Program Information & Skill Alignment Chart for:
Electro-Mechanical Engineering – CIP Code 15.0403
Mount Joy Campus

Form to be submitted to IU 13 with PIF

Program Description	Automated manufacturing is now a standard process in most industries. The Electro-Mechanical Engineering program is designed as a pre-engineering program with an industry-driven curriculum developed by leaders in the field. This program combines mechanics, control, electronic and electrical engineering, and systems design to create useful products. Examples of Electro-Mechanical systems include robots, 3Phase HIGH VOLTAGE, motor controls, and machine tools with automated controls CNC, belts, chains, bearings, and automated machines. In such systems, the software has become an integral part of the product itself, an actual "machine element" necessary for proper function and operation. The Electro-Mechanical Engineering program includes an innovative curriculum. Students will gain knowledge and skills in blueprint reading, mechanics, pneumatics, hydraulics, electricity, electronics, motors, motor control, programmable logic controls, robotics and motion control, process control instrumentation, and computer-integrated manufacturing.
Program Information (costs, certifications, uniform)	Textbook- (Provided) Industrial Maintenance and Mechatronics **Uniforms**- $100.00 (approximate) • Leather Steel Toe Work Boots (NO sneakers) • Royal Blue LCCTC uniform T-shirts • Dark Blue Work Pants (Dickies) Program Opportunities/Certifications • NOCTI Certification • OSHA 10 Hour certificate (paid for by school) • EPA 608 Refrigerant (optional)
Program Outline & Pathways	**State Program of Study Task Outline** • Technical Documentation • OSHA/Safety in the Lab • Blueprints and Schematics • Basic AC/DC Electricity • Electrical Measurements • Electrical Resistance • Circuit Analysis • National Electric Code • Direct Current Motors • Alternating Current Motors • Inductance and Capacitance • Industrial Motor Control • Transformers • Soldering Techniques • Basic Electronics • Logic Functions • Programmable Logic Controllers (PLC's) • Mechanical Power Transmission Systems • Pneumatics
	Pathways • Engineering 4-year college degree • Electro-Mechanical Technician • Industrial Engineering Technician • Industrial Maintenance Mechanic • Industrial Maintenance Electrician • Industrial Automation Technician **Post-secondary options/ Continuing Education** 2-year programs • Thaddeus Stevens Technical College • Harrisburg Area Community College • Reading Area Community College • Pennsylvania College of Technology 4-year Programs • Penn State • Harrisburg University • ABC apprenticeship

	• Hydraulics • Robotics	
Other Information	Student/Teacher Ratio- 24:1 SOAR/Articulation Agreement SOAR is a Pennsylvania Department of Education (PDE) program which enables high school students who successfully complete a PDE approved career and technical program to earn college credits. The number of credits available varies by school, program and from one school year to another. Please discuss these options with your counselor. Delaware County Community College 15 Credits Northampton County Area Community College 9 credits Pittsburgh Technical College 18 credits Westmoreland County Community College 12 credits	

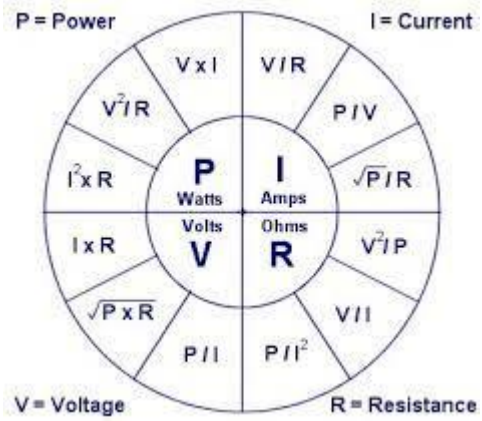
Student Name: _____ District: _____

Skill Alignment Chart for:

Electro-Mechanical Engineering – CIP Code: 15.0403

Educational and Physical Attributes	Program Expectations	Present Education Level and Current Supports
Program Safety / Physical Considerations	• Sitting, standing, walking, and repetitive tasks • Climb ladders, work at heights using ladders, lifts etc. • Ability to lift 50 lbs • Eye-hand coordination • Ability to work independently • Excellent self-discipline to focus for extended periods • Visual acuity • Depth perception • Fine motor dexterity • Color differentiation	
Action/Need:		
Program Environment *Indoor/outdoor* *Dust/dirt/fume/noise etc* *Layout of room – theory/lab*	The industry is typically hot, heavy, dirty, and dangerous. That is why it pays so well. Noise above 100 dB requires ear protection. The learning environment is more comfortable. Classroom and lab are temperature controlled and very clean.	
Action/Need:		

Typical Level of Support	At CTC, we have itinerant IU13 support teachers and paraeducators. In the itinerant model, the support teachers have multiple programs and provide check-ins during the day. The itinerant model does not include co-taught classes where teachers are in classes for extended periods of time. IU13 paraeducators also support several teachers, spreading out their day between multiple programs. The learning center is available at scheduled times for testing accommodations, study/instructional groups, and work completion support. Since time there takes away from lab time, students are encouraged to use it strategically.	
Action/Need:		
Reading / ELA levels	G-W Textbook is at the 11-12th grade level Online Curriculum is at the college level. INTEGRATE KNOWLEDGE/ IDEAS GRADES 11-12 • Integrate and evaluate multiple sources of information presented in diverse formats...to solve a problem. • Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible. • Synthesize information from a range of sources into a coherent understanding. • Determine the meaning of symbols, key terms, and other domain-specific words. • Analyze the structure of the relationships among concepts in a text. • Analyze the author's purpose in providing an explanation, describing a procedure.	
Action/Need:		

Writing Levels Example: Work order document with precision step-by-step work completed	Technical Writing • Write informative or explanatory texts, including the narration of technical processes, etc. Research • Draw evidence from informational texts for research.	
Action/Need:		
Math Levels From Faraday's Law: V2 = V1 (N2/N1) – Direct Relation Transformers are rated in voltamps, or VAs (volts x amps). Input VAs are equal output VAs, which means the output voltage is inversely proportional to the output current. Knowing these relationships makes calculating without formulas possible. V = Voltage I = Current (amperes) From conservation of energy: V1 I1 = V2 I2 Then: I2 = I1 (N1/N2) – Inverse Relation Example 1: A transformer has 300 turns in the primary, 50 turns in the secondary, and 120 volts applied to the primary. What is the voltage of the secondary? Step 1: Set up the proportion Step 2: Invert ratio The company that you work for produces metal alloys. The alloy you are working on requires a make-up of 20% iron and 80% nickel, by weight. How many grams of iron should be added to 40 grams of nickel?	Math Associated Vocabulary • INVERSE • RECIPROCAL • PROPORTION • CROSS MULTIPLICATION • RATIO • CONSTANT • TRIGONOMETRY • COORDINATE GEOMETRY 	

Action/Need:		
Theory time	• Lecture 90 minutes daily • Computer assignments 90 min daily	
Action/Need:		
Homework *Amount per night*	• Approximately 1 hour	
Action/Need:		
Lab Time *Guided vs Independent Work*	• 2.5-3 Hours of Independent lab work daily	
Action/Need:		
Tests *NOCTI testing – Yes* *Frequency of tests/quizzes*	• NOCTI Testing pre-test and post test • Hands-on assessment of skills • Marking period exams • Weekly formative assessments • Skills and knowledge assessments are related	

Action/Need:		
Behavioral Expectations *Executive Function* *Organizational skills*	• Ability to work independently • Ability to work in small groups • Excellent problem-solving skills • Self-control • Follows oral and written directions • Time management skills • Critical thinking skills • Attention to detail	
Action/Need:		
Other *Skills specific to the Career Co-op\Internship*	• Mechanical Ability • Willingness to learn • Great attendance • Many employers require you to work overtime • Many employers require you to pass a pre-employment drug test and participate in a random testing program while employed.	
Action/Need:		

*District Representative Signature*_____ *Date* _____