<h1 style="text-align:center">PROPOSAL</h1>

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THE UNIVERSITY OF MONTANA-MISSOULA

Helena College of Technology

Business Department

Associate of Applied Science

Computer Technology

Fall Semester 2001

PROGRAM DESCRIPTION

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Brief Description

The Computer Technology program at the Helena College of Technology currently consists of options in Networking, Programming, and Microcomputer Applications. The Helena College of Technology proposes to add a Network Architecture option in the Computer Technology Associate of Applied Science degree program.

The current Computer Technology Networking option, prepares students to configure and operate network servers and user account security. The College of Technology currently offers an Electronics Degrees that prepares students for work in computer repair and in fiber and radio technologies. In the past, the Helena College of Technology has graduated network "generalists" who knew about media, traffic and client/server configuration, but were not "deep" in any one area. We now have both the job market and the student interest and count to support training "specialist" in each of these network areas. A companion Level I proposal seeks to rename the current Networking option to Network Administration so that the two options are easily distinguishable by students.

The proposed Network Architecture option is a 71-credit program delivered in a four-semester sequence. It is based on other Computer Technology programs and expanded to focus the student on Internet and Intranet routing and switching. The design, tracking and management of traffic prepare the student for actual configuration and operation of the switches and security firewalls on the Network rather than at the server sites. It has a different entry point than the current Computer Technology degree and should appeal to students who have previous network training or understand computers and network enough to know that network transmission and traffic is their preferred emphasis. High school students graduating with previous Cisco program background would be a typical placement as well as community students wishing to migrate from computer programming and applications into network management.

Needs Assessment

Why does HCT need to do it? There are several reasons. First and foremost, the Internet is becoming a backbone technology like telephones that supports all other technologies. By not having one of the "foundation" technologies all other areas of the College will be limited in their ability to explore appropriate uses of the Internet. Second, the Helena area has indicated that both the students and employers exist here and are interested in Internet skills. Third, as a Montana higher education institution, we need to support students, especially technical students, graduating from programs like the Cisco Academies in Montana high schools. Fourth, to successfully compete for new students with other institutions we need to offer quality leading edge programs.

The new option incorporates the Nortel Academy Program in with the Cisco curriculum. The Nortel program does two major things for HCT. First, it introduces new voice and video technologies as well as Internet backbone switching that the Cisco curriculum is weak on. Units on voice over IP, ATM and Sniffer equipment are significant and important additions to the curriculum that HCT can't do well and Cisco doesn't do well at this time. The second major advantage is that the Nortel program isn't quite equivalent to Cisco I-IV CCNA program. As such it offers a more vendor neutral view of networking to the student and offers HCT the "competitive leverage" of potentially choosing to not do the Cisco program. HCT will not offer the "duplicate" parts of the program to the same students at the same time.

Because the proposal does not request the authority to establish a new program, but rather is an expansion of the existing Computer Technology Network program, there has not been a comprehensive needs assessment done. Need for the program is based on the following:

- There is a high rate of placement of current Computer Technology Network graduates, particularly those with an emphasis in Internet traffic. HCT currently has 50-70 Network students per year.

- There is a high student interest in additional traffic classes and certifications to be more competitive in the job market. High school graduates with Cisco Certified Network Associate (CCNA) background in particular need additional opportunities.
- Comments from the HCT Computer Technology business advisory committee indicated Network traffic skills and certification were the single most important hands on skill.
- Comments from state government; community economic development and secondary education leaders support additional programs in computer network traffic and security.
- Several calls from companies considering relocation to Montana inquired about the availability of this type of program.

Relationship to the Role and Scope of the Institution

The program is consistent (in fact, critical) to the continued success of the occupational computer technology and digital electronics programs. Digital Networking is and will continue to be the foundation of all technology based information transmission activities. This program will result in an Associate of Applied Science degree and as such, allow transfer and upward migration to four-year Bachelor of Applied Science degrees in the state.

Impact on Administrative Structure

The new option will become a part of the Computer Technology program. The Computer Technology program is under the direction of the chair of the Business Department. No revision of the current administrative structure is required.

Similar Programs in Montana

Montana Tech of The University of Montana – Butte

- The Helena College of Technology is currently working with Montana Tech to develop a two-plus-two articulation agreement to allow students to transfer into the Bachelor of Science Degree in Information Technology and Design at Montana Tech.

  College of Technology, Montana State University-Billings

  Montana State University-Great Falls College of Technology

  College of Technology of The University of Montana-Missoula

  Flathead Valley Community College

Program Accreditation

The faculty teaching the Cisco courses and the Nortel courses will need to be certified by Cisco and Nortel. Currently, two faculty members are certified through Cisco IV and one is certified through Cisco II. The proposal includes funding for additional certification through Cisco VIII and Nortel IV. The proposal meets the minimum standards for accreditation by the Northwest Association of Schools and Colleges.

Proposed Curriculum

The current degree and option focuses on Computer Server technology and user security. With the explosive growth of the Internet there is now a significant interest and need in managing IP traffic flow and security. Current technology uses routers and switches. Many institutions in Montana (including HCT) included the Cisco Academy curriculum to help address education in this growing area. This degree carries that direction further by allowing those students to continue on to the next level (the Cisco Certified Network Professional (CCNP) curriculum). In doing that, the student must make a choice at entry that emphasizes Network rather than servers and users as their goal. It is expected that some of the 50-80 students currently in the Network Administration option and Electronics programs will choose this degree. This is viewed as desirable since it is unlikely that placement can support those numbers in a single area of computer specialties. This program should allow more specialization and hence better placement for students in the rapidly growing computer network industry. The result should be continued healthy, long-term growth.

The Electronics and Computer Technology faculty designed the curriculum with input from students, employers, the Computer Technology Advisory committee, and existing (Cisco and Nortel) industry curriculums. It must be remembered that this field is rapidly growing and changing and increased placement is necessary as well as rapidly evolving technical options and specialties. HCT believes this program will help accomplish that goal.

Students unsure of what areas of computing they wish to enter will continue to enter the general Computer Technology curriculum and choose among applications, programming and network (server and user) administration as in the past.

Others, such as high school Cisco Academy graduates will enter knowing that want to specialize in Internet traffic management and security.

Semester I consists of a basic background in Math, English, Computer Technologies and Network Technologies. Semester II will move the student into more advance Network Technologies (Cisco CCNA level expertise) and will broaden the students background in the most common computer applications on the network (server administration, web servers and web page basics). The goal of semester III is to move the student to a new level of network expertise including network-to-network issues, voice and video technologies and Internet backbone routing through the use of the Nortel and Cisco CCNP curriculums. Unix is required as a literacy class since many network devices (routers, switches and web servers) are based on Unix. Semester IV is designed to complete the more advanced network skills topics (through mastery of the Cisco CCNP level topics) and to transition the student into workplace issues and skills through career development and capstone project based classes.

Electives exist and students are encouraged to focus on them in one of six areas depending on their background and interests. The areas are: 1) readiness preparation in intro to micros, math, and English: 2) business management and accounting; 3) general education to facilitate continuation to a four-year degree; 4) computer technology network server skills; 5) basic electricity, fiber and radio skills; or 6) MS Office proficiency.

Current Faculty

The Computer Technology department has two full-time faculty and the Electronics Department has one full-time faculty teaching in the networking administration and device areas. The cross-curriculum faculty, in teaching its current classes of Cisco, LAN Operating Systems, UNIX, and Network Technologies support the development of a more advanced networking focus degree.   The current faculty are:

Dave Marshall, Computer Technology   Level III   Cisco certified Levels I-IV

Kevin Brockbank, Computer Technology   Level I   Cisco certified Levels I-II

Emmett Coon, Electronics Technology   Level I   Cisco certified Levels I-IV

New Faculty

To introduce the degree over its first two years, one full-time faculty would be needed in the first year. The estimate is that one additional faculty member will be needed during the second year. HCT will not need additional faculty FTE to support existing students who reallocate between programs and catalogs. Finally, as the network programs continue to grow, HCT will need to continue to provide permanent staff to support the increased specialization required by the technical depth of this program. Adjunct faculty may be used in specific situations but are not generally available with the skills needed. Following each year, further assessment as to faculty needs would be addressed.

Support Personnel

No additional support personnel will be required. The current Information Technology Department consists of two full-time technicians and two student assistants and is adequate to support the program.

CAPITAL OUTLAY, OPERATING EXPENSES AND PHYSICAL FACILITIES

Library Resources

Library resources are available to support this proposed program.

Clinical, Laboratory, and/or Computer Equipment

A new computer lab will be created to support this option. The Helena College of Technology has recently received a grant for $20,000 from TRW to assist in the creation of the lab. The new lab will be located at the Ray Bjork campus, space currently rented by the College.

EVALUATION OF PROPOSED PROGRAM

Faculty Committee/Council Report

Current students, HCT Electronics and Computer Technology faculty, HCT management, and the HCT Academic Affairs committee reviewed the proposal. The HCT Computer Technology advisory committee of community employers also reviewed it.

Outside Consultants

No outside consultants were employed in the preparation of this proposal.

FISCAL IMPACT AND BUDGET INFORMATION

	FY 2002 First Year		FY 2003 Second Year		FY 2004 Third Year	
	FTE	Headcount	FTE	Headcount	FTE	Headcount
I. PLANNED STUDENT ENROLLMENT						
A. New enrollment	15	20	30	35	30	35
B. Shifting enrollment	15	20				
GRAND TOTAL PLANNED STUDENT ENROLLMENT	**30**	**40**	**30**	**35**	**30**	**35**

	First Year		Second Year		Third Year	
	FTE	Cost	FTE	Cost	FTE	Cost
II. EXPENDITURES						
A. Personnel Costs						
1. Faculty	1.0	$33,110	2.0	$66,220	2.0	$66,220
2. Administrators						
3. Adjunct Faculty						
4. Graduate/Instruct. Asst.						
5. Research Personnel						
6. Support Personnel						
7. Fringe Benefits		$9,403		$18,806		$18,806
8. Other						
Total Personnel FTE and Cost	**1.0**	**$42,513**	**2.0**	**$85,026**	**2.0**	**$85,026**
B. Operating Expenditures						
1. Travel for Faculty Training		$7,000		$7,000		$7,000
2. Professional Services						
3. Other Services						
4. Communications						
5. Utilities						
6. Materials and Supplies						
7. Rentals						
8. Repairs and Maintenance		$4,500		$4,500		$4,500
9. Materials – Resale						
10. Miscellaneous						
Total Operating Expenditure		**$11,500**		**$11,500**		**$11,500**
C. Capital Outlay						
1. Library Resources						
2. Equipment		$42,300		$22,300		$22,300
Total Capital Outlay		**$42,300**		**$22,300**		**$22,300**
D. Physical Facilities						
1. Construction/Renovation						
2. Rental (Ray Bjork Facility)		$10,000		$10,000		$10,000
E. Indirect Costs (overhead)						

GRAND TOTAL EXPENDITURES	**$106,313**	**$128,826**	**$128,826**

III. REVENUES

A. Source of Funds

1. Appropriated Funds (Reallocation)	$81,313	$161,130	$161,130
2. Appropriated Funds/New			
3. Federal Funds			
4. Other Grants (TRW, Cisco)	$25,000		
5. Fees			
6. Other ( )			
Total Source of Funds	**$106,313**	**$161,130**	**$161,130**

B. Nature of Funds

1. Recurring	$81,313	$161,130	$161,130
2. Non-Recurring	$25,000		
GRAND TOTAL REVENUES	**$106,313**	**$161,130**	**$161,130**

PROPOSED CURRICULUM

AAS DEGREE

COMPUTER TECHNOLOGY

NETWORK ARCHITECTURE OPTION

Program Entry Prerequisites: High School degree plus:

- Demonstrated computer desktop navigation skills equal to Intro to Micros Proficiency

Program

Semester I (18 credits)

- EL126 Cisco I – 4 credits
- EL176 Cisco II - 4 credits
- CT101 Introduction to Computer Technology with Programming - 4 credits
- ENG107T Technical Communications (or ENG121 English Composition) - 3 credits
- MAT130T Fundamentals of Algebra (or MA108 College Algebra)- 3 credits

Semester II (17 credits)

- EL226 Cisco III - 3 credits
- EL276 Cisco IV - 3 credits
- CT218 Operating System Administration (Win2000 Server) - 4 credits
- CT240 PC Configuration or EL 243 PC Management - 3 credits
- CT160 Presentations - 2 credits
- CT145 Internet - 2 credits

Semester III (18 credits)

- New - Cisco V - 3 credits
- New - Cisco VI - 3 credits
- English Elective - 2 credits
  - ENG115T Business Correspondence,

- ENG113T Public Relations or

- ENG111T Applied Principles of Communication

  - New - Nortel III - 3 credits
  - New - Nortel IV - 3 credits
  - CT 219 Unix - 2 credits
  - Electives - 2 credits

Semester IV (18 credits)

  - New – Cisco VII – 3 credits
  - New – Cisco VIII - 3 credits
  - HR110T Career Development - 3 credits
  - CT265 Capstone - 2 credits
  - Electives – 7 credits

COURSE DESCRIPTIONS

The first year courses are entirely from the current curriculum and no significant changes are expected in the descriptions in the current HCT catalog. This is also true of the English Elective, Unix, Career Development and Capstone classes in the second year.

New classes are listed below

Cisco V: This class explores advanced routing protocols with "intelligent" metrics for choosing the best traffic routes. It also explores external "border gateway" routing protocols for choosing traffic routes between different networks. Students will connect routers into networks using more advanced routing protocols such as OSPF and EIGRP. Students will then learn to interconnect various network using different protocols into a network of network (Internet) using BGP routing technology.

Cisco VI: The class explores more advanced technologies to access IP networks remotely including security. Students will explore access control list, firewalls, border gateway and address translation technologies and theories. They will build and test IP and TCP firewalls for networks, hosts and individual computers.

Cisco VII: This course covers multilayer switching technologies including LAN, WAN and QOS issues. Students will learn the fundamentals of streaming IP technologies such as voice and video and their impact on the networks. They will use ATM and other technologies to build networks utilizing QOS techniques to prioritize voice, video and data traffic.

Cisco VIII: This is an advanced troubleshooting class building on the previous Cisco VII semester to use hands on techniques to diagnose network problems. Students will be expected to work on and contribute to projects involving many different types of host computers, routers and switches running complex combinations of voice, video and data traffic. The ability to quickly identify and resolve network design problems and traffic issues will be stressed.

Nortel III: This class focuses on the Internet switched backbone (ATM) and on the migration of telephony onto the Internet. Students will learn how the Internet is built, the theory of the underlining switching and routing technologies and concepts such as traffic prioritization. Using a Network Sniffer, students will learn to identify individual packets and analyze traffic makeup.

Nortel IV: This is an integration class focusing on design and bringing together the media, switching, routing and application issues from the previous classes into an "integrated project" format. This class will emphasize the integration of voice, data and video needs into the design of a single network. All aspects of the network including media, switching, routing, and application traffic analysis will be combined into a single network "solution" or design.