

Quinsigamond Community College

Internal Program Review

2002 - 2003

Computer Systems Engineering Technology
Program

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Section I: Competitive Analysis and Regional Labor Market Demand

1. Market Influences

A. Provide a broad definition of this employment sector. List specific knowledge and skill requirements for employment in this field.

Response:

Overview of Computer Systems Engineering Technology Program

The Computer Systems Engineering Technology (CSET) Program prepares students for careers in the Information Technology department in businesses today. Information Technology can be defined as the study, design, development, implementation, support, and management of computer-based infrastructures that support information systems. Information Technology is usually used to refer to the computer and network-connectivity hardware, operating systems software, and third-party software. Information Systems is a term used to define the systems (applications) that manage information, often developed internally within an organization.

The CSET program is different from the Computer Information Systems (CIS) programs because it focuses on the design, development, and maintenance of a company's computer infrastructure whereas the CIS programs focus on the development of applications software that manages the company's data.

Knowledge and Skill Requirements for Employment in IT

There are many knowledge and skills that fall into this career field:

- Ability to identify and resolve problems with computer hardware
- Ability to identify and resolve problems with networks such as hardware failures or network failure points
- Ability to design network cable plants and computer needs based on a company's business specifications
- Ability to install, configure and maintain operating systems (both client, network, and multi-user) in support of an end-user environment.
- Communicate with people of all levels in an organization.

Job titles that fall into the CSET program area include:

- Computer Support Specialist
- Computer Hardware Technician
- Help Desk Support Specialist
- Network Planners / Designers / Engineer
- Network Administrator / Manager
- (Operating) Systems Programmer
- Systems Administrator

Through several industry groups such as CompTIA and ITAA, employee skill sets needed in this field are clearly defined (see Appendix A) and industry standard certification is available including:

- A+ (Hardware Certification)
 - Net+ (network topology certification)
 - I-Net+ (internet networking technology certification)
 - MCSE (Microsoft Windows Systems Engineer operating systems certification)
 - Linux+ (Unix/Linux operating systems certification)
 - IT Project+ (IT Project Management Certification)
 - IEEE Cabling Certification
 - Server + (operating systems certification)
 - CCNA (Cisco routing certification)
- (see Appendix A for complete description)

Employers use these standard certifications to gauge potential applicants skills, much more so than degrees because the certifications are so clearly defined.

Overview of Employment Sector

Any company of any size that currently utilizes computer equipment could employ CSET graduates. With 10 million employed in this field currently, Information Technology Association of America (ITAA) projects a national shortfall of 843,329 employees over the next 12 months. ITAA lists technical support and network design as the number 1 and 4 hottest jobs of 2001.

The pay range for these highly skilled specialists vary greatly based on skill sets. Examples are as follows:

Job Title	National Pay Range	Local Pay Range
Computer Support Specialist	35,000 to 60,000	32,000 to 60,000
Computer Hardware Technician	39,000 to 60,000	32,000 to 47,000
Help Desk Support Specialist	35,000 to 60,000	35,000 to 60,000
Network Planners/Designers/Engineer	45,000 to 80,000	50,000 to 100,000
Network Administrator / Manager	42,000 to 75,000	42,000 to 93,000
(Operating) Systems Programmer	42,000 to 100,00	45,000 to 100,000
Systems Administrator	42,000 to 75,000	42,000 to 93,000

**Above ranges gathered from Monster.com, CompTIA, and Boston Globe. (See Appendix B for examples)*

There seems to be a consensus that employees can't easily acquire the complete skill set required to meet industry need. Research completed by the ITAA of industry reflects that on-the-job training is the easiest way for employees to acquire the needed skill set since there is a gap in academia programs. Basically, academia is not teaching the complete set of skills an employee needs. This appears to be especially true in Massachusetts and has become a political issue in the up-coming Governor's election. The reason for gap is due to several reasons:

- Fast-changing trends and new product development in IT making it difficult to keep up,
- Expense of technology in an instructional environment, and
- Inability of higher education to retain quality instructors due to pay gaps between education and IT industry.

B. Using relevant labor statistics, indicate whether employment opportunities in this field are expected to increase or decrease over the next 3-5 years. Please cite the sources that you have used to make these predictions. (Note: It is easier for Admissions and Marketing Departments to refer to these predictions if they can quote the source)

Response:

Expected Employment Growth in Information Technology

Employment is expected to continue growth in this area as represented in the following table:

Organization/Study Cited	Percentage Increase thru 2008
MA Division of Employment and Training	90% ¹
Career Info Net	108%
American Association of Community Colleges	102 – 108%
Bureau of Labor Statistics	> 36%

**accounting for 83% of all new jobs in MA or a total of 70,000 (See Appendix C for examples)*

Not only is the growth significant but the number of existing jobs expected to be replaced through 2008 is approximately 80% due to relocation, retirement, job switching and/or career change.

Currently there is a shortage of adequately trained employees to fill job openings in this sector. This has been an issue both nationally and locally, where employers often have to

perform employee searches nationwide to fill positions. Employers often seek contractors internationally to fill these positions.

C. Review and analyze the most recent five years of institutional data to determine whether graduates of this program have found employment in their field and/or transferred to related four-year programs in their field within one year of graduation.

Response:

Employment Found by Graduates

Since this is a relatively new program, the first 5 students completed graduation in May of 2001. All graduating students found work in this career field prior to or within a month of graduation.

- PC Support Specialist at Allmerica Financial
- Network Administrator at Worcester Public Schools
- Testing Specialist at EMC
- Network Installer / Administrator at PCS Consulting
- Other student employment details unknown

In addition to finding careers in the IT field, two students continued their education at 4-year institutions.

D. Please identify the specific occupations (and job titles, if possible) for which program graduates are prepared for. Identify the types of employers that have hired graduates of this program within the last 5 years.

Response:

Occupations that CSET Graduates are Qualified for

There are several job titles that would fall into this career field:

Job titles that fall into the CSET program area include:

- Computer Support Specialist
- Computer Hardware Technician
- Help Desk Support Specialist
- Network Planners/Designers/Engineer
- Network Administrator / Manager
- (Operating) Systems Programmer
- Systems Administrator

Employers from various business areas in the private and public sector has hired our students:

- Public schools
- Insurance
- IT Consulting
- High-technology IT companies

Because of the nature of the coursework, students are prepared to work in any setting which utilizes computers and/or networks.

E. Identify the institutions to which students have transferred in the last three years.

Response:

Two students who graduated in May 2001 with Associate degrees in CSET continued their education at:

- Northeastern University in unknown Program
- Worcester State University in Computer Science

F. Summary and Analysis: Market Influences

Response:

The IT employment sector has historically been good with continued high-rate growth, allowing our students access to good employment opportunities upon graduation.

2. Programmatic Currency

A. Describe how the program maintains curricular currency.

Response:

Program Review

The program is fairly new, originating in 1999, and has not been updated until now. Since the life cycle of technology is short, this program should be reviewed yearly to keep up with industry needs. Course descriptions should be modified to reflect generic technology and as industry trends change and newer technology becomes available, instructors should teach the new trends and technology.

Technology in Use in the Classroom

Hardware - The hardware technology used in the classroom often does not meet the needs of the students in the classroom. For example, in our hardware technician course, we use computers that are approximately 10 years old, lacking the newer technology components discussed in the book and used in industry. Another example is in our network technician course, we have limited resources for use by students, therefore we are unable to demonstrate or make common cable types used today, basic skills that an IT professional must have.

Software – Although new software is expensive, instructors are usually able to obtain access to a limited amount by a small purchase of new licenses, licenses available already at QCC, provided in a limited form by the vendor, or even selecting to use free-ware (no cost and sharable). For examples over the last year:

- we obtained a limited number of Windows 2000 operating system from the Network Services group,
- we selected text books with a student copy of the operating system included on CD-ROM, and
- we selected to use a free-ware operating system in our Enterprise Operating Systems class.

As new operating systems are commercially introduced and become common in the business place, instructors attempt to teach those in the classroom. However, an on-going problem is that the hardware in the classroom is not always able to support the new operating systems. An example of software that we have been unable to acquire is a network management tool for use in our Network Management class.

Instructor Education

Because of the fast-pace change in IT technology and trends, instructors are forced, often each semester, to obtain new knowledge and skills. Unfortunately, time invested by instructors to keep up with the latest technology is extensive and often inadequate.

Industry Certification

Instructors attempt to align course syllabi with industry standard certification. Some instructors obtain industry certification and belong to and participate in industry associations related to that certification.

Industry Associations and Research

Instructors participate with Industry Associations and perform research to keep up with the ever-changing trends in IT.

B. Explain the existing mechanisms that allow for regular input from local employers or other relevant sources

Response:

We often get input from:

- students that are working in the field and
- employers of our cooperative work students as we do site visits.

C. Describe how this input affects the program. (Note: It is helpful with our accreditation process if you can include some specific examples of input that have led to recent changes in the program.)

Response:

There has been several of major skill sets that are not currently in our program that students currently working in the industry have requested:

- Router technology (utilized in all LAN/WAN environments)
- Technical Writing
- Unix Operating Systems (currently 70% of new installations but we have no class that focuses on this technology)

D. Describe ways that the College could support program faculty's incorporating more area industry input.

Response:

In this field, the technology is constantly changing. If we had more input from area industry, we could focus on exactly what technologies are utilized in the Worcester business community and emphasize those in the classroom. Therefore, an advisory committee that is well-rounded representing a broad range of industry leaders in the Worcester area is suggested.

E. Summary and Analysis: Currency

Response:

Although currency in the program is attempted by

- Talking with students about their educational needs,
- Maintaining and obtaining industry certification, and
- Researching industry trends in the field through industry associations.

Yet, several obstacles exist:

- Lack of faculty time and resources to learn and incorporate new technology,
- Lack of funding for technology use in the classroom, and
- Lack of business contacts in the Worcester community.

3. The Pipeline: OCC Feeders

- A. **Identify all feeders, both actual and potential, to the program. Identify any potential “customized “ feeders the College might be able to develop.**

Response:

Existing Feeders

Existing feeders into the program include:

- area high schools.

Potential Feeders

Potential feeders include:

- local unemployment associations, and
- local industry associations and user groups.

Although we focus on recruitment of high school students, it is important to note that the CSET program has a small percentage of students entering directly from high school. Although no statistics are available, most CSET students have graduated from high school several years ago and have some work experience, most likely not in the IT field. Therefore, focusing on attracting non-traditional students may make better use of our time if we wish to expand our enrollment.

- B. **List all articulation agreements currently in place in this program (i.e., agreements with local secondary schools, community-based organizations, proprietary schools, etc.).**

Worcester Technical School

- CSC 233 – Computer Hardware Support
- CSC234 - Introduction to Networks

Millbury High School

- CSC 233 – Computer Hardware Support (*See Appendix D for details of agreements*)

Both schools offer courses that match up directly with our curriculum. These two courses in our curriculum which matches up to industry standard certification: A+ and Net+ Industry Standard Certification.

- C. **Do program faculty regularly collaborate with their peers in local high schools, four-year colleges and universities, business and industry or community-based organizations on such activities as curriculum development, work-based learning, or professional development? Please cite examples from most recent three-year period. If no active collaboration at this time, please comment on how this type of collaboration might enhance the program. In what ways could the College provide faculty support in this area?**

Response:

Faculty Participation in Local Seminars with High Schools

- Faculty has attended multiple seminars and participated in working groups with local high schools to discuss skill standards and articulation agreements as the opportunity arises.

Potential Collaboration with Four-Year Colleges and Universities

- An area of opportunity that exists is establishing transfer agreements with local four-year colleges and institutions.

- D. Explain the mechanisms in place within the program to insure that students who have been granted credit through articulation agreements transition smoothly into the QCC program. In what ways could the College increase its support in this area?**

Response:

Since existing articulations are based on industry standard courses, students entering the program and taking advantage of the articulation agreements should experience a seamless transition.

- E. Explain the program's involvement with the Tech Prep consortia or other educational collaboratives, if relevant.**

Response:

Experienced Based Education

QCC's involvement in this area has increased notably through the efforts of the Experience Based Education program. Since our CSET program courses often focus on skillsets needed to pass industry standard certification, we grant credit to students that have passed industry standard exams. For example:

- CompTIA's A+ certification equates to 3 credits for CSC 233
- CompTIA's Net+ certification equates to 3 credits for CSC 234
- Microsoft's MCP for Win 2000 Professional equates to 3 credits for CSC 141
- Microsoft's MCP for Win 2000 Server equates to 3 credits for CSC 241
- CompTIA's I-Net+ or Microsoft's MCP for Implementing and Administering a Microsoft Windows 2000 Network Infrastructure equates to 3 credits for CST 231

We also allow students to submit portfolios for review of existing experiences and skills. Both of these allow working students, to obtain credit for existing skills and skip directly to courses in which they will obtain new skills.

QCC's Continuing Education (CE) Agreements

- Since QCC's Continuing Education offers some courses to business that are similar or the same in content as ours, we offer credit for some courses completed through QCC's CE.

Tech Prep Activities

In addition, Marcia Skillings is active in improving relationships and agreements with all members of the Tech Prep consortia as well as with other educational coalitions. Some activities that have resulted from this effort are:

- Campus tours and program overviews for prospective students,
- Breakfast meetings to foster networking with Worcester County schools
- Establishing agreements with Worcester County high schools.

F. Summary and Analysis: The Pipeline: QCC Feeders

Response:

Additional Feeders Not Necessary to Maintain Enrollment at this Time

- The CSET Program is not lacking for students at this time. It is growing exponentially at this time, probably due to the attractiveness of the field: high salaries and fast-paced. Prior to increasing enrollment, additional faculty with advanced IT skills are needed.

Focus of Feeder Programs

- If we do want to increase the enrollment, we should focus on methods to reach the adult learner audience rather than the high school students, since the majority of our students fall into that category.

4. Role of the Program Advisory Committee

A. Is there an Active (meets at least once a year) advisory committee for this program?

Response:

Proposed Advisory Committee

At this time, there is not an advisory committee, however this would be a method to ensure that the CSET Program keeps up with the needs of the community and provides contacts with future potential employers for our students.

B. If yes, what is the composition of the advisory committee? How are appointments made to the committee?

Response:

The proposed advisory committee would consist of IT professionals from a broad-range of industries that utilize computer technologies in the Worcester County area, such as:

- Advertising/Marketing
- Agricultural
- Airline
- Architectural/Engineering
- Construction
- Legal/Attorneys
- Banking/Financial/Accounting
- Manufacturing
- Health Services
- Real Estate
- Computer Services and Consulting
- Computer Manufacturing
- Education
- Restaurant/Food Business
- Wholesale or Retail Sales
- Logistical/Delivery/Trucking
- Insurance
- Hotel Industry
- Telecommunications

The companies should vary in size from small business to corporations.

Participation on the committee would be voluntary at our request with terms of 3 years.

C. Explain the roles and responsibilities of this committee

Response:

Proposed Advisory Committee Responsibilities

The advisory committee would meet twice a year to discuss industry trends and identify new or enhanced skills that they need in their IT employees.

D. If possible, cite examples of how committee input has had an impact on the program over the last 3-5 years.

Response:

N/A

E. Summary and Analysis: Role of the Program Advisory Committee

Response:

Establishment of an advisory committee is proposed to ensure that our students graduate with the IT skill set needed to obtain employment in Worcester County. The advisory committee would contain IT professionals from a broad range of industries in the area.

5. Competition, Market, Strategies, and Enrollment Projections

A. Identify the program's primary competitors. Describe the process utilized and/or the rationale to determine the list of competitors.

Response:

QCC's primary competitors in this area are:

Other colleges in the local area that have like curriculum

- Springfield Technical Community College
- Mount Wachusetts Community College
- Massachusetts Bay Community College
- Greenfield Community College
- Bunker Hill Community College
- Middlesex Community College

Other College's Continuing Education Department

- QCC
- Boston University
- Clark University (the biggest IT program in this area)

Independent Training Academies

- New Horizon
- Salter School
- Computer Training Specialists
- Xindra Institute
- Academy of Learning
- Advanced Centers for Technology and Training
- Sylvan Technology Centers (*See Appendix E for examples of curriculum*)

The above list is simply partial. The research entailed research of course offerings from any training organization in the state of Massachusetts. The above list contains a sampling of training organizations within a reasonable driving distance of QCC. The research indicates that most community colleges in the state offer a 2-year degree similar to QCC's CSET degree. Independent training centers and most college's Continuing Education Department offers courses similar to QCC CSET's offerings but in shortened timeframes and at a cost of approximately 10 times the cost of QCCs.

B. Identify QCC's program strengths and market niche with respect to these competitors. In other words, what makes QCC's program the first choice?

Response:

Competition Overview

- Continuing Education (CE) Department's and independent training centers sometimes offer courses beyond what we offer, meaning a better and more complete selection that aligns with industry needs. In fact, this will be good input to determine what we should be offering to better compete. Usually, CEs and independent training centers courses are targeted to a little difference audience that QCCs. They tend to target people already working in business or who have short-term learning needs. These locations usually has state of the art technology and facilities.

QCC Benefits and Drawbacks

- Benefits - QCC offers a well rounded education, not just technical. We provide higher quality technical training because we provide basic theory and then very technical hands-on training in specific technologies. QCC's tuition is very affordable.
- Drawbacks - QCC has neither state of the art technology (which directly effects the quality of student learning) nor facilities. Currently, we are using hardware technology outdated by at least

several years and sometimes 10+ years. Our facilities consist of a single small classroom packed full with computers placed on tables around the walls without appropriate cooling systems. With a full class, the classroom is too full to move freely and becomes hot. Because we only have one classroom, it is not available to students outside of their scheduled class time.

C. Explain the specific marketing strategies the College has employed with respect to this program over the last three to five years. Please do NOT list general marketing strategies here. Identify marketing efforts relevant to your program specifically.

Response:

Other than presentations providing an overview of the CSET program to visiting high School students and participating in college open houses, no marketing has been done for the CSET Program.

D. Describe how program faculty work with the admissions officers to recruit students into the program. If unknown, outline a recruitment plan with specific activities.

Response:

The coordinator often presents to high school students visiting QCC and participates in QCC career fairs.

E. Is the need for this program expected to grow or decline over the next five years? Please base your response on specific data.

Response:

Currently, we have approximately 70 students listed as CSET majors, with a few graduating this spring and approximately 20 new students in the fall, based on my conversations with high school students and inquiries into the program so far this year and documented growth last year of 32 to 70 students.

F. Based on analysis of information presented in this section, prepare enrollment projections for the next five years. Please describe what you believe is the optimum program size.

Response:

CSET Enrollment Projections

Obviously, targeted marketing and recruiting could easily raise enrollment. On our current course without targeted marketing, enrollment projections should resemble the following table:

Academic Year	Actual/Projected	Enrollment
2000 – 2001	Actual	32
2001 – 2002	Actual	70
2002 – 2003	Projected	90 – 110
2003 – 2004	Projected	105 – 125
2004 – 2005	Projected	110 – 135
2005 – 2006	Projected	125 – 145
2006 – 2007	Projected	135 – 155

However, we have very limited facilities of a single regular-sized classroom with outdated computer equipment on tables against the walls, unless we update and expand the facilities, we should consider limiting enrollment at no more than 100.

G. Summary and Analysis: Marketing Strategies, and Enrollment

Response:

Without Additional Marketing

Due to IT career opportunities, the CSET Program is expected to continue it's current growth pattern unless enrollment limits are put in place. However, due to our limited facilities and computer lab resources, we will not be able to support this growth by the 2003 – 2004 academic year.

With Additional Marketing

If we would like to increase enrollment in the CSET Program, we should:

- Improve and expand our computer lab facilities,
- Identify new courses to fill the learning gap that currently exists to meet industry needs (Unix, Routing, and Technical Writing),
- Hire additional faculty with advanced IT skills, and
- Target adult learners that are interested in a new career path or enhancing their existing IT career.

6. Opportunities for Program Expansion

A. Are there other directions this program might evolve in order to sustain currency and quality? Consider the following categories, but feel free to include other categories in your response:

- **New certificate options within the program**
- **New concentrations within the program**
- **Different career ladder options within the program**
- **New associate degree program possibilities**
- **Development of modularized courses**
- **Continuing/professional education in the field (i.e., CEU's, prep for recertification, etc.)**
- **Distance education course development**
- **More proactive job placement/ support post-graduation**
- **Other...**

Response:

Career Ladder structure of Coursework

Currently, the CSET coursework is designed to provide skills that could get a student a job after a single year. With each additional semester, the student will gain skills to increase his marketability and increase his potential salary.

Update Current Associates Degree Program to Meet Industry Standards and Needs

Currently, the course descriptions are outdated (for example, old technology is described), courses that are no longer relevant to the industry need to be removed, and new courses need to be introduced. This would prepare our students much better for the needs in industry today.

Offer Certificate Programs

We should offer certificate programs for students who wish to advance their education but are unable to pursue a 2-year degree. These certificate programs should be one year or less. Certificates could also be offered for those who already have our Associates degree. These certificates would focus on some highly desired or new technology skill sets for industry. We should continue to market to students who have graduated from our program with new offerings that meet the ever-changing industry needs and foster a life-long learning partnership with our students.

Modularized Courses

Modularized courses could be offered beginning with out existing online courses.

Offer Additional Online Courses

We currently offer two online courses (CSC 233 Computer Systems I and CST 235 Network Management) in the curriculum. However, due to limited classroom space, we should consider offering more courses online beginning with:

- CSC 234 Computer Systems II
- CST 231 Networking with TCP/IP
- CSC 141 Operating Systems

B. Summary and Analysis: Opportunities for Program Expansion

Response:

Opportunities for Program Expansion

- Opportunities for Program Expansion do exist. Some approaches to accomplish this include:
- Update curriculum to meet industry needs,
- Eliminate the every-other-semester course cycle (to allow students to enter program in spring or fall),
- Expand facilities to two computer labs,
- Update technology used in the classroom,
- Offer more online courses,

- Consider modular courses,
- Consider offering courses in condensed timeframes,
- Offer more weekend courses,
- Provide more visibility to the Program through marketing,
- Offer short-term Certificate Programs (1 year or less), and
- Offer advanced Certificate Programs (for students who already have a degree or want to focus in a single area of expertise).

Section II: Curriculum, Instruction, Assessment, Program Credentials and Faculty

1. Foundations of the Program

A. Describe the rationale for offering the degree with respect to environmental scan information (job outlook) and its unique niche in its particular Employment sector.

Response:

This degree field is listed on all employment reports as one of the fastest growing fields on top of a large employment sector currently existing. These statistics include the following:

- Large employment sector of 10 million.
- Information Technology Association of America (ITAA) projects a national shortfall of 843,329 employees over the next 12 months (thru the end of 2002).
- ITAA lists technical support and network design as the number 1 and 4 hottest jobs of 2001.
- MA Division of Employment and Training expects a 90% growth in this field over the next 6 yrs (thru 2008).
- Bureau of Labor Statistics expects greater than 36% growth in this field over the next 6 years. (See Appendix A for details)

B. List degree or certificate objectives in measurable terms (6-8 overall statements)

Response:

Currently, students have two basic options:

- Computer Systems Engineering Technology Associate in Science, and
- Transfer to 4-year institutions.

An additional option should include a 26 credit certificate option, PC Specialist Certificate, that would give students skills needed for an entry-level position in the IT field. This certificate could be obtained in 2 semesters.

C. Define expected graduation competencies or student outcomes. Your response should include reference to general education outcomes, employability or “umbrella competencies”, and career-related competencies or technical skills.

Response:

The goals and competencies for the CSET program were derived from a study of industry standard job skills needed in IT. (See Appendix F for examples and sources)

Upon graduation from QCC with an Associate of Science in Computer Systems Engineering Technology, a student will obtain:

- Fundamental professional skills including communications, math, and writing through 21 credits of liberal arts.
- An understanding of basic business functions enabled by IT including the implementation and use of basic end user software in an office environment.
- An understanding of the fundamentals of computer electronics.
- Ability to perform support and maintenance of computer hardware.
- Ability to design, implement and maintain local and wide area computer networks.
- Ability to perform implementation and support of multiple industry standard computer operating systems in enterprise networking environments.
- An understanding of basic programming structures and algorithms.
- Ability to design and implement routing basics utilizing the TCP/IP protocol.
- An understanding of the management of IT components and projects involving their implementation.
- Experience in an IT business environment through cooperative education.

Upon completion of the PC Specialist Certificate from QCC, a student will obtain:

- Fundamental professional skills including communications, math, and writing through 9 credits of liberal arts.
- An understanding of basic business functions enabled by IT including the implementation and use of basic end user software in an office environment.
- Ability to perform support and maintenance of computer hardware.
- Ability to perform implementation and support of multiple industry standard client operating systems.
- An understanding of basic programming structures and algorithms.

D. Describe how the program supports the College's mission and purposes

Response:

The CSET program supports the college's mission by providing:

- Students with career skills,
- Students 2-year education transferable to a 4-year institution, and
- Local business community with a skilled workforce.

E. Prepare a draft program mission statement.

Response:

The mission of the CSET Program is to prepare students for a broad range of career opportunities in the Information Technology (IT) field. Graduates are prepared to work in virtually any business or organization that utilizes computers and computer networks. This is accomplished by adhering to industry standards developed to measure and promote the competency of IT professionals.

F. Summary and Analysis: Foundations of the Program

Response:

The foundation of the CSET program is solid in terms of:

- Need - All researched job outlook projections have shown high rates (36% to 112% increase) over the next 6 years (thru 2008). The CSET program has been growing at a high rate (at least 100% per year) over the last 2 years with no formal marketing attempts.
- Direction – The direction of IT is constantly changing. To clearly identify the programs mission and goals, research on the current industry standard job skills in IT was performed. This was utilized to develop the ten major program goals.
- Audience - The audience in the Worcester area includes graduated high school students, unemployed adults looking for retraining or a new profession, and adults currently working in the field to obtain a degree. .

2. Curriculum Strengths and Areas Needing Enhancement

A. Based on the analysis of regional labor market needs, evaluate the current curriculum strengths and identify those areas that you believe require enhancement.

Response:

Although the CSET degree program is growing at a fast pace, it is clear that it is not keeping up with the needs of industry. Proposed changes:

- Modify the CSET Associate in Applied Science include:
- Update course content of existing classes to reflect new technology and trends.
- Add new classes that include new technology skills.
- Eliminate classes that have less relevance to IT today.
- Add a 26 credit PC Specialist Certificate.

B. Include the proposed curriculum for each of the current or proposed options in the program.

Response:

The proposed CSET AS curriculum include

<i>Semester One</i>	<i>3cr</i>	<i>Semester Three</i>	<i>3cr</i>
<i>Intro to Comp Apps in Tele</i>	<i>3cr</i>	<i>Windows Srvr Op Systems</i>	<i>3cr</i>
<i>Psych of Interpers Relations</i>	<i>3cr</i>	<i>Technical & Work Writing</i>	<i>3cr</i>
<i>Computer Electronics</i>	<i>4cr</i>	<i>Network Management</i>	<i>4cr</i>
<i>English Comp & Lit I</i>	<i>3cr</i>	<i>Networking w/TCP/IP</i>	<i>4cr</i>
<i>College Math I</i>	<i>3cr</i>	<i>Unix Op Systems I</i>	<i>4cr</i>
<i>Semester Two</i>	<i>3cr</i>	<i>Semester Four</i>	<i>3cr</i>
<i>Windows Client Op Systems</i>	<i>3cr</i>	<i>Business Elective</i>	<i>3cr</i>
<i>Intro to Comp HW & Support</i>	<i>4cr</i>	<i>Cooperative Work Exp</i>	<i>3cr</i>
<i>Intro to Networking Tech</i>	<i>4cr</i>	<i>Enterprise Networking</i>	<i>4cr</i>
<i>English Comp & Lit II</i>	<i>3cr</i>	<i>Speech Communications</i>	<i>3cr</i>
<i>Intro to Prog with C++</i>	<i>3cr</i>	<i>Intro to Routing</i>	<i>3cr</i>
		<i>Liberal Arts Elective</i>	<i>3cr-4cr</i>
		<i>Total Credit</i>	<i>70cr-71cr</i>

The above curriculum aligns with the previously defined program goals as follows:

<i>Program Goal</i>	<i>Course Implementation</i>	<i>In Support of Industry Standard Certification</i>
<p>Goal 1 Fundamental business skills including communications, math, and writing through 21 credits of liberal arts.</p>	<ul style="list-style-type: none"> • Business Elective: (MGT 101, MGT 211, MKT 201, BSL 101, or BSL 103) • Psychology of Interpersonal Relations (PSY 118) • English Composition & Literature (ENG 101) • English Composition & Literature (ENG 102) • Technical & Workplace Writing (ENG 205) • College Math I: Precalculus (MAT 123) • Speech Communication Skills (SPH 101) 	

Goal 2 An understanding of basic business functions enabled by IT including the implementation and use of basic end user software in an office environment.	<ul style="list-style-type: none"> Intro to Computer Apps in Telecomm (CIS 115) 	Microsoft MOUS
Goal 3 An understanding of the fundamentals of computer electronics.	<ul style="list-style-type: none"> Computer Electronics (ELT 110) 	
Goal 4 Ability to perform support and maintenance of computer hardware.	<ul style="list-style-type: none"> Intro to Computer Hardware & Support (CSC 233) 	CompTIA A+
Goal 5 Ability to design, implement and maintain local and wide area computer networks.	<ul style="list-style-type: none"> Intro to Networking Technologies (CSC 234) 	CompTIA Net+
Goal 6 Ability to perform implementation and support of multiple industry standard computer operating systems in enterprise networking environments.	<ul style="list-style-type: none"> Windows Client Operating Systems (CSC 141) Windows Server Operating Systems (CSC 241) Enterprise Networking (CST 238) Unix Operating Systems (CST ---) 	Microsoft MCSE CompTIA Linux+
Goal 7 An understanding of basic programming structures and algorithms.	<ul style="list-style-type: none"> Intro to Programming with C++ (CIS 121) 	
Goal 8 Ability to design and implement routing basics utilizing the TCP/IP protocol and implement common TCP/IP services and utilities.	<ul style="list-style-type: none"> Networking with TCP/IP (CST 231) Intro to Routing (CST ---) 	CompTIA iNet+ Cisco CCNA
Goal 9 An understanding of the management of IT components and management of projects involving their implementation.	<ul style="list-style-type: none"> Network Management (CST 235) 	CompTIA IT Project+
Goal 10 Experience in an IT business environment through cooperative education and seminars.	<ul style="list-style-type: none"> Coop Work Experience & Seminar (CST 299) 	

(See Appendix F for details on new or modified courses included in the CSET curriculum)

The above proposed CSET AS curriculum includes the following changes:

Change names of 4 existing courses to more closely reflect course contents:

- Windows Client Operating Systems
- Windows Server Operating Systems
- Introduction to Computer Hardware and Support
- Introduction to Networking Technology

Rewrite course descriptions of 2 existing courses to use generic terms for technology rather than vendor specifics, so as technology changes, the course descriptions won't need to be updated.

- Windows Client Operating Systems
- Windows Server Operating Systems

Rewrite course descriptions of 2 existing courses to accurately reflect course contents.

- Network Management
- Enterprise Networking

Modify prerequisites within the program to match current need. Change Program Elective to one of the following Business Electives.

- Introduction to Business (MGT 101)
- Principles of Management (MGT 211)
- Principles of Marketing (MRK 201)
- Business Law 1 (BSL 101)
- E-Business Law & Ethics (BSL 103)

Replace CSC 221 C++ for Scientist and Engineers with CIS 121 Introduction to Programming with C++ to shift focus from math to currently needed programming skills.

Add existing course of ENG 205 Technical and Workplace Writing to respond to industry needs.

Add 2 new course (to be developed) to respond to industry needs:

- CST Unix Operating Systems I
- CST Introduction to Routing

Remove 2 courses: ELT 121 Digital Circuits and MAT 124 College Math II: Trigonometry that are less relevant in this computer field.

The proposed new PC Specialist Certificate includes

<i>Semester One</i>		<i>Semester Two</i>	
<i>Intro to Comp Apps in Tele</i>	<i>3cr</i>	<i>Windows Client Op Systems</i>	<i>3</i>
<i>Psych of Interpers Relations</i>	<i>3cr</i>	<i>Intro to Comp HW Support</i>	<i>4</i>
<i>English Comp & Lit I</i>	<i>3cr</i>	<i>Unix Op Systems I</i>	<i>4</i>
<i>College Math I</i>	<i>3cr</i>	<i>Intro to Prog with C++</i>	<i>3</i>
		<i>Total Credits</i>	<i>26cr</i>

The above proposed PC Specialist Certificate curriculum prepare students for entry-level IT position as a PC Specialist with the following skills:

- Microsoft Office Applications (MOUS)
- PC Hardware Repair (CompTIA's A+)
- PC Operating Systems:
- Windows 95/98/ME/2000/XP (Microsoft's MCPs)
- Unix
- Entry-level Programming Skills

C. For each course in the revised curriculum, provide a description, statement of goals, major topics covered, primary tests or materials, and instructional technology used. (Please refer to the attached format.)

Response:

The following table provides a brief overview of the courses within the proposed CSET curriculum. For a complete description of modified and/or new courses, see attachment. (See Appendix F for complete details on new or modified courses included in the CSET curriculum)

Course Title	Course #	Description/Statement of Goals	Instruction Methods
Cluster A			
Introduction to Computer Apps in Telecommunications Or Introduction to Microcomputer Applications in Business	CIS 115 Or CIS 111	Provides introduction to the use of computers including computer hardware, operating systems, and end-user software (such as word processing, spreadsheets, browsers, and database tools).	Lecture/Lab Online
Computer Electronics	ELT	Provides a basic course in electronics	Lecture/Lab

	110	and how it relates to the design of computers in a hands-on environment.	
Psychology of Interpersonal Relations	PSY 118	Provides basic personal communications needed in the workplace.	Lecture
English Composition & Literature I	ENG 101	Provides reading/writing skills needed in the workplace.	Lecture
College Math I: Precalculus	MAT 123	Provides basic math skills needed in the computer technology field.	Lecture
Cluster B			
Windows Client Operating Systems	CSC 141	Provides knowledge and hands-on experience in the selection, installation, configuration, and maintenance of client operating systems. Prepares students to sit for their MCP in the current Microsoft client operating system.	Lecture/Lab
Introduction to Computer Hardware and Support	CSC 233	Provides knowledge and hands-on experience in building and repairing personal computers.	Lecture/Lab Online
Introduction to Networking Technologies	CSC 234	Provides students with knowledge and hands-on experience in building computer networks.	Lecture/Lab
English Composition & Literature II	ENG 102	Provides reading/writing skills needed in the workplace.	Lecture
Introduction to Programming with C++	CIS 121	Provides students with an introduction to programming constructs needed in computer systems administration.	Lecture/Lab
Cluster C			
Windows Server Operating Systems	CSC 241	Provides knowledge and hands-on experience in the selection, installation, configuration, and maintenance of server operating systems. Prepares students to sit for their MCP in the current Microsoft server operating system.	Lecture/Lab
Technical and Workplace Writing	ENG 205	Provides students with knowledge and experience in writing technical documentation.	Lecture
Network Management	CST 235	Provides students with knowledge and hands-on experience with planning and management a network in a business environment.	Lecture/Lab Online
Networking with TCP/IP	CST 231	Provides knowledge and hands-on experience in designing, installing, configuring and managing a TCP/IP network.	Lecture/Lab Online
Unix Operating Systems I	CST 2##	Provides knowledge and hands-on experience in the selection, installation, configuration, and maintenance of server operating systems. Prepares students to sit for a certification exam on the Unix	Lecture/Lab

		operating system.	
Cluster D			
Business Elective	---	Provides students with introductory business knowledge needed to assist them in understanding computer implementations in a business environment.	Lecture
Cooperative Work Experience & Seminar	CST 299	Provides students with some real business experience in the computer systems engineering technology field.	On the job
Enterprise Networking	CST 238	Provides students with knowledge and hands-on experience in designing, installing, configuring, and maintaining a network environment with multiple hardware and operating systems. This course focuses on connectivity between operating systems as well as overall functionality of the network (including Web and email servers).	Lecture/Lab
Speech Communication Skills	SPH 101		Lecture
Introduction to Routing	CST 2##	Provides students with knowledge and hands-on experience in routing traffic among various networks.	Lecture/Lab
Liberal Arts Elective	---		Lecture

D. Describe the rationale for the course sequence in the revised program. A rationale of course sequence should be provided for the specific program related courses, the general education courses, electives, etc.

Response:

The course sequence loads many liberal arts courses in the first semester since one computer related prerequisite is needed up front. The remaining liberal arts courses are spread out over the remaining semesters to balance the course load between highly technical courses with laboratories and liberal arts. Many of the technical computer-related courses require prerequisites that build upon previous knowledge, therefore the course sequence is directly related to this. (See Appendix G for course knowledge dependencies)

E. Explain how the general education components are integrated with the department specific courses.

Response:

Careful consideration and integration was used when selecting the liberal arts courses. In all of our technical coursework, writing skills are needed. In many of the technical courses, business, communications and presentation skills are also needed. For example, in Network Management and Enterprise Networking, students are presented with a common business scenario and are responsible in designing a solution. Students are then required to develop the solution in the laboratory and/or present written documentation and presentations to sell their solution to the rest of the class.

**F. Does the curriculum incorporate “writing across the curriculum”?
Provide an illustration, if applicable.**

Response:

See above *E*.

G. Describe how the program meets the QCC philosophy of “high tech, high touch, high quality”.

Response:

The CSET program does follow QCC’s philosophy. The courses presented include the latest technology in a hands-on environment. The quality is superior over other institutions because we often have certified instructors or instructors with business experience teaching in a combination environment of lecture and hands-on.

H. Does the program structure provide students with at least one elective choice? Please explain your response: If no, is it possible to revise the curriculum so that there is at least one elective? Please explain your response.

Response:

In the proposed CSET AS curriculum, students have 2 electives:

- Liberal Arts Elective
- Business Elective:
 - Introduction to Business (MGT 101)
 - Principles of Management (MGT 211)
 - Principles of Marketing (MRK 201)
 - Business Law 1 (BSL 101)
 - E-Business Law & Ethics (BSL 103)

I. Summary and Analysis: Description of Curriculum

Response:

Although the CSET degree program is growing at a fast pace, it is clear that it is not keeping up with the needs of industry. Proposed changes:

- Modify the CSET Associate in Applied Science to:
- Update course content of existing classes to reflect new technology and trends.
- Add new classes that include new technology skills.
- Eliminate classes that have less relevance to IT today.
- Add a 26 credit PC Specialist Certificate to provide entry-level IT skills in 2 semesters.

3. Relevance of Instructional Methodologies, Assessment Strategies and Program Credentials

A. Summarize the INSTRUCTION METHODOLOGIES utilized in the program. What are the strengths and challenges of these methodologies?

Response:

The strengths of our program are as follows:

- Lecture combined with hands-on experience in the laboratory. This is a very powerful learning environment that combines the theoretical knowledge needed with a real life learning experience.
- Laboratory assignments integrate writing, presentation, math, communications, and business skills together with the technical skills necessary in the workplace through case study projects. The technical skills do not go very far if students are unable to apply them in a business environment. This is a common complaint that industry has with this type of training.
- Our instructors keep current with technology, some have business experience, and some are certified. However, it is difficult to find instructors that have good IT experience in business and/or instructors that are industry standard certified.

B. Provide recommendations for additional methodologies that would enhance students' learning. More specifically, are there additional ways in which instructional technology could enhance students' learning? Options for distance learning? Please explain your answer, and include how the College might support these efforts.

Response:

The following would provide enhancement to the student's learning:

- Improved lab facilities. Four major improvements are needed:
 - An additional lab. We currently have one lab that is booked solid from 8am to 10pm. This prohibits students from spending time on their own in the lab or being able to make up a lab that they have missed. We need to provide our students with the "open lab" concept where they can come and go as fits their schedule. This would be a major building block in the foundation of our program emphasizing that students could learn all they want to (even beyond what is discussed in the classroom) at their own pace and at their convenience in QCC's state-of-the-art facilities.
 - New quality computers for lab use. We currently purchase fairly inexpensive computers and components that are subject to breaking and other problems with heavy student use. We also take equipment from other parts of the college and filter them over to the lab when they are replaced. This is fine for some of the learning, but the equipment seems to be outdated when we first get it, which causes a problem in some cases. For example, older equipment with not run newer operating systems.
 - Technology to adequately support the network infrastructure for the laboratory such as dedicated servers and routers.
 - Materials and equipment to support additional learning such as various cable so that students can have hands-on experience in making cables with a variety of connectors.
- Release time for instructors to keep current on technology is needed. This field is a very difficult field with technology constantly changing. When instructors need to learn new products (such as operating systems) to keep our courses current, time invested in learning and redesigning course projects is great. For example, Microsoft produces a new release of their operating systems every year or two. When this happens, Microsoft no longer sells their older operating systems on new computers, therefore, every new machine will have the new operating system. As we move to teaching the new operating system in our classroom, we have to change the texts and classroom materials to accommodate in several classes.
- Additional online classes would provide additional options for working professionals. We are already moving in this direction with a total of 5 or 6 online classes in our curriculum available in fall or 2002.

C. Please provide a detailed assessment plan outlining the methodologies used for ongoing student assessment and final outcome assessment.

Response:

The following is a list of assessment tools currently used in the classroom:

- Case study projects – this approach is the most accurate assessment of whether the student can successfully implement the knowledge necessary in this field.
- Quizzes and Exams – these are important indicators if students have done reading assignments and participated during lectures. Although students enjoy the case study projects much more, this assessment is still necessary since it prepares them for the information covered on and the format of the industry standard certification exams.
- Capstone Course (Enterprise Networking) – utilizes the above assessment approaches but also builds upon all previous coursework, requiring the student to remember and utilize skills previous gained.

D. Describe the strengths and challenges of each of the assessment methodologies listed above.

Response:

The strengths of the case study projects are that they replicate real-life business scenarios and the students success or failure probably represents their future work. The weakness of this method is that QCC often does not have technology available to fully test this approach.

E. Provide recommendations for additional methodologies to evaluate student achievement.

Response:

QCC directly aligns its technical coursework with highly desired industry standard certification. We encourage students to take the exams (although there is a cost of \$100-\$150 associated with the exams) because they are so highly recognized and respected in the IT field. If students have passed the corresponding certification exams, we will give them credit for that class. This is particularly useful for students who are already in the field and want the degree but already have most or all of the skills taught in particular classes. We should continue to focus more on the industry standard exams and incorporate their test questions into ours.

F. Has the program been evaluated by an EXTERNAL ACCREDITATION organization within the last five years?

Response:

No, there are no external accreditation organizations for IT education however, there are many industry standard certifications available in this field.

G. If yes, please provide name of the organization and date of last accreditation review. Did the program meet all of the accreditation requirements? If no, please explain. Attach the summary of the accrediting team's recommendations.

Response:

N/A

H. If the program has not been evaluated externally, list any appropriate professional accreditation or licensure for the program that the College should pursue. (E.g., Industry certifications, professional associations, etc.)

Responses:

There are numerous industry standard certifications for this field. These certifications are recognized throughout the world and are better known than college degrees because of the standardization. QCC's goal has been and will continue to be in the future to align our coursework with these industry standard certifications:

- CompTIA's A+
- CompTIA's Net+
- CompTIA's I-Net+ (new in proposed curriculum)
- CompTIA's IT Project+ (new in proposed curriculum)
- CompTIA's Linux+ (new in proposed curriculum)
- Cisco's CCNA (new in proposed curriculum)
- Microsoft Certified Systems Engineer (MCSE) or Microsoft Certified Systems Administrator (MCSA) that each consists of a series of 4 to 7 exams known as MCPs.

I. What changes, if any, might need to be considered to foster enhanced program quality?

Consider the following, but you need not limit your response:

- **change in admission requirements**
- **inclusion of an internship or other work-based learning experience**
- **introduction of 1 or 2 electives to allow students to self-select learning opportunities**
- **development of a capstone course to synthesize the learning experience**
- **varied instructional methodologies**
- **enhanced assessment of student competencies**
- **better integration of technology applications**
- **specific instructional aides/software etc.**
- **more coordination of faculty efforts, including the possibility of more full-time faculty**
- **attainment of program accreditation, certification, or licensure**

Response:

There are many of the above that the CSET program has already pursued:

- Change in admission requirements – the admission requirements were changed in Spring of 2002 to allow students who needed developmental math or English to enroll in our program.
- Inclusion of an internship or other work-based learning experience – a coop has been included in the last semester of our AS degree for several years.
- Introduction of 1 or 2 electives to allow students to self-select learning opportunities – we continue to offer students electives (under the proposed plan, Business and Liberal Arts electives) however we have not developed electives in the CSET curriculum.
- Development of a capstone course to synthesize the learning experience – we have offered and will continue to offer Enterprise Networking in the last semester of our curriculum as a method of taking all skills learned throughout the program and tying it together.
- Varied instructional methodologies – we have and will continue to combine lecture with hands-on learning environments.
- Enhanced assessment of student competencies – continue focus on industry standard certification exams and provide practice tests for our students.
- Better integration of technology applications – we continue to integrate hands-on experience of computer and networking technologies.
- Specific instructional aides/software etc. – we continue to teach the latest operating systems technology.
- More coordination of faculty efforts, including the possibility of more full-time faculty – we continue to try to coordinate efforts among faculty to use the same books and the same projects so that all students get consistent instruction regardless of the instructor.
- Attainment of program accreditation, certification, or licensure – currently the program coordinator has several industry standard certifications.

However additional efforts can be made:

- Modify existing instructional methodologies by providing less instructor-led laboratories and provide students with open-lab time. Currently for each of our technical courses we offer 2 to 3 hours of lecture and 3 to 4 hours of lab, both of which are instructor led. This requires students to commit to a specific 5 to 7 hour block each week per class. The modification would provide some

- flexibility for students on when to attend lab. It would also require less hours of instructor time. However, this would only be possible if we had lab assistants to mind the operations of the lab.
- Update laboratory equipment and software.
 - Obtain a second laboratory classroom for “open lab”.
 - Obtain a laboratory monitor or assistant in the laboratory classrooms to monitor use of equipment since we often lose components from the classroom through theft.
 - Develop additional articulation agreements with area high schools.
 - Develop transfer agreements to other 4-year schools.
 - Additional faculty as the program grows would allow faculty to focus more on 2 or 3 different class preparations rather than 5 or more.
 - Provide incentives for instructors to obtain certification. When the instructors are certified, it allows them the knowledge needed to better assist students in gaining certification.

J. Summary and Analysis: Relevance

Response:

Although the strength of our program is our instructional approach that combines both classroom lecture with instructor-led hands-on laboratory, this could be further strengthened by providing an “open-lab” available to the students for a wide range of hours. It would allow students to make up lab assignments that they missed, explore learning opportunities that are discussed in class but not fully explored due to time limitations in the lab, study and practice for certification exams, or self-paced learning.

A recommendation that would improve the utilization of faculty would be to cut back on instructor-led labs and substitute some open lab time for students to work on their own.

4. Program Growth Opportunities

- A. In your opinion, would it be beneficial to develop a common core curriculum along related career programs? E.g., computer education, business, administrative support, electronics, etc.) Please explain your answer.**

Response:

This program used to be part of the Electronics common core curriculum, however, the proposed curriculum pulls it out. This change was proposed because there were things taught in the core curriculum that were less useful to students than many things that were missing from the program. For example, Digital Circuits is taught as part of the core curriculum, however, most of the information taught in this course isn't very relevant to computer networking today. The CSET curriculum is lacking in Unix and Routing skills which all computer networking professionals need today. As a result, the proposed CSET curriculum separates away from the Electronics common core so that needed courses can fill slots that less relevant courses currently fill.

- B. Describe, in detail, all potential areas for program growth. Include, but do not limit your response to the following:**

- **Career Ladder Potential**
- **New Degree or Certificate Options**
- **Professional/continuing Education Opportunities**
- **Professional Recertification Preparation/Test**
- **Flexible Delivery Options**
- **Enhanced Instructional Methodologies**
- **Improving Assessment for Student Competencies**
- **Distance Learning Course Development**

Response:

Several new growth opportunities exist:

- The PC Specialist Certificate would provide an option for students who have a limited amount of time to obtain new skills in the IT profession, while providing a growth opportunity into a CSET AS degree with many more career options.
- We could market the CSET curriculum as a "life-long learning partner" for IT professionals. Since we will be teaching the latest technologies, students who have graduated in the past, can return for inexpensive credited courses that update their existing skills. Several graduated students have expressed interest in the 2 newly proposed courses that provide Routing and Unix skills.
- We should also explore 1 credit exam preparation courses for working professionals (although the CCE may already be doing this).
- Another potential money-making option (which would probably fit in the CCE a little better) would be the possibility of becoming a testing center (such as a Prometric Testing Center). This would provide our students with an onsite testing center and may prove to be a money-making opportunity (testing centers get a percentage of the test fees).
- One challenge that we face with limited classroom and enrollment is that we can only offer one section of a class per semester and we must offer it when the classroom is available. With these limiting factors, students often cannot enroll in the one section being offered, therefore we should continue to explore online courses as well as online modular courses. As of Fall of 2002, 6 or 7 courses in the CSET curriculum will be available online.

C. Summary and Analysis: Program Growth Opportunities

Response:

The CSET program is already busting at the seams without any new marketing. It seems as though the track that we are currently on, appears to be the right track. We are offering online courses and aligning our technical courses to industry standard certification. The newly proposed PC Specialist Certificate will attract individuals who desire to obtain entry-level job skills in two semesters.

5. Students and Program Assessment (Review relevant data over the last five year period.)

- A. What have been the incoming students' average scores on QCC placement tests each year for the last five years?**

Response:

Since this program is so new with few graduates to date, an appropriate amount of data to base these statistics is not available.

- B. What is the graduation students' average college GPAs over the last five years? GPAs in major courses? Please describe the additional measures of central tendencies: i.e. median, mode, etc.**

Response:

Since this program is so new with few graduates to date, an appropriate amount of data to base these statistics is not available.

- C. If relevant, how have students performed during their field placements or related work based learning experiences?**

Response:

Based on input from coop employers, CSET students are well prepared technically for their positions and exhibit a quality work ethic. Many graduates have also reported back to the program coordinator on progress at the work site, noting that their employers have been impressed with computer hardware and Microsoft operating systems skills. Some graduates have expressed interest in additional skills including Unix and Routing.

- D. Indicate the number of students who have transferred to four-year programs, if applicable.**

Response:

Since this program is so new with few graduates to date, an appropriate amount of data to base these statistics is not available. However, of the five 2001 graduates, only one planned to continue to a 4-year institute and that would be done in conjunction with working full time.

- E. Track the average earnings of program graduates each year for the three years immediately following graduation.**

Response:

Since this program is so new with few graduates to date, an appropriate amount of data to base these statistics is not available.

- F. Provide a summary of the program's enrollment patterns over the last five years.**

Response:

Since this program is so new with few graduates to date, an appropriate amount of data to base these statistics is not available.

- G. Indicate the program retention rate over the same period. Note: Consider two cohorts: fall to spring (same year); fall to Following Fall (one year).**

Response:

Since this program is so new with few graduates to date, an appropriate amount of data to base these statistics is not available

H. Determine the average number of semesters it takes for students to complete the program.

Response:

Since this program is so new with few graduates to date, an appropriate amount of data to base these statistics is not available

I. Define indicators of program quality. Describe strategies used to assess the success of the program in achieving its stated objects.

Response:

Factors that show the success of the program include:

- Employment in the field at graduation. Unofficial statistics gathered from students by the Program Coordinator show graduates of 2002 reflected 100% employment in the IT field within a month of graduation.
- Certification in one or more topics upon completion of courses. Unofficial statistics gathered by the Program Coordinator from students show that graduates of 2002 reflected 80% of students certified in one or more topics.

J. Summary and Analysis: Program Assessment

Response:

An appropriate amount of statistical data is unavailable for the CSET program to derive an assessment of the program success. However, unofficial data shows that our students are getting placed quickly in their career field.

6. Faculty

A. **Is the current faculty able to adequately address the instructional needs of all courses, both general and specialty, in the program?**

Response:

Currently, the program coordinator teaches all third and fourth semester technical classes during the day. Keeping up on the advanced technology and changing the curriculum to match is difficult from a time perspective. As the program continues to grow, additional faculty with advanced skills in computer networking and operating systems technology would be a great improvement to the students and the program coordinator. It would allow more focus on 2 or 3 advanced courses rather than on 5 or more advanced courses. The problem with finding new faculty that already possess these skills is that the average pay in this field for a person with these skills is approximately triple what a full-time faculty member makes.

B. **Is institutional support for upgrading faculty credentials required? If yes, please explain the kind of upgrade required and approximate cost associated with the upgrade?**

Response:

Every year in the CSET field there are new technologies that need to be incorporated into the classroom. For example, last year the following new technologies were learned by faculty and deployed in the classroom:

- Windows 2000 – In several courses, we taught Windows NT (CSC-141 taught NT Workstation, CSC-241 taught NT Server, CST-238 taught both in the enterprise, and CST-231 taught TCP/IP implemented on both platforms). With 2000 replacing NT, faculty was required to learn Windows 2000 Professional, 2000 Server, 2000 Advanced Server, and 2000 Data center and incorporate those four new operating systems in the above mentioned courses.
- Wireless networking – This new technology and popular trend was incorporated by faculty into several classes: CSC-233 Computer Systems II (proposed Introduction to Networking Technologies), CST-231 Networking with TCP/IP, CST-238 Enterprise Technologies, and CST-235 Network Management.
- Red Hat Linux 7.0 – For addition to CST-238 Enterprise Technologies since we didn't have a Unix class.
-

Next year, faculty will need to learn:

- Windows XP for at least CSC-141 Microsoft Client Operating Systems.
- IT Project+ for CST-235 Network Management.
- SNMP monitoring tool for CST-235 Network Management.
- Current Cisco Routing operating system for new course.
- Current Unix operating system for new course.

There are several needs that could assist faculty in obtaining updated skills as the technology changes:

- Assistance in maintaining student resources in the lab. Currently this mostly falls on faculty and with the number of students, it becomes unmanageable.
- Full-time lab assistants/supervisors. This would allow us to have open lab and keep better track of the hardware and software in the labs. They could also provide some basic assistance to students and/or faculty.
- Release time for new course development and course maintenance (as technology changes). We have tried to design our course descriptions to be independent of specific vendor technology, however we always attempt to teach the current more popular software and hardware technologies.
- Off-site vendor training (when requested).
- Reimbursement of certification testing.
- Practice certification test software (this would assist students as well).

C. Over the last five years, what has been the ration between full-time and part time faculty within this program?

Response:

This program shares faculty with other programs within the Electronics core curriculum therefore there is only a single dedicated faculty who also serves as the program coordinator. In Spring of 2002, about 55% of courses were taught by full-time faculty.

D. Describe how adjunct faculty are integrated into the existing program.

Response:

It is difficult to find adjunct faculty, however when we do find them, the program coordinator provides the instructor with an overview of the lab, copies of syllabi and class material, and ongoing assistance as needed.

E. Should the College employ additional full or part-time faculty in this discipline? Provide a detailed rationale.

Response:

As the program grows, we will need additional full and part time faculty. We currently have a difficult time in finding quality adjunct faculty, mostly because of the pay differential between industry pay and adjunct pay.

F. Describe how all faculty members contribute to curriculum development and over all program cohesiveness. Do ALL faculty members, both full and part-time have an opportunity to contribute to curriculum development?

Response:

This is an area of potential improvement in the CSET program. Currently, we do this on in a non-formal environment but I would like to see more of an organized approach to this which would include:

- A once a semester meeting to discuss issues/changes throughout the curriculum.
- A collaborative for instructors that teach the same courses to share classroom materials. A proposal would be to establish this in at least an electronic manner through list servers and/or shared electronic media.

G. Does the current level of support staff meet the needs of the program faculty? Please explain your answer.

Response:

All full-time faculty that teaches in this program is fairly self motivated and through mandatory Division meetings, communicate regularly to work through any issues that might arise. However this leaves out the adjunct faculty that probably needs more support. However, between the support provided by the Dean and Program Coordinator, most seem fairly happy.

H. Summary and Analysis: Faculty

Response:

Our biggest challenges are:

- Keeping faculty trained in the latest technology (which has no more than an 18-month cycle for major advances). These major advances in technology require a lot of new learning and a time commitment on an instructor's part.
- Obtaining quality adjunct faculty mostly because experienced IT professionals are in great demand today and the private sector pay is so great in comparison to pay in education.

Currently, with shared faculty from other programs, full- to part-time faculty ratio is at approximately 55%/45%. Faculty levels will need to increase in the CSET program as the enrollment increases. Qualified

faculty will always be an issue in this discipline because of the pay differential between industry and college pay.

SECTION III: Institutional Support and Other Program Resources

1. **Program Support (Please note: Use this section to reflect upon what institutional supports would useful and why).**

A. **List targeted program marketing and recruitment strategies employed over the last two years? In your opinion, are they appropriate to sustain strong enrollment?**

Response:

No new marketing strategy has been employed over the last two years.

B. **Provide recommendations for new or additional marketing or recruitment strategies.**

Response:

With little or no marketing, this program is growing exponentially (increasing 3 to 4 times over the last 2 years). There is a large market for this program and it could be grown in an almost unlimited fashion if we wanted to.

There are several new marketing approaches that could be utilized:

- In the new technology advising center, information should be provided on the IT curriculum, characteristics for IT professionals (is it right for your?), and job/pay information.
- Additional articulation agreements with area high schools.
- Shortened semesters (where we teach courses with prerequisites back to back).
- Agreements with 4-year universities.
- Mailings, sophisticated web page, and radio/TV broadcasts.

Marketing to focus on four specific areas:

- Adults working in the IT field that don't have a degree
- Online class options
- High school students with computer career interests (usually get directed to CIS)
- Unemployed adults seeking a profession

C. **Does the program have sufficient linkages with business, community-based organizations, other colleges and universities, or K-12 public schools? Please explain and cite specific examples. Present in chart form as explained in the guidelines for C & D, opposite page.**

Response:

The linkages currently in place:

- Articulation agreements with one Worcester and one Millbury high school.
- Business contacts obtained through our students coops. Employers often come back wanting more of our students.

D. **Provide suggestions for improved program linkages. What, if any, assistance do the program faculty need in order to facilitate these linkages effectively?**

Response:

- Advisory Committee would provide the school with additional employer contacts.
- Additional articulation agreements could entice high school students.
- Agreements with 4-year colleges would entice students to spend 2 years locally and less expense before going to the 4-year school of their choice.

Network Infrastructure (PRIORITY 4)	2	Cisco Router Cable Plant UPS	One for each classroom Cable, hubs, switches	\$2,200 \$15,000 \$500
Total				\$178,250

G. Summary and Analysis: Program Supports

Response:

The CSET faculty does get by with the existing technology available (which is mostly “hand-me-down equipment” in the single laboratory). The yearly budget of \$6,500 doesn’t provide much in the way of technology and we seem to be stuck in the early 1990s. However, the quality of this program would improve greatly if state-of-the-art technology was deployed in the classroom and an “open lab” made available to students. As we improve our facilities, the quality of our program will improve, and our enrollment will increase. This is a costly improvement, however the pay back would be realized.

2. Academic Supports

A. Are there sufficient instructional/research resources to support student learning in this program?

Response:

Students have limited lab resources available to them during a limited amount of lab time, however their learning would be exponentially increased if we could adopt an “open lab” approach where they could learn at their own pace and beyond what was taught in the classroom. Another classroom would be necessary. We also have limited computer resources. Students would be more valuable employees if they were exposed to additional technologies such as USB hubs and various devices commonly found in industry today.

B. Assess the overall currency of the current collection of books, periodicals, and audiovisual materials in the library. Recommend new acquisitions and/or periodical subscriptions. In addition, please work with the library staff to weed outdated materials from the library’s current holdings.

Response:

The library should carry an updated supply of certification study guides that correspond to the course that we teach. There are several companies that publish such guides: For Dummies and ACE are two quality study guide sets. Currently, the program coordinator purchases these texts and shares these with the students. Videos and online test software are also available. However, because of the quickly changing technology, this must be reviewed and modified yearly.

C. Are there sufficient technology resources, specifically software and hardware resources? Are these resources available and accessible to students? To faculty?

Response:

See previous Section III: Program Supports

D. Provide a list of recommended technology acquisitions (i.e., software, hardware, PC projection units, etc.) Please prioritize this list and identify the immediacy of the priority.

Response:

The program cannot survive much longer without a quality lab with modern technology (Priority 1 through 3 as described in Section III: Program Supports). Currently, we have students asking why we don’t have this type of technology when many of our competing schools (such as Curry College) does. However, the new “open lab” would enhance our students learning experience so greatly that it is a high priority also, but one that needs a high degree of planning.

E. Does the Individualized Learning Center provide ample academic support services for students in the program?

Response:

Because of the highly technical nature of the CSET program, the ILC cannot provide tutoring support for CSET students.

F. Provide recommendations for improved academic support services.

Response:

Our recommendations for improved academic supports are as follows:

The following is a list of recommendations for academic support services that would enhance the quality of the CSET program.

- The new Technology Advising Center will provide quality direction in the area of advising.
- Assistance in maintaining current and future lab facilities.

- Full-time supervisor to assist students in gaining access to laboratory resources to enhance their in-classroom gained knowledge.
- New updated technology in lab facilities.
- New “open lab”.

G. Summary and Analysis: Academic Supports

Response:

Currently, similar academic supports that are available for all programs are available for the CSET program.

However, several improvements could be made:

- Advising will be taken care of through the new Technology Advising Center.
- Assistance in the current and future labs by:
 - Technical support for technology in the labs (instructors try to do this now and there is just too much).
 - Lab Supervisor to monitor use of resources and assist in technical support.

Updated facilities including:

- Technology in existing lab.
- New “open lab”.

3. Student Supports

A. How do your students explore career opportunities and prepare to access them?

Response:

The faculty attempts to educate students in career opportunities and how the prospects look today. Joseph Whitney enhances that knowledge by visiting classrooms to discuss upcoming job fairs and employment outlooks. Joe also assists students individually in exploring job openings, resume preparation and coordinating coops.

B. Provide recommendations for enhancing students' career exploration and planning.

Response:

The required work coop is a valuable tool for students. Once in the workplace, they have a better idea of what aspects of the IT job they like and don't. This enables them to look more specifically at their first job. However, during their capstone course, we would like to bring in working professionals to provide an real-life perspective to their IT job.

The new Technology Advising Center will improve career direction for the students.

C. Are current student support services adequate to support the teaching and learning process?

Consider:

- **Counseling Services**
- **Disability Services**
- **Health/Wellness Center**
- **Transfer Information**
- **Other Services (as listed in QCC catalog)**

Response:

However, an area that needs further exploration is the transfer agreements to 4-year colleges. Currently there are none for the CSET program. Dan Daily does a good job in assisting students and knowing what credits are accepted by some of the commonly attended universities in the area, but we could better serve students if we set up formal agreements.

D. Provide recommendations for additional services that would be beneficial to your students.

Response:

Currently, we don't have any students with physical disabilities in the CSET program, however it is possible that at any time we could and we would need to provide resources such as special computer hardware and/or software to support them. The need would be unique to the individual based on their disability. This is a very common need in industry and we should be prepared to respond when the need does arrive.

E. Summary and Analysis: Student Supports

Response:

There are two issues currently being addressed:

- The new Technology Advising Center will improve career direction for the students.
- Joe Whitney works closely with students providing some career counseling and assisting in placement with employers for their coops.

More is needed in the future to develop transfer agreements with 4-year universities. There is the potential need to assist disabled students in our program with assistive technologies.

4. Physical Facilities

A. Are the current physical facilities sufficient from an instructional perspective? If no, explain and provide recommendations.

Response:

No, CSET does not have adequate classroom facilities. Currently, most of the classes are taught in any available classroom. Scheduled labs are in the laboratory classroom, but because of the number of classes currently provided, it is booked from 8 am to 10 pm except for weekends. CSET really needs three rooms:

- Classroom for lecture with overhead and dedicated computer.
- Lab classroom for scheduled laboratory classes.
- Lab classroom for open laboratory assignments and experimentation.

B. Are the current physical facilities sufficient from a competitive perspective? If no, explain and provide recommendations.

Response:

No, students are in need of having access to equipment during non-class times for completion of lab assignments, if they are unable to attend a lab, or just for additional experimentation. Prior to getting a second lab in place, we should consider opening the labs to students on weekends while it is not in use by a class.

C. Given enrollment projections, will additional classrooms or laboratories be required? If yes, please specify the requirements and identify immediacy of the need.

Response:

Although we are getting by with the current situation, as soon as we can get a second “open” lab in place, our instructional quality will go up significantly.

D. Summary and Analysis: Physical Facilities

Response:

Classroom space on campus is limited. The CSET program really needs 3 classroom spaces:

- Classroom for lecture with overhead and dedicated computer (currently CSET classes are taught in whatever classrooms are available).
- Lab classroom for scheduled laboratory classes (which is currently totally booked).
- Lab classroom for open laboratory assignments and experimentation.

5. **Program Financing**

A. **Has the program's funding been sufficient over the last five years? Please explain your response.**

Response:

Since this program is fairly new, it was initiated and maintained mostly with "hand-me-down" equipment. Over the last 2 years, we have maintained the program with a \$5,000 budget and \$1,500 supplies budget. Although that amount is very meager for an IT budget of this type, it has allowed us to make some improvements such as installing removable drives in the computers.

B. **Provide an analysis of the cost of this program. Be sure to include ALL costs. (For example, costs associated with instructional salaries, space, lost opportunity costs, equipment rentals and/or maintenance, etc.**

Response:

The following is a list of recurring costs to run the CSET program

Item	Description	Cost Per Year
Instructional Salaries	1 dedicated Full-time Faculty 5 shared Full-time faculty Adjunct Faculty Laboratory Supervisors	
Classroom Space	Dedicated Classroom Laboratory Shared Classrooms	
Technology Needs	to keep current for a 4 year life cycle w/2 labs (incl hardware maint and software agree)	\$45,000
Classroom Supplies	Media, cable, tools	\$6,500

C. **Based on your enrollment projections, are there projected increases or decreases in the budgetary requirements of this program over the next five years?**

Response:

Obviously as our enrollment increases, our funding will need to increase.

- Second Lab - We are currently at the point that we have outgrown our existing single lab. Two years ago, we held all lecture classes and our labs in the CSET dedicated laboratory (213S). Last year, we began pulling all of our lecture classes out of 213S. In the Spring of 2002, no lecture classes were held in 213S yet it was booked solidly with scheduled labs for CSET (CSC and CST), Intel, and Verizon courses with exception of a small time slot on Friday morning, Saturday afternoon, and Sunday. So there is an immediate need for funding for a second laboratory. This is obviously a one time initial cost for design and furniture with a smaller recurring cost.
- Updated Technology - There is also immediate need to update equipment in the labs. We could assume a 3 to 4 year life on most of this equipment.
- Lab Supervisors – There is a immediate need for lab supervision/monitors. This is obviously a recurring cost.

However, following that large funding needed immediately, little funding is actually needed beyond personnel and supplies to maintain the program. However, if we took a more reasonable approach to keeping the technology up to date by purchasing some each year, the monetary outlays would be less shocking.

D. Summary and Analysis: Program Financing

Response:

The CSET program has been under budgeted for years. Because of the small budget allocated, we are in urgent need of updated technology in our labs. Since the large growth in the program, we are in need of additional lab facilities.

Section IV: Executive Summary of Findings

- A. **Briefly summarize the program highlights and recommendations for program improvement (2-4 pages). Provide a summary of action steps that prioritize what needs to be done with an estimated timeline for completion. Remember that this document will be presented to the QCC Board of Trustees and the President's staff as a tool for negotiating necessary program resources.**

Response:

Overview of Computer Systems Engineering Technology (CSET) Program

The Computer Systems Engineering Technology (CSET) Program prepares students for careers in the Information Technology (IT) department in businesses today. IT can be defined as the study, design, development, implementation, support, and management of computer-based infrastructures that support information systems. Information Technology is usually used to refer to the computer and network-connectivity hardware, operating systems software, and third-party software.

Currently, the CSET Program offers an Associate of Science (AS) degree with a total of 64 credits. Graduates of the CSET Program are prepared to work in virtually any business or organization that utilizes computers and computer networks. QCC's CSET Program offers a well-rounded education by integrating writing, presentation, math, communication, and business skills together with technical skills to simulate IT environments common in business today. We utilize lecture for basic IT theory and also hands-on training in our laboratory.

Employment for CSET Graduates in the Information Technology (IT) Field

The employment field for IT employees is very good. IT has a large employment sector with 10 million currently employed in the field with a 90% growth expected by the Massachusetts Division of Employment and Training over the next 6 years (through 2008). It also has a high rate of pay varying between \$35,000 to \$100,000+ annually. As a result of opportunities available within the IT, the CSET program has experienced a growth rate of over 100% for each of the last two years without any special marketing.

Skills Needed in IT Today

With technology constantly advancing, it is necessary to review and update our CSET curriculum on an ongoing basis. Over the last year and within the framework of Internal Program Review, research was conducted to categorize and prioritize skills needed by IT professionals today. This research included techniques such as interviewing local IT managers and professionals, reviewing job descriptions of job openings, and reviewing several of the IT industry associations that define and test for IT skills. These skills have been categorized into the following areas:

- Fundamental professional skills including communications, math, and writing.
- An understanding of basic business functions enabled by IT including the implementation and use of basic end user software in an office environment.
- An understanding of the fundamentals of computer electronics.
- Ability to perform support and maintenance of computer hardware.
- Ability to design, implement and maintain local and wide area computer networks.
- Ability to perform implementation and support of multiple industry standard computer operating systems in enterprise networking environments.
- An understanding of basic programming structures and algorithms.
- Ability to design and implement routing basics utilizing the TCP/IP protocol.
- An understanding of the management of IT components and projects involving their implementation.
- Experience in an IT business environment.

Changes Needed to the CSET Curriculum to Keep Up-to-Date in Today's IT

The above list of skills was then cross-referenced with skills obtained from the existing CSET Associate of Science curriculum to identify deficiencies. As a result of that activity, we are modifying the curriculum by:

- Adding new courses to replicate new technologies currently being utilized in the industry, specifically Unix operating systems and Routing technologies,
- Removing courses that have less relevance in today's industry, such as digital circuitry,
- Modifying liberal arts requirements to include courses that provide skills needed in a business environment such as workplace writing and business courses, and
- Changing names of existing courses to be more descriptive of course contents.
- Adding a Personal Computer (PC) Specialist Certificate consisting of 26 credits to be offered for students who wish to obtain IT skills for job placement in under a year.
- Align CSET courses with industry standard certification. Both the CSET AS and PC Specialist Certificate will consist of classes that are directly aligned with industry standard skill sets and certifications that have been developed to measure and promote the competency of IT professionals and are administered and tested by industry organizations such as CompTIA, Microsoft, and Cisco. This is done so that students can take a class and immediately sit for one of the highly desired IT certifications. These certifications are recognized throughout the world and often land a student employment based on the certification alone.

Changes Needed to the Classroom/Laboratory to Keep CSET Program Up-to-Date

In addition to modifying our curriculum, it is also necessary to update the technology used within our program on a regular basis, which is a costly endeavor. The program is currently in need of:

- Updated computers in our existing Laboratory 1 (213S) – Much of our equipment is outdated technology that has been passed down from other parts of the college. Although this is acceptable in some applications, it is unacceptable and prohibiting in others. It is also important to note that these facilities are used for our Verizon and Intel classes. This would require approximately \$60,000 for new computers for 1 instructor and 20 students. **IP**
- Updated network infrastructure for Laboratory 1 (213S) and for use in classrooms – This includes servers running various operating systems to support both the network infrastructure and various classroom work at a cost of approximately \$20,000. **IP**
- Updated technology for use in classroom and laboratories – introduce students to common technology such as USB adapters, printers, scanners, software, different cable media, and etc. at a cost of approximately \$6,650. **IP**
- A second laboratory classroom – Due to the growth of students enrolled in the CSET program, our only laboratory is in use from 8am to 10pm on Monday through Friday with exception of a couple of hours and some time on weekends. This limits students' ability to make up incomplete or missed assignments or to learn on their own. This would require approximately \$70,000 for equipment in a second laboratory plus \$17,700 for network infrastructure between the two labs. **HP**
- Laboratory Supervisors or Monitors in the laboratory classrooms to monitor use of equipment – Due to the high volume of students going through our laboratory, it is impossible for faculty to maintain the equipment and track hardware and software utilized by students. As a result, our laboratory equipment is not in proper working order for the next class and often loses (probably due to theft) hardware and/or software. **IP**

Other Changes Needed in Support of the CSET Program

Other recommendations modifications for the CSET Program include:

- Participate in the Technology Center. The Technology Center will provide a technology preparation pipeline with all students who express interest in technology fields, but specifically aimed at attracting, enrolling, retaining, and graduating women and minority candidates in the technology fields. **IP**

Utilize instruction that will promote quality in the CSET education:

- Align coursework with industry certifications and promote testing of. **IP**
- Integration of writing, communication, math, and business into technical coursework. **IP**
- Promote experimentation in "open" lab environment, allowing students to explore their IT interests and expand knowledge beyond classroom. **HP**
- Continued work with local business to place QCC students into coop positions. **IP**

- Provide assistance and guidance to students about the IT field through the new Technology Advising Center and the Placement Resource Center. **IP**
- Obtain assistance in maintaining student resources in the lab. Currently, it falls mostly on the instructors and becomes unmanageable with the number of students we support. **IP**

Utilize approaches that would assure continued growth in the CSET Program:

- Develop marketing material to get the word out. **HP**
- Develop additional articulation agreements with area high schools. **HP**
- Develop transfer agreements to other 4-year schools. **HP**
- Develop relationships to with local unemployment organizations. **HP**

Keep program up-to-date with current industry trends by:

- Regular curriculum review and updates when needed. **Every 2 Years**
- Review of changes in industry certification direction. **On-going**
- Communicate with the local community through an advisory board for input and feedback. **HP**
- Deploy and maintain state-of-the-art technologies in our classrooms. **IP**

Utilize faculty to the fullest extent by:

- Reorganizing the scheduled (instructor-led) labs into a combination of scheduled and “open” labs (which would allow students to work on projects as their time permits). This would also free some faculty time so they could be in the classroom more. **HP**
- Provide release time and/or training on new technology for instructors, including IT certification. **IP**
- Hire additional faculty as needed (currently a 55% full-time faculty instruction rate) with advanced IT skills. **EP**

Provide flexible course delivery including:

- Online courses (in Fall of 2002, 6 or 7 courses within the CSET curriculum will be online). **HP**
- “Open” laboratory times rather than only scheduled. **HP**
- Modular courses. **EP**
- Condensed courses. **EP**
- Eliminate every-other-semester course cycle (to allow students to enroll in fall or spring). **EP**
- Continued support for Experienced-Based Education. **IP**

Summary of CSET Program Review

The CSET Program is currently a strong technology-driven program that is experiencing rapid growth. It is a fairly new program that has had few resources expended, utilizing mostly previously used equipment. If the program is to maintain some level of quality and expand in size, resources will need to be expended to update the curriculum, classroom and laboratory facilities, and the technology utilized.