



Northland Pioneer College

EXPANDING MINDS • TRANSFORMING LIVESSM

NPC Mechatronics Program Feasibility Study

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2012

Northland Pioneer College

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Approved

1. EXECUTIVE SUMMARY

The Mechatronics Program (MET) will create, support, and promote lifelong learners by instilling basic occupational skills in the disciplines of Mechanical, Electrical, Instrumentation, and Process Controls. In the fall of 2013 we plan to have our program operational in Holbrook using the new Skill Center and its computer room and lab space. The Mechatronics Program will be totally funded for three years by the Arizona Sun Corridor Get Into Energy Consortium's (ASC-GIEC) grant from the U.S. Department of Labor's Trade Adjustment and Assistance Community College Career Training (TAACCCT) program.

2. DESCRIPTION OF PRODUCTS AND SERVICES

Modern industry relies on highly complex production systems to produce high-quality, economical products for an ever demanding world. Mechatronics teaches the systems thinking required to effectively operate, program, and problem solve in this complex environment. Many technologies are integrated to make these sophisticated production systems : mechanical, electronic, electrical, and computer software. The curricula will incorporate training outcomes to prepare students with job ready skills. The skills will include interfacing, problem solving, programming, sequencing, and operation processes.

Students gain knowledge and skills in blueprint reading, CAD drawing, mechanics, pneumatics, hydraulics, electricity, motors, motor control, programmable logic controls, robotics and motion control, process control, instrumentation and computer integrated manufacturing. Emphasis is placed on predictive maintenance, troubleshooting and quality assurance.

NPC's strategic pillars will be at the forefront of our program. Continually advancing learning opportunities, accountability, and relevant technology will be the capstone of our program. We will accomplish this through use of both online assessments and hands-on performance testing.

We will also seek accreditation from the National Center for Construction Education and Research (NCCER) to increase the marketability and transferability of our curriculum to any other institution that has NCCER accreditation. NCCER is a nationally recognized accrediting organization. There are several NCCER accredited programs within the state that provide options for students to complete apprenticeships with NCCER curriculum¹. Our goal is to allow our courses to transfer to four-year degree institutions for bachelor's degree programs.

3. TECHNOLOGY CONSIDERATIONS

The new NPC Skills Center is has been awarded to a general contractor and is on track to be operational in Holbrook for the 2013-2014 academic year . It will be equipped with modern computer and training equipment to provide our students with all the Mechatronics and Instrumentation Controls Learning Systems.

4. Student Employment Prospects-Projected Growth and Salaries

TABLE1: Projected Job Growth and Salaries, Arizona

Job Category	% Job Growth-2016	% Job Growth-2021	Annual Median Salaries
Line workers	3.93%	4.24%	\$65,035.34
Technicians	5.80%	9.50%	\$51,572.12
Plant/Field Operators	14.50%	24.70%	\$60,114.92
Engineers	9.03%	14.93%	88,027.93

Source: Energy Workforce Demand Report-West Region, prepared by EMSI for CEWD, May 2012

Table 2: Hiring Projections

Job Category	Current Job Openings	Hiring Projections through 2015	Hiring Projections through 2017
Line workers	29	153	255
Technicians(non nuclear)	36	267	445
Technicians nuclear	47	162	270
Generation Workers(non nuclear)	75	347	579
Generation Workers nuclear	18	67	112
Engineers (non nuclear)	46	226	376
Engineers (nuclear)	26	91	151
Electricians (mining)	120	360	600
TOTAL	397	1,672	2,788

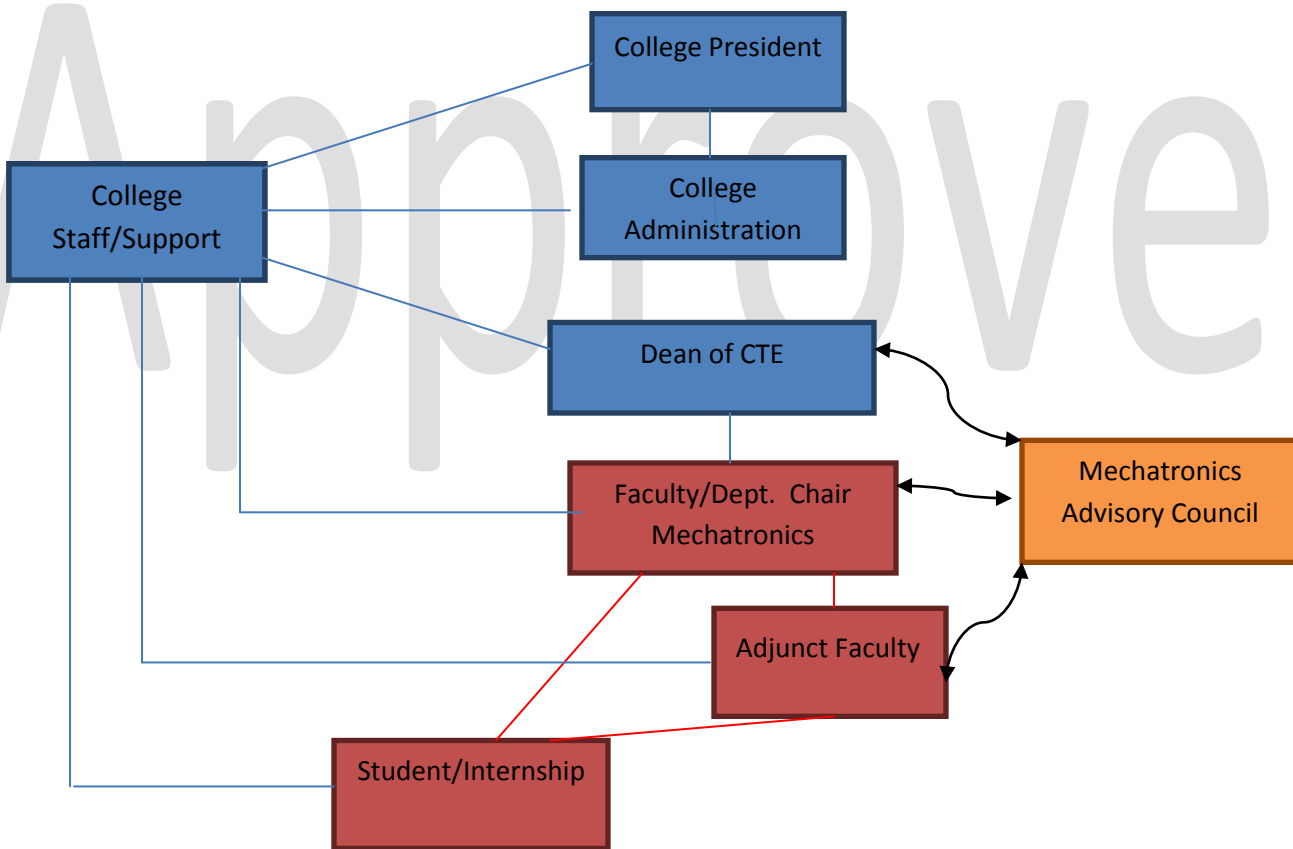
Source: Energy Workforce Demand Report- West Region, prepared by EMSI for CEWD, May 2012

5. MARKETING STRATEGY

The Arizona Sun Corridor Get Into Energy Consortium (ASC-GIEC), led by Estrella Mountain Community College, is a collaboration between five of the states' community colleges located within this high-growth region. These colleges are Estrella Mountain Community College (EMCC), Chandler-Gilbert Community College (CGCC), Pima Community College (PCC), Northland Pioneer College (NPC), and Yavapai College (YC). The Consortium will provide marketing throughout the state and each community college will oversee their direct area marketing.

Staffing for the MET Program will be funded for three years. The grant will provide for two full-time faculty positions. The MET Faculty will report to the Industrial Maintenance and Operations (IMO) Coordinator, who will report to the Dean of Career and Technical Education and receive input and guidance from the Mechatronics Advisory Council.

The Operational Structure of the NPC Mechatronics Program



6. SCHEDULE

The MET Program at NPC will be implemented in in the fall 2013. We will follow the grant phase period.

The MET Program seeks to achieve one degree track and one Certificate of Proficiency (CP) in Instrumentation and Controls:

AAS: Mechatronics Technology (2013)

CP: Instrumentation and Controls Technology (2013)

Phase 1 Create: CP and AAS for Mechatronics Technology and Instrumentation and Controls Technology (Completed by fall 2013)

AAS: Mechatronics Engineering Technology

Associate in Applied Science Degree

The Mechatronics Engineering Technology Program prepares students for careers as engineering technicians in diversified manufacturing. Students gain knowledge and skills in blueprint reading, CAD drawing, mechanics, pneumatics, hydraulics, electricity, motors, motor control, programmable logic controls, robotics and motion control, process control, instrumentation and computer integrated manufacturing. Emphasis is placed on predictive maintenance, troubleshooting and quality assurance.

Course	Course Title	Credit
MET 100	Introduction to Shop Machinery	1
MET 110	Manufacturing Fundamentals	3
MET 120	Industrial Mechanical I	5
MET 130	Industrial Electrical Systems	4
MET 140	Introduction to PLC	4
MET 150	Industrial Mechanical II	6
MET 160	Rotating Electrical Machines	4
MET 200	Robotics and Motion Control	4
MET 210	Process Control and Instrumentation	3
MET 220	Advances PLCs	4
MET 230	Integrated Manufacturing Systems	3
MET 240	Mechatronics Application Project	4
	Total	46

In addition to the courses listed, the following general education courses are required for completion of the AAS degree. These courses may be taken prior to, concurrent with, or following completion of the Mechatronics Program.

	Discipline Studies	7
MAT 152	Advanced Algebra	3
ENL 101	College Composition	3
	Communications: ENL 102, 109, SPT120	3
CIS 105	Computer Applications and Information Technology	3
CIS 141	Managing and Maintaining Your PC I (A+)	3
CIS 142	Managing and Maintaining Your PC II (A+)	3
	Total	25

Certificate of Proficiency in Instrumentation and Controls (existing NPC courses)

Course	Course Title	Credit
IMO 270	DC Analysis and Laboratory	4
IMO 271	AC Analysis and Laboratory	4
IMO 272	Control Systems I Core	4
IMO 273	Control Systems II Continuous Process Controls	6
IMO 274	Control Systems III Network and Variable Speed Drives	4
	Total	22

The Certified Production Technician (CPT) program enables students to build foundational skills. The program uses an interactive multimedia competency based curriculum that teaches Manufacturing Skill Standards Council (MSSC) nationally recognized standards

The Arizona Sun Corridor Get into Energy Consortium (ASC-GEIC) is built on industry engagement with all the major state and regional energy employers and Center for Energy Workforce Development (CEWD), a non-profit consortium of electric natural gas and nuclear utilities and their associations. Educational institutions in the Arizona Energy Workforce Consortium have collaborated with energy industry members of CEWD to adopt the Get Into Energy Career Pathways (GIECP) model. This model provides a clearly-defined system of competencies and industry recognized credentials linked to employment and career advancement. The identified competencies are the skills, knowledge, and abilities required to work in the energy industry. ASC-GEIC will align this competency model with the new and enhanced energy training programs being proposed. The Arizona Energy Workforce Consortium will work closely in an advisory and Subject Matter Expert (SME) role in the development and implementation of all credentials.

Plans to Stack and Lattice Credentials: The Energy Industry Competency (EIC) model provides a framework for industry credentialing. Credentials have been specifically identified to reduce skill gaps in the energy workforce, both foundational and job specific, and increase the percentage of potential candidates who can pass the pre-employment tests. Through the partnership with CEWD, the credentials implemented in Arizona will become part of a national network of portable credentials recognized by energy industry employers across the country.

Figure 2: Arizona Stackable Credentials



7. FINANCIAL PROJECTIONS

Operating Expenses

The program will be funded for three years by the Trade Adjustment and Assistance Community College Career Training (TAACCT) grant. Northland Pioneer College will receive 1.9 million dollars over a three-year period to fund the program. Per grant projections, Northland Pioneer College expects to enroll 20 Mechatronics students taking a six-credit Mechatronics course per year. Based on a cost of (\$62) per credit hour and (\$145) in course fees per FTSE per year, this translates into approximately (\$20,680) in program earnings per year. Less the cost of adjunct faculty salaries at \$15,530 per year, the net gain for the Mechatronics program is estimated at (\$5,150).

The chart on the following page depicts the current budget as funded by the Arizona Sun Corridor Get into Energy Consortium’s Trade Adjustment and Assistance Community College Career Training grant.

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Northland Pioneer Community College - ASC-GIE BUDGET

		YEAR 1	YEAR 2	YEAR 3	YEAR 4	TOTAL	DESCRIPTION
A. Personnel							
Faculty 1 (\$80K)	AY	\$ 30,000	\$ 61,800	\$ 63,654		\$ 155,454	Faculty to increase capacity within program and to support Strategies 3,4,5 - Expand and enhance stacked or lificed credentials, Embed and expand technology enabled learning, and Establish educational partnerships for articulation and transfer. Faculty salary is based on 9 months for academic year and 2 months for summer (Year 1 is 1/2 of academic year at 4.5 months)
	Summer	\$ 13,333	\$ 13,733	\$ 14,145		\$ 41,212	
Faculty 2 (\$80K)	AY	\$ 30,000	\$ 61,800	\$ 63,654		\$ 155,454	
	Summer	\$ 13,333	\$ 13,733	\$ 14,145		\$ 41,212	
Lab Tech (PSA 9/4)		\$ 29,180	\$ 40,073	\$ 41,275		\$ 110,528	Fulltime Lab-technician to support program and increase capacity for TAA eligible participants
Project Coord (PSA 10/4)		\$ 32,042	\$ 44,005	\$ 45,325		\$ 121,372	Fulltime Project Coordinator (onsite) to coordinate activities, programs and with consortia members
Career Coach (PSA 9/4)		\$ 29,180	\$ 40,073	\$ 41,275		\$ 110,528	Fulltime Career Coach to provide assessments (Tiers 1-5) leading to commomn industry recognized credentials
		\$ 177,068	\$ 275,218	\$ 283,474	\$ -	\$ 735,760	Subtotal for Personnel Salaries
B. Fringe Benefits							
Faculty 1		25,180	33,616	36,827		\$ 95,622	Fringe Benefits for Fulltime Faculty includes a rate of 19.5% (year 1) with a 1% increase per year + a medical election of \$16,747 (year 1) with annual increase of 9.64%.
Faculty 2		25,180	33,616	36,827		\$ 95,622	
Lab Tech (PSA 9/4)		22,425	28,560	28,080		\$ 77,975	Fringe Benefits for all Fulltime employees includes a rate of 19.5% (year 1) with a 1% increase per year + a medical election of \$16,747 (year 1) with annual increase of 9.64%.
Project Coord (PSA 10/4)		22,982	27,365	29,858		\$ 80,205	
Career Coach (PSA 9/4)		22,425	28,560	28,080		\$ 77,975	
		118,192	148,117	161,491	\$ -	\$ 427,800	
C. Travel							
Trip 1 CEWD (2 ppl)		\$ 6,000	\$ 6,000	\$ 6,000		\$ 18,000	Instate and Out of State Travel estimate based on previous experience and established rates; includes travel to CEWD conferences or activities.
In State		\$ 9,000	\$ 9,000	\$ 9,000		\$ 27,000	
		\$ 15,000	\$ 15,000	\$ 15,000	\$ -	\$ 45,000	Subtotal for Travel
D. Equipment							
Equipment		\$ 500,000		\$ -	\$ -	\$ 500,000	Lab and safety equipment to support mechatronics program.
		\$ -	\$ -	\$ -	\$ -	\$ -	
		\$ 500,000	\$ -	\$ -	\$ -	\$ 500,000	
E. Supplies							
Printing/Outreach Materials		\$ 10,000	\$ 10,000	\$ 10,000		\$ 30,000	ASC-GIE Program outreach materials for students, printing
Curriculum Materials		\$ 5,000	\$ 5,000	\$ 5,000		\$ 15,000	In support of Department of Energy's NTER for distribution throughout the state
Software		\$ 5,000	\$ 5,000	\$ 5,000		\$ 15,000	
		\$ 20,000	\$ 20,000	\$ 20,000	\$ -	\$ 60,000	
F. Contractual							
WorkKeys for NCRC Test (10% of \$72K)		\$ 7,200	\$ 7,200	\$ 7,200		\$ 21,600	To support Strategies 1, 2; Develop and implement recruitment, retention and achievement strategies for TAA-eligible workers, Develop career pathways and build academic programs. To provide career assessment (Kuder) and tools for the Career Coach to utilize for assessment and career readiness.
Kuder Career Coach License (10%)		\$ 15,135	\$ 22,695	\$ 22,695		\$ 60,525	
EES Employment Skills Test (10%)		\$ 3,027	\$ 4,539	\$ 4,539		\$ 12,105	
Energy Industry Fundamentals Test (10%)		\$ 4,036	\$ 6,052	\$ 6,052		\$ 16,140	
		\$ 29,398	\$ 40,486	\$ 40,486	\$ -	\$ 110,370	Subtotal for Contractual Activities
G. Interior Renovations							
Remodel Lab Space		\$ -	\$ -	\$ -	\$ -	\$ -	N/A
		\$ -	\$ -	\$ -	\$ -	\$ -	Subtotal for Construction
H. Other							
Subject Matter Experts		\$ 10,800	\$ 10,800	\$ 10,800		\$ 32,400	In support of curriculum for Strategies 3, 4, 5 - Expand and enhance stacked or lificed credentials, Embed and expand technology enabled learning, and Establish educational partnerships for articulation and transfer. Outreach to participants with One-Stops, CEWD, and Science Foundation Az.
Outreach/Education costs		\$ 20,000	\$ 20,000	\$ 20,000		\$ 60,000	
		\$ 30,800	\$ 30,800	\$ 30,800	\$ -	\$ 92,400	Subtotal for Other
I. Total Direct Costs		\$ 890,458	\$ 529,620	\$ 551,251	\$ -	\$ 1,971,330	Total for Direct Costs
J. Indirect Costs		\$ -	\$ -	\$ -	\$ -	\$ -	Total Indirect Costs (0% at NPCC)
K. Grand Total		\$ 890,458	\$ 529,620	\$ 551,251	\$ -	\$ 1,971,330	Grand Total by College