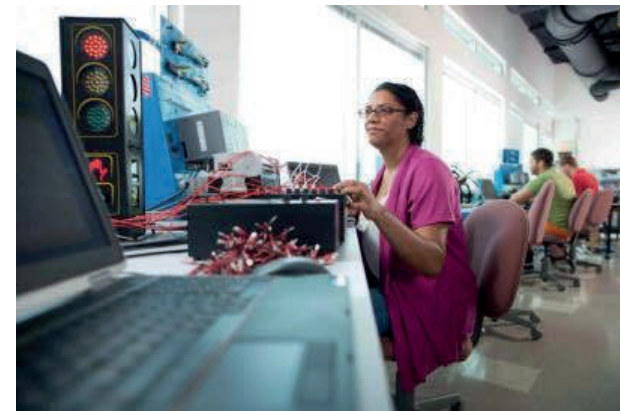


Mechatronics Education in Florida

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FLATE's VISION

FLATE will be Florida's leading resource for education and training expertise, leadership, projects, and services to promote and support the workforce in the high performance production and manufacturing community.



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NSF Advanced Technological Education

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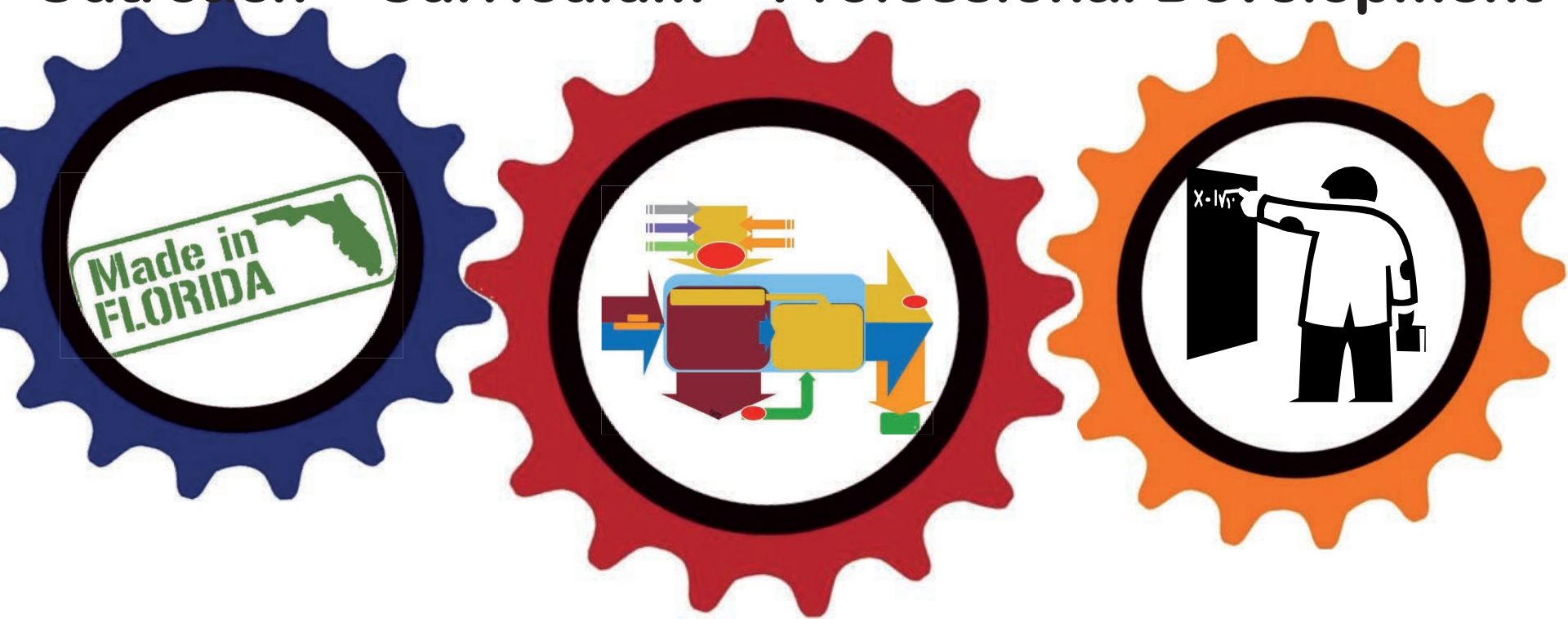
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FLATE's Goals

Outreach ♦ Curriculum ♦ Professional Development



Advancing Excellence in Engineering Technologies



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Objectives

1. Present what programs the Florida Department of Education offers in secondary & post-secondary levels
2. Share educational best practices
3. Consider what Industry looks for in today's technicians



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What is Mechatronics?

“*Mechatronics* is the synergistic combination of precision mechanical engineering, electronic control and systems thinking in the design of products and manufacturing processes. It relates to the design of systems, devices and products aimed at achieving an optimal balance between basic mechanical structure and its overall control.”

<http://www.journals.elsevier.com/mechatronics/>



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Equipment Technician Skills Standards



Maricopa Advanced Technology Education Center

Semiconductor Manufacturing Equipment Technician Skill Standards (2000)



<http://matec.org/work/skills/skills2000.pdf>



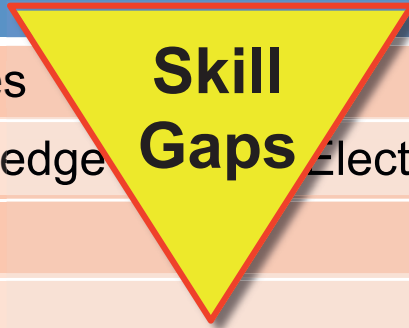
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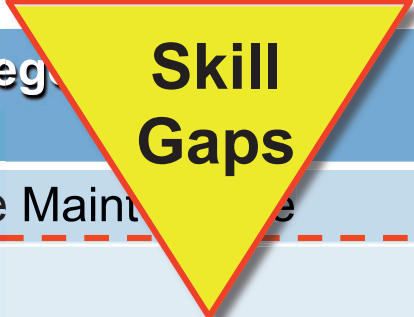
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Results of College Self-assessments (1 – 11)

	Skill Category	Needs	CC Stats
1	Implementing Quality Principles	3	1.56
2	Demonstrating Working Knowledge of Electronics	3	2.44
3	Operating Equipment	1	1.50
4	Processing Wafers	1	0.56
5	Troubleshooting and Repairing Electrical/Electronic Equip.	3	2.13
6	Troubleshooting and Repairing Pneumatic Systems	3	1.00
7	Troubleshooting and Repairing Hydraulic Systems	3	0.63
8	Troubleshooting and Repairing Electromechanical Systems	3	1.13
9	Troubleshooting and Repairing Vacuum Systems	3	0.88
10	Troubleshooting and Repairing RF Systems	3	1.25
11	Operating Remote Systems	1	1.00



Results of College Self-assessments (12 – 22)



	Skill Category	Needs	CC Stats
12	Perform Preventive and Routine Maintenance	3	1.69
13	Maintain Automated Systems	3	0.56
14	Implementing Manufacturing Technology and Techniques	1	0.63
15	Utilizing Computers	3	3.00
16	Adhering to Basic Safety Practices	3	0.94
17	Applying Scientific Fundamentals	2	1.13
18	Performing Mathematical Calculations	3	2.19
19	Recognizing Workplace Fundamental Principles	3	1.63
20	Using Information Skills	3	2.50
21	Employing Interpersonal Skills	3	2.25
22	Displaying Appropriate Personal Qualities	3	2.25

What's the impact of these gaps?

\$\$\$

- Increases the learning curve for entry level technicians
- Extends OJT for unprepared entry level technicians
- Consumes more time and resources
 - Mentor's and trainee's time
 - Dollars
- Production times affected
 - More down time
 - More delays



Florida's academic mechatronics programs

- A.S. Engineering Technology (“ET Degree”)–Advanced manufacturing specialization
Motors, controls, hydraulics, pneumatics, automation, robotics, systems integration
- PSAV – Industrial machinery maintenance & repair
- H.S./PSAV - Automation & Production Technology
- H.S./PSAV - Engineering Technology
- H.S. - P.L.T.W.

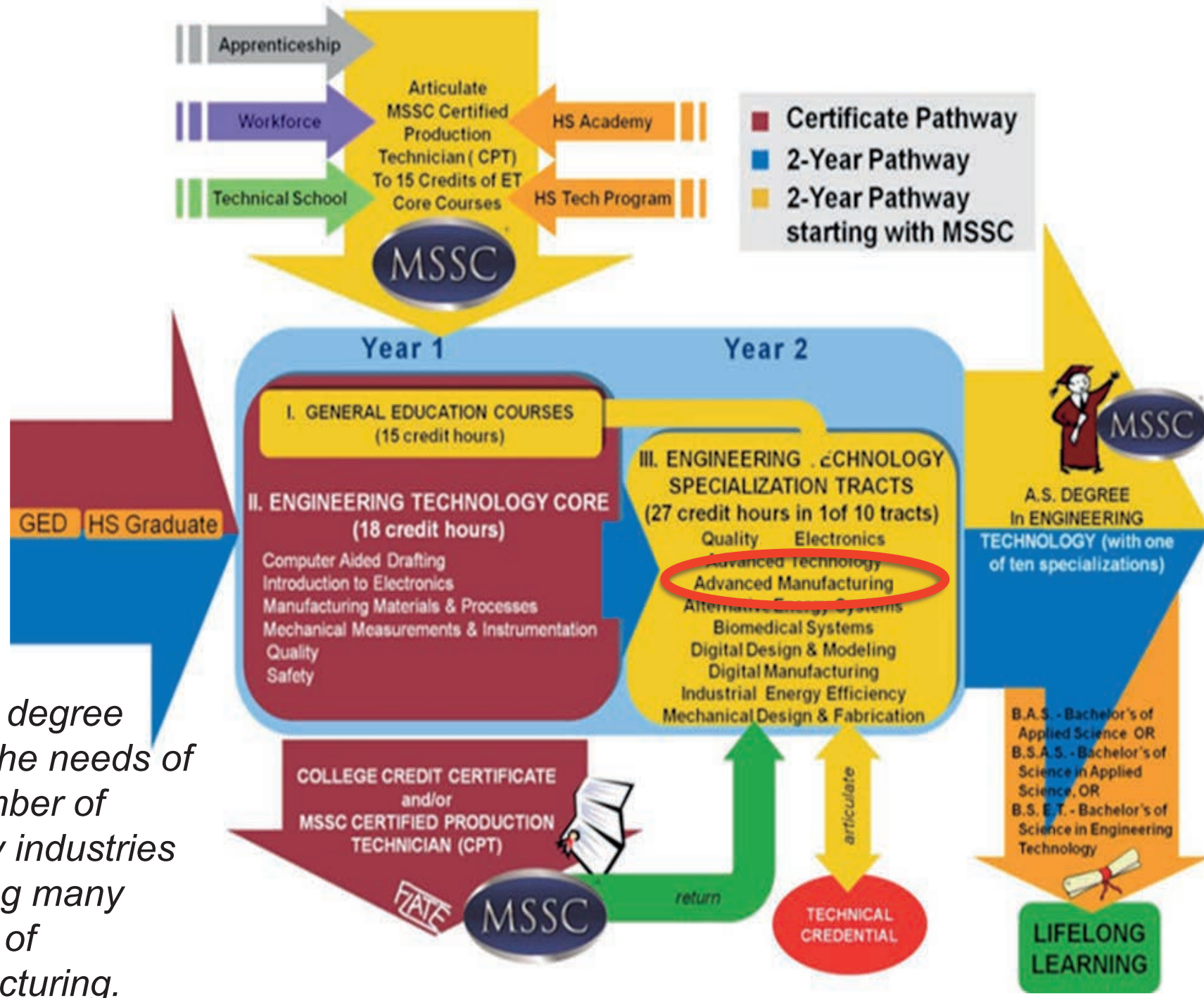


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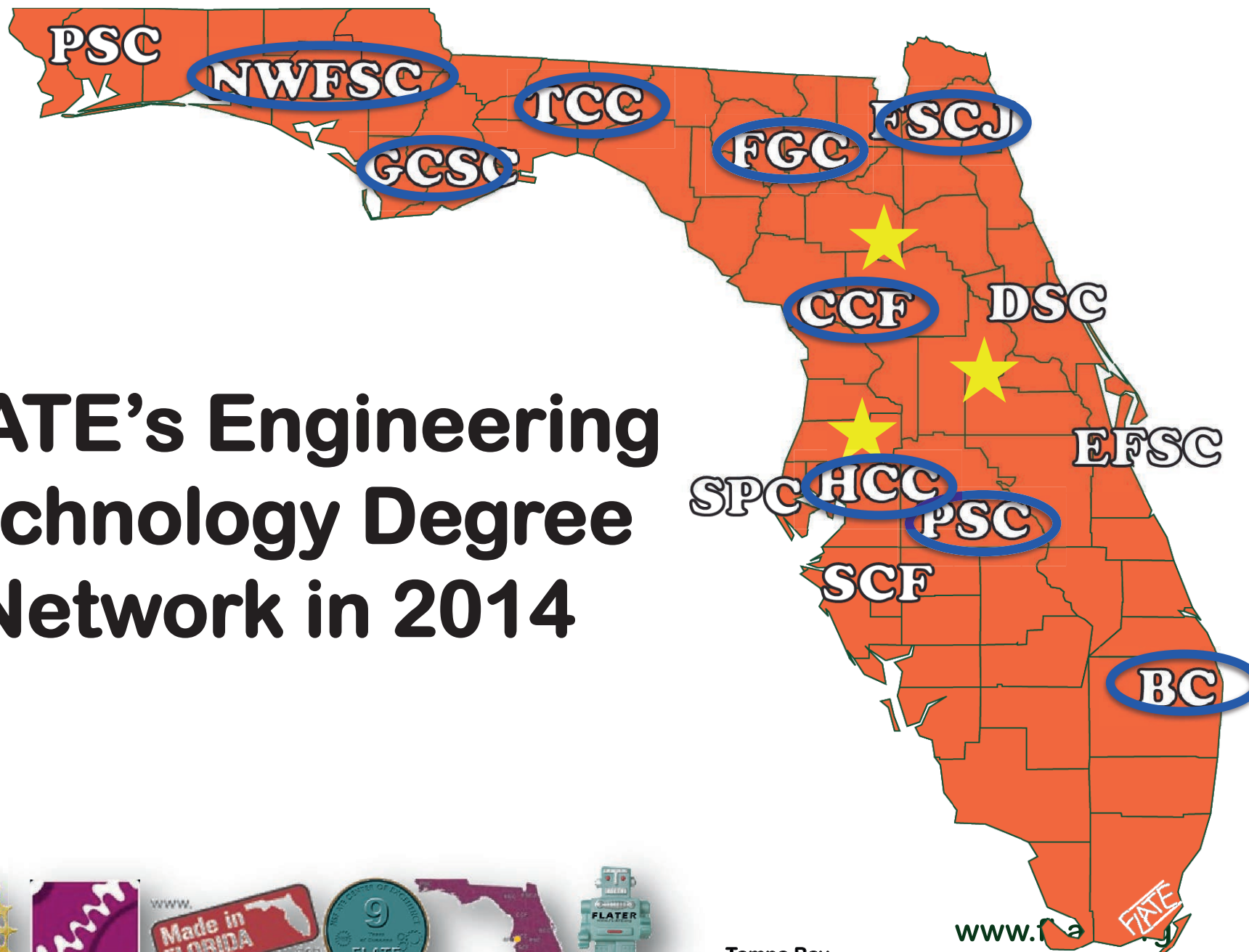
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The ET degree meets the needs of a number of industry industries including many sectors of manufacturing.



FLATE's Engineering Technology Degree Network in 2014



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Florida Engineering Technology AS Degree

I. General Education – 15 - 18 credit hours

English Science
Math Social Science
Humanities

II. ET Core - 18 credit hours

Computer Aided Design Electronics
Manufacturing Processes & Materials Quality
Mechanics & Instrumentation Safety



III. 10 Specialization Tracks: 24 to 27 credit hours

Advanced Manufacturing Mechanical Design & Fabrication
Alternative Energy Systems Electronics
Biomedical Systems Digital Design & Modeling
Digital Manufacturing Industrial Energy Efficiency
Advanced Technology Quality

60 semester hours

Mechatronics closely related job titles

- Electro-mechanical Technicians
- Robotics Technicians
- Electrical/Electronic Equipment Assemblers
- Electrical and Electronics Repairers, Commercial and Industrial Equipment
- Maintenance and Repair Workers
- Maintenance Workers, Machinery



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Related college credit certificates

COLLEGE CREDIT CERTIFICATE	CREDIT HOURS /CONTACT HOURS (16 contact hour=1 credit hour)
Automation	12 /64
Lean Manufacturing	12/64
Hydraulics, Pneumatics, Motors	12/63
Mechatronics	30/480



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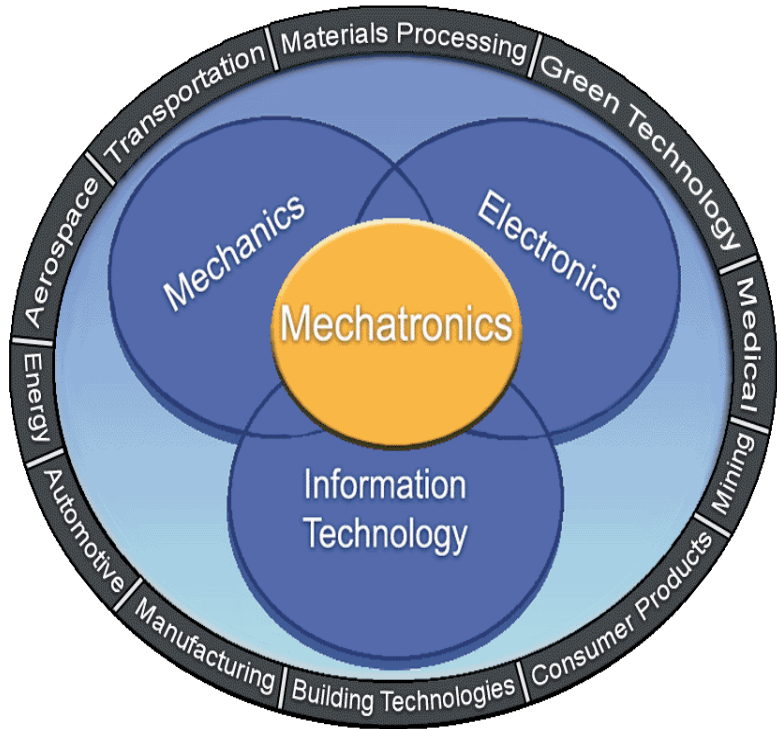
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Program Layout

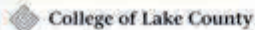
	Term 1 16 Weeks	Term 2 16 Weeks	Term 3 16 Weeks
	<u>ETM 2315</u> Mechanical Devices & Systems	<u>ETS 1700</u> Hydraulics & Pneumatics	<u>ETS 1603</u> Robotics – Mechanics and Controls (Intro to Robotics)
	<u>EET 1084</u> Survey of Electronics (Fundamentals of Electrical Systems)	<u>ETS 1511</u> Motors and Controls	<u>EML 811</u> Mechatronics I (Capstone)
	<u>ETS 1352</u> Introduction to Manufacturing Processes (Introduction to High Tech Manufacturing)	<u>ETS 1542</u> Introduction to PLCs (Fundamentals of PLCs)	<u>EML 811</u> Mechatronics I (Capstone)
	<u>ETD 1100</u> Engineering Drawing (Engineering Drafting – CAD)	<u>BCN 2732</u> OSHA Safety	

Mechatronics college credit certificate



In the end:

The graduate will function as an entry-level technician who can work with modules in a mechatronic system as well as be able to assess and analyze the system as a whole.



What's missing in traditional teaching methods

- Subsystem Inter-relationships
- Systems Integration
- Comprehensive System Analysis
- Comprehensive Troubleshooting



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A day in the life of a mechatronics technician

- Effective communication
- Hands-on technical and soft skills
- Work with hazardous materials and equipment
- Works on high-dollar complex systems requiring great attention to detail
- Has mechanical aptitude similar to automotive or aircraft technicians



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more ...

- More than just electronics, i.e., automation, pneumatics, power, etc.
- Troubleshooting, problem solving, and critical thinking
- Interacts with manufacturing operations, process engineering, equipment engineering, facilities, and equipment customer service engineers



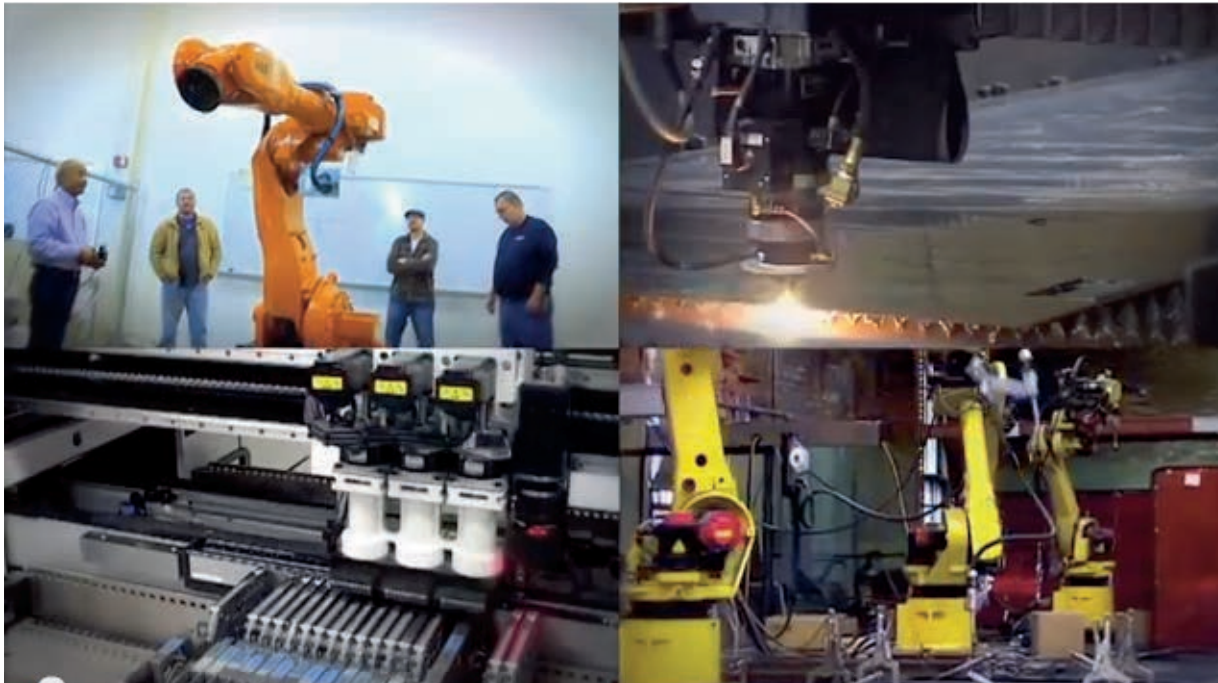
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Mechatronics video

- http://www.youtube.com/watch?feature=player_embedded&v=Vv84kjl5FQ8



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Concluding thoughts...

- Mechatronics is a growing skill set
- These skills are transferable across many industries
- Educational institutions must better understand how these skill sets can be integrated in curricula offerings



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Thank you!

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Florida Advanced Technological Education Center of Excellence**

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PRESENTATION available for download at:

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Note the **“Implementing a Systems Approach to Mechatronics Education”** Workshop on July 21