COLORADO MESA
UNIVERSITY

AY 2012 – 2013
Program Review

Process Systems
Technology

Program Review

Process Systems Technology

Prepared by:

Carolyn Ferreira-Lillo
John Sluder

- **Program Overview**

The Process Systems Technology program includes two distinct technical areas:

- Process Control, modeled around the Center For the Advancement of Process Technologies (CAPT) national curriculum.
- Instrumentation and Electronics, modeled around the Electronics Technician Association Certified Electronics Technician (ETAc)

The program offers Associate of Applied Science degree:

- AAS Process Systems Technology

With the completion of the degree students are prepared to take the ETAc certification

The Process Systems Technology program, or some of the technical areas in the program, has been offered at Colorado Mesa University for more than 30 years as an industrial electronics program. The current structure of the program was established in 2008 to address the changes in the demands of businesses in the region. The local oil and gas companies advised that there were few jobs for graduates with narrowly focused training in the electronics areas that are now under this program. The suggestion was that we begin offering a program that provided some classes in the industrial control field. The eventual outcome of that advice was the current Process Systems degree. Additionally, students participate in a cross-curricular capstone course. This provides graduating students with a better understanding of the systems of production activities that they will encounter upon entering the workforce in our community.

The curriculum is updated regularly to reflect changes in area business needs, which reflect the national and international trends in the industry. By utilizing the industrial electronics history and expertise of the faculty we will begin to develop specialty certificates in the areas of:

- Instrumentation and electronics
- Industrial control maintenance
- Occupational Safety and Health Technologies

- **Program Goals and Objectives**

"Colorado Mesa University shall also maintain a community college role and mission, including vocational and technical programs. Colorado Mesa University shall receive resident credit for two-year course offerings in its commission-approved service area."

Program Goals
The overall program goals for the Technology Integration program at WCCC are:

- Provide the students with the skills and knowledge to be productive citizens and excel in their chosen fields.
- Work with business and industry stakeholders to continually enhance the quality and timeliness of technical content.
-

Program Objectives
The program objectives for the Technology Integration program at WCCC are aligned with the role and mission of Colorado Mesa University which allows students and faculty to:

- Demonstrate an understanding and appreciation of the liberal arts including the humanities, social sciences, mathematical and natural sciences,
- Practice a commitment to student learning and achievement, including, but not limited to applying basic through advanced technology theory, demonstrating hands-on skills, problem solving techniques, using multiple strategies,
- Demonstrate subject matter knowledge and pedagogy, including, but not limited to creating effective learning environments, practicing teaching both as a science, providing contextual learning activities,
- Manage and monitor student learning, based upon best practice including, but not limited to using a variety of teaching methodologies, involving support personnel, parents and community members to maximize student success, following ethical responsibilities of teaching,
- Organize teaching practices and learn from experiences including, but not limited to, using current research to improve practice, accept teaching as a lifelong learning process, interact with various education personnel and professional associations,
- Participate in learning communities, including, but not limited to, using the community to enhance programs, interact with parents and business and industry to maximize learning, participate in local, state and national professional associations,
- Use technology and concepts to enhance learning and personal/professional productivity including, but not limited to, implementing curriculum that includes technology-enhanced methods and strategies, applying technology to a variety of assessment and evaluation strategies; and,
- Colorado Mesa State values teaching, learning, and student-faculty interaction. We provide our students with expanded opportunities to participate in research

and active hands-on learning as a supplement to the classroom. Colorado Mesa is dedicated to assisting students in achieving their goals and dreams.

Communication:

- Apply principles of grammar and vocabulary in decimation in the field of Process Control Industries
- Explain in written and oral form the basic principles that applies to the field of Process Control Industries
- Explain in written and oral form the basic principles that applies to the field of Process Control Industries

Computational:

- Apply Mathematical concepts and practices to the field of Process Control Industries

Critical Thinking:

- Evaluate and report on researched data that applies to the field of Process Control Industries
- Locate, gather, organize and evaluate evidence on an assigned topic or question of practice in a work place setting

Specialized Knowledge:

- Demonstrate personal and professional ethical behavior in the field of Process Control Industries
- Generate substantially error-free products or processes in the field of Process Control Industries
- Describe the scope and application of principle features in the field of Process Control Industries, including safety and quality control

Applied Learning:

- Apply contextual physics to the field of Process Control Industries
- Demonstrate mastery of current technology in the field of Process Control Industries
- Apply contextual electronics to real world application
- Apply instrumentation theory and practice to real world application
- Demonstrate and understanding of Process Control Systems

Analysis of Need for the Program

i. Enrollment rates have been steadily increasing, which also reflects the state-wide enrollments in similar programs, although, with added support, we know the pool of potential students is larger

than our enrollments. We have also seen a drop in 2012-13 a trend that needs to be reversed.

Program	Degree	Code	Major	2007-08	2008-09	2009-10	2010-11	2011-12
Process Systems Technology	AAS	1320	Process Systems Technology	2	10	17	24	24
Total				2	10	17	24	24

**Not divided between Fall and Spring

Our graduation and placement rates are very good in relationship to the type of student that enters or program. We have very few full-time traditional students. Most of the cohorts are working students only taking a few classes per semester, thus it takes them more than two years to graduate.

ii. As the Grand Valley grows and the oil and gas industry ramps-up, we see a growing demand for electronics, instrumentation, and process systems control technicians. We have already placed many of our graduates in the oil and gas fields as E-Techs, within numerous businesses (including Chevron, Encana, and support industries) as Process Control field and plant technicians. We are developing a strong advisory council which will help guide our curricular decisions.

At the conclusion of the last Program Prioritization Review conducted by Academic Affairs and the office of the President, Technology Integration (formerly Communications Technology/Telecommunications) ranked the second highest of all AAS degrees by the diverse committee (Appendix iv). One of the key elements was program efficiency. When it was made clear that ½ of a Faculty FTE, from our department, supports other programs such as Electric Lineman, CISB, UTEC and Mathematics coursework at the Bishop campus our efficiency is very effective.

Through the guidance of our Business Advisory Committee, we have identified a critical need for Process Technology certifications. This is not only in support of the oil and gas industry, but advance manufacturing businesses needs are now beginning to emerge. The core of that coursework is industrial electromechanically controlled systems and networking problem solving skills. The addition of this degree will enhance both the enrollments of the program and the critical need for advanced technical training equipment.

Our program is successful for the students because we teach contextually in a technologically rich environment with extensive hands-on content-rich course work. Our graduates have work with Faculty that have rich industry experience and the students have work in real-world environments created by that faculty. As stated by Craig Barrett, Chairman Intel Corporation, "My hope as a business leader is that these reforms will get us to the 21st-century school – a 21st-centrury learning environment that offers a content-rich curriculum. "inquiry-based learning" has value, but process should not replace content" .

These concepts have been reinforced when members of our department and school were awarded a National Science Foundation Grant (NSF) titled; Integrated Learning Systems: A model approach in which we proposed the development of a content-rich model integrating multiple disciplines in a project-based learning environment. Working with local businesses as partners on the grant, the team will explore this innovative learning model to help create the 21st-century school environment. This acknowledgement by the NSF attests to the fact that we are on the right track.

With the role and mission at Colorado Mesa University /WCCC being a teaching college, our program strives to innovate, research, and excel in that mission. We are teachers first and foremost and the positive results show in the success of our graduates exemplifies our efforts.

- **Narrative Summaries of Resources**

i) Unique characteristics of the program influencing the need for resources.

Process Systems Technology includes multiple disciplines that present a unique set of challenges and synergy.

The challenge is to prioritize the resources to meet industry demands for technically competent workers in developing markets; while maintaining the academically rigorous basic skills required of multiple diverse employers.

The most recent example is the two-phase Gas and Oil demand. Currently the exploration of gas and oil is driving demand for electronics technicians. Primarily these jobs are electro-mechanical but with some electronics and networking experience desirable. Closely on the heels of the exploration will follow production of the Oil and Gas industry. While the fundamental troubleshooting and technical skills will still be required additional specialized training in Process Control is anticipated.

Maintaining the strong electronic fundamentals has provided our small program the agility to meet the industry trends which are demonstrably cyclical.

ii) Faculty and Staff

a. The afore-mentioned mult-idisciplined market place requires multi disciplined faculty with strong teaching and technical skills. Professional development has to be vigorously pursued to satisfy the rapid advances required of our graduates. We need additional training in Process Control's an example being Programmable Logic Controller's, (PLC's).

iii) Physical Facilities

The physical plant was intended to be a temporary solution to the schools growth need and was not intended to last longer than two years. The facility present's a harsh environment for maintenance and calibration of electronic equipment. It is not adequately enclosed and subjects laboratory equipment to excessive dirt, dust, humidity and temperature extremes. (Not to mention the faculty and students).

iv) Instructional equipment, including instructional technology and its use.

a. The program has utilized the fundamental electronics equipment to good advantage for the changing skill demands of industry. This basic equipment is however becoming dated and is in need of deferred preventative maintenance.
b. Changing emphasis of the job market requires significant capital to meet the specific skill sets which are cyclical. The near term challenge is to provide an adequate Process Control laboratory. This equipment is more specialized and costly.
c. Additional capital is required to provide asynchronous distance learning for our non-traditional working student.

v) Library, including DVD, video, etc.

Library support is adequate and provides good reference materials to support the core competencies. The changing technical skills need additional asynchronous curriculum and course development. The WCCC campus has need of a dedicated student computer to supplement and augment class/ library support.

vi) Unique sources of revenue and expenditures

a. NSF funds have been obtained principally because we have shown the ability and agility to integrate our teaching curriculum to meet industry demand. This Grant is now complete and cannot support the post-secondary requirements required to meet the Process Control demand

- **Effectiveness**

i. Accreditations by Professional, National, and International Associations are critical to the Process Systems Technology degree programs, because the businesses and industries that support us require certifications when hiring our graduates. The program is nationally and internationally certified by the following external organizations:

Certified curriculum (ETA Electronics Technicians Association)
Local Cisco Academy, Accredited by CISCO
Proposed Process Control certified by CAPT

ii. In working closely with the Math department we have restructured the MATH 107 Career Math class to more closely align with the Colorado Community College System (CCCS) and with the requirements of the mathematics department by developing MATH 108 Technical Mathematics. The staff has also restructured and introduced the Applied Physics course to align with the changes in the mathematics course.

iii. Assessment of student academic achievements within the program includes the assessment process of Mesa State College. The department also keeps CCCS assessment records on completers, surveys, certifications, and skills.

iv. Faculty success data

Promotions
2005 One faculty promoted to Associate Technical Professor
2006 One faculty promoted to Assistant Technical Professor
2007 One faculty applying for Assistant Technical Professor

v. 2011 One faculty promoted to Assistant Technical Professor

Teaching

Professional and student evaluations
Chamber of Commerce Outstanding Educator awards
CCCS Certification and mentoring approval

vi. Advising
Departmental
SOAR

vii. Scholarship
Industry Certifications
Professional Certifications
Bridge Courses
Continuing education coursework

viii. Service
Advisory committees Career Center, Job Corp, RMPBS
MSC service: Faculty Senate, Advising Committee, Information Technology support.

ix. Other
NSF Grant
Industry association work – special recognition

x. Student success data

Certifications
2005 seven Associate Certified Electronics Technicians
2006 two Associate Certified Electronic Technicians

BAS degree students
We have students currently on the BAS path who have earned an AAS in Process Systems Technology.

- **Strengths Identified by the Review**

i. The strengths identified by our internal review include strong support from our business advisory council and participation of businesses with internships, support of grants, and guest lectures. We are also accredited by external national and international organizations which enhance the placement and growth of our graduates.

Additionally, the program is enhanced by the quality and commitment of the faculty in scholarship, advising, service and professional development. The student's evaluations attest to the quality of education they are receiving.

- **Areas Needing Strengthening Identified by Review**

  i. The major area needing strengthening is the enrollments and graduation rates. The degree offerings require a very specialized student willing to commit to very rigorous coursework as demanded by the industry. Our students are very easy to spot, they are just hard to find.

  We know that there is a pool of qualified students in our service area and we need to develop a recruiting plan to reach out to those interested. There is also competition from other colleges and technical schools in the area that advertise heavily in our service area. Even though, their programs are more specialized and more expensive, they have a strong marketing component that attracts the type of student we need.

  Finally, as we propose to launch new certificate degrees which will strengthen the program, we will need to have equipment and trainers to be able to design our instruction around modern technologies to support the needs of local and regional businesses.

- **Vision**

  i. With the addition of the Process Systems Technology degree the department has a need for updated and new equipment, faculty scholarship, and marketing support to effectively launch the degree. The technology we work with needs to be the same equipment and systems that our students will be using in the field; if not, we are doing the students a disservice and ineffectively supporting our business stakeholders. Some of the equipment and support can be solicited from the business partners, but the college needs to also support this critical new path.

Appendix A

Statistics

i. **Statistics for past five years**

Combined 5 Year Trends Report

School	WESTERN COLORADO COMMUNITY COLLEGE	School Code/Suffix	327
Program	PROCESS SYSTEMS TECHNOLOGY	Level	Postsecondary
Program ID	76770	CIP ID	150613
Program Request ID	5306	Non Trad	Yes, Male Dominated
Approval Date	10/31/2007	Expiration Date	10/31/2012
Status	New		

5 Year Completion Rate Trends

		Program at WESTERN COLORADO COMMUNITY COLLEGE			This CIP Statewide		
School Year	Status	Number Enrolled	Number of Completers	Completion Rate	Number Enrolled	Number of Completers	Completion Rate
11	New	22	7	32%	103	24	23%
10	New	15	1	7%	157	35	22%
09	New	8	0	0%	118	17	14%
08	Unknown	2	2	100%	32	23	72%
07	N/A	0	0	0%	10	4	40%

5 Year Placement Trends - Follow Up Students

			Program at WESTERN COLORADO COMMUNITY COLLEGE							This CIP Statewide					
Yr	Status	Comp	Empl R	Empl U	UnEmpl	Cont	TPP	R	Comp	Empl R	Empl U	UnEmpl	Cont	TPP	R
11	New	7	4	1	0	3	7	7	24	16	2	3	6	21	23
			57%	14%	0%	43%	100%	100%		70%	9%	13%	26%	91%	96%
10	New	1	0	0	1	0	0	1	35	13	5	4	9	24	27
			0%	0%	100%	0%	0%	100%		48%	19%	15%	33%	96%	77%
09	New	0	0	0	0	0	0	0	17	7	2	0	10	16	16
			0%	0%	0%	0%	0%	0%		44%	13%	0%	63%	100%	94%
08	Unknown	2	2	0	0	0	2	2	23	10	3	2	1	13	15
			100%	0%	0%	0%	100%	100%		67%	20%	13%	7%	87%	65%
07	N/A	0	0	0	0	0	0	0	4	2	1	0	2	3	3
			0%	0%	0%	0%	0%	0%		67%	33%	0%	67%	100%	75%

Appendix B

Finance & Budget

ii. Finance and Budget Sheet

FY14 Budget Worksheet
BASIS

PROGRAM		FY12 Budget	FY12 Actual	over (under)	FY13 Budget	inc (dec)	FY14 Req*
Agriculture	Program Expenses	-	-	-	1,000	1,000	3,000
	Course Fees	-	-	-	5,000	5,000	
	Total Agriculture	**-**	**-**	**-**	**6,000**	**6,000**	**3,000**
Marketing	Program Expenses	2,000	2,516	516	2,100	100	2,000
	Course Fees	-	-	-	-	-	
	Total Marketing	**2,000**	**2,516**	**516**	**2,100**	**100**	**2,000**
Digital Design**	Program Expenses	6,500	5,766	(734)	2,800	(3,700)	3,000
	Course Fees	1,375	237	(1,138)	1,375	-	
	Total Digital Design	**7,875**	**6,003**	**(1,872)**	**4,175**	**(3,700)**	**3,000**
Process Tech	Program Expenses	3,500	1,918	(1,582)	2,100	(1,400)	3,500
	Course Fees	1,590	2,612	1,022	1,590	-	
	Total Process Tech	**5,090**	**4,530**	**(560)**	**3,690**	**(1,400)**	**3,500**
Office Admin	Program Expenses	2,000	1,216	(784)	1,300	(700)	1,500
	Course Fees	1,750	458	(1,292)	1,750	-	
	Total Office Admin	**3,750**	**1,674**	**(2,076)**	**3,050**	**(700)**	**1,500**
Tech Int	Program Expenses	3,500	3,573	73	3,500	-	3,500
	Course Fees	2,400	2,102	(298)	2,400	-	
	Total Tech Int	**5,900**	**5,675**	**(225)**	**5,900**	**-**	**3,500**
Water Quality	Program Expenses	2,000	-	(2,000)	500	(1,500)	1,500
	Course Fees	-	-	-	-	-	
	Total Water Quality	**2,000**	**-**	**(2,000)**	**500**	**(1,500)**	**1,500**
	TOTAL BASIS	**26,615**	**20,398**	**(6,217)**	**25,415**	**(1,200)**	**18,000**

* attach justification for budget increases (specific purchases, increased costs, increased FTE, etc)
** includes Animation, Graphics, Media Tech

Appendix C

Library Assessment

Library Curriculum Assessment
Tomlinson Library
Colorado Mesa University

The following form is a snapshot of the library's collection in support of a program review.

Date of assessment: December 2012

Collection under review: Process Systems Technology (Western Colorado Community College)

Program level: **Certificate** **Associates** Bachelors Masters

Delivery mode: _____

Library Liaison: Aimee Brown

1. Current Collection Review

   The Library collection was assessed using the Library of Congress subject headings listed below.

   - Chemical processes
   - Engineering instruments
   - Manufacturing processes
   - Process control

   a. Reference Sources:

   There are no books on these subjects in the Reference Collection.

   b. Monographic Sources:

   There are 157 books, including 114 e-books, with at least one of the subject headings listed above. An overview of their dates of publication is below.
   - 2010-2012: 35%
   - 2000-2009: 38%
   - Before 1999: 27%

   - Age Analysis of Monographic Collection

   Please see the section above.

c. Periodicals:

The library provides access through our licensed article databases to 7 periodicals in full text online through the current issue that cover these subjects. They include:

- *DEMM: Digest of Equipment, Materials, & Management*
- *Electro Manufacturing*
- *Human Factors and Ergonomics in Manufacturing*
- *Industrial Laser Solutions for Manufacturing*
- *International Journal of Manufacturing Systems*
- *Journal of Manufacturing Science & Engineering*
- *Journal of Studies on Manufacturing*

d. Electronic Resources:

The library subscribes to the licensed article database Academic Source Complete which provides access to articles on process systems technology. Below is a list of the number of full-text articles published in 2000 or later in trade or academic journals that a search for these subject terms produced.

- Computer integrated manufacturing: 922
- Engineering instruments: 2,836
- Manufacturing processes; 11,269
- Process control: 3,043

2. Recommendations for additions to the collection:

Most of the library's e-books related to this program are geared toward upper-level students and engineering and computer science professionals. Most of the hard copy resources are out-of-date. In consultation with the faculty, the collection needs to be weeded and additional materials should be added to ensure that they are relevant to the entry-level students. Any new materials added should be in electronic format so that they are convenient for students to use.

Library Director: Sarah Cron Date: 1/2/2013

Appendix D

Faculty Vitae

Name:

Carolyn R Ferreira-Lillo

Start Year: 1/2009

Program:
Technology Integration

Department:
WCCC - Business, Applied Science & Information Services

WESTERN COLORADO
COMMUNITY COLLEGE
A Division of Colorado Mesa University

Full-time Faculty Vita

Faculty Rank

○ Technical Professor ◉ Assistant Technical Professor
○ Associate Technical Professor ○ Technical Instructor

Highest Degree

MS	StonyBrook University	Technology System Management	1999 - 2001

Education: (List all degrees beginning with most recent-include post docs and external certificates)

M.S. Technology System Management, StonyBrook University, 2001
B.S.E.E Electrical Engineering, City College of New York,1993
A.A.S Electrical Engineering Technology, Queensborough Community College, 1984

Teaching 2003-Present:

Courses Taught

TECI-132 Introduction to IT Hardware and System Software
TECI-260 Information Technology Hardware and System Software
TECI-110 Applied Physics
PROS-117 AC Circuits
PROS/TECI-118
Math -108 Technical Mathematics
Math - 107 Mathematics for Technology
PROS 120 Process Technology I: Equipment
PROS 230 Quality in Process Technology
44310 Process Technology
44311 Engineering Physics
44316 Technology Integration 1
44317 Math for IT
44329 Technology Integration 2
PROS 100 Introduction to Process Technology
Certificate
CTE Post secondary: Technology Integration Preliminary
CTE Post secondary Energy, STEM
2011 Cisco Networking Academy Instructional Conference
Spring 2011 Instructor Certification by Cisco for Discovery 3: Introducing Routing and Switching in the Eterprise
Spring 2010 Instructor Certification by Cisco for Discovery 2: Working at a Small-to-Medium Business or ISP
Spring 2010: Instructor Certified by Cisco for Discovery 1: Network for Home and Small Business
2009 Instructor Certified by Cisco for TECI 132/260 PC Hardware and Software

Evidence of Continuous Improvement

Spring 2012: EDU 260
Spring 2012: Campous Safty Workshop
Fall 2011: EDUT 250 CTE in Colorado
Fall 2011: ISMT 580 IS Phys: Acad Insitute/CTE
2011: NEEDS and ENCANA: Colorado Energy Workshop Completed.
Summer 2011: Colorado Career & Technical Education Conference (14 contact Hours)

Summer 2011: ISMT 580 IS ED: Understanding by Design
Spring 2011: Instructor Technical Webinars
Spring 2011: Plans of Study (POS) Palooza
Spring 2011: ISMT 580 IS Math: Acad Insitute/CTE (7.5 contact hr)
Spring 2011: ICAP Career Guidance and (1 contact hr)
Fall 2010 Cisco Networking Academy Instructional Conference
2009/2010 workshops at Mesa state in Web CT
2009 Universal Design for Learning: Creating Accessible Course Materials
Fall 2011: EDUT 250 CTE in Colorado
Spring 2009: WebCT Basic Workshop
Spring 2009: WebCT Advanced Workshop

Innovative Materials/Activities

Supervision of Student Research/Project(s)

Scholarship and Creative Work, 2003-Present:
Journal Articles

Conference Presentations

Technical Reports

Exhibits

Grants (proposed or funded)

Professional Memberships
2009 - present Cisco Alumni
2011- present ACTE

Honors and Awards

Service 2003-Present:
Institutional
Colorado Community College System: Member of the Curriculum Committee 2010 - present
Vice Chair for 2011-Present
Undergraduate Curriculum Committee 2011 - present
WCC Counsel spring 2011
CTE Committee 2010 - present
2010 - present Secondary (high school) Committee 2011
2010 - present High Schools Interviews
2010 - present Tours for high school
2009 advising at Mesa State
Community
2010 - present Rotary
2010 - present Event volunteer at Sacred heart Church
2011 CACTE
Advising 2003-Present:
Institutional level
2010 - present Post Secondary Advising
Committee:
2010- present Curriculum Committee
2. Career in technical Education

public service:
Fund raisers for Rotary
Fund Raiser for Sacred Heart Church
Department level
2010 -Present Postsecondary Advising
2010- Present High school Advising

Prior Professional Experience Relevant to Current Position: (Include year(s) of employment, employer, position title and responsibilities)

Year(s) of Employment	Employer	Position Title	Position Responsibilities
1997 - 2008	Bronx Community College (Bronx NY)	Lecturer	Syllabi, Creating Writing intensive classes for JENED
1984 - 1998	Queensborough Community College	Adjunct Technician:	the operation and maintenance of lab equipment associated with electronic classes,
1985 - 1992	Lucas Aul Aerospace	Electronics Technician/Material and Production Control:	Testing, Troubleshooting

Please record the number "items/events" you have listed above in the following categories.
If you specify items/events under "other," please provide an explanation/definition.

Books	**Book Reviews**	**Creative Publications**
Journal Articles	**Performances**	**Patents**
Conference Presentations	**Exhibitions**	**Grants-funded and non-funded**
Sabbaticals	**Fulbrights**	**Book Chapters**
Other (related to discipline)		

Name:

Jack P Yon

Start Year: 2003

Program:
Technology Integration

Department:
WCCC - Business, Applied Science & Information Services

WESTERN COLORADO COMMUNITY COLLEGE
A Division of Colorado Mesa University

Full-time Faculty Vita

Faculty Rank

- ○ Technical Professor
- ◉ Assistant Technical Professor
- ○ Associate Technical Professor
- ○ Technical Instructor

Highest Degree

AAS Mesa State College Technology Integration - Networking/Telecommunicat 2008

Education: (List all degrees beginning with most recent-include post docs and external certificates)

Certificate/License: Authorization to Teach Career & Technical Education, State of Colorado June 2011 - June 2016;
Certificate: National Career Pathways Network Leadership Certification, Career Cluster Institute, Denver, CO, 2010;
Certificate: Cisco Certified Network Associate - Security, Santa Barbara City College, CA, 2009;
Associates of Applied Science, Technology Integration - Networking/Telecommunications Cluster: With Distinction, Mesa State College, Grand Junction, CO, 2008;
Certificate: Cisco Information Technology (IT) Essentials I: PC Hardware and Software, Mesa Community College, AZ, 2008;
Certificate: Cisco Information Technology (IT) Essentials II: Network Operating Systems, Mesa Community College, AZ, 2008;
Certificate: SkillsUSA - Colorado State Certified Leadership Trainer (Train-the-Trainer), SkillsUSA University, Kansas City, MO, 2008;
Certificate: Associate Electronics Technician, Electronics Technicians Association International, Greencastle, IN, 2008;
Certificate/License: Professional Teacher License, State of Colorado, June 2007 - June 2012
Certificate: Cisco Certified Network Associate - Wide Area Network (WAN) Technologies, Colorado Mountain College, CO, 2007;
Certificate: Cisco Certified Network Associate - Switching Basics and Intermediate Routing, Colorado Mountain College, CO, 2006;
Certificate: Chapter Management Institute, SkillsUSA University, Denver, CO, 2006;
Certificate/License: Provisional Teacher License, State of Colorado, August 2004 - August 2007;
Certificate: Cisco Certified Network Associate - Routers and Routing Basics, Colorado Mountain College, CO, 2003;
Certificate: Cisco Certified Network Associate - Networking Basics, Colorado Mountain College, CO, 2003;
Certificate/License: Alternative Teacher Licenser Program, Colorado State University, CO, 2003-2004

Teaching 2003-Present:

Courses Taught

44310, Process Technology I
44311, Engineering Physics
44312, Process Technology II
44316, Technology Integration I
44317, Math for IT
44318, Technology Integration II
ELCL 120, Fundamentals of Electricity
PROS 100, Introduction to Process Technology
PROS 110, Safety, Health, & Environment
TECI 132, Introduction to IT Hardware and System Software
TECI 180, Cisco Networking I
TECI 185, Cisco Networking II

TECI 196, Topics: Security
TECI 220, Regulations and Standards
TECI 230, Cisco Networking III
TECI 235, Cisco Networking IV
TECI 260, Information Technology Hardware and System Software
TECI 265, Advanced IT Hardware and System Software
TECI 265L, Advanced IT Hardware and System Software
TECI 290, Certification: A+
TECI 290, Certification: CCENT/ICND1
TECI 290, Certification: CET(a)
TECI 290, Certification: ICND2
TSTC 160, Electronic Control Systems
UTEC 120, Industrial Safety Practices
UTEC 220, Industry Employment Practices
WQMS 100, Introduction to Water Quality

Evidence of Continuous Improvement

Fluke Networks, Webinar, "Wired & Wireless Analysis with One Tool", February 20, 2012
Fluke Networks, Webcast: Troubleshooting on Both Sides of the Access Point, February 14, 2012
Colorado Association for Career and Technical Administrators, Mid-Winter Conference, February 7-10, 2012
Colorado Association of Career and Technical Educators, Executive Board Meeting, January 20, 2012
Lauren Jones, MA, NCC,CTE-Career Guidance Trainer & Specialist, Individual Career and Plans/Plans of Study workshop, January 9-11, 2012
Career and Technical Regional Standards Workshop, October 14, 2011
Academics-in-Career and Technical Education, Workshop, October 7-8, 2011
ISMT-580, IS Math: Academic Instruction/CTE, Graduate-level In-service, October 7, 2011
ISPH-580, IS Physics: Academic Instruction/CTE, Graduate-level In-Service, October 8, 2011
Colorado Association of Career and Technical Educators, Executive Board Meeting, September 30, 2011
Colorado Community College System (CCCS), Regional Career and Technical Education Workshops, September 21-23, 2012
Colorado Association for Career and Technical Educators, Summer Conference, July 17-21, 2011
Cisco Networking Academy Conference 2011, June 26-30,2011
Perkins Funding and Budgets Training, May 23, 2011
Academics-in-Career and Technical Education, workshop, April 29-30, 2011
ISEN-580, IS English: Academic Instruction/CTE, Graduate-level In-Service, April 29, 2011
Colorado Energy NEED Workshop, Encana Corporation, April 19, 2011
Fruita Middle School, Career Fair Presentation, March 29, 2011
Colorado Association for Career and Technical Administrators, Mid-Winter Conference, February 8-11, 2011
Colorado Association of Career and Technical Educators, Executive Board Meeting, January 21, 2011
Individual Career and Academic Plans, meeting, November 16, 2010
Academic-in-Career and Technical Education, workshop, November 5-6, 2010
Colorado Association of Career and Technical Educators, Executive Board Meeting, October 15, 2010
STEM, Careers and Technical Education, workshop, October 8-9, 2010
ISMT-580, IS Math Academic Instruction/CTE, Graduate-level In-Service, October 9, 2010
MCSD 51, ICAP Task Force, September 21, 2010
Colorado Association of Career and Technical Educators, Executive Board Meeting, September 17, 2010
Cisco Networking Academy Conference 2010, August 2-4, 2010
Colorado Association for Career and Technical Educators, Summer Conference, July 19-22, 2010
8th Annual Career Cluster Institute, June 13-16, 2010
Association of Career and Technical Education, Math-in-CTE, May 2009-May 2010
Colorado Association for Career and Technical Administrators, Mid-Winter Conference, February 3-5, 2010
North American STEM Education Symposium, October 12-16, 2009
College-in-Colorado-Advancer Training, July 24, 2009
Cisco Networking Academy Conference 2009, July 13-15, 2009

Colorado Association for Career and Technical Administrators, Mid-Winter Conference, February 4-6, 2009
Leadership in Technical Education, workshops, December, 2008
State Certified Trainer, SkillsUSA State Certified Trainer Workshop, Kansas City, Missouri, February 25-28, 2008
SkillsUSA Fall Leadership Conference, November 10, 2007
Colorado Association of Career and Technical Educators, E-Portfolio Workshop, July 9, 2007
Colorado Association of Career and Technical Educators, Summer Conference, July 10-12, 2007
SkillsUSA Chapter Management Institute, October 2, 2006
Colorado Association of Career and Technical Educators, Summer Conference, July 25-28, 2005
SkillsUSA University, National Leadership and Skills Conference, Kansas City, Missouri, June 22-24, 2005
VE 494, Independent Study, Colorado State University, Spring 2004
VE 486, Practicum, Colorado State University, Spring 2004
VE 473, Communication Strategies, Colorado State University, Fall 2003
VE 472, Classroom Management, Colorado State University, Fall 2003
VE 471, Orientation and Assessment -New Teachers, Colorado State University, Fall 2003
Crossroads Conference, Colorado Council for Children with Behavioral Disorders, October 17, 2003

Innovative Materials/Activities
Chapter and Final Case studies for, Technology Integration I & II; "real world" scenario based study integrates content of objective areas and requires students to apply concepts to create a solution for the scenario. Final case study is one of which the students will create presentations and virtual networking concepts, which enables them to create a portfolio of accomplished skill sets.

Chapter and Final Case studies for, Cisco Networking classes, TECI 180 - 235; "real world" scenario based study integrates content of objective areas and requires students to apply concepts to create a solution for the scenario. Final case study is one of which the students will create presentations and virtual networking concepts, which enables them to create a portfolio of accomplished skill sets.

Embedded Academic content within CTE course, cross-walked to State, National, ACT standards and approved for Graduation credit requirements.

Supervision of Student Research/Project(s)
December 2011: Ten students from TECI 230, completed a presentation of a case study scenario, that represented a fictional company with specific requirements for a company network and were required to use proper and preferred methods of protocols and practices.

May 2011: Ten students from TECI 185, completed a presentation of a case study scenario, that represented a fictional company with specific requirements for a company network and were required to use proper and preferred methods of protocols and practices.

April 2009: Seven students from TECI 260, performed preventative maintenance on 127 computers under the supervision of myself and the company of Western Colorado Podiatry services.

Scholarship and Creative Work, 2003-Present:
Conference Presentations
"Affect of Moores Law" and it's relationship to an IT Support persons pay and or the cost of new technology today, Academic-in-CTE, October 7-8, 2011

"Energy and relationships" and the cause and effect as stored in a spring, Academic-in-CTE, October 7-8, 2011

"Information representation" - Information representation in Information Technology, using base numbers, April 29-30, 2011

Grants (proposed or funded)
"Digital Tools for Electronics and Electricity in the classroom", Grand Junction Chamber of Commerce classroom Improvement grant, $800.00 for handheld digital oscilloscopes for the Technology Integration Curriculum, December 2008

Professional Memberships

Association of Career and Technical Education (ACTE) -- 2004 - present
Colorado Association of Career and Technical Education (CACTE) -- 2004 - present
Colorado Association of Career and Technical Administrators (CACTA)-- 2009 - present
SkillsUSA -- 2003 - present
Electronics Technician Association, International (ETAi) -- 2003 - present
National Coalition for Electronics Education (NCEE) -- 2003 - present
Computer Science Teachers Association (CSTA) -- 2005 - present

Honors and Awards

2011
-- Promoted to Assistant Technical Professor, Rank
-- Recommended for "Distinguished Faculty", Mesa State College

2008
-- Five Year Service Award

Service 2003-Present:

Institutional

2012
-- Career and Technical Education Committee, Chair
-- Crisis Team Member
-- College and Career Readiness Tour

2011
-- Career and Technical Education Committee, Chair
-- Crisis Team Member
-- SkillsUSA Advisor
-- Tenure and Promotion Recommendation Committee
-- Imbedded Academic-in-CTE Crosswalks, Chair
-- Sophomore Tour

2010
-- Career and Technical Education Committee, Chair
-- Crisis Team Member
-- SkillsUSA Advisor
-- Imbedded Academic-in-CTE Crosswalks, Chair
-- Sophomore Tour

2009
-- SkillsUSA Advisor
-- Imbedded Academic-in-CTE Crosswalks, Chair
-- Sophomore Tour

2008
-- SkillsUSA Advisor
-- Imbedded Academic-in-CTE Crosswalks, Chair
-- Sophomore Tour

2007
-- SkillsUSA Advisor
-- Sophomore Tour

2006
-- SkillsUSA Advisor
-- Sophomore Tour

2005
-- SkillsUSA Advisor
-- Sophomore Tour

2004
-- SkillsUSA Advisor
-- Sophomore Tour

2003
-- SkillsUSA Advisor

Community
2012
-- School District 51, Individual Career and Academic Plans Committee, Advisor
-- Secondary and Post Secondary Plans of Study, Chair
-- Colorado Association for Career and Technical Education, Executive Board Member
-- Colorado Association for Career and Technical Education, STEM, Arts, Design and IT Division President
-- Career Center: Multi-Media, Graphics, and Computer Technology Advisory Committee Member
-- Career Fair, Fruita Monument Middle School
-- Career and Technical Education MCSD 51 Leadership Team, Chair
-- Imbedded Academic-in-CTE Crosswalks, Chair
-- CTE, College Credit in place, Chair

2011
-- School District 51, Individual Career and Academic Plans Committee, Advisor
-- Secondary and Post Secondary Plans of Study, Chair
-- Colorado Association for Career and Technical Education, Executive Board Member
-- Colorado Association for Career and Technical Education, STEM, Arts, Design and IT Division President
-- Career Center: Multi-Media, Graphics, and Computer Technology Advisory Committee Member
-- Career Fair Fruita Monument Middle School
-- Career and Technical Education MCSD 51 Leadership Team, Chair
-- School District 51, Individual Career and Academic Plans Committee, Advisor
-- Secondary and Post Secondary Plans of Study, Chair
-- Imbedded Academic-in-CTE Crosswalks, Chair

2010
-- Colorado Association for Career and Technical Education, Executive Board Member
-- Colorado Association for Career and Technical Education, STEM, Arts, Design and IT Division President Elect
-- SkillsUSA State Certified Trainer
-- Proto Camp Instructor/Advisor
-- Career Fair, Fruita Monument Middle School
-- Career Fair, Rocky Mountain Elementary School
-- Imbedded Academic-in-CTE Crosswalks, Chair

2009
-- SkillsUSA State Certified Trainer
-- Imbedded Academic-in-CTE Crosswalks, Chair

2008
-- SkillsUSA State Certified Trainer

Advising 2003-Present:

Institutional level
2008
--SOAR Sessions: 2

2007

--SOAR Sessions: 3

2006
--SOAR Sessions: 2

2005
--SOAR Sessions: 2

Department level
2005 - present
Student Advisor -- 20-45 students
2004 - present

Technology Integration Program High school Interviews -- 30-50 students

Prior Professional Experience Relevant to Current Position: (Include year(s) of employment, employer, position title and responsibilities)

Year(s) of Employment	Employer	Position Title	Position Responsibilities
2001 - 2002	IntelliTec Colleges, CO	Dean of Faculty	Train and manage full time faculty
2000 - 2001	SBM Site Services, CO	Area Manager	Train and manage staff
1979 - 2000	United States Navy	Chief Petty Officer	Train and manage service members

Please record the number "items/events" you have listed above in the following categories.
If you specify items/events under "other," please provide an explanation/definition.

	Books		**Book Reviews**		**Creative Publications**
	Journal Articles		**Performances**		**Patents**
3	**Conference Presentations**	3	**Exhibitions**	1	**Grants-funded and non-funded**
	Sabbaticals		**Fulbrights**		**Book Chapters**
5	**Other (related to discipline)**	Student Services and Advising Center presentations of Technology Integration, Process Tec			

Name:

John L Sluder

Start Year: 1998

Program:
Technology Integration

Department:
WCCC - Business, Applied Science & Information Services

WESTERN COLORADO
COMMUNITY COLLEGE
A Division of Colorado Mesa University

Full-time Faculty Vita

Faculty Rank

- ○ Technical Professor
- ◉ Assistant Technical Professor
- ○ Associate Technical Professor
- ○ Technical Instructor

Highest Degree

Colorado Mesa University	Business Computer Information Systems	2014

Education: (List all degrees beginning with most recent-include post docs and external certificates)

Cisco Networking Academy CCNA Discovery Certificate 2010
VoIP Global Knowledge Certificate 2009
Cisco Networking Academy CCNA 1&2 Certificate 2003
Colorado State University Professional Teacher Licensure License 2003
Buck Institute for Education Project-Based Curriculum Dev. Certificate 2002
Red Hat Global Learning Linux System Administration Certificate 2002
Intel Innovation in Education Intel Master Teacher Certificate 2001
Colorado State University Vocational Teacher Credential Credential 1998

Teaching 2003-Present:

Courses Taught

TECI 132 Introduction to IT Hardware and System
TECI 170 Introduction to Communications
TECI 180 Cisco Networking I
TECI 185 Cisco Networking II
TECI 240 VoIP Fundamentals
TECI 251 Leadership
TECI 260 Information Technology Hardware and System
TECI 265 Advanced IT Hardware and System Software
TECI 265L Advanced IT Hardware and System Software Laboratory
TECI 290 Certification:
TECI 292 Capstone in Technical Engineering Planning and Economics

Evidence of Continuous Improvement

Cisco Networking Academy CCNA Discovery Certificate 2010
VoIP Global Knowledge Certificate 2009

Innovative Materials/Activities

National Science Foundation - "Integrated Learning Systems, A Model Approach" Co-Principle Investigator. Awarded to Mesa State College/Western Colorado Community College - $445,000

Supervision of Student Research/Project(s)

Encana Drill Cuttings Reclamation and Reuse
Developed and maintained the Linux, Apache, Moodle, PHP (LAMP) distance learning site for the NSF project.

Scholarship and Creative Work, 2003-Present:
Conference Presentations
TeleCOOP of Colorado Invited Oral Presentations 1998-2003
CISCO Accademy CISCO I & II Instructor Certified 1998-2011
NSF/ATE CoPI Integrated Learning Systems 2006-2010
SCATE National Robotics Training Center 2009
Curriculum Development Consultant
AACC Annual Convention; Presenter, ILS 2009

Technical Reports
SCATE National Robotics Training Center 2009
Curriculum Development Report

Grants (proposed or funded)
National Science Foundation - "Integrated Learning Systems, A Model Approach" Co-Principle Investigator. Awarded to Mesa State College/Western Colorado Community College - $445,000

Professional Memberships
Cisco Networking Academy
Association for Career and Technical Education (ACTE)

Honors and Awards
Chamber of Commerce Teacher of the Year, 2001

Service 2003-Present:
Institutional
HLC Self evaluation subcommittee lead

Community
RMPBS Local Advisory Board

Advising 2003-Present:
Institutional level
WCCC student advising sessions

Department level
Students in department programs

Prior Professional Experience Relevant to Current Position: (Include year(s) of employment, employer, position title and responsibilities)

Year(s) of Employment Employer Position Title Position Responsibilities

Information Technologies International, Inc., ISP Grand Junction, CO
Owner, Chief Operating Officer (1993-1997)
· Director of Internet Services from startup to sale of first successful ISP in Grand Junction.
· Supervise all the stages involved with planning and production of multimedia programs and Internet Services, including technical support and customer service.
· Actively teaching and training Internet communications through the use of digital technology.
· Principal Consultant for Information Management Systems. Principal Expert/Consultant for photographic and video production.

RUST Geotech, Grand Junction, CO
Manager, Reproduction and Audiovisual Services (1988-1993)
· Responsible for all photographic, printing, audiovisual, and multimedia services for the U.S. Department of Energy Grand Junction Project Office.
· Managed the facility's copy center production, managed 12 employees.
· Responsible for budget and cost control.

UC West Photo Lab, Colorado Springs, CO
General Manager (1985-1987)
· Manager responsible for bringing the business to break-even in eight months.
· Supervised the purchase and installation of equipment.
· Responsible for employee hiring and training, responsible for inventory control, sales, marketing, and budgeting while managing 20 employees.

Williams and Meyer Co., Art Form Communications, K&S Photo, Chicago, IL
General Manager/ Freelance Designer (1982-1985)
· Managed a full-service photo laboratory with 80 employees.
· Trained in Kodak E-6, C-41, and EP-2 processes.
· Experienced designer on Dicomed D-38, Micro II IBM, Micro I Apple, and FCG Beacon computer graphic systems.

Please record the number "items/events" you have listed above in the following categories.
If you specify items/events under "other," please provide an explanation/definition.

	Books		**Book Reviews**		**Creative Publications**
	Journal Articles		**Performances**		**Patents**
3	**Conference Presentations**	1	**Exhibitions**	3	**Grants-funded and non-funded**
	Sabbaticals		**Fulbrights**		**Book Chapters**
1	**Other (related to discipline)**	Coleman Fellow			

External Program Review

Process Systems Technology
Associate of Applied Science Degree
Western Colorado Community College
Colorado Mesa University

Reviewed by:
Gary Hicks
Division Chair, Physical Sciences and Process Technologies
Brazosport College
500 College Drive
Lake Jackson, Texas
(979) 230-3291
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Submitted to:
Dr. Steven Werman
Assistant Vice President, Academic Affairs
Colorado Mesa University
Site Visit Conducted: March 14-15, 2013

I. INTRODUCTION

On March 14-15, 2013, a site visit of the Process Systems Technology Program at Western Colorado Community College (WCCC) was conducted. The visit included meetings with the following:

- John Sluder, Department Head Business, Applied Sciences, and Information Services,, WCCC
- Dr. Steven Werman, Assistant Vice President, Academic Affairs, Colorado Mesa University (CMU)
- Brigitte Sundermann, Vice President of Community College Affairs, WCCC
- Martin Chazen, Faculty, WCCC
- Carolyn Ferreira-Lillo, Faculty, WCCC
- Process Systems Student Interviews, WCCC
- Dr. Carol Futhey, Vice President, CMU
- Sarah Cron, Director of Tomlinson Library, CMU
- Jeremy Brown, Executive Director of Information Technology and Telecommunications, CMU
- Betty Schans, Faculty Assessment Coordinator, CMU

The visit also included a tour of the facilities as well as observation of a lower division course, PROS 120 Process Technology I – Equipment and an upper division course, PROS 292 Integrated Learning Systems.

The Process Systems Technology Program has been in existence for about five years. The program supports the oil and gas industry as well as advanced manufacturing business needs. It started in response to changes in the demands of business and industry. The changes needed that were identified by industry involved shifting the emphasis of the program from electronics to a combination of two technical areas: process control and instrumentation/electronics. The addition of classes in the industrial control field expanded the knowledge and skills of graduates to better align with these industry needs.

II. EXECUTIVE SUMMARY

An Executive Summary Table is included in Appendix A. This table is a summary of observations made from the program review. The following are observations, recommendations, and suggested resources pertaining to the review elements listed in the summary table. Some of these will be discussed in more detail in the recommendation section of this report (Section III).

B. Curriculum

The program curriculum is very broad, covering content in process control, plant operations, instrumentation, and electronics. This breadth appears to be needed due to the employer wanting knowledge and skills in multiple areas. From interviewing the students in the program (Appendix B), the students felt like the program gave them a good foundation for learning the skills they would need in a job upon graduation. In looking at documentation on the program it appears that there has not been a formal crosswalk between the knowledge and skills needed by the employer and the knowledge and skills addressed in the curriculum. This would be very helpful in confirming that the curriculum is aligned with industry needs and provide guidance for any needed changes. This is further addressed in Section III B in this report.

Some of the strengths of the curriculum are:

- The DC Circuits and AC Circuits courses both provide the student with a good foundation in electronics.
- The development of the Technical Mathematics and Applied Physics courses mentioned in the self study should better reinforce the technical courses in the program. It should also better address the Applied Learning and Computational Outcomes: apply contextual physics to the field of process control industries and apply mathematical concepts and practices to the field of process control industries.
- The Leadership Development course stresses the soft skills that are needed in the workplace
- The Integrated Learning Systems course as well as several other courses, provides skills in problem solving, team skills, and oral and written presentations.
- The program has an articulation agreement with the Bachelor of Applied Science (BAS) degree in Computer Information Systems or Business Administration so the student can easily continue from an AAS degree to a BAS degree.

Since one of the most important skills a graduate in this field can possess is the ability to troubleshoot, requiring a troubleshooting course in the degree plan is recommended. Although troubleshooting is obviously done in some of the other courses, due to its importance it should be a stand-alone course.

C. Recruiting/Retention

Based on the combined enrollment trends from 2007/2008 to 2011/2012 there has been a significant increase in enrollment; however, looking at the self study and in discussions with the

want to shift some of the emphasis to the lower level classes. Industry tours are also a good way to keep students motivated toward finishing their degree. Collecting survey information from students who have dropped out of the program may be helpful in gaining some insights into the retention problems, but is usually difficult to get a very high response rate.

D. Learning Environment

The program objectives focus on learning environments that provide a demonstration of hands-on-skills, problem solving techniques, and contextual learning. From observing classes and interviewing students and instructors, it is evident that these qualities are put into practice.

The students interview (Appendix B) spoke of the program as being a very hands-on program, having a lot of team activities, doing a lot of projects, and faculty working very closely with them. The instructors emphasized bringing everyday examples into the lab to teach concepts. As an example, observing the PROS 292 – Integrated Learning System class (Appendix C), the students were assigned a project that involved teamwork, information sharing between students, problem solving, and creativity. It also provided opportunities to research a topic, design a pilot unit, gather data, and report on their findings through oral and written presentations. Students seemed to be actively engaged in learning through their project work and the instructor took on more of a learning facilitator role. The electronics lab also provided a good environment for contextual learning in the electronics field. What is missing in the program that would complete these program objectives is a lab that would provide an industrial environment for Process Systems, using an operating system that would include instrumentation and equipment that the students would find in the work environment. This will be discussed further in Section III-C.

E. Faculty

Based on the faculty vitae, faculty members appear to be actively involved in staying current in their area of expertise (certifications, courses, etc.). One faculty member is in the process of receiving his degree. There may be a concern from the accrediting agency until the degree is obtained. There was also involvement in community and professional organizations. In interviewing the students, they indicated the faculty was very accessible and helpful.

Two concerns regarding faculty are recruiting new faculty and providing training for current faculty in process control technology (discussed in Section III-B). Process Systems Technology and related fields is an area that has shown to be very difficult in recruiting faculty that have

and the student is evaluated on how he/she responds to the problem. The Simtronics Corporation (http://www.simtronics.com/) is one of the companies that sales simulator software that can be accessed by the student through the college's online software Desire2Learn (D2L). Typically the college will purchase a number of licenses which will allow one student at a time on the simulator per license. To reduce the costs the college can purchase a limited number of licenses (one or two) and assign each student a time slot in which they can use the software.

Maintenance and Supplies – A concern expressed by both students and faculty was a need for more college support for lab equipment maintenance and purchasing lab supplies. The instrumentation and equipment needed in this type of program and the cost of maintaining it is typically expensive. In looking at the budget for the department, even with obtaining donations from industry, it appears to be inadequate. Increasing the budget or possibly obtaining grant funds needs to be considered.

Library Resources – Based on the program self study and the library curriculum assessment, the library resources are adequate. In my discussions with Ms. Cron, Director of Tomlinson Library about discarding some of the older library materials, I was asked how recent the information needed to be to be useful to the program. A 10 year time limit was suggested. This needs to be confirmed with the Department Head. Since instrumentation and electronics technology tend to change quickly journals may be more appropriate. The library seems to have very good access to textbooks through a loan program and electronic resources. There were also questions asked about resource materials for environmental health and safety which is part of the Process Systems Technology Program. There is a communication included in Appendix D, which includes recommendations for environmental, health, and safety resource material from Dr. Craig Litton, which might be helpful in selecting resource material.

G. Assessment Plan

Based on a discussion with Ms. Schans, the Faculty Assessment Coordinator, the college and university is in a process of developing new program outcomes and assessment plans for the different departments. From showing her the documents that were received from the department head, she indicated the Process Systems Technology Program were where they should be in their assessment plan development at this time. Degree program outcomes had been identified and were cross-walked with the courses in the program. The next step would be to complete the "Program Outcome and Assessment Plan Template." In looking at the degree program outcomes/courses cross-walk (matrix) the courses identified for "Critical Thinking" outcomes were all first year courses. This outcome requires skills such as research,

B. Priority Recommendations

1. Recommendation 1 – Increase Industry Advisory Committee Involvement

Having an "industry driven" program is critical to any successful technical program. There were several indications of industry supporting and being involved in the program:

- Chevron coming to campus to interview graduates and hiring several soon to be graduates.
- Providing materials for projects in the Integrated Learning Systems Lab
- Funding scholarships and making donations to the program
- Supporting grants
- Providing guest lectures
- Providing internships

To strengthen this relationship and to get better input from your industry partners it is recommended that you have regular advisory meetings. Getting industry to attend meetings is a common problem with all technical programs. The department head mentioned possibly having meetings offsite tagging on to a meeting that the industry members were already attending. This might be helpful since some of the members are in remote locations and would also make better use of their time. It is important to get their input in these meetings, take minutes, and follow-up on any input they give you. Advisory members can also be used to get industry representatives to speak at recruiting events which was mentioned earlier in the recruiting Section II-C. The advisory committee membership list had a wide representation of companies; however there was not a representative from Chevron. Since Chevron seems to be a key employer for your graduates, a special effort needs to be made to get a Chevron representative on the advisory committee. Included in the resource material that accompanies this report is an example of a charter for a process technology advisory committee which may provide ideas in adding more structure to the advisory committee.

2. Recommendation 2 – Crosswalk Industry Knowledge and Skills with Curriculum

Based on discussions with the Department Head, the Process Systems Technology program has never gone through a process where industry subject matter experts (employers of graduates) provide knowledge and skills needed for new employees and crosswalk that information with knowledge and skills provided in the program. The process is sometimes referred to as a gap analysis or DACUM (Designing a Curriculum). This process should be very helpful in making sure the curriculum is aligned with the companies you serve and should provide some direction on any future changes. The better the alignment you have between the curriculum and actual job knowledge and skills will allow your graduates to adapt to their jobs quicker and should increase the demand for your graduates. One of the criteria that some companies look at in

equipment that is used in the field. This would narrow the gap between the students' educational environment and their work environment. The Programmable Logic Controller (PLC) lab is a good step in that direction, but there is currently a sizable gap between the equipment the students are using in the lab and the equipment that is used in the field. The crosswalk that was suggested earlier should give some direction for developing a process systems trainer that could accomplish this. As a minimum this should include modern instruments that measure flow, level, temperature, and pressure that are controlled by a modern distributive control system (DCS).

Funds for such a trainer may need to be provided through a grant source. This unit could be obtained through the purchase of a training unit from one of many vendors. Another option which might reduce the costs would be to have the students in the PROS 220 classes do part of the installation as a project. Much of the support structure, piping, control system configuration, etc., would still need to be done through contract labor. There is lab book for the Instrumentation Technology Installation Lab at Brazosport College which gives instructions and lab exercises on installation of equipment for a process control trainer in the resource materials that accompany this report which might be helpful.

IV. CLOSING REMARKS

After completing the site visit and this review, I have been very impressed with Western Colorado Community College and the Process Systems Technology program. The review process itself has been a very thorough look at the program, and I feel it is a very important step in determining future direction. Thanks to the administration of WCCC and CMU for doing such a good job in organizing the visit and directing the review.

Concerning the future for the program, I can see a lot of potential. Besides the qualities that have previously been mentioned in the report there are several other positive strengths that I think are significant to the future of the program:

Job Growth – Based on data from the Mesa County Workforce Center (2012) there is a projected 16% job growth in process systems' occupations in 22 counties on the western side of the state from 2012-2017, with average annual earnings of $50,000. Extending the projections out to 2022 the demand increases to 27.6% compared to a statewide anticipated industry job growth of 14.6%.

Job Placement – The graduate placement for the program for the past three years has been 100%. The course work also prepares students for the option to obtain their electronics certification.

V. APPENDICES

A. Appendix A - Executive Summary Table

Appendix B - Student Interviews

STUDENT INTERVIEWS

There were about 8-10 students that participated in the interviews. Most of the students were in their upper level courses close to graduating. The students seemed to be very open in talking about strengths of the program as well as ways to improve the program. Below are the questions that were asked along with the student responses.

- What are the strengths of the program?
    - Opportunities to work with different majors
    - Team activities
    - Professors always willing to help
    - Very hands-on program
    - Many of the classes were very challenging
    - Got to do a lot of projects
    - Camaraderie among students, helping each other
    - Cross discipline courses
    - Diversity of course content (there were also some comments about the need for getting into more depth in certain areas)
    - Liked the way the teachers taught the classes
    - The versatility of the college/university in being able to begin a technical program and transfer into a 4-year degree program
- What are the challenges and needed improvements for the program?
    - Program is underfunded
    - Program is understaffed
    - Labs could be more organized
    - Need to use more of the process instrumentation equipment in the lab
        - Student was referring to transmitters such as the Rosemount wireless temperature transmitter
    - Use more equipment like they would be using at the job
    - Access to labs
        - Many of the students were working on projects which required them to work about 15 hours outside of class, mostly in the lab. They needed a student aid or lab supervisor available in the lab so they could have more access.
    - Need more focus in some areas of the program
    - Equipment maintenance support
        - A lot of the equipment was old and frequently had problems due to lack of repair

- Needed another computer in the lab and a printer. (Computer needs to have access to internet and L-drive)

- The students were asked to provide suggestions on recruiting students along with any barriers they perceived in recruiting students:
  - Suggestions:
    - Potential students need to be aware of the variety of skills they learn in the program
    - Workforce Center needs to be more involved in recruiting
    - Use students to help recruit and talk to potential students perhaps through a student committee
    - Expand recruitments to cover Western slope about 100 mile radius
    - Have a "show and tell" demo unit to use for recruiting events
    - There may be some of the university students who might find the program something they may want to pursue
  - Barriers
    - There was a lack of awareness among the potential students of the careers in process systems primarily because it is not something people have observed compared to careers such as auto mechanics. Public needs to be made aware of what exactly they might do with the career, salaries, benefits, etc.
    - There was a perception from several of the students in the program and potential students that the program was not supported well by the college/university. This perception seemed to be primarily based on a lack of current technology in the labs.
- Did you feel the program prepared you for a job?
  - All the students felt like it gave them a good foundation for learning the skills and knowledge required once they were employed
  - Two of the students had already gotten job commitments from Chevron. When asked about their company training once they start their job – they indicated that they would be going to Midland for one week of training and then be sent to a job site which would provide training for six months. It sounded like a lot of this training would be on-line and observing other employees.

Faculty Classroom Observation Form

Directions: This form is intended as a checklist to record activities observed in class; not a scaled rating form. Please keep in mind that the observation reflects a **"snapshot"** of teaching and is not intended as a representation of overall teaching practices.

Instructor Matt Powell Date 3-14-2013

Course Prefix and number PROS 120 Course Title Process Technology I Equipment

Number of Students 4 Observer Gary Hicks

Check if Observed	**Organization**
X	Begins and ends class on time
X	Relates information to previous class(es), or provides students with opportunity to do so
X	Follows an outline or an organized plan for the class session
X	Uses effective transitions between class topics
X	Summarizes periodically throughout and at end of class or prompts students to do so

Comments:

This class was a lower division class typically taught in the second semester. Instructor was reviewing for an upcoming exam. Topics were turbines and motors. Instructor had objectives and study questions for students to use out of class for exam preparation.

Check if Observed	**Variety and Pacing of Instruction**
	Uses a variety of instructional methods (if applicable)
X	Allows adequate wait time when asking questions
	Responds to wrong answers constructively
	Draws non-participating students into activities/discussion
	Prevents specific students from dominating activities/discussion
X	Asks probing questions when student answers are incomplete
X	Guides the direction of the discussion
	Refrains from answering own questions

Comments:

Instructor would frequently ask questions to draw the students into a discussion. Very good interaction between instructor and students which progressed well and stayed on topic.

Comments:

Since this was a review the instructor asked a lot of questions and received very good student response. Students in turn would ask instructor questions and at times there were discussions between students on some of the topics. A lot of the students seemed to have a mechanical background and would bring their past experiences into the discussion.

General Observations
The class was well organized and had very good student participation. It would have helped to have had a PowerPoint slide at different times in the class to illustrate the equipment that was being discussed. I don't know whether this room is normally used as a lecture room. If it is the college might consider installing a computer and a projector in the room. Cut-away equipment of a steam turbine and electric motor would also have been very helpful. The department may want to prioritize what equipment they would like to have in cut-away demos as the department budget permits.

Check if Observed	Instructor-Student Interaction
X	Instructor checked on students to make sure they were doing exercise properly
X	All students were actively participating in lab exercises
NA	Students were wearing proper PPE
X	Treats students with respect

Comments:

There was a lot of interaction between instructor and teams. The team that was presenting their project was working on a "Cellulosic Biofuel" project which involved producing ethanol from the tamarisk plant, a local plant which was a problem to the community. Each of the students worked on a part of the project from researching the different stages of the project, then developing a pilot unit to go from digesting the plant to distilling the ethanol. The group was planning on temperature controlling the unit locally with a Programmable Logic Controller (PLC) and eventually controlling the unit remotely.

General Observations

This was a very unique class and lab which provided a very good learning environment. The students seemed to be very engaged in their projects and based on the team presentation seemed to be knowledgeable about their part in the project. The course seemed to bring out communication and teamwork across disciplines, leadership skills, oral and written communications, problem solving skills, and self-confidence. The college/university wide showcase in which they were to develop a poster/abstract brought another dimension of competition. Most of the equipment for the project seemed to be donated by a local company. In updating their progress on the construction of the pilot unit the students mentioned a problem in getting some of the supplies. This may have been due to a budget issue.

BRAZOSPORT COLLEGE: Physical Sciences and Process Technologies Division
Safety, Health and Environmental Management Program
500 College Drive, Lake Jackson, Texas 77566

25 March 2013

To: Gary Hicks, Division Chair
Physical Sciences and Process Technologies

From: Craig E. Litton, Dr.P.H.

Subject: Book Recommendation for Western Colorado Community College

- *Accident Prevention Manual for Business and Industry, Administration and Programs 13th Edition* National Safety Council
- NFPA 101 *Life Safety Code Handbook* 2009 Edition
- *Code of Federal Regulations 1926 OSHA Construction Standards*
- *Field Safety*, from the National Center for Construction Education and Research 352-334-0911
- Safety Technology, from the National Center for Construction Education and Research 352-334-0911
- Goetsch, D (2010), *Occupational Safety and Health (7th Edition)*. Englewood Cliffs, NJ: Prentice-Hall
- 2. 29CFR 1910 **OSHA** General Industry Regulations available online via www.osha.gov or in a recommended edition from Mangan Communications, Inc.
- *Hazardous Waste Operations and Emergency Response Manual* (2006) Wiley-Interscience
- *ENVIRONMENT*, Eighth Edition (2011) Raven, Peter H., Berg, Linda R., Hassenzahl, John Wiley & Son, Inc
- *Case Studies: Sixty Practical Applications of OH&S Control Principles*, D. Jeff Burton, IVE Press, 2004
- Free to download from TCEQ
    - **A Guide to Pollution Prevention Planning**
        - Details the steps in the pollution prevention planning process for facilities that must comply under the Waste Reduction Policy Act--small and large quantity generators and those who report on the Toxics Release Inventory Form R. http://www.tceq.texas.gov/publications/rg/rg-409.html