to reflect new technology
  + Developed two computer security certificate programs.
  + Developed an advanced Network Engineer certificate program.
  + Revised our programs to stay in synch with Microsoft's changing emphasis.  As Microsoft has moved from their MCSE (Microsoft Certified System Engineer) designation to their MCITP (Microsoft Certified IT Professional) our courses have been revised; some have been deactivated; and, some new courses (CIS-212/CIS-213) have been created.
  + Migrated courses to the current versions of Microsoft operating systems.  Specifically, CIS-271 has moved to Vista and then again to Windows 7; and multiple courses (CIS-272, CIS-273 and CIS-274) have moved to Windows Server 2008.
  + Curriculum successfully mapped to the National Training Standard for Information Systems Security Professionals, NSTISSI No. 4011, and the National Training Standard for System Administrators, CNSSI No. 4013E as administered by the Committee on National Security Systems (CNSS) and the National Security Agency (NSA).  The department has been recognized for these accomplishments at the Colloquium for Information Systems Security Education (CISSE) Conferences.
  + Sinclair Community College designated as a Center of Academic Excellence in Information Assurance (IA) 2 Year Education (CAE2Y) by the Department of Homeland Security (DHS) and the National Security Agency (NSA).
  + Continued dialog with Air Force Institute of Technology (AFIT) regarding possible areas of collaboration to enhance our students' experience and to enlarge their opportunities following their time at Sinclair Community College.
  + Together with Air Force Institute of Technology (AFIT), hosted the 2011 Colloquium for Information Systems Security Education (CISSE) Preconference Workshops by providing hardware, software and lab space for conference attendees to work in intense, hands-on Workshops on a variety of security topics.
* Target entry-level computer users
  + BIS-105 Computer Concepts is a pre-requisite for many CIS certificate and degree programs.
  + CIS-100 CIS Student Orientation for Success required for all CIS certificate and degree programs.
  + CIS-111 Introduction to Problem Solving and Computer Programming required for all CIS certificate and degree programs.
  + CIS-107 Introduction to Operating Systems required for all CIS certificate and degree programs.

**Recommendations**

* Define processes for development of appropriate assessments, reviewing and sharing assessment results in developing opportunities in a strategic fashion.
  + **Assessment Method(s):**
    - Formative Assessment Method(s) and Description:
      * Formative assessment is achieved through course-by-course completion. CIS courses provide interactive learning experiences where students complete small projects and hands-on activities. Tests and quizzes are also used to assess learning.
    - Summative Assessment Method(s) and Description:
      * Summative assessment is conducted in CIS-278, Computer Information Systems Capstone, the Capstone course for our degrees. CIS-278 is a three-hour course which focuses on a systems development project that the students design and complete. These projects have come from both inside and outside the college. Examples of past projects have included web pages, grants development projects, inventory and budget projects, database creation, and business plans. The instructor acts as the development manager, and user interviews are part of the early structure of the project. Collaboration and team dynamics play an important role in the success of the projects. Another major part of CIS-278 is a career planning and placement component, including resume preparation, marketing, researching job opportunities, interviewing. Students complete course and peer evaluation forms which are used to review the degree curriculum and the students' perceptions of their abilities. This data is shared with CIS faculty.
      * CIS-278 has participated in a Sinclair Foundation supported Innovative Project with the General Education Committee to assess oral communication and thinking skills. Students were assessed by faculty and staff from various departments during the formal presentation of their projects. Students also provided written responses to questions about their general education experience at Sinclair.
  + **Results**
    - Students are completing all projects and demonstrate competence in computer skills. Feedback from CIS-278 indicates that students' technical skills are very good. Areas needing emphasis include oral and written communication, time management, teamwork, and critical thinking. Students say that CIS-278 is the best course they ever took because it is “real.”
    - Students provide feedback on the CIS curriculum as part of CIS-278. Their feedback indicates a need for development of oral and written communication, time management, teamwork, and critical thinking skills. They also say there needs to be more coursework on project planning and management.
    - In CIS-278, a survey is given to the project “user” to determine how well students perform and how well they are prepared. Technical skills are rated highly.
* **Analysis/Actions:**
  + Results from CIS-278 are used for curriculum changes. The proposed core curriculum for CIS includes a communication course. Oral and written communications, along with critical thinking are emphasized in all CIS courses. Information Systems Analysis (CIS-210) is required for all degree options along with a module in project management software and ethics. Advisory board members concur with these changes. The General Education oral and written communication checklists are used in the capstone course for assessment of the team project presentations. All CIS courses contribute significantly to the students' abilities to think logically within the computer information content areas. Ethics is an important part of CIS-278 and is also integrated throughout CIS-210.
* Expand the use of assessment data (direct and indirect) to inform decision making
  + The chart below was developed to collect and analyze direct measures of program outcomes for several of our CIS core courses. Direct, formal measures have not been collected, other than student success in these core courses. The department will expand the use of assessment data to influence our decision making and to document improvements particularly in the core courses.

**Computer Information Systems Program Outcomes, 2006-07**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Program Outcomes** | | **06-07** | **07-08** | **08-09** | **09-10** | **10-11** |
| **PO #1**  Use effective oral and written communication skills and teamwork skills in the delivery of customer service, project planning, and project completion in the information technology business environment. | **Direct measure data are *collected***  ***CIS-100 & CIS-278*** | **Direct measure data are *analyzed*** | **Document *improvements*** |  |  |
| **PO #2**  Apply effective and flexible critical thinking, general business, and problem solving skills to typical business or technical problems associated with area of concentration. |  | **Direct measure data are *collected***  ***CIS-100,***  ***CIS-111,***  ***CIS-210 &***  ***CIS-278*** | **Direct measure data are *analyzed*** | **Document *improvements*** |  |
| **PO #3**  Demonstrate ability to research, select, use, and troubleshoot hardware**, software,** and network components or connections appropriate to area of concentration. |  |  | **Direct measure data are *collected***  ***CIS-100,***  ***CIS-107,***  ***CIS-230 &***  ***CIS-278*** | **Direct measure data are *analyzed*** | **Document *improvements*** |
| **PO #4**  Apply programming, database, operating systems, and business application skills to solve and troubleshooting business and information technology problems related to area of concentration. |  |  |  | **Direct measure data are *collected***  ***CIS-100,***  ***CIS-111,***  ***CIS-265 &***  ***CIS-278*** | **Direct measure data are *analyzed*** |

* Set priorities for the department
  + Focus resources on enrollment opportunities
    - Revised the course planning guide to offer small enrollment classes sensibly.
    - Reduced the number of sections offered for courses that exhibit high cancellation rates.
    - Reduced the numbers of cancellations, but we continue to have cancellations higher than desired due to the declining enrollments.
    - Developed a Sinclair Community College CIS Network Engineer (NEEN) program television advertisement.
    - Marketed through IT Matters radio show.
    - Wrote an article published in ***Cincinnati Dayton High School Graduate***.
    - Developed radio advertisements that ran on IT Matters.
    - Many faculty and students have appeared as guests on IT Matters.
    - Set up booth at ITEC at Dayton Convention Center.
    - Ran newspaper advertisements.
    - Held two high school career awareness days annually.
    - Tech Prep liaison regularly makes presentations at area high schools.
    - Chair and faculty make many presentations at various high schools and community events.
  + Identify and abandon less productive courses, programs, and activities
    - The CIS curriculum is constantly revising its curriculum in order to keep current with industry needs and technology certifications.
    - Courses and programs which have been eliminated:
      * Low demand - CCNP (CIS-200 Fundamentals of Programming a Firewall and CIS-201 Wireless Network Administrator) Advanced Networking Engineer Short Term Certificate (ANE.STC).
      * Legacy systems or low demand - Microsoft Operating Systems (CIS-260 Microsoft Exchange Server, CIS-275 Designing Windows Active Directory and Network Infrastructure, CIS-277 Planning a Windows Network Infrastructure, CIS-257 Microsoft Internet Security & Acceleration (ISA) Server, CIS-259 Designing Security for Windows Networks, CIS-M72 Cyber Security: Tools, CIS-M73 Cyber Security: Information & Identity Security) and CIS-148 Advanced Visual Basic. Replaced these courses with more technical courses – CIS-164 Introduction to User Support and CIS-166 User Support Tools & Techniques.
    - In the process of transiting our curriculum to semesters, the CIS department eliminated the following Short Term Certificates:
      * Business Operations System Support II (BOSS2.STC).
      * Fast Track Programmer Analyst Enterprise Specialization (FTPA1.STC).
      * Fast Track Programmer Analyst Web Development Specialization (FTPA2.STC).
      * Help Desk Analyst (HD.STC).
      * Web Programming Certificate Visual Basic Track (WW1.STC).
      * Web Programming Certificate Java Track (WW2.STC).
  + Continue efforts to retain students
    - Completed Web Programming Certificate and the Fast Track Programmer Analyst Certificate for distance delivery using the new Distance Learning template.
      * All are ADA compliant.
    - We are working on creating competency learning objects available for distance and regular classroom delivery.
      * This is an ongoing effort that is part of our NSF grant project proposal.
      * It is a more complex task than we originally anticipated.

**Based on feedback from environmental scans, community needs assessment, advisory committees, accrediting agencies, Student Services, and other sources external to the department, how well is the department responding to:**

**The current needs of the community?**

* Department created and supports Students Correcting Open-door PC Emergencies (SCOPE) lab. This program provides computer support and repair for Sinclair students, faculty and staff. Practically helpful for students who have a problematic computer that they use for school work.
* Provided technical job training for displaced workers from 2009 to 2011. There was a surge in enrollment due to manufacturing closures.
* Department participates in service learning and serving nonprofit companies by supplying graduating CIS Capstone students to serve the community.
* Revising curriculum to reflect changes in Information Technology. User Support has been upgraded to include networking courses. Network Administration has been upgraded to include Windows 7 and Server 2008. A computer security track has been added to CIS programs.
* The College is concerned with offering the most relevant course content available at the lowest cost possible. Subsequently, the CIS Department has been active in changing course content to ensure both compatibility with current certification requirements and current trends in IT positions that require those certifications.
* Each concentration has a Business Advisory Committee that meets periodically to review curriculum and job opportunities. The department does respond to the needs of the community by periodically updating the content of their courses thereby enabling students to keep their skills current.
* Continue or increase the number of hands-on opportunities for students to work with the currently available vendor networking equipment. Over the years, CIS department supplied approximately 20 technicians to work for Sinclair ITS (per Adam Demeter).

**The emerging needs of the community?**

* Expose students to different vendor equipment. Allows students to work with a variety of vendor brands.
* Computer crimes are going unprosecuted due to a climate that reinforces the notion that police departments are ill-equipped to handle complex technological investigations. As a result the Cyber Investigation Technology track addresses this need with curriculum designed to educate students to be effective investigators. It is difficult to determine how well we are meeting the need given the track’s young age. We expect to award our first degree in 2012.
* Continue to monitor changes and updates in Sinclair’s goals and merge them with the emerging needs of the community.
* Provide Capstone projects for the Sinclair Bookstore. This helps the Sinclair Bookstore install and prep net-books and tablet PCs for student use. Also document instructions for Sinclair Bookstore personnel on how to prepare, scrub and re-image the net-books and tablet PCs for each quarter/semester.

**The current needs of the college?**

* Mobile and wireless technology added to curriculum.
* New Data Analytics Short Term Certificate (DA.STC).
* Increased the number of hands-on networking and user support labs.
* Increased alignment to A+ exams (including revision January 2011).
* Created a new User Support Technician Short Term Certificate (UST.STC) for the prison.
* Attended Dayton IT Pro Camp. Consisted of a variety of IT related lectures including the release of a new version of Hyper V (Microsoft’s business level virtual machine) to compete with VMWare. As a result, decided to add virtual machine material to the content of CIS-225. Also, will research Microsoft PowerShell for possible additions to CIS-264 content.
* Add the use of Packet Tracers to the Network Engineer curriculum.
* Added VMWare for virtual computing use by students.
* Increased the number of labs and updated them to reflect the needs of businesses.
* The Students Correcting Open-door PC Emergencies (SCOPE) program is funded by a grant, initiated by Barbara Tollinger, Chair of BIS. With support from Martha Taylor, former CIS Chair, this computer software and repair room was created by Anton Bruckner, and his Capstone students. Later the department hired Ken Hook, CIS Adjunct Faculty, to run and manage the SCOPE operation on a full-time schedule. Students who do the repair work, primarily come from the CIS User Support track. SCOPE has employed 66 CIS students since its inception. Another 44 students volunteered for SCOPE on weekends. This provides students with job experience for their resumes.
* User Support has been upgraded to include networking courses CIS-1510 (Windows Client Operating System), CIS-2711 (Windows 7 Enterprises Desktop Support) newly created course for semesters, and CIS-2640 (Network Security).
* Created a new User Support Technician Short Term Certificate (UST.STC) for the prison. Had to adapt our curriculum to a restrictive environment; no internet, no flash drives, no CDs. For research, the instructor brings in computer equipment adds newspaper and training videos for classroom use.

**Curriculum over the last five years and**

* In 2008 the Department moved to the new Cisco Exploration curriculum.
* In 2011 the Department added the CCNA Security curriculum.

**What are the department’s/program’s goals and rationale for expanding and improving student learning, including:**

**Courses?**

* In light of designation as a Center of Academic Excellence in Information Assurance 2-Year Education, explore, research and prioritize courses on Cyber Security and Information Assurance (CSIS).
* In view of increasing demand for “Big Data” skill sets among practitioners, explore, research and prioritize courses on Data Analysis and Analytics (DAA).
* Considering the continued demand for Game Development skills, explore, research and prioritize courses on Games, Graphics and Visualization (GGV).
* Noting growth in “baby-boom generation” demand for healthcare, explore, research and prioritize courses on Health Care Information Technology (HCIT) – in conjunction with Allied Health Department.
* In light of the high and increasing demand for Mobile Device Software and Web Developers, explore, research and prioritize courses on Mobile Computing Devices (MCD).
* Considering the increased need for Cyber Security, explore, research and prioritize the inclusion in Software and Web Development courses of Writing Secure Software Development Applications and Writing Secure Web Development Applications.
* Given the increased emphasis both internationally and at Sinclair Community College on the “Cloud,” explore, research and prioritize the inclusion in courses of Virtualization, and especially VMWare and Microsoft Hyper-V.
* Considering the increasingly competitive nature of the network hardware and software marketplace, explore, research and prioritize Network Engineering courses on Enterasys and Juniper Equipment.
* In view of the increased automation of system administration tasks and duties, explore, research and prioritize course material on Microsoft Windows PowerShell Task Automation Framework.

**Programs?**

* **New certificate programs?**
  + In light of designation as a Center of Academic Excellence in Information Assurance 2-Year Education, explore, research and prioritize Cyber Security and Information Assurance (CSIS) Certificate.
  + Noting growth in “baby-boom generation” demand for healthcare, explore, research and prioritize Health Care Information Technology (HCIT) Certificate.
  + In light of the high and increasing demand for Mobile Device Software and Web Developers, explore, research and prioritize Mobile Computing Device (MCD) Certificate.
* **New degree programs?**
  + Associate of Technical Studies (ATS) Degrees.
    - In light of designation as a Center of Academic Excellence in Information Assurance 2-Year Education, explore, research and prioritize Cyber Security and Information Assurance (CSIS) ATS Degree.
    - In view of increasing demand for “Big Data” skill sets among practitioners, explore, research and prioritize Data Analysis and Analytics (DAA) ATS Degree.
    - Noting growth in “baby-boom generation” demand for healthcare, explore, research and prioritize Health Care Information Technology (HCIT) ATS Degree – in conjunction with Allied Health.
    - In light of the high and increasing demand for Mobile Device Software and Web Developers, explore, research and prioritize Mobile Computing Device (MCD) ATS Degree.
  + Associate of Applied Science (AAS) Degrees.
    - In light of designation as a Center of Academic Excellence in Information Assurance 2-Year Education, explore, research and prioritize Cyber Security and Information Assurance (CSIA) AAS Degree.
    - In view of increasing demand for “Big Data” skill sets among practitioners, explore, research and prioritize Data Analysis and Analytics (DAA) AAS Degree.
    - Noting growth in “baby-boom generation” demand for healthcare, explore, research and prioritize Health Care Information Technology (HCIT) AAS Degree – in conjunction with Allied Health.
    - In light of the high and increasing demand for Mobile Device Software and Web Developers, explore, research and prioritize Mobile Computing Device (MCD) AAS Degree.

**Delivery formats?**

* On-line, Hybrid, and Face-to-Face Delivery Formats in all CIS courses (where possible and effective).
* Use a team-oriented, project-based and cognitive apprenticeship[[8]](#footnote-8)-based approach in all CIS courses (where possible and effective).

**Locations?**

* Courseview Campus Center.
* All satellite locations.[[9]](#footnote-9)
* High Schools.[[10]](#footnote-10)
* Wright-Patterson Air Force Base Center.
* Miami Valley Career Technology Center.
* Miami Valley Research Park.
* Kettering-Dwight L. Barnes Community and Continuing Education Center.

**What are the department’s goals and rationale for:**

**Reallocating resources?**

* Curriculum was extensively reviewed for the semester conversion process.
  + Courses were combined and/or eliminated as appropriate.
* Possibly look at using Net Labs as a cost effective way of working with equipment from multiple sites to a central site.
* In order to serve the most students as efficiently as possible, courses must be offered to satisfy the requirements of the Ohio Board of Regents (OBOR), degrees, certificates, higher education and the IT industry.
  + Based on these requirements, courses are developed and offered.
* If a track is deemed no longer relevant, a reassessment is initiated and courses either updated or deactivated.
* At this point in time we are not so much thinking of re-allocating resources as we are thinking of expanding them. That is to say, we are looking at an overall growth in enrollment, not an overall shift or decline in enrollment.

**Discontinuing courses?**

* None at this time.

**What resources and other assistance are needed to accomplish the department’s/program’s goals?**

* Fill existing open tenure-track faculty positions with more experienced, credentialed and qualified full-time faculty.
* Working with Human Resources, recruit more experienced, credentialed and qualified part-time faculty (especially at the learning centers and Courseview).
* More labs (especially at the learning centers and Courseview).
* Working closely with Center for Teaching and Learning, Business Advisory Committees, IT employers, and professional associations and organizations, carefully target professional development opportunities to maintain currency in IT field.
* We would like to explore, research and prioritize for consideration a program in which current faculty is granted release time to work in local industry, or in which local industry works on-site at Sinclair Community College with CIS faculty participation.
* We want to work closely with the Business and Public Services Entrepreneurship Degree and Certificate Program Faculty to encourage our students and graduates to become entrepreneurs.
* Regularly updated classroom content in sync with industry, science, technology, and professional association standards.

**Section V Appendix: Supporting Documentation**

1. **Mission of the department and its programs**

*The purposes of the CIS Department and its Programs are:*

To educate, instruct and train students in the art, science and technology of (1) working with – investigating, securing, engineering, managing, administering, developing, supporting, maintaining, and networking – computer information systems and (2) supporting human and institutional users of computer information systems.

* In order for them to complete CIS degrees and certificates;
* In order to prepare them to take and pass CIS certification exams;
* In order for them to upgrade or acquire both general and specific Computer Information Systems (CIS) skills;
* In order for them to transfer to higher educational institutions primarily to complete Bachelor’s, but also to complete Master’s and Doctoral degrees;
* In order to develop competent and talented CIS technicians and professionals for actual and potential area employers;
* In order to provide opportunities for growth to students;
* In order to prepare students for the demands of the CIS and IT industries;
* In order to provide access to current CIS technologies; and
* In order to provide students with opportunities and guidance in pursuing lifelong learning.

*Among the publics served by the CIS Program are: students, higher educational institutions, employers, the community, disciplines and professions.*

*The student public includes:*

* Tech Prep students enrolled in high schools and taking courses using Sinclair Community College CIS curricula;
* Post-Secondary Educational Opportunity (PSEO) students concurrently enrolled in high school and Sinclair Community College CIS courses;
* Students who have completed and graduated from high school and now are continuing their educations in a CIS degree or certificate program;
* Transfer students who have completed some college courses elsewhere and now are in pursuit of a CIS degree or certificate;
* Transfer students who have completed an Associate’s or Bachelor’s degree or a certificate at some college elsewhere and now are in pursuit of a CIS degree or certificate at Sinclair;
* Non-transfer adult students now starting and continuing their educations in pursuit of a CIS degree or certificate;
* Adult students returning to Sinclair Community College after some interruption of their earlier studies now in pursuit of a CIS degree or certificate;
* Adult students such as displaced workers who have enrolled in CIS courses at Sinclair Community College and are hoping to start new CIS careers;
* Students hoping to transfer to four-year higher educational institutions to continue their studies in pursuit of a Bachelor’s degree;
* Students hoping to become employed by CIS employers upon graduation with a CIS degree or certificate solely for purposes of employment or also for purposes of working their way through a Bachelor’s degree program;
* Personal interest students completing pre-requisites for starting graduate programs in CIS, Information Systems (IS), Management Information Systems (MIS), Computer Science (CS), Computer Engineering (CE) or Information Technology (IT) for Master’s or Doctoral Degrees;
* Students such as retirees taking courses in CIS simply out of personal interest, curiosity, or for their own edification.

*The higher educational institution public includes:*

* Higher educational institutions offering Bachelor’s degree programs with which Sinclair Community College currently has Articulation Agreements;
* Higher educational institutions offering Bachelor’s degree programs with which Sinclair Community College currently does not have Articulation Agreements;
* Higher educational institutions offering Master’s or Doctoral degree programs.

*The employer public includes:*

* CIS and IT employers such as:
  + CIS and IT for-profit companies and non-profit companies;
  + CIS and IT governmental and non-governmental organizations;
  + For-profit or non-profit companies that are not themselves CIS or IT companies but use CIS and IT in-house;
  + Governmental or non-governmental organizations that are not themselves CIS or IT organizations but use CIS and IT in-house.
* IT trade associations such as Technology First.

*The community public includes the community:*

* Montgomery County residents investing in education by supporting tax levies specific to Sinclair Community College
* State and Federal taxpayers supporting Sinclair Community College;
* Ohio Department of Job and Family Services.

*The last public includes the CIS disciplines and professions:*

* Computer Information Systems (CIS);
* Information Systems (IS);
* Management Information Systems (MIS);
* Computer Science (CS);
* Computer Engineering (CE);
* Information Technology (IT);
* Related professional organizations and associations such as the Association for Computing Machinery (ACM) and the Institute of Electrical and Electronics Engineers Computer Society (IEEE-CS).

1. **Analysis of environmental factors – Internal Analysis**

**Key Internal Stakeholders**

* + Students, Alumni, Other Departments that use CIS courses in their degree and certificate programs, Tech Prep Consortium, Quickstart Office and other pre-college programs, Information Technology Services (ITS), Distance Learning, Degree and Certificate Program, Business Advisory Committees, Full-time Faculty (Tenured, Tenure-track, Annually Contracted), Part-time Faculty (Adjuncts).

**How CIS knows it is meeting the needs of Key Internal Stakeholders**

* Surveys, Formal Meetings, Participation in State-wide events, Alumni data, Course evaluations, Success and retention data, Research and Analytics Reporting Data Set, Success of “We Are IT” Girls in IT Conference.

**Challenges or Support Concerns**

* Need to improve cooperation between CIS faculty and ITS staff to help students be more successful;
* Need to improve efforts to recruit non-traditional CIS students, especially women and ethnic minorities;
* Lack of more well-equipped labs;
* Providing both widely used and cutting-edge information technology computer hardware and software to students;
* Considering the needs of students who wish to further their educations through transfer programs to four year colleges and universities;
* Difficulty of faculty keeping up with such dynamic and rapidly changing fields as CIS and IT;
* Need for additional professional development beyond what Sinclair Community College typically offers, especially in view of wide variety of different CIS fields and specializations;
* Keeping the curriculum current and comprehensive to fully prepare graduates for careers in areas of concentration
* Continuously improving faculty teaching and student learning through faculty professional development;
* Providing faculty with funds to stay abreast of the latest information technology software and hardware;
* Hiring of qualified Adjunct Faculty;
* Evaluating current staffing levels for the Department’s existing and future needs; and
* Adapting standard and virtualized operating and networking system environments in classrooms to meet the demands of today’s marketplace.

**Who Feeds Program**

* Students as described in the first public served by CIS above.

**Outside Courses and Departments Relied on for Educating Students in CIS**

* Business Information Systems (BIS): BIS-104 Introduction to PC Usage, BIS-M45 Microsoft Excel, and BIS-M46 Advanced Expert/Excel (for Data Analytics Short Term Certificate [DA.STC]); BIS-105 Computer Concepts (for all CIS students); BIS-160 Introduction to Word, PowerPoint and Excel (for User Support Technician Short Term Certificate [UST.STC]);
* Mathematics (MAT): MAT-101 Elementary Algebra or placing into a higher level MAT course on the placement test (for all CIS students); MAT-116 College Algebra or MAT-121 Mathematics for Business Analysis, and MAT-122 Statistics I and MAT-220 Statistics II (for Data Analytics Short Term Certificate [DA.STC])
* Developmental (DEV): DEV-085 A Review of Basic Arithmetic Skills (for User Support Technician Short Term Certificate [UST.STC]);
* Other: Students must be inmates at the Dayton Correctional Institution (for User Support Technician Short Term Certificate [UST.STC]); and
* The Semester conversion will remove BIS-105 Computer Concepts as a requirement and add BIS-1120 Computer Concepts and Applications.

**Existing Unexplored Opportunities to Help Internal Stakeholders**

* Bioinformatics, Health Database Administration, Health Informatics, Data Analysis & Analytics, Business Intelligence, Data Mining, Wireless Networking, Mobile Devices, Mobile Applications Development, Writing Secure Applications, Courses and Curricula, Degree Programs, Certificate Programs, More Articulation Agreements, Better Marketing to Students and Employers, Strengthen Tech Prep Transition to Sinclair Community College, Better Adjunct Faculty Mentoring, Better Business Advisory Committee Usage, “One Stop” Portal for Information on CIS for Students and Employers, Student Clubs (BPA and Cyber Competitions).

**Data Currently Being Used to Inform Decision Making**

* Research, Analytics and Reporting (RAR) data, although it needs to be summarized, easily interpretable, and easily obtainable.

**Where Data is Weakest**

* Lack of data on why students drop out of classes;
* Lack of data on students who take our courses solely out of “personal interest”; and
* Lack of data on transfer students.

**Actions that could be taken as a result of collecting Data**

* Decisions could and should be “data-driven” or at least well informed (although past performance is no guarantee of future success); and
* Retention strategies could be put into place – need to know root causes students dropping out or discontinuing education.

**Analysis of environmental factors – External Analysis**

**Key External Stakeholders**

* Employers (human resource demand for Cisco Network Engineers has stayed constant), Capstone Customers and Clients, Internship Sites, Technology First, Ohio State Department of Education, Ohio Board of Regents.

**How CIS knows it is meeting the needs of Key External Stakeholders**

* Scholarship recipients, Participation in State-wide events, Formal feedback from employers, Formal feedback from Capstone customers and clients, Formal feedback from Internship sites.

**Department chairpersons and faculty members have an opportunity to revise and refine the analysis as part of the self-study process.**

* Number of students entering internships has increased; and
* Cisco web site has included more resources for students to pursue education and jobs.

**Listing of CIS Degree Programs**

* Cyber Investigation Technology (CYIT.AAS)
* Microsoft Security Specialist (MSSC.AAS)
* Network Engineer (NEEN.AAS)
* Network Manager (NEMA.AAS)
* Software Development (SODE.AAS)
* User Support (USSU.AAS)
* Web Development (WEDE.AAS)

**Listing of CIS Certificate Program**

* Cyber Investigation Certificate (CYSEC.CRT)

**Listing of CIS Short-Term Certificate Programs**

* Advanced Networking Engineer (ANE.STC)
* Business Operations Systems Support (BOSS) I (BOSS.STC)
* Business Operations Systems Support (BOSS) II (BOSS2.STC)
* Data Analytics (DA.STC)
* Fast Track Programmer Analyst Enterprise Specialization (FTPA1.STC)
* Fast Track Programmer Analyst Web Development Specialization (FTPA2.STC)
* Geospatial Technology Programming Specialist (GST.STC)
* Help Desk Analyst (HD.STC)
* Information Systems Security (ISSC.STC)
* Linux Security and Network Essentials (LSNE.STC)
* Network Engineering Associate (NEA.STC)
* Security for the Networking Professional (SNP.STC)
* User Support Technician (UST.STC)
* Web Programming Certificate Java Track (WW2.STC)
* Web Programming Certificate Visual Basic Track (WW1.STC)

**Statement of program learning outcomes and linkage to courses**

**Include the program outcomes for each program in Section**

*General CIS Program Outcomes*

* Apply effective and flexible critical thinking, general business, and problem solving skills to typical business or technical problems associated with area of concentration.
* Apply programming, database, operating systems, and business application skills to troubleshoot and solve business and IT problems related to area of concentration.
* Use effective oral and written communication and teamwork skills in the delivery of customer service, project planning, and project completion in the IT business environment.
* Demonstrate ability to research, select, use and troubleshoot hardware and network components or connections appropriate to area of concentration.

*Specific CIS Associate of Applied Science Degree Program Outcomes*

* Cyber Investigation Technology (CYIT.AAS)
  + Demonstrate the process to find and recover data artifacts present, deleted, or hidden to preserve the verifiable integrity of digital evidence.
  + Demonstrate creative and critical thinking skills in the analysis of digital crimes/cyber security issues, and problems by applying acceptable problem solving strategies, research, analysis, synthesis, evaluation, assessment, adaption and application of computer forensic techniques.
  + Diversify the manner of evidence collection consistent with standard criminal justice “chain of evidence” procedures to maximize prosecutorial effectiveness while minimizing legal defense challenges and legal liabilities.
  + Develop programs, databases and business techniques to identify and/or resolve cyber-crimes, including the development of plans for incident analysis and avoidance.
  + Display professional oral and written communication skills and collaborate with a team to deliver and implement a project plan in the business and criminal justice environment in addressing cyber security/issues problems.
  + Diagnose and prescribe solutions to hardware, networks, and operating systems problems.
* Microsoft Security Specialist (MSSC.AAS)
  + General Program Outcomes applied to area.
* Network Engineer (NEEN.AAS)
  + General Program Outcomes applied to area.
* Network Manager (NEMA.AAS)
  + General Program Outcomes applied to area.
* Software Development (SODE.AAS)
  + General Program Outcomes applied to area.
* User Support (USSU.AAS)
  + General Program Outcomes applied to area.
* Web Development (WEDE.AAS)
  + General Program Outcomes applied to area.

*Specific CIS One-Year Technical Certificate Program Outcomes*

* Cyber Investigation Certificate (CYSEC.CRT)
  + Demonstrate creative and critical thinking skills in the analysis of digital crimes and cyber security issues, problem solving strategies, research, analysis, synthesis, evaluation, assessment, adaption and application of computer forensic techniques.
  + Develop programs, databases and business techniques to identify and or resolve cyber- crimes, including the development of plans for incident analysis and avoidance.
  + Find and recover data artifacts present, deleted, or hidden to preserve the verifiable integrity of digital evidence.
  + Describe collection of evidence consistent with standard criminal justice “chain of evidence” procedures to maximize prosecutorial effectiveness while minimizing legal defense challenges and legal liabilities.
  + Diagnose and prescribe solutions to hardware, networks, and operating systems problems.

*Specific CIS Short-Term Technical Certificate Program Outcomes*

* Advanced Networking Engineer (ANE.STC)
  + Demonstrate the ability to use an operating system and software packages on a personal computer to prepare and manipulate word processing documents, design and use spreadsheets, create graphs, use databases and communicate with other PCs using telecommunication facilities available.
  + Exhibit professional/occupational behavior and work habits.
  + Identify, analyze, and document program/system specifications and information requirements for a typical business problem.
  + Apply program development techniques that demonstrate a formal process for decision making and problem solving.
  + Identify and apply the principles of financial accounting.
  + Correctly design and program a computer solution using procedural and nonprocedural methods, given detailed specifications of a problem.
  + Apply mathematical skills to formulate and solve problems manually (later to be solved by programming a computer).
  + Identify the basic, underlying procedures and relationships which are the components of a business computer system, including hardware, software, data, and people.
  + Work as part of a team to complete a system development project assignment.
  + Demonstrate the ability to design and implement personal and corporate databases using a commercial database package.
  + Describe/apply general business knowledge and skills.
* Business Operations Systems Support (BOSS) I (BOSS.STC)
  + Demonstrate the ability to design and implement personal and corporate databases using a commercial database package.
  + Exhibit professional/occupational behavior and work habits.
  + Correctly design and program a computer solution using procedural and nonprocedural methods, given detailed specifications of a problem.
  + Describe/apply general business knowledge and skills.
  + Use effective oral and written communication skills and teamwork skills in the delivery of customer service, project planning and project completion in the IT business environment.
  + Demonstrate the ability to use an operating system and software packages on a personal computer to prepare and manipulate word processing documents, design and use spreadsheets, create graphs, use databases and communicate with other PCs using telecommunication facilities available.
  + Identify, analyze, and document program/system specifications and information requirements for a typical business problem.
  + Demonstrate the ability to research, select, use and troubleshoot hardware and network components or connections appropriate to an area of concentration.
  + Identify and apply the principles of financial accounting.
  + Apply effective and flexible critical thinking, general business skills and problem solving skills to typical business or technical problems associated with business operations systems support.
  + Work as part of a team to complete a system development project assignment.
  + Apply program development techniques that demonstrate a formal process for decision making and problem solving.
  + Apply mathematical skills to formulate and solve problems manually (later to be solved by programming a computer).
  + Identify the basic, underlying procedures and relationships which are the components of a business computer system, including hardware, software, data, and people.
* Business Operations Systems Support (BOSS) II (BOSS2.STC)
  + General Program Outcomes applied to area.
* Data Analytics (DA.STC)
  + Apply programming, database, and business application skills to solve and troubleshoot business and IT problems
  + Use effective oral and written communication skills and teamwork skills in the delivery of project planning and project completion in the IT business environment.
  + Design, develop and implement data analytic solutions
* Fast Track Programmer Analyst Enterprise Specialization (FTPA1.STC)
  + Apply program development techniques that demonstrate a formal process for problem solving.
  + Analyze, design, and code a solution for a business problem.
  + Create programming solutions that use appropriate object-oriented concepts.
* Fast Track Programmer Analyst Web Development Specialization (FTPA2.STC)
  + Apply program development techniques that demonstrate a formal process for problem solving.
  + Analyze, design and code a solution for a business problem.
  + Create programming solutions that use appropriate object oriented concepts.
* Geospatial Technology Programming Specialist (GST.STC)
  + Develop critical thinking and problem solving skills.
  + Demonstrate novice level skill in using GIS software and concepts.
  + Develop programming skills to effectively understand and apply programming knowledge to GIS concepts and solutions.
* Help Desk Analyst (HD.STC)
  + Employ exemplary customer service, communication, and assistance skills.
  + Apply sound hardware and software troubleshooting skills to solve technical problems.
  + Exhibit professional/occupational behavior and work habits.
* Information Systems Security (ISSC.STC)
  + General Program Outcomes applied to area of concentration.
* Linux Security and Network Essentials (LSNE.STC)
  + Configure and test user level and Linux network security.
  + Install, manage, and troubleshoot Linux operating systems and Linux network security.
  + Use appropriate tools to analyze Linux networks.
* Network Engineering Associate (NEA.STC)
  + Apply mathematical skills to formulate and solve problems manually (later to be solved by programming a computer).
  + Identify and apply the principles of financial accounting.
  + Describe/apply general business knowledge and skills.
  + Exhibit professional/occupational behavior and work habits.
  + Correctly design and program a computer solution using procedural and nonprocedural methods, given detailed specifications of a problem.
  + Apply program development techniques that demonstrate a formal process for decision making and problem solving.
  + Identify, analyze, and document program/system specifications and information requirements for a typical business problem.
  + Demonstrate the ability to use an operating system and software packages on a personal computer to prepare and manipulate word processing documents, design and use spreadsheets, create graphs, use databases and communicate with other PCs using telecommunication facilities available.
  + Identify the basic, underlying procedures and relationships which are the components of a business computer system, including hardware, software, data, and people.
  + Work as part of a team to complete a system development project assignment.
  + Demonstrate the ability to design and implement personal and corporate databases using a commercial database package.
* Security for the Networking Professional (SNP.STC)
  + Apply mathematical skills to formulate and solve problems manually (later to be solved by programming a computer).
  + Identify and apply the principles of financial accounting.
  + Describe/apply general business knowledge and skills.
  + Exhibit professional/occupational behavior and work habits.
  + Correctly design and program a computer solution using procedural and nonprocedural methods, given detailed specifications of a problem.
  + Apply program development techniques that demonstrate a formal process for decision making and problem solving.
  + Identify, analyze, and document program/system specifications and information requirements for a typical business problem.
  + Demonstrate the ability to use an operating system and software packages on a personal computer to prepare and manipulate word processing documents, design and use spreadsheets, create graphs, use databases and communicate with other PCs using telecommunication facilities available.
  + Demonstrate the ability to design and implement personal and corporate databases using a commercial database package.
  + Identify the basic, underlying procedures and relationships which are the components of a business computer system, including hardware, software, data, and people.
  + Work as part of a team to complete a system development project assignment.
* User Support Technician (UST.STC)
  + Assemble necessary components and install them in a desktop computer system. Bring the system into full operation.
  + Identify and resolve issues with software and hardware installation and configuration.
  + Exhibit professional and occupation behavior and work habits.
  + Employ exemplary customer service, communication and assistance skills.
* Web Programming Certificate Java Track (WW2.STC)
  + Apply mathematical skills to formulate and solve problems manually (later to be solved by programming a computer).
  + Correctly design and program a computer solution using procedural and nonprocedural methods, given detailed specifications of a problem.
  + Apply program development techniques that demonstrate a formal process for decision making and problem solving.
  + Identify, analyze, and document program/system specifications and information requirements for a typical business problem.
  + Demonstrate the ability to design and implement personal and corporate databases using a commercial database package.
  + Work as part of a team to complete a system development project assignment.
* Web Programming Certificate Visual Basic Track (WW1.STC)
  + Apply mathematical skills to formulate and solve problems manually (later to be solved by programming a computer).
  + Apply program development techniques that demonstrate a formal process for decision making and problem solving.
  + Identify, analyze, and document program/system specifications and information requirements for a typical business problem.
  + Demonstrate the ability to design and implement personal and corporate databases using a commercial database package.
  + Identify the basic, underlying procedures and relationships which are the components of a business computer system, including hardware, software, data, and people.
  + Work as part of a team to complete a system development project assignment.

**Admission requirements**

**List any admission requirements specific to the department/program(s).**

* There is open access of students to CIS Department degree programs, certificate programs, and courses.
* Pre-requisites are built into the programs and courses with basic College expectations for placement. For example,
  + All CIS students are required to have completed successfully or have equivalent knowledge of BIS-105 Computer Concepts; and
  + All CIS students are required to have completed successfully MAT-101 Elementary Algebra or to have placed into a higher level Math course on the placement test;
  + Data Analytics Short Term Certificate (DA.STC) requires: BIS-104 Introduction to PC Usage, MAT-116 College Algebra or MAT-121 Mathematics for Business Analysis;
  + User Support Technician Short Term Certificate (UST.STC) requires: BIS-105 Computer Concepts, BIS-160 Introduction to Word, PowerPoint and Excel, DEV-085 A Review of Basic Arithmetic Skills, Other – Students must be inmates at the Dayton Correctional Institution;
  + Network Engineering Associate of Applied Science (NEEN.AAS) Degree requires: CIS-107 Introduction to Operating Systems; and
  + Cyber Investigation Technologies Associate of Applied Science (CYIT.AAS) and Cyber Investigation Certificate (CYSEC.CRT) requires: Department Approval, Background Check.
* **CIS-111 Introduction to Problem Solving & Computer Programming Course Objectives**
  + Develop and apply problem solving skills.
    - Identify key components of a problem to be addressed in solving the problem.
    - Explain and apply the steps of the programming process.
    - Demonstrate knowledge of technical documentation associated with software development including: data definition; output design; and expected results.
  + Develop algorithms that analyze and solve programming logic problems.
    - Demonstrate how to read and understand a program specification.
    - Describe why and how data are organized.
    - Demonstrate knowledge of basic software design including: input and output; data types; constants; variables; expressions.
  + Understand the constructs of a computer program including:
    - Sequence structure;
    - Selection; and
    - Iteration (loops).
  + Successfully use design tools to specify the solution and debug introductory level programs.
* **CIS-111 Learning Objectives**
  + Chapter 1 An Overview of Computers and Programming
    - Describe the data processing cycle of input, processing, output and storage.
    - Explain the difference between syntax errors and logical errors.
    - Identify and appropriately use the basic flowcharting symbols for input, processing, and output.
    - Identify and appropriately use pseudo-code key words and indentation formats for input, processing, output and decisions.
    - Define / declare a variable.
    - Use a sentinel or dummy value.
    - Explain the difference between string and numeric variables.
  + Chapter 2 Working with Data, Creating Modules, and Designing High-Quality Programs
    - Describe the advantages of modularization.
    - Understand how a module can call another module.
    - Describe the mainline logic of a complete program.
    - Describe end-of-program functions.
  + Chapter 3 Understanding Structure
    - Explain the difference between structured and unstructured logic.
    - Describe the three basic structures of sequence, selection and repetition.
    - Use the three basic structures to draw flowcharts and to write pseudo-code.
    - Understand the priming read in a structured data processing loop.
  + Chapter 4 Making Decisions
    - Describe the six logical comparison relational operators.
    - Know how to evaluate expressions involving numeric data.
    - Understand AND and OR logic and how to use it in program design.
    - Write AND and OR decisions that demonstrate program efficiency.
    - Combine decisions in an AND or OR situation.
    - Use selections with data in ranges and avoid common errors.
    - Understand Precedence when combining AND and OR Logical Operators.
  + Chapter 5 Looping
    - Describe the advantages of looping within the context of program efficiency.
    - Use a While loop with a loop control variable.
    - Use a counter to control looping.
    - Know how to use a For loop, or a Do Until loop.
    - Understand Nested loops.
    - Know how to Accumulate totals and implement Counting in programs.
  + Design of Event-driven Programs with Graphical User Interfaces (GUIs)
    - Apply the program development process: design, code, test and debug.
    - Understand the principles of good GUI design.
    - Describe and understand the steps involved in developing an event-driven application.
    - Plan the logic for an event-driven program.
    - Create a storyboard.
    - Define objects in an object dictionary.
    - Create a modular logic program problem solution in pseudo-code.
  + VB Fundamentals of Programming in Visual Basic (VB 6)
    - Successfully create VB objects (label, text box, command button, picture box).
    - Describe the process of creating a VB event (a click event).
    - Understand arithmetic operations and use VB arithmetic operators.
    - Use built-in functions to carry out commonly used operations
    - Understand and use dim to declare variables.
    - Understand and use fundamental VB data types: string, integer, single, double.
    - Successfully use the VB programming environment to create, execute, and test a VB program
  + VB Decisions
    - Understand and know how to use the various relational and logical operators used in implementing decisions in VB.
    - Know the order of precedence used by the computer for simplifying complex expressions involving arithmetic, relational and/or logical operators.
    - Describe the various types of decisions that can be made in a computer program, including the If-Then, If-Then-Else, If-Then-ElseIf, nested Ifs and the Case decision structures.
  + VB Debugging Tools and Simple Debugging
    - Know how to use the Immediate Window, the Watch Window and the Locals Window to debug.
    - Know how to step through a VB program and set breakpoints.
  + Programming Fundamentals with Scribbler Robots
    - Know how to create a simple sequence of commands for Scribbler, download it, test it and make necessary corrections.
    - Know how to implement a Loop structure for Scribbler to follow.
    - Know how to create and execute a module (sub-routine) in Scribbler code.
    - Know how to make Scribbler draw geometric shapes such as square or rectangle.
* **CIS-111 Related CIS Associate Degree Program Outcomes**
  + Develop and apply problem solving skills.
  + Design, document and implement computer program solutions given specifications of a problem.
  + Work as part of a team to design and /or implement computer system components.
  + Exhibit professional/occupational behavior and work habits.
* **CIS-111 Associated General Education Outcomes:**
  + Critical thinking/Problem solving: develop and apply problem solving skills.
  + Critical thinking/Problem solving: apply the program design process.
  + Critical thinking/Problem solving: apply the program development process.

**CIS-111 Introduction to Problem Solving & Computer Programming Sample Assignment**

**Pseudo-code** is a methodology used to show the logic plan for a program. While flowcharting is a visual representation of program design logic, pseudo-code is a linear, written representation of it. It can be helpful to start with a flowchart first, then move on to developing a logic plan in pseudo-code. Pseudo-code is closer to the format in which program code is written. Careful use of key words and indentation make the logic easier to understand. Care in writing the pseudo-code also makes it simpler to debug the logic.

Note: The following examples of pseudo-code are slightly different than the way they are presented in the Ferrell textbook. Either method will be accepted for homework requirements.

Pseudo-code examples for the **Sequence Structure**:

Begin

Input Hours

Input Rate

PayAmount = Hours \* Rate

Print “Pay amount due is “, PayAmount

End

Commas are used to separate **text** from **variables** in print statements. However, the actual symbol used will depend on the programming language

Begin

Input Item1

Input Item2

Input Item3

SubTotal = Item1 + Item2 + Item 3

SalesTax = SubTotal \* 0.06

Total = SubTotal + SalesTax

Print “Your purchase total is “ , Total

End

**CIS-111 Introduction to Problem Solving & Computer Programming Sample Assignment (continued)**

Pseudo-code examples for the **Selection Structure**:

Begin

Input First

Note the use of **indentation** to show actions taken within a structure. The first indented line is action taken when the IF condition evaluates to TRUE

Each IF statement must have an **End IF** to match it. When there are 2 possibilities, an Else statement must also be present.

Pseudo-code should represent a smooth flow from one **structure** to another within the logic

Input Second

If First = Second

Print “The values are equal”

Else

Print “The values are not equal”

End If

End

Begin

Input Hours

Input Rate

If Hours < 40

PayAmount = Hours \* Rate

Else

PayAmount = 40 \* Rate + (Hours – 40) \* Rate \* 1.5

End If

Print “Pay amount due is “, PayAmount

End

Begin

Input First

Dashed lines added to this example to show how pseudo-code lines up within structure, and indents where a selection is made

Input Second

If First = Second

Print “The values are equal”

Else

If First < Second

Print First, “is less than “, Second

Else

Print First, “is greater than “, Second

End If

End If

End

**CIS-111 Introduction to Problem Solving & Computer Programming Sample Assignment (continued)**

Pseudo-code examples for the **Iteration Structure (looping)**:

***For Loop with number of iterations pre-determined by a loop variable***

Begin

For Count = 1 to 5

Print “Count is “, Count

End For

Print “Loop finished”

End

***While Loop that loops while condition is true (Pre-test)***

Begin

Print “Are you happy? (1=yes, 2=no)”

Input Answer

While Answer < 1 OR Answer > 2

Print “Please try again … Are you happy? (1 = yes, 2 = no)”

Input Answer

End While

If Answer = 1

Print “Glad to hear it”

Else

Print “I’m sorry to hear that”

End If

End

***Do Loop that performs 1 set of instructions before testing condition (Post-test)***

Begin

SubTotal = 0

Input ItemPrice

Do

SubTotal = SubTotal + ItemPrice

Input ItemPrice

Loop Until ItemPrice <> -1

Total = SubTotal \* 1.06

Print “Your total is “, Total

End

**General Education Outcomes**

**Capstone Writing Assignment**

**Capstone Students**: Complete a reflective paper that looks back at your learning experiences at Sinclair holistically. Specifically, related to your major, please address the following areas:

1. During your learning experiences at Sinclair, in what ways have you recognized diversity of personal values (both ethnic and cultural)?
2. During your learning experiences at Sinclair, in what ways have you taken responsibility for consequences?
3. During your learning experiences at Sinclair, in what ways have you demonstrated respect for diverse cultures?
4. During your learning experiences at Sinclair, in what ways have you displayed respect for the rights of others?
5. During your learning experiences at Sinclair, in what ways have you demonstrated understanding of local and global citizenship?
6. As you consider your career field, in what ways will you display behavior consistent with the ethical standards within your discipline? ( *Note:* You may wish to look at the ***IEEE Code of Ethics*** for more information on ethical standards within the discipline. <http://www.ieee.org/portal/pages/iportals/aboutus/ethics/code.html> )
7. As you consider your career field, in what ways will you display respect for the rights of others?
8. As you consider your career field, in what ways will you demonstrate honesty?

In your paper, consider where, in your learning process, you acquired those outcomes. For each of the eight items above, a minimum of a fully developed paragraph (100-200 words) is expected. The paper will be evaluated using the following rubric:

**RUBRIC**

Written Communication

Values, Citizenship, and Community

Problem Solving and Critical Thinking

Rate the student for each outcome as Excellent (4), Competent (3), Needs Work (2), or Unacceptable (1). You may circle the number or write a checkmark through the rated box for each outcome.

Excellent Competent Needs Work Unacceptable

TASK DESCRIPTION: Capstone (or graduating) student is to submit a reflective paper, relating Gen Ed outcomes acquisition of Values, Citizenship, and Community, (while a student at Sinclair).

Course: Student

Name:

OUTCOMES COMMENTS (should be specific and instructive, to aid the student’s learning and movement to the excellent level)

Written Communication

Applies the stages of the writing process (prewriting, drafting, revision, and editing)

4 3 2 1 Develops original and thought provoking topics and controlling ideas

4 3 2 1 Generates and selects sufficient relevant and logical evidence

4 3 2 1 Arranges ideas appropriately

4 3 2 1 Displays correctness in sentence structure, paragraphing, word choices, spelling, and grammar

Reads and responds critically

4 3 2 1 Identifies relationships between/ among main ideas and supporting ideas

Problem Solving and Critical Thinking

Articulates ideas or problems

4 3 2 1 Makes oneself understood using a minimum of jargon and giving attention to audience being addressed

Uses appropriate problem solving methods

4 3 2 1 Identifies and states connections to sources, either personal or analytical

4 3 2 1 Demonstrates beginning intuitive thinking which integrates ideas from a variety of resources

Exhibits openness to alternative ideas

4 3 2 1 Displays evidence of rethinking one’s own perspective including openness to change

Demonstrates analysis of information to support a chosen position with attention to consequences

4 3 2 1 Organizes and thinks in a logical manner

4 3 2 1 Provides appropriate justification for a chosen position or solution

4 3 2 1 Demonstrates ability to justify key components of a chosen position and/or solution

Recognizes logical fallacies

4 3 2 1 Identifies when views are based on self interest or preconceptions

Values/Citizenship/Community

Examines personal values

4 3 2 1 Defines personal values related to honesty, truthfulness, responsibility, respect, etc.

4 3 2 1 Recognizes diversity of personal values both ethnic and cultural

4 3 2 1 Displays behavior consistent with the ethical standards within a discipline or profession

Takes responsibility for actions

4 3 2 1 Demonstrates actions reflective of taking responsibility for consequences

4 3 2 1 Demonstrates respect for diverse cultures

Acts as a responsible citizen in a variety of communities

4 3 2 1 Displays respect for the rights of others

4 3 2 1 Understands the expectation, obligations, and processes of local and global citizenship

4 3 2 1 Demonstrates honesty in a variety of contexts

1. One root of *competency* is rivalry as in competition. This educational conception of competency suggests what we are trying to do is help students become more competitive in the marketplace. See ***Online Etymology Dictionary*** <http://www.etymonline.com/index.php?allowed_in_frame=0&search=competency&searchmode=none> [↑](#footnote-ref-1)
2. Another root of *competency* is sufficiency to deal with what is at hand. This educational conception of competency suggests that what we are trying to do is to help students develop sufficient means for living. See ***Online Etymology Dictionary*** <http://www.etymonline.com/index.php?allowed_in_frame=0&search=competency&searchmode=none> [↑](#footnote-ref-2)
3. Competency in Computer Literacy; Competency in Critical Thinking and Problem Solving; Competency in Information Literacy; Competency in Analysis, Synthesis and Research; Competency in Legal and Ethical Use of Information; Competency in Oral Communication; Competency in Written Communication; and Competency in Values, Citizenship and Community. [↑](#footnote-ref-3)
4. Improved abilities to solve and troubleshoot business and IT problems by applying programming, database, operating system, networking system and business skills;

   Improved abilities to engage in teamwork when applying customer service, project planning, and project completion skills in an IT business environment;

   Improved abilities to think critically in an effective and flexible manner to solve typical practical and technical business problems;

   Improved abilities to research, select, use, and troubleshoot CIS hardware, software and networks;

   Improved abilities to comprehend CIS and IT topics; and

   Improved abilities to take personal responsibility for learning and education. [↑](#footnote-ref-4)
5. Improved educational, instructional, training, and productivity levels of students and graduates to meet the CIS, IT and related human resource needs of community employers for the sake of becoming employed, or also for the sake of working one’s way through higher education degree and certificate programs (such as the Work to School Program at University of Dayton Research Institute, and Internships and the Educational Reimbursement Program at Riverside Research);

   Improved educational, instructional, and training levels of students and graduates in order to meet the transfer requirements of other community public and private higher education institutions;

   Improved CIS Department/Community partnerships through:

   Capstone Projects with Community clients and customers;

   Internships with Community employers;

   Public Lectures, Workshops, and other Events open to the Community such as the CIS Lecture Series;

   TechFest;

   Tech Prep Junior Orientation Days;

   Publications such as ***CIS Connect***.

   Improved abilities to meet employer demand for employees with technical, written communication, oral communication, teamwork and professional skills;

   Increased public awareness and value of “know-how” and “know-why,” or skills and understanding, necessary to realize benefits from information technology; and

   Increased public awareness of and value in the ethical, privacy and security issues that accompany the use of information technology. [↑](#footnote-ref-5)
6. Improved effectiveness of disciplines/professions. in solving and troubleshooting business and CIS problems in the CIS disciplines and professions such as: Computer Information Systems (CIS); Information Systems (IS), Management Information Systems (MIS); Computer Science (CS); Computer Engineering (CE); and Information Technology (IT);

   Improved effectiveness in communicating orally and in writing and engaging in teamwork when applying project planning and project completion skills in the CIS disciplines and professions;

   Improved effectiveness and flexibility in thinking critically about typical practical and technical business problems in the CIS disciplines and professions;

   Improved effectiveness in researching, selecting, using, and troubleshooting CIS hardware, software and networks in the CIS disciplines and professions;

   Improved standards of human and information systems quality and performance in the CIS disciplines and professions;

   Improved educational, instructional and training standards in the CIS disciplines and professions;

   Improved currency in all teaching, technology and instructor credentials within the CIS Department;

   Increased awareness of security and privacy issues;

   Increased positive view of CIS technicians and professionals; and

   Increased awareness of ethical issues regarding the use of computer information systems. [↑](#footnote-ref-6)
7. **Bureau of Labor Statistics**, ***Occupational Outlook Handbook***, Thursday, March 29, 2012.

   “Employment of *computer programmers* is expected to increase 12 percent from 2010 to 2020, about as fast as the average for all occupations.”

   “Employment of *computer support specialists* is expected to grow 18 percent from 2010 to 2020, about as fast as the average for all occupations.”

   “Employment of *computer systems analysts* is expected to grow 22 percent from 2010 to 2020, faster than the average of all occupations.”

   “Employment of *database administrators* is projected to grow 31 percent from 2010 to 2020, much faster than the average for all occupations.”

   “Employment of *information security analysts, web developers, and computer network architects* is projected to grow 22 percent from 2010 to 2020, faster than the average for all occupations.”

   “Employment of *network and computer systems administrators* is expected to grow 28 percent from 2010 to 2020, faster than the average for all occupations.”

   “Employment of *software developers* is projected to grow 30 percent from 2010 to 2020, much faster than the average for all occupations.” (*italics* added)

   <http://www.bls.gov/ooh/computer-and-information-technology/home.htm> [↑](#footnote-ref-7)
8. Bareiss, Ray and Radley, Martin, “Coaching via Cognitive Apprenticeship,” ***SIGCSE ’10***, March 10-13, 2010, Milwaukee, WI, USA. Copyright ACM. [↑](#footnote-ref-8)
9. Huber Heights Learning Center, Englewood Learning Center, Preble County Learning Center. [↑](#footnote-ref-9)
10. Centerville High School and Eaton High School. [↑](#footnote-ref-10)