Internal Program Review
Self-Study Report

Program Name
Computer Technology

Credentials Offered
Network Administration, AAS - 62/63 credits
Programming, AAS - 63/64 credits
Network Administration, AS Program of Study - 60 credits
Programming, AS Program of Study - 60 credits

Self-Study Completed by:
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Date Completed:
2017 - 2018

A. Introduction

The Helena College University of Montana Computer Technology (CT) program is a two-year program offering options in two different areas of technology: Network Administration, and Programming. Each option area prepares students for employment within a wide range of information technology fields. The Computer Technology program helps students develop a foundational knowledge in technology and gives students the knowledge, skill set, and tools to build upon as their employment needs and opportunities change throughout their career.

The Computer Technology program offers a very hands-on, results oriented curriculum that offers practical real-life experience through project-based course work and industry-based internship opportunities. The focus of the CT curriculum is to give students the knowledge and skills needed for employment and success in the work place. In addition, the Computer Technology program features full-time and adjunct faculty who have many years of experience working in information technology and who bring a variety and depth of industry knowledge into the classroom.

B. Alignment with Mission, Strategic Goals and Core Themes

MISSION STATEMENT

Helena College University of Montana, a comprehensive two-year college, provides access to and support of lifelong educational opportunities to our diverse community.

The Helena College University of Montana Computer Technology (CT) program is a two-year program offering options in two different areas of technology: Network Administration and, Programming. Curriculum for each option area prepares students for employment within a wide range of information technology fields. Program curriculum develops a foundational knowledge in technology that students can build upon as their employment needs and opportunities change throughout their career.

STRATEGIC GOALS

STRATEGIC GOAL #1 – PROMOTE STUDENT SUCCESS AND ACHIEVEMENT

1. Construct academic pathways for undergraduate education that enable seamless career transition or postsecondary educational transfer.

CT program faculty participate in the Big Sky Pathways meetings and agreements with local high schools. A few courses are available to be offered as dual credit at local high schools.

2. Increase educational access and support for a diverse student population through community efforts and collaboration.

CT faculty manage the Saturday lab monitors as well as regularly attend Saturday labs.

3. Promote a culture of collaboration and communication that ensures that the College meets its mission.

STRATEGIC GOAL #2 – ADVANCE ACADEMIC EXCELLENCE AND SCHOLARSHIP

1. Provide relevant and enriching instruction academic programs that address the evolving job market and global community.

In the 2014-15 academic year, the CT curriculum was modified significantly with the goal of reducing the number of credits required for AAS degree completion. The high credit requirements were deemed a barrier to student achievement. Two courses were eliminated, two courses were added, and two courses had their credits reduced for the Network Administration option. Four courses were eliminated, three courses were added, and two courses had their credits altered for the Programming option. The AAS Programming option was reduced by seven credits and the AAS Network Administration option was reduced by six credits.

In the 2017-18 academic year the CT curriculum was modified to include one new course for both the Programming and Network Administration options. One course was eliminated for the Network Administration option and two courses were eliminated for Programming. It was decided that the program would no longer offer spring entry due to low enrollment in courses required to get spring-starting students ready for their third semester.

Internships continue to be encouraged for all AAS CT students. While some students are not able to participate in internships, many do take advantage of this opportunity.

2. Utilize research and assessment data to make evidence-based decisions regarding curriculum, instruction, and programming.

In the fall of 2017 the CT faculty surveyed CT students on their preference for class schedule days and times. The results did not show a clear preference for a day or time but did indicate that having to make fewer trips to the college per week and having less down time between classes was preferred. For the fall 2018 CT schedule, a structured scheduling approach was taken. Student cohorts were identified, and a schedule produced that reduced the number of days students would be on campus and reduce or eliminate down-time between courses. The goal was to increase educational access for students that work or have extensive family

responsibilities.

3. Demonstrate that students have learned requisite knowledge and skills relevant to their educational goals.

The CT faculty is committed to using the new student learning outcome assessment system to help satisfy this requirement.

STRATEGIC GOAL #3 – BUILD COMMUNITY ENGAGEMENT AND PARTNERSHIPS

1. Foster collaborative partnerships with business, industry, and the broader community to enhance workforce development and lifelong learning.

We will continue to supervise student interns in internships and work with the new Helena College administration to collaborate in the creation of apprenticeships and job shadowing opportunities with Helena area businesses.

2. Evaluate and respond to on-going and emerging community educational and workforce needs.

The CT advisory board meets twice yearly to make recommendations on their IT workforce needs.

3. Expand civic engagement opportunities through work-based learning and other real-world educational experiences.

Students that are not able to do an internship quite often do a capstone project. Very often, the capstone projects are for area groups and non-profit organizations. The Systems Analysis and Design class incorporates a group project where student group's partner with area companies and organizations to analyze and recommend solutions to the problems identified.

STRATEGIC GOAL #4 – MODEL AND FOSTER EQUITY, INCLUSION, AND CULTURAL COMPETENCY

1. Ensure that recruitment and hiring practices promote equity and inclusion.

2. Develop a diversity and inclusion action plan with measurable outcomes and ongoing assessment.

3. Deliver professional development and other training to support the increased cultural competency of students and employees.

STRATEGIC GOAL #5 – ENSURE INSTITUTIONAL INTEGRITY

1. Maintain and enhance a transparent process for resource prioritization and allocation that fosters efficient, effective and equitable use of fiscal resources.

CT program faculty prepare an annual budget and participate in budget discussions.

2. Procure and allocate resources to support the mission of Helena College.

The CT program received a donation of 11 servers and 15 laptop computers from the Montana State Library. Helena College provided funding for additional power outlets for the servers. The laptops are used in the PC Repair class (ITS-280).

3. Devise and implement performance metrics for assessing institutional progress towards identified goals.

CT faculty have served and will continue to serve on instructional committees, such as SPAA, Strategic Enrollment Planning (SEP) steering committee, SEP workgroup and IDEA, charged with assessing key areas of the college.

CORE THEMES

Through an inclusive campus and community-wide discussion of Helena College's purpose and goals, three core themes have been identified individually and collectively to define the College's mission.

- Student Access and Success
  - Objective 1: Helena College achieves its strategic enrollment management goals

    CT faculty participate in SEP committees and work groups.

  - Objective 2: Helena College students achieve their educational goals

    CT faculty advise students on their educational goals and conduct graduation audits of the completed course work required for degree completion.

- High Quality Education
  - Objective 1: Helena College students demonstrate achievement of learning outcomes.

    CT faculty have been working with academic and assessment leadership at Helena College to develop a new system for tracking assessments of course

and degree student learning outcomes for the entire college. The CT program faculty will be working to include their student learning outcome assessments in the system as soon as it is available.

- Objective 2: Helena College supports professional growth opportunities for faculty and staff to advance excellence in teaching and delivery of support services

  Given the rapidly changing IT field, CT faculty are continuously working to learn new skills, techniques and knowledge.

- Community Enrichment
  - Objective 1: Helena College is responsive to regional workforce development needs

    CT faculty participated in Cyber Security education meetings designed to foster increased Cyber Security curriculum in Montana Colleges. One of the new courses adopted in the spring of 2018 was in response to insights gained at the meetings.

    CT faculty participate in the annual Computer Science Summit meetings of Montana Computer Science faculty. Helena College hosted the 2018 meeting of the CS Summit.

  - Objective 2: Helena College provides cultural, intellectual and social resources for the community

    CT faculty volunteer to assist the Lewis and Clark County 4H in the setup and operation of computer, network and application support the 4H livestock sale held every year at the Lewis and Clark County Fair.
    Faculty have also been asked to speak at Helena High school science classes, discussing computers, the internet and hacking.

  - Objective 3: Helena College partners with the community to expand opportunities for learning and service.

    Most fall semesters, CT faculty organize the CT Round table forum. Current students, former students, advisory committee members, area professionals, CT faculty and Helena College administrators meet to discuss the current IT market and educational opportunities for students. This is also an opportunity for students to network with area professionals.

In the spring, CT faculty organize an interview and resume day at which advisory committee members and area professionals volunteer to conduct mock interviews and resume reviews for CT students.

C. Alignment with Community Needs

The Computer Technology Advisory committee is composed of industry experts, from private business and state government. Helena College faculty meet with the advisory committee twice yearly. The advisory committee makes suggestions based on emerging industry trends resulting in the addition or modification of curricular content in courses and/or the program. With the Computer Technology Advisory Committee's input and guidance, the CT program curriculum continues to evolve meeting current and future needs of our workforce partners.

Internships are a vital component of the CT program curriculum. Student Internship opportunities are available with local and state agencies and private businesses. The relationship between the CT program and our local workforce partners is mutually beneficial to the businesses and Helena College students by enabling interns to receive an active and authentic learning experience while providing businesses with quality entry-level "employees" who have strong knowledge and skill sets.

With a growing business community and state government centered in Helena, demand in CT related career fields should provide long-term growth.

D. Student Participation and Success

Overall student participation appears to align with Helena, statewide and national economic trends. Traditionally when there is a strong economy, students tend to forgo their post-secondary education goals. Helena College headcount seems to reflect this trend as line "C" of the Program Review Data Summary shows a decrease from the previous period, 110 average to the current 100 student unduplicated headcount. Traditional students, continuing ed. and students retraining for the workforce continue to be strong numbers in the CT Program however, with an increase in FTE of almost 10% (55.1 increased to 64 FTE). Retention rates for part time students decreased slightly (line G) as expected with the strong economy, but should turn around with implementation of a new instruction schedule and hours making it easier for full time workers to attend more traditional evening courses. About half of the program courses are offered in the hybrid-online format. With these courses, content is offered online and the majority of in-class time dedicated to group work and lab time. In order to increase student access to equipment and offer additional assistance with coursework, the program offers supplemental lab time on Saturdays. One can often find program full time faculty assisting students during the Saturday Labs. In cooperation with program advisory committee members and professional volunteers, the program offers a mock interview and resume review night for program students. We have found

that our students who struggle with soft skills have been very successful after participating in the interview night offered each spring semester.

The addition of servers and hardware donated by the Montana State Library, and through the efforts of an adjunct instructor, presents an additional level of opportunity for program students. In the spring of 2017, under direction of the adjunct involved with the donation, students rack-mounted and configured the servers, installed software and network wiring. Worked with Helena IT Department staff to integrate these systems into the college IP networking scheme and performed operational testing on the systems, as a capstone class project.

In 2017, chairs were replaced in the CT classrooms D121 and 122. This upgraded seating that had been used by students for several hours each day since 2000.

We are hopeful that in the future, Helena College will become a certified testing center and allow local access to national certification exams for our students and the Helena community. Currently students and the community must travel out of town to sit for most certification exams.

Overall graduation rates for full time students (within 150% of completion time, Line L.) is slightly below the Helena College average of 30%, but is indicative of students wishing to "double degree" in both CT options or add an additional option outside the CT Program. Nursing plus CT to become Health-informatics (Health information technology) or CT Networking plus Welding/Machine Tool as the use of CNC manufacturing becomes more entrenched.

The typical Helena College CT student is an adult learner, with family obligations and works full time, part time or in an internship. It is difficult for part time students to meet the 150% completion target, however the CT Part time Graduation rates (line J) reflect the dedication of part time students attending Helena College as it shows 50% in year five, and an average of 14% in this reporting cycle. Again, these numbers will only go up as day shift employees become evening students under the new CT scheduling model.

Finally, the data seems to support the improvement full-time faculty can have on a program. For several years, the CT program had two dedicated full-time faculty members and a larger number of adjunct instructors. Since adjuncts are not necessarily professional educators, some courses lacked academic continuity and thoroughness needed to ensure students have a successful educational experience. As a result the more adjuncts a program may have, the more disjointed the program may become resulting in a less than positive student experience. Student satisfaction has a direct correlation with program retention rates.

As a third, full-time faculty member was added to the Computer Technology program, we were able to decrease reliance on adjunct faculty. Student Participation and Success data and individual course feedback appears to support the position that the CT program's curriculum and students have benefited from the consistency 3 full-time instructors bring to the program.

Although there are internal and external constraints such as resources and economic conditions the data suggests the Computer Technology program is relatively strong and supports the mission of Helena

College by meeting workforce needs, strengthening employee knowledge and skills, and providing a bridge to educational attainment through degrees.

E. Student Learning Outcomes

CT Program Student Learning Outcomes

- Apply knowledge of computing and mathematics appropriate to the discipline.
- Analyze a problem, and identify and define the computing requirements appropriate to its solution.
- Design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.
- Demonstrate an ability to function effectively on teams to accomplish a common goal.
- Describe professional, ethical, legal, security and social issues and responsibilities in computer technology.
- Demonstrate an ability to communicate effectively with a range of audiences.
- Demonstrate an ability to analyze the local and global impact of computing on individuals, organizations, and society.
- Recognize the need for and an ability to engage in continuing professional development.
- Demonstrate an ability to use current techniques, skills, and tools necessary for computing practice.
- Determine information to meet an identified need.

Network Administration Outcomes

- Demonstrate the ability to install, configure, diagnose, repair and upgrade entry-level personal computers, software, and network fundamental components according to industry standards.
- Demonstrate the ability to plan, install, configure, and manage resources; connect and run applications; monitor, optimize and troubleshoot network software and hardware.
- Determine the type of software or hardware necessary to complete an objective.
- Describe the functions of different operating systems.
- Demonstrate the ability to implement, administer, and troubleshoot a server in a networked environment.
- Demonstrate and ability to apply the principles of modern microcomputer operating systems, network architecture, hardware architecture, and subsystems to network.
- Demonstrate an ability to repair and manage operating systems.
- Demonstrate the ability to solve basic network design and application problems using knowledge of common network architectures and network software.

Programming Outcomes

- Demonstrate knowledge of programming concepts, logic, design and problem solving techniques.
- Develop, deploy and test desktop, distributed, and web applications.
- Write computer programs using fundamental software development skills.
- Write computer programs using Object –oriented programming features

- Demonstrate critical thinking by applying appropriate data structures and Abstract Data Types (ADTs).
- Analyze and design information systems and database applications solutions to achieve business/organizational goals.
- Demonstrate the ability to implement a designed solution to solve business IT problems using state-of-the-art programming techniques and applications software.

F. Curriculum and Instruction (Academic Programs Only)

Computer Technology A.A.S. – Network Administration Required Courses First Semester (16 Credits)

Mart-145	Web Design	3	
Choose one of the following:			
CSCI 100 or	Intro to Program or	3	
CSCI 107	Joy and Beauty Com		
Choose one writing:			
WRIT 121T	Intro to Tech Writ	3	Placement or WRIT 095
WRIT 101	College Writing 101		Placement or WRIT 095
Choose One Math :			
M 115	Probability and	3	Placement or M080 or M 092
M 121	Linear or College Algebra		Placement or M093
Advising Option Credits:			
NTS 104	CCNA 1: Intro to Net	4	
Second Semester (16 Credits)			
ITS 280	Computer Repair	4	
ITS-224	Intro to Linux	3	
Choose one of the following:			
COMX-106	Comm in a Dynamic	3	Placement or WRIT 101
PSYX 100 or	Workplace or		
SOCI 101	Intro to Psych or Intro to Sociology		
Advising Option Credits:			
CSCI-240	Database and SQL	3	CSCI 100 & ITS-280
NTS 105	CCNA 2: Rout & Switching	3	

Third Semester (15 Credits)

NTS-205	CCNA 4:Conn Networks	3	NTS-105
Choose one of the following			
CSCI-298	Internship or	2	Instructor Approval
CSCI-299	Thesis/Capstone or		
CSCI-292	Independent Study		
Advising Option Credits			
ITS-274	Ethical Hacking and	3	NTS-105, ITS-224
ITS-230	Admin Script Powershell	2	ITS-280, NTS-104
ITS-231	Admin Script Python	2	ITS-280, NTS-104
ITS-255	IP Telephony (VoIP)	3	NTS-105

Fourth Semester (16 Credits)

CSCI-212	Web Server Admin	3	ITS-224, ITS-280, NTS-104
CSCI-221	Systems Analysis &	4	CSCI-240, Writ101/121T

	Design		
ITS-212	Network Ops – Server	3	ITS-280, NTS-104
ITS-218	Network Security	3	ITS-224, ITS-280, NTS-104
NTS-204	CCNA 3: Scaling Networks	3	NTS-105

Computer Technology A.A.S. – Programming

Required Courses First Semester (16 Credits)

Mart 145	Web Design	3	
Choose one of the following:			
CSCI 100 or	Intro to Program or	3	
CSCI 107	Joy and Beauty Com		
Choose one Writing:			
WRIT 121T	Intro to Tech Writ	3	Placement or WRIT 095
WRIT 101	College Writing 101		Placement or WRIT 095
Choose One Math:			
M 115	Probability and Linear or	3	Placement or M080 or
M 121	College Algebra		M092 Placement or M093
Advising Option Credits:			
NTS 104	CCNA 1: Intro Net	4	

Second Semester (16 Credits)

ITS 280	Computer Repair	4	
ITS-224	Intro to Linux	3	CSCI-230
Choose one of the following:			
COMX-106	Comm in a Dynamic	3	WRIT095 or place in
PSYX 100 or	Workplace or		WRIT101
SOCI 101	Intro to Psych or Intro to Sociology		
Advising Option Credits:			
CSCI 111	Prog with Java	4	CSCI 100
CSCI 240	Databases SQL	3	

Third Semester (14 Credits)

CSCI 221	Prog with Java II	4	CSCI111
Choose one of the following			
CSCI 298	Internship	2	Instr Aproval
CSCI 299	Thesis/Capstone		
CSCI-292	Independent Study		
Advising Option Credits:			
CSCI 211	Client Side Web Dev.	3	CSCI 100 & Mart 145
CSCI 245	Modern Data Sys	3	CSCI 111 & CSCI240
CSCI 276	Application Security	2	CSCI 111 & CSCI 240

Fourth Semester (17 Credits)

CSCI-206	.Net Applications	4	CSCI 111 & CSCI 240
CSCI 121	Sys Analysis & Design	4	CSCI 240 & WRIT 101/121T
CSCI 238	Std Base Mobile	3	CSCI 111 & MART 145
CSCI 127	Joy & Beauty of Data	3	CSCI 111 & CSCI 240
CSCI 257	Web Services	3	CSCI 111 & CSCI 240

A.S. Computer Technology—Programming

Required

CSCI100	Introduction to Programming	3
CSCI111	Programming with Java I	4

CSCI121	Programming with Java II	4
CSCI240	Databases and SQL	3
Choose THREE of the following		
CSCI206	.NET Applications	4
CSCI221	Systems Analysis and Design	4
CSCI245	Modern Database Systems	3
CSCI257	Web Services	3

A.S. Computer Technology—Network Administration

Required		
CSCI100	Introduction to Programming	3
ITS212	Network Operating System-Server Admin	4
ITS224	Introduction to Linux	3
ITS280	Computer Repair and Maintenance	4
NTS104	CCNA 1: Introduction to Networks	4
Choose TWO of the following		
CSCI240	Databases and SQL	3
NTS105	CCNA 2: Routing and Switching Essentials	3
NTS204	CCNA 3: Scaling Networks	3

G. Faculty/Staff Profile

Coon, Emmett
Computer Technology
A.S., Northern Montana College
A+, CCNA, CCAI
At Helena College since Fall 1996

Steinwand, Bryon
Computer Technology
B.S., Montana State University
At Helena College since Fall 2001

Pokuri, Mounika
Computer Technology
M.S., University of Central Missouri
At Helena College since Fall 2017

H. Fiscal and Physical Resources

Helena College has the lowest tuition per FTE student in the State according to analysis by the Montana Commissioner for Higher Education. Required budget item requests have been continually approved. Long term budget request have been approved several (three) times. Newly purchased server and Cisco equipment, as well as donated equipment help the Computer Technology program maintain currency with industry standards. An unanticipated donation of computer equipment prompted Helena College to provide funds from the FY18 budget to upgrade wiring. The upgrade was necessary to provide adequate power in the student server room. A donation of this magnitude is not a common occurrence and contingency funding outside the normal budget process is greatly appreciated by both program faculty and students.

Finding qualified adjuncts that are willing to teach for the current pay scale has been a consistent problem. Course fees are currently adequate, thus no increase was deemed necessary in 2018. Anticipation of Cisco Network Academy equipment requirements are often an issue as notification of changes are not received in line with the budget request cycle. Routers currently in use are a mixture of 2800 and 2900 models, the older of which will be upgraded in the next few years. The Computer Technology program's five year average instructional expenditure is $3,205. The instructional cost per completion is $10,577. Both costs are down from the previous reporting period ($3,322 and $12,794 respectively).

I. Recommendations and Preliminary Implementation Plan

CT faculty will use the new student course assessment system to map course student learning outcomes to degree outcomes and degree outcomes to College institutional competences. Previously CT faculty developed pre-tests for entering CT students and post-tests for graduating students to assess student learning. The implementation and grading of the testing turned out to be far too labor intensive so the project was not fully implemented. Assessment of student learning has been an ongoing problem for many areas, not just CT. Helena College is initiating a new system to document the assessment of student learning outcomes.

CT faculty will use the new student course assessment system, when available, to document student outcome assessments for all CT courses. CT faculty embrace the new system and will use it to map course student learning outcomes to degree outcomes and degree outcomes to College institutional competences and document student outcome assessments for all CT courses.

CT faculty will organize and participate in the CT Round Table Forum in the fall of 2018. The round table meetings increase the visibility of CT program and allow students to network with area professionals. CT faculty will organize and participate in the CT Round Table Forum each fall.

CT faculty will organize and participate in the interview and resume day in the spring of 2019. Often CT students have difficulty performing well in job interviews. The students that participate in interview and resume day get to interact and are professionals during mock interviews and resume reviews. CT faculty will organize and participate in the interview and resume day every spring.

J. Program Review Data Summary

K. Appendix (Additional data or exhibits)

2018 Computer Technology Program Data Summary