P-TECH

CHARGING INTO THE FUTURE

Topics Covered

- What is P-TECH?
- How do the Robotics and Automation and Cybersecurity pathways work?
- Whatever happened to the program formerly known as Mechatronics?
- What does this opportunity mean for students?

P-TECH

Pathways in Technology Early College High School

- Started in 2011 by IBM, program meant to fill the skills gap
- Partnership: K12, Community College, Business/Industry
- 21st Century New Collar jobs
- 16 Million New Collar Jobs by 2024
  - Require post secondary degree, maybe not 4 years
  - Require technical skills, certifications
  - Can go on to 4 year or beyond

What is a P-TECH program?

Pathways in Technology Early College High school (P-TECH) brings together the best elements of high school, college and the professional world.

Students can begin as early as 9th grade and go through 13th or 14th grade (i.e. high school and two equivalent years of college) to earn an Associate of Applied Science degree.

P-TECH provides college education, relevant workplace skills and *No tuition cost* to students and families as long as students have a passing grade.

Who works on P-Tech at STEM?

- P-Tech Program Leader - Mike Shallenberger, Engineering Teacher
- P-Tech Pathway Subject Matter Experts
  - Robotics and Automation - Mike Shallenberger, Engineering Teacher
  - Cybersecurity - Todd Trichler, Computer Science Teacher
- Internships - Career Discovery team
- Administrative Support
  - Amelia Reinkensmeyer, Post Graduate Assistant
  - Stephanie Webb, Office Manager

Robotics and Automation (formerly Mechatronics Engineering Technology) P-TECH Program

Partnership between STEM School Highlands Ranch, Arapahoe Community College, and Advanced Manufacturing industries (Panther Industries is our CHAMPION!!!, as is AAP!!!)

What is Robotics and Automation, or Mechatronics?

- Mechatronics is a 21st century field focusing on recent innovations in technology.

- Mechatronics is a synergetic integration of mechanical, electrical, control, automation, robotics, computer system for industry and computer engineering technologies.

Robotics and Automation (Mechatronics) Careers

- Technician
- Robotics
- PLC programming-
  - Manufacturing
  - Power and Energy
  - Medical
  - Agriculture
  - Water treatment
  - …

Colorado: In the Nation's Top 20 for Manufacturing Job Creation

	Projected Annual Job Openings COLORADO	Percent Growth (2016-2026) COLORADO	Projected Annual Job Openings NATIONWIDE	Salary/Hr
Industrial Machinery Mechanics and Maintenance Technician	660	+29%	33,000	$12-25
Electromechanical Engineering Technologists	140	+15%	7,100	$20-$30
Industrial Engineering Technologists	140	+15%	7,100	$15-$30
Mechatronics Technologist	190	+17%	9,500	$20-$30
Industrial Engineering Technicians	50	+3%	5,500	$20-$30
Electrical and Electronics Engineering Technologist	130	+8%	12,000	$20-$40
First-line Supervisors of Production	700	+7%	59,300	$15-$30

Mechatronics job, from Indeed

- 13,955 PLC Technician
- 67,967 Robotics
- 53,566 Pneumatics
- 44,451 Electrical Technician
- 27,027 Mechanical Engineer
- 164,789 Mechanical Engineering-including Technicians…
- Too many others to list…

Pay ranges from $15/hour-$50/hour, to $100K+++

Program Description

- Associate of Applied Science in Mechatronics Engineering Technology
- Mechatronics –
  - Blend of Mechanics and Electronics, PLC programming
  - Both are skills needed in current manufacturing environments
- Curriculum
  - Designed as a collaboration between the two ACC, STEM School and industry representatives.
  - General Education coursework is included to meet the college degree requirements for the community college system.
  - Details: Total of 62 credit hours: 16 General Education and 46 Technical

Program Description

- General Education Coursework
  - English Composition
  - Business Workplace Skills
  - Technical Math (or higher level math)
  - Philosophy - Logic
  - Physics

- Technical Coursework
  - SolidWorks/Mechanical
  - Electrical Print Reading
  - Fundamentals of DC/AC
  - Automation Control Circuits
  - Motors and Controls
  - Industrial Wiring
  - Fluid Power
  - Programmable Logic Controllers
  - Introduction to Robotics
  - Robotics Technologies
  - Industrial Rotating Equipment
  - OSHA Voluntary Compliance
  - Elective

Associate of Applied Science Degree– Robotics and Automation – 9th grade start

Subject/Grade	Grade 9 – Fall	Grade 9 – Spring	Grade 10 – Fall	Grade 10 – Spring	Grade 11 – Fall	Grade 11 – Spring	Grade 12 – Fall	Grade 12 – Spring	Grade 13 – Fall	Grade 13 - Spring	Grade 14
English	ENG 121										
Math							Math 108 or higher				
Social Studies									PHI 113		
Science								PHY 105 OR PHY 112 OR PHY 212			
World Languages											
STEM electives											
Fine Arts						BUS 121					
General electives					CAD 255						
	EIC 102	ELT 106	ELT 254	ELT 252	OSH 117		ELT 267	MTE 244 OR CAD 262 OR PRO 230	ELT 258	ELT 268	
					ELT 248	ELT 255	IMA 120	MTE 244 OR CAD 262 OR PRO 230		ELT 259	
										ELT 280	

Associate of Applied Science Degree– Robotics and Automation – 10th grade start

Subject/Grade	Grade 9 – Fall	Grade 9 – Spring	Grade 10 – Fall	Grade 10 – Spring	Grade 11 – Fall	Grade 11 – Spring	Grade 12 – Fall	Grade 12 – Spring	Grade 13 – Fall	Grade 13 - Spring	Grade 14
English							ENG 121				
Math			Math 108 or higher								
Social Studies									PHI 113		
Science				PHY 105							
World Languages											
STEM electives											
Fine Arts						BUS 121					
General electives					CAD 255			MTE 244 OR CAD 262 OR PRO 230			
			EIC 102	ELT 254	OSH 117	ELT 252	ELT 267	MTE 244 OR CAD 262 OR PRO 230	ELT 258	ELT 268	
			ELT 106		ELT 248	ELT 255	IMA 120			ELT 259	
										ELT 280	

Associate of Applied Science Degree– Robotics and Automation – 11th grade start

Subject/Grade	Grade 9 – Fall	Grade 9 – Spring	Grade 10 – Fall	Grade 10 – Spring	Grade 11 – Fall	Grade 11 – Spring	Grade 12 – Fall	Grade 12 – Spring	Grade 13 – Fall	Grade 13 - Spring	Grade 14
English							ENG 121				
Math					Math 108 or higher						
Social Studies					PHI 113						
Science						PHY 105					
World Languages											
STEM electives											
Fine Arts								BUS 121			
General electives											
					EIC 102	ELT 254	CAD 255	MTE 244 OR CAD 262 OR PRO 230	ELT 258	ELT 268	
					ELT 106	ELT 255	OSH 117	MTE 244 OR CAD 262 OR PRO 230	ELT 267	ELT 259	
						ELT 252	ELT 248		IMA 120	ELT 280	

Internships

- Students work at paid internships to gain experience. Internships can take place during the school year and also can be scheduled for the summer.
- Internships through STEM have been done with the following partners:
  - Panther Industries
  - IBM
  - AAP Automation (makes parts for a variety of things)
  - Bacara USA
- There is also an official internship runs through ACC. ACC requires an internship in order to earn an Associate of Applied Science. That is in addition to our STEM Internships.

Industry Certification

- Curriculum aligned with Industry standards such as PMMI (Packaging Machinery Manufacturing Institute) Mechatronics Certification.
- Students will be able to test to achieve these certifications after taking appropriate courses:
  - PMMI Certifications: Electrical, PLC programming, Fluid Power...
  - OSHA 10: Safety
  - NOCTI Robot certifications: Fanuc Robot Technician
  - SACA: Electrical, Controls, PLC. VFD, Ethernet, Robotics...
  - More...

Cybersecurity P-TECH Program

Partnership between STEM School Highlands Ranch, Arapahoe Community College, and Field Guide IT

What is Cybersecurity?

- Cybersecurity is, most simply, **any protection used to prevent cyber attacks**. In the practical sense, cybersecurity is a combination of technology (hardware and software), processes, and people working together to prevent attacks related to data, processes, or financial extortion.

- The Cybersecurity pathway prepares students to:
  - Access the security needs of computer and network systems
  - Recommend safeguard solutions
  - Manage the implementation and maintenance of security devices, systems and procedures

Program Description

- Associate of Applied Science in Cybersecurity
- Curriculum
  - Designed as a collaboration between the two ACC, STEM School and industry representatives.
  - General Education coursework is included to meet the college degree requirements for the community college system.
- Details: Total of 60 credit hours: 16 General Education and 42 Technical
- ACC has transfer articulation with CSU-Pueblo as part of ACC's collaboration campus. At CSU-Pueblo, students can start as a junior with no more than 61 credits and work toward the graduation requirements for a bachelor degree in Computer Information Systems - Cybersecurity Concentration.

Program Description

- General Education Coursework
  - English Composition
  - Business Workplace Skills
  - Technical Math (or higher level math)
  - Philosophy - Logic

- Technical Coursework
  - Networking I and II
  - Network Security Fundamentals
  - Unix/Linux Server Administration
  - Firewalls and How They Work
  - Vulnerability Assessment
  - Enterprise Security
  - Introduction to Programming
  - Fundamentals of UNIX
  - UNIX Shell Programming
  - Configuring Windows Server
  - Digital Forensics
  - Elective

Internships

Field Guide IT is our partner for STEM internships. They will also reach out to their partner and customer base for work based learning opportunities.

Last summer we had 10 students intern with IBM at $20 per hour, and we expect this relationship to continue.

Cybersecurity Industry Certification

- Curriculum aligned with Industry standards
- Students will be able to test to achieve these certifications after taking appropriate courses:
  - CompTIA Security+
  - CompTIA Linux+
  - Microsoft Technology Associate (MTA) and/or Microsoft Certified Solutions Associate(MCSA)
  - CompTIA Advanced Security Practitioner (CASP)
  - More

Who can participate?

1. Be in 9th, 10th, 11th, or 12th grade
2. Be a student of good standing in previous coursework and show a history of strong standardized test scores. This may include a GPA of 3.0 for the previous 2 semesters.
3. Have a social maturity to excel in a college environment
4. Receive a minimum score on the ACT, SAT, or Accuplacer as needed
5. Complete all portions of the CE application and submit the completed application to the STEM Post Graduate Assistant by the published deadlines
6. Meet with the Post Graduate Assistant once each year to review eligibility for CE
7. Be enrolled in a college-level, guaranteed transfer courses or counselor approved courses
8. If required, return the attendance form that will be sent to students
9. Be enrolled in the College Opportunity Fund

Interested in P-Tech?

What to do next:

1) Student should talk with Mike Shallenberger
2) Complete the STEM P-Tech Enrollment Form (on website)
3) Contact Post Graduate Assistant, Amelia Reinkensmeyer (amelia.reinkensmeyer@stemk12.org). She will schedule a meeting with the student and their counselor.
4) To pursue a P-Tech pathway, students need to do the following:
    a) Apply at ACC
    b) Complete any needed testing
    c) Apply at the Colorado Opportunity Fund
5) Once accepted, register for courses based on P-Tech plan constructed with counselor.

What if my student leaves P-TECH?

If my student does not finish the P-TECH program, do I need to repay the tuition cost?

There is **no penalty**, or cost, or problem if a student leaves the program. Students can leave at any time, take their certifications with them, and they get to keep the college units they have earned.

The only time parents need to reimburse tuition cost is if a student fails or withdraws from a concurrent enrollment class. This applies whether the student is in P-Tech or taking concurrent enrollment classes for college.

Currently working on new Pathways

We plan to launch Health Care and Automotive Tech pathways as well as other pathways that will serve our students.

ACC is supportive of developing these pathway. ACC has existing programs for Health and Automotive Tech so the development should go fairly quickly.

We will need to identify specific Industry Partners for new pathways.