Florida's Exemplary Manufacturing Career Pathways

Industry-aligned, credential-based technical education

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FLATE

Florida's Advanced Technological Education Center of Excellence

Impact Florida. Lead Nationally.

NSF Advanced Technological Education

ATE CENTERS

www.atecenters.org

Partners with Industry for a new American Workforce

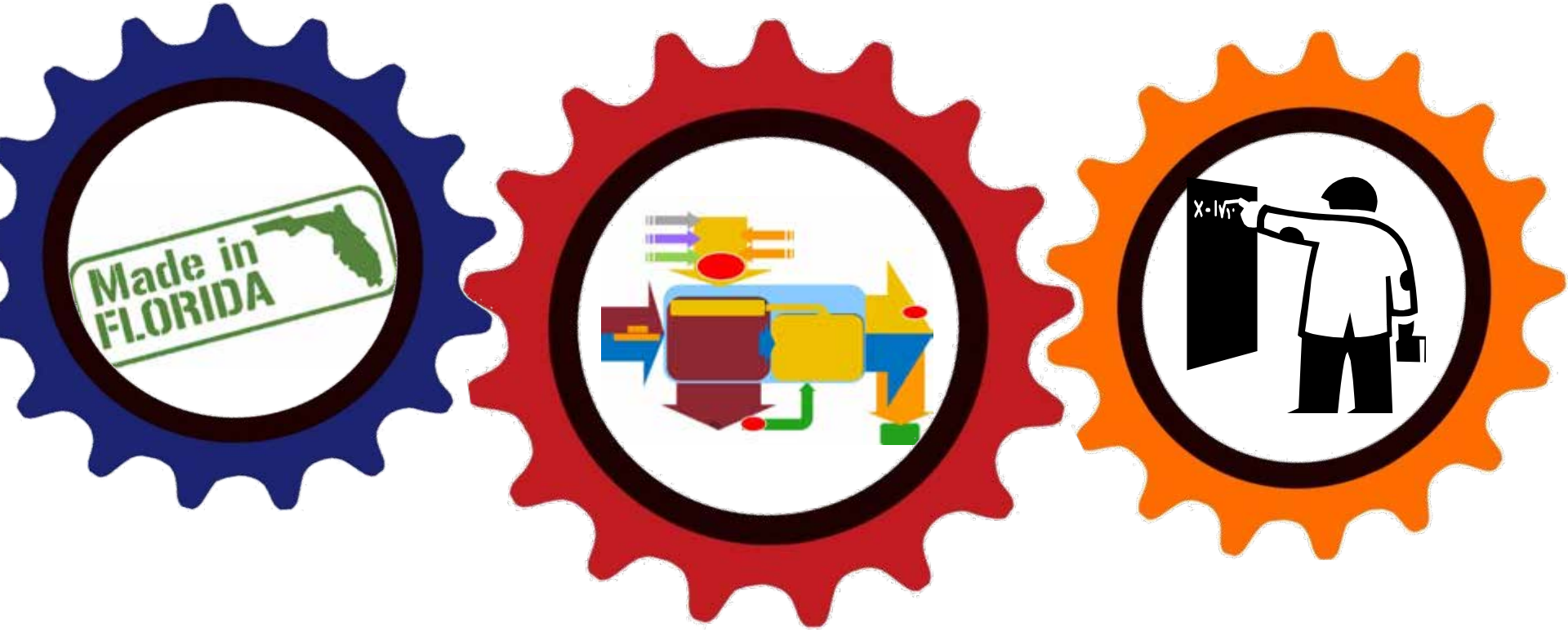
VISION

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.

Impact locally. Lead nationally.

Impact Florida. Lead Nationally.

Outreach ◆ Curriculum Reform ◆ Professional Development



Tell Teach Train

Advancing Excellence in Engineering Technologies

What is manufacturing?

When we think of manufacturing – we think of **PRODUCTION** – how things are made

Manufacturing is a process that takes raw **materials** and **turns** them into (useful) products. It implies **mass production**, as in making products by **hand** or with the help of **machinery**.

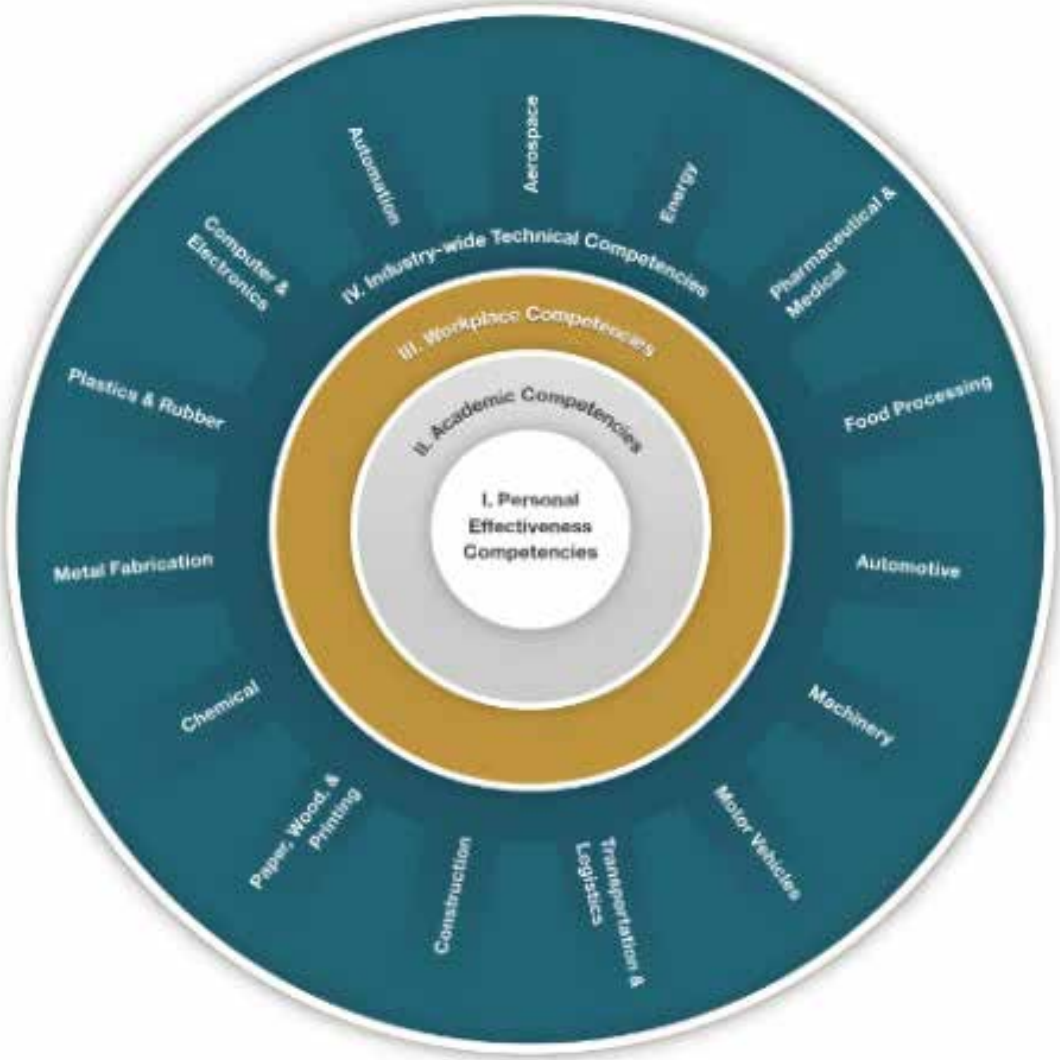
MANUFACTURING is changing raw or processed materials into products people can use or just want! This includes cell phones, computers, jeans, orange juice, jewelry, cosmetics, cars…you name it. Everything is manufactured and **YOU** could be part of the action!

What is manufacturing?

- Engineering & Design
- Product Development
- Business Services
- Information Technologies
- Human Resources
- Construction
- Building Facilities
- Legal
- Packaging
- Marketing
- Logistics & Transportation
- Environmental Health & Safety

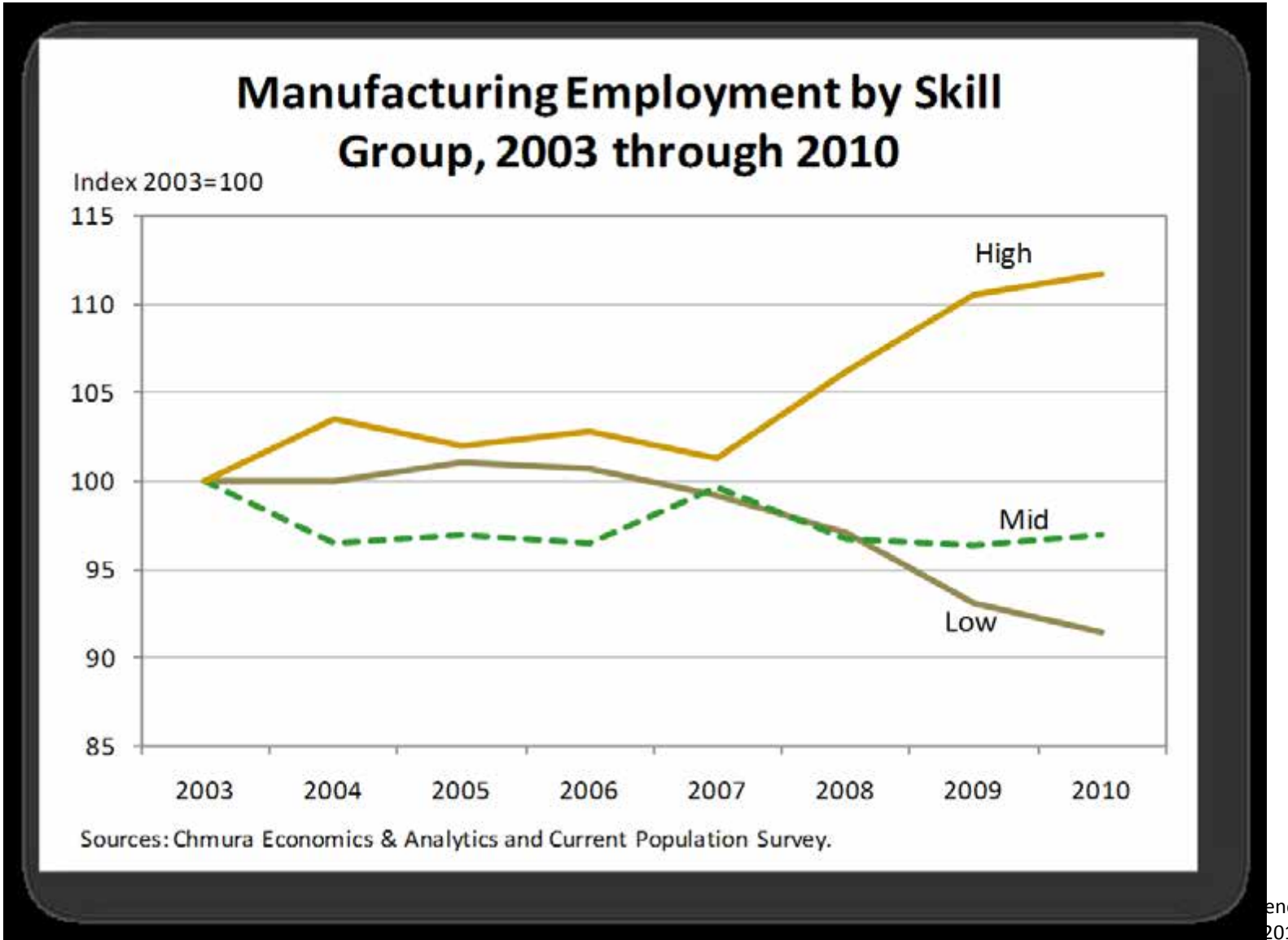
BUT – there is much more

NAM: National Perspective



Automation
Aerospace
Energy
Pharmaceuticals & Medical
Food Processing
Automotive
Machinery
Motor Vehicles
Transportation & Logistics
Construction
Paper, Wood, & Printing
Chemical
Metal Fabrication
Plastics & Rubber
Computer & Electronics

Manufacturing Jobs Require Higher Skills

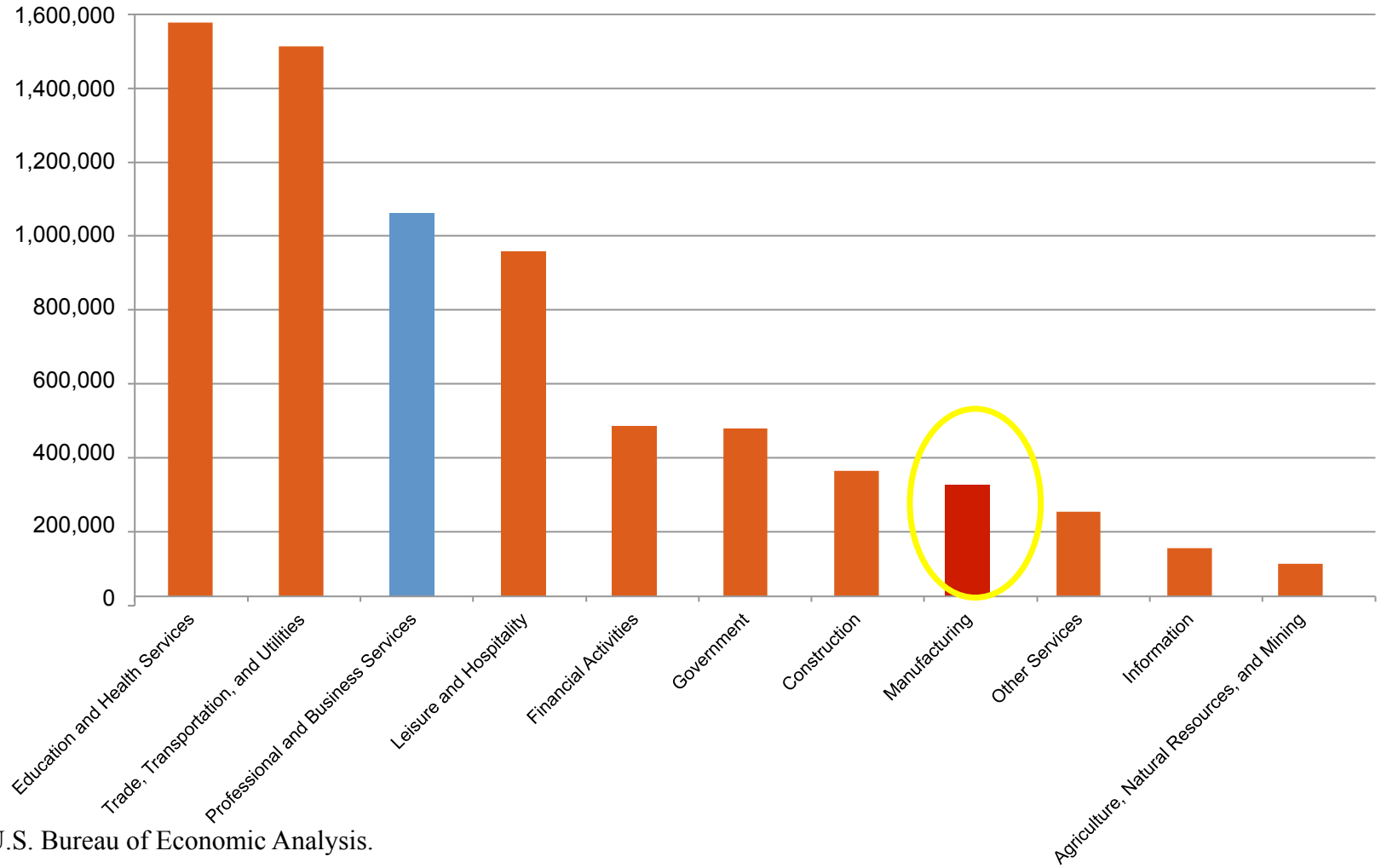


dvanced Manufacturing is a Economic Driver in Florida

- Florida Manufacturing Establishments: **14,324**
- Manufacturing Employment: **306,800**
- **$36.7 billion** of the total state output
- Percent of Florida exports: **85%**
- Manufacturing Average Annual Compensation: **$62,859** (54.8% higher than other sectors)

Source: U.S. Bureau of Economic Analysis.

Adv Manufacturing is the 8th Largest Employer in the State



Source: U.S. Bureau of Economic Analysis.

Roadmap for Manufacturing Education

- Integrated academic and technical learning pathways
- More focus on STEM (Science, Technology, Engineering and Math) education
- More integrated career and education pathways to higher education and lifelong learning
- Integration of nationally portable, industry-recognized credentials aligned to educational programs
- Deep engagement of industry with education

Impact Florida. Lead Nationally.

21st Century Manufacturing

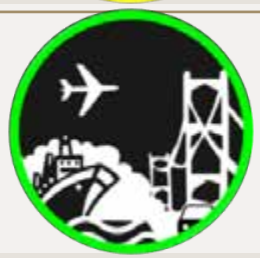
PRODUCTION PATHWAYS

- Production Planning & Control
- Manufacturing Engineering
- Maintenance, Installation, Repair
- Quality Assurance
- Logistics and Inventory Control
- Safety & Environmental Assurance

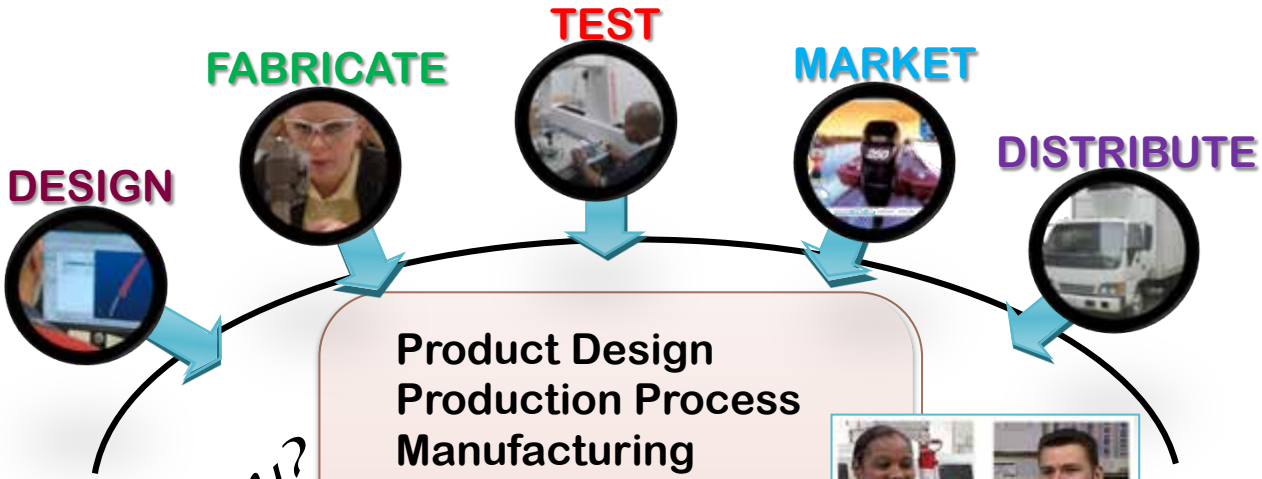
SAMPLE OCCUPATIONS

Machinist
Manufacturing Engineer
Automated Process Technician
Production Engineer
Production Technician
Welding Technician
Quality Technician
Industrial Maintenance Tech

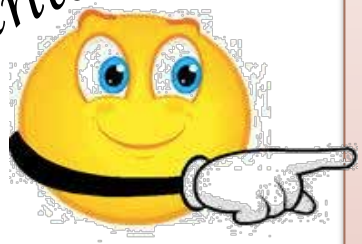
Do what you ♥ in a manufacturing career

Aviation & Aerospace		Packaging, Beverage, Food & Pharmaceuticals	
Medical Devices & Equipment		Machining & Product Fabrication	
Transportation & Logistics		Leisure & Entertainment	
Electronics, Computers & Electrical		Product Design & System Integration	

What is manufacturing?



What jobs interest you?

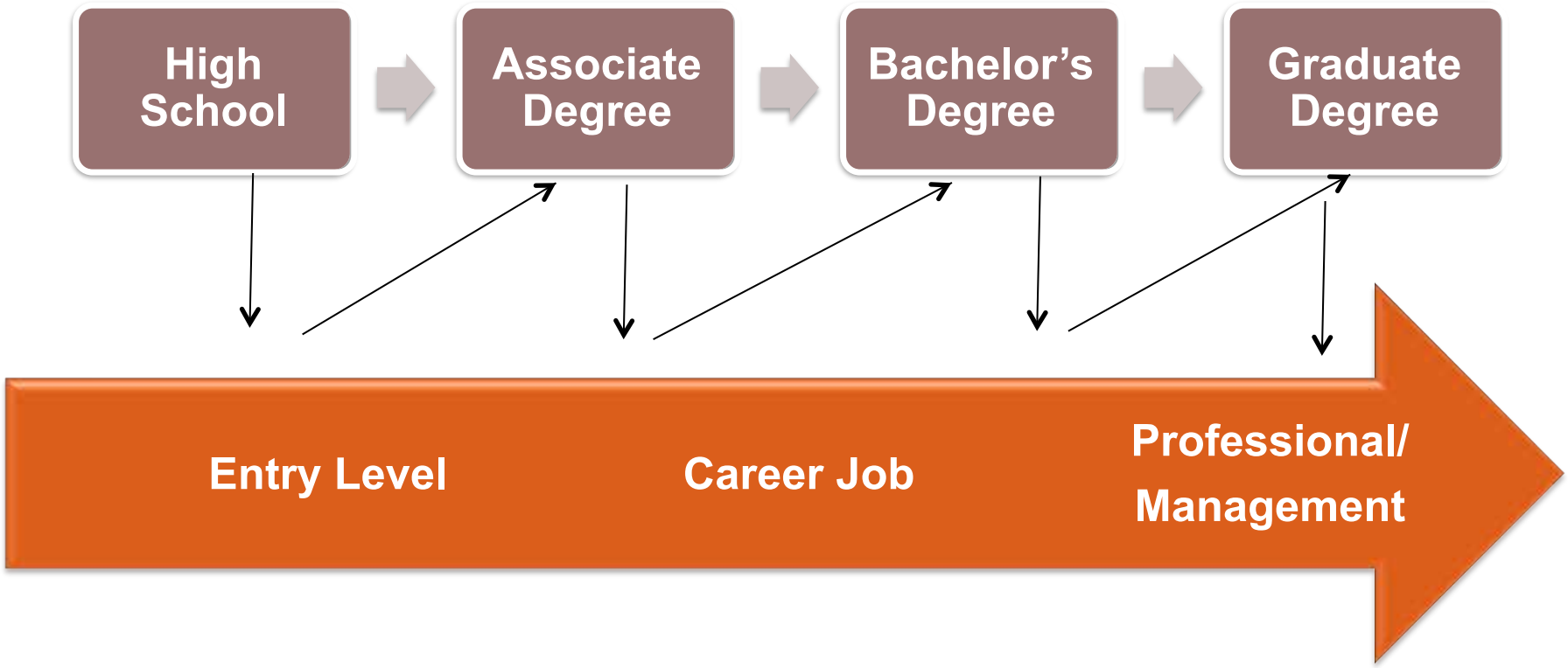


- Product Design
- Production Process
- Manufacturing
- Operations
- Engineering
- Fabrication
- Automation and Controls
- Robotics
- Materials Handling
- Quality Assurance
- Packaging Design
- Logistics

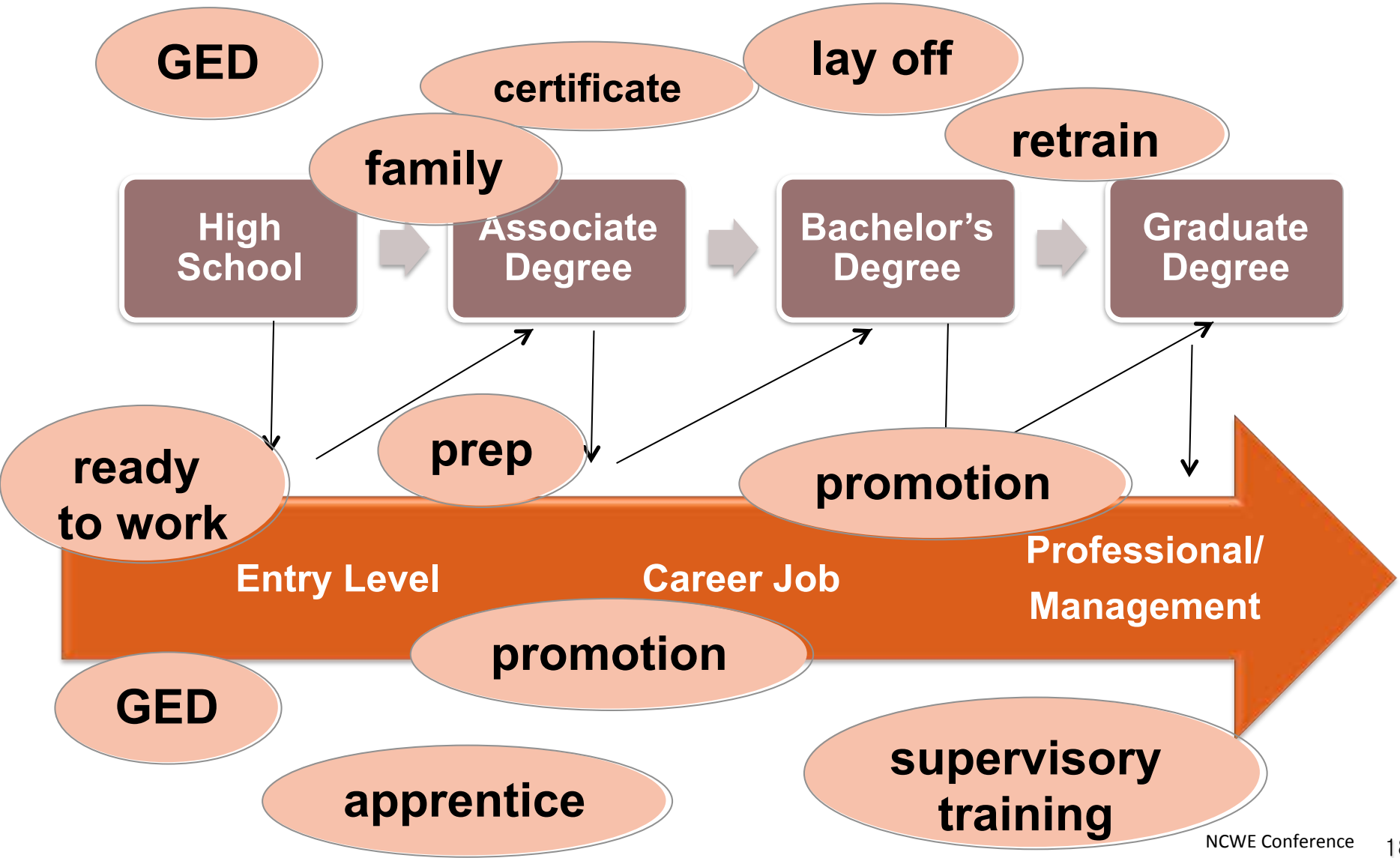
Why?

Why?

Pathways we took



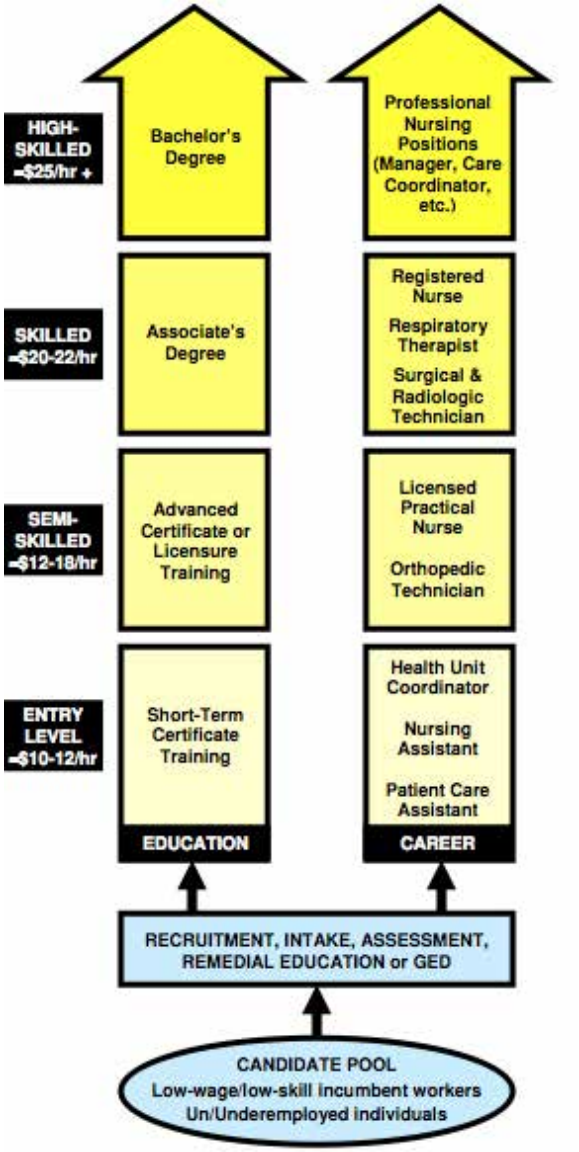
21st Century Career Pathways

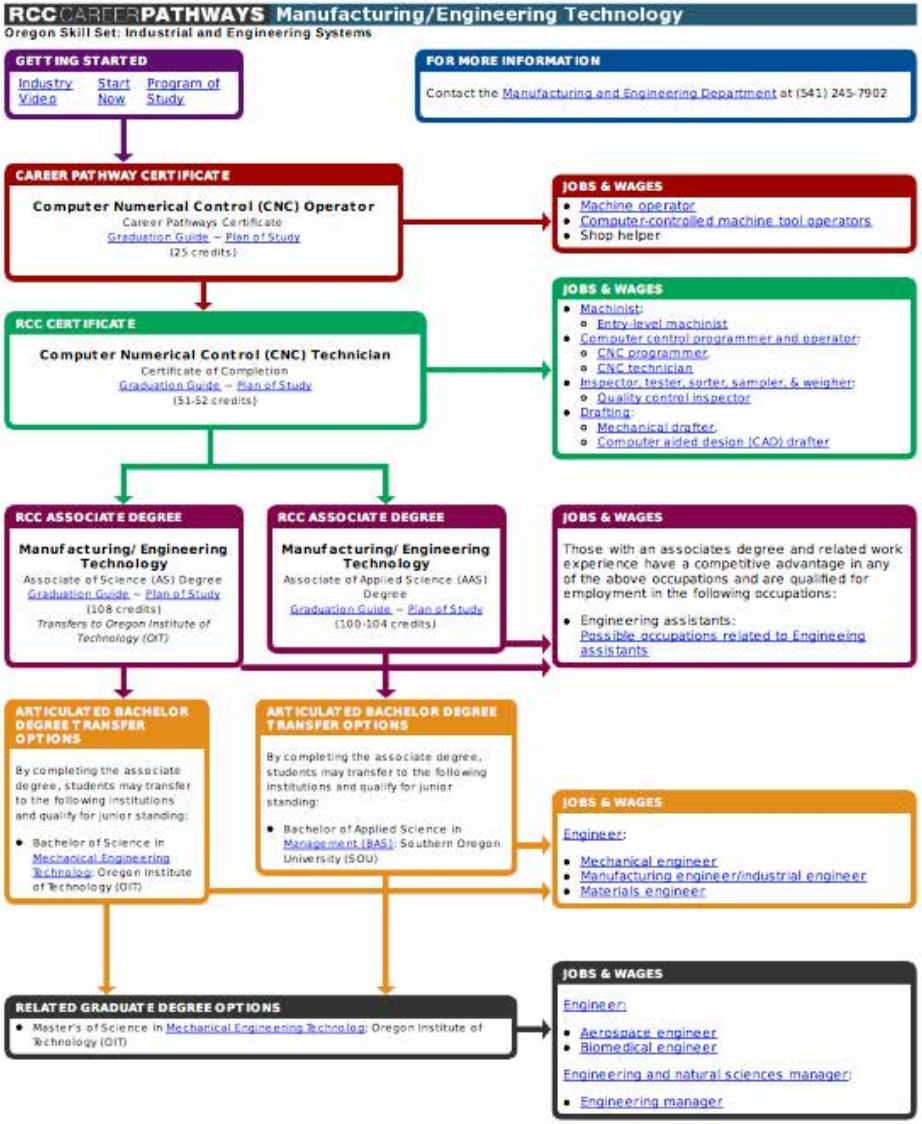


What makes a good Career Pathway?

- Offer early careers awareness/education
- Define clear & concise pathways
- Provide contextualized learning
- Have multiple, clearly marked entry & exit points
- Align & articulate with industry credentials
- Offer stackable industry & education credentials
- Have industry drivers & industry engagement
- Meet local workforce needs
- Provide wrap-around student services
- Include educator professional development
- Is a partnership with a shared vision

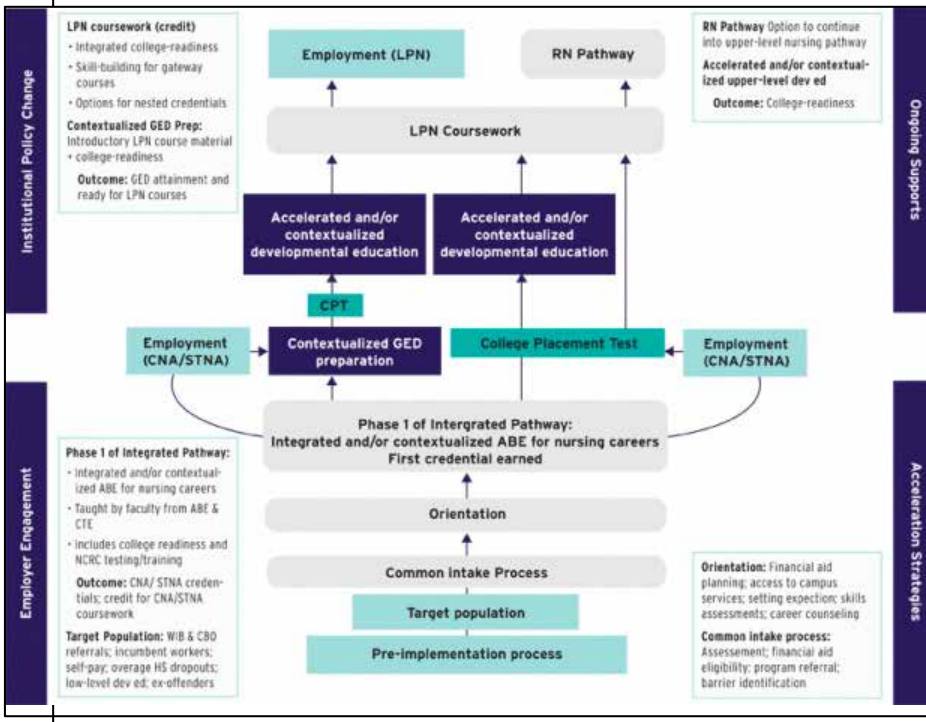
Samples





From: JFF

Samples



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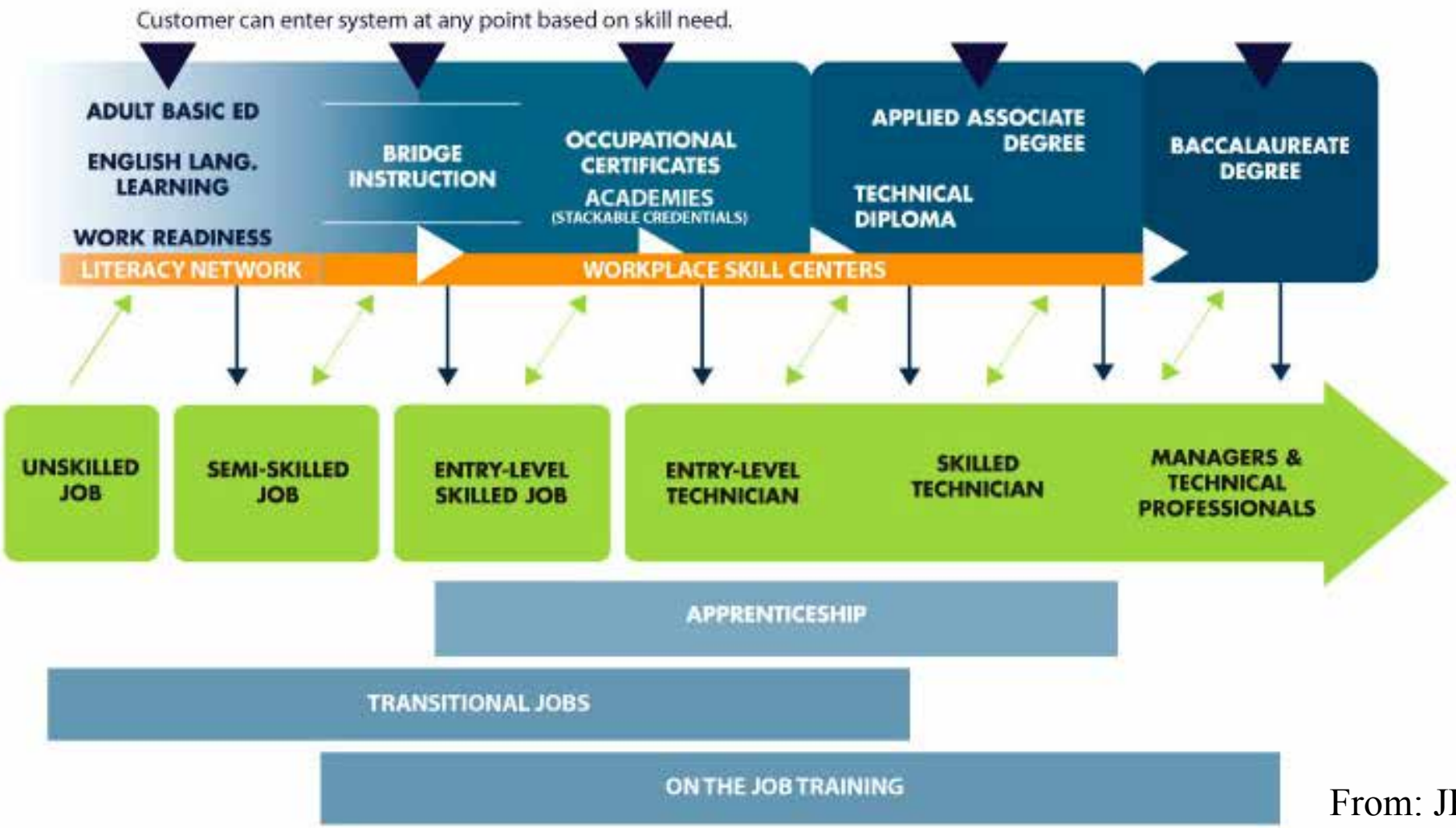
Samples



From: JFF

K-16 Pathway Examples: DOE & NASDCTE

BROUGHT to YOU by
National Association of State Directors of Career Technical Education Consortium
(NASDCTEc)

MANUFACTURING

Manufacturing

Name _____

Learner ID _____

School/College/University _____

SAMPLE

Manufacturing

Career Cluster Plan of Study for► Learners ► Parents ► Counselors ► Teachers/Faculty

This Career Cluster Plan of Study (based on Manufacturing Career Cluster) can serve as a guide, along with other career planning materials, as learners continue on a career path. Courses listed within this plan are only recommended coursework and should be individualized to meet each learner's educational and career goals. *This Plan of Study, used for learners at an educational institution, should be customized with course titles and appropriate high school graduation requirements as well as college entrance requirements.

EDUCATION LEVELS	GRADE	English/ Language Arts	Math	Science	Social Studies/ Sciences	Other Required Courses Other Electives Recommended Electives Learner Activities	*Career and Technical Courses and/ or Degree Major Courses for Manufacturing	SAMPLE Occupations Relating to This Career Cluster
	Interest Inventory Administered and Plan of Study Initiated for all Learners							
SECONDARY	9	English/ Language Arts I	Algebra I	Earth or Life or Physical Science	State History Civics	All plans of study should meet local and state high school graduation requirements and college entrance requirements. Certain local student organization activities are also important including public speaking, record keeping and work-based experiences.	**Introduction to Manufacturing Occupations	► Assembler ► Boilermaker ► Design Engineer ► Environmental Engineer ► Foundry Worker ► Freight, Stock and Material Mover ► Health and Safety Representative ► Industrial Machinery Mechanic ► Inspector ► Labor Relations Manager ► Logistician ► Manufacturing Technician ► Pattern and Model Maker ► Production Manager ► Quality Control Technician ► Safety Engineer ► SPC Coordinator ► Tool and Diemaker ► Traffic Manager ► Welder
	10	English/ Language Arts II	Geometry	Biology	U.S. History		**Information Technology Applications	
	11	English/ Language Arts III	Algebra II	Chemistry	World History Economics		**Employment in Manufacturing Occupations	
	College Placement Assessments-Academic/Career Advisement Provided							
	12	English/ Language Arts IV	Trigonometry or Statistics or other math course	Physics	Psychology		**Applications in Manufacturing Technology	
	Articulation/Dual Credit Transcripted-Postsecondary courses may be taken/moved to the secondary level for articulation/dual credit purposes.							
POSTSECONDARY	Year 13	English Composition English Literature	Algebra	Chemistry Physics	American Govt. Psychology	All plans of study need to meet learners' career goals with regard to required degrees, licenses, certifications or journey worker status. Certain local student organization activities may also be important to include.	**Safety in the Workplace	
	Year 14	Speech/ Oral Communication	Computer Applications	Biological Science Physcial Science	American History Geography		Continue courses pertinent to the pathway selected.	
	Year 15	Continue courses in the area of specialization.						
	Year 16						Complete Manufacturing Major (4-Year Degree Program)	

**See course descriptions on page 2.

SAMPLE

K 16 Pathway Examples: DOE & NASDCTE

MANUFACTURING, MAINTENANCE & REPAIR

SAMPLE

Manufacturing: Maintenance, Installation and Repair
Career Pathway Plan of Study for ▶Learners ▶Parents ▶Counselors ▶Teachers/Faculty

*This Career Pathway Plan of Study (based on the Maintenance, Installation and Repair Pathway of the Manufacturing Career Cluster) can serve as a guide, along with other career planning materials, as learners continue on a career path. Courses listed within this plan are only recommended coursework and should be individualized to meet each learner's educational and career goals. *This Plan of Study, used for learners at an educational institution, should be customized with course titles and appropriate high school graduation requirements as well as college entrance requirements.*

EDUCATION LEVELS	GRADE	English/ Language Arts	Math	Science	Social Studies/ Sciences	Other Required Courses Other Electives Recommended Electives Learner Activities	*Career and Technical Courses and/or Degree Major Courses for Maintenance, Installation and Repair Pathway	SAMPLE Occupations Relating to This Pathway
		Interest Inventory Administered and Plan of Study Initiated for all Learners						
SECONDARY	9	English/ Language Arts I	Algebra I	Earth or Life or Physical Science	State History Civics	All plans of study should meet local and state high school graduation requirements and college entrance requirements. Certain local student organization activities are also important including public speaking, record keeping and work-based experiences.	• Introduction to Manufacturing Occupations	▶Biomedical Equipment Technician ▶Boilermaker ▶Communication System Installer/ Repairer ▶Computer Installer/Repairer ▶Computer Maintenance Technician ▶Electrical Equipment Installer/ Repairer ▶Facility Electrician ▶Industrial Electronic Installer/ Repairer/Manager ▶Industrial Machinery Mechanic ▶Industrial Maintenance Electrician ▶Industrial Maintenance Technician/ Mechanic ▶Instrument Calibration and Repairer ▶Instrument Control Technician ▶Job/Fixture Designer ▶Laser Systems Technician ▶Maintenance Repairer ▶Major Appliance Repairer ▶Meter Installer/Repairer ▶Plumber, Pipe Fitter and Steam Fitter ▶Security System Installer
	10	English/ Language Arts II	Geometry	Biology	U.S. History		• Information Technology Applications	
	11	English/ Language Arts III	Algebra II	Chemistry	World History Economics		• Employment in Manufacturing Occupations	
		College Placement Assessments-Academic/Career Advisement Provided						
	12	English/ Language Arts IV	Trigonometry or Statistics or other math course	Physics	Psychology		• Applications in Manufacturing Technology	
		Articulation/Dual Credit Transcripted-Postsecondary courses may be taken/moved to the secondary level for articulation/dual credit purposes.						
POSTSECONDARY	Year 13	English Composition English Literature	Algebra	Chemistry Physics	American Government Psychology	All plans of study need to meet learners' career goals with regard to required degrees, licenses, certifications or journey worker status. Certain local student organization activities may also be important to include.	• Safety in the Workplace • Workplace Communication	
	Year 14	Speech/ Oral Communication	Computer Applications	Biological Science Physical Science	American History Geography		• Predictive and Preventive Maintenance • Manufacturing Equipment	
	Year 15	Continue courses in the area of specialization.					• Continue Courses in the Area of Specialization	
	Year 16						• Complete Manufacturing Major (4-Year Degree Program)	

Project funded by the U.S. Department of Education (VO51B020001)

SAMPLE

Pathway Examples: NAM

Aligning STEM Education, Certification and Career Pathways

For Florida via Engineering Technology A.S. Degree

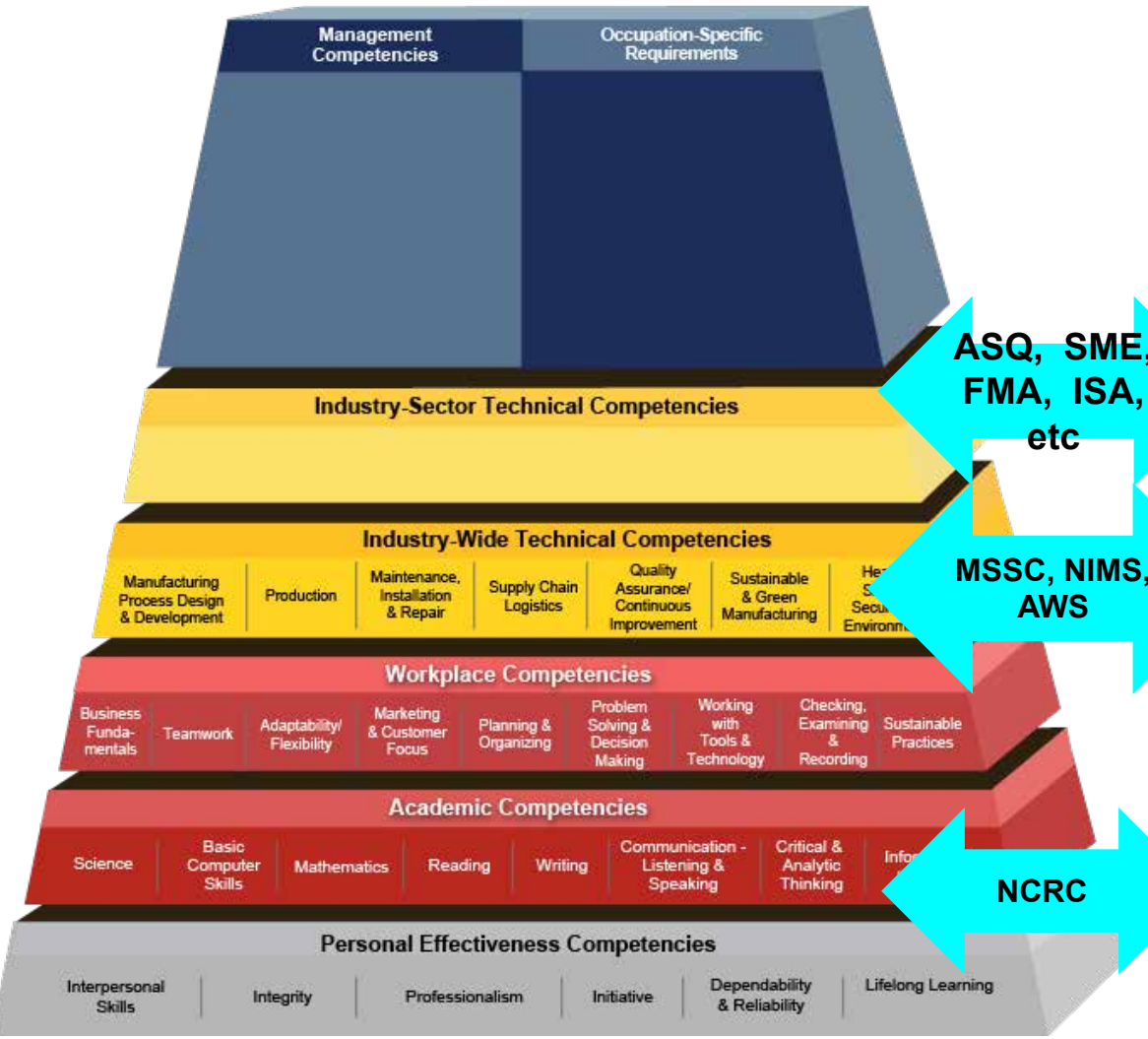
Education Pathway	↔	Certification Pathway	↔	Career Pathway
MASTERS OR PHD				
BACHELORS OF SCIENCE / ENGINEERING TECHNOLOGY (various disciplines) • Florida State Colleges; FA&MU; **BACHELOR OF APPLIED SCIENCE / TECHNOLOGY MANAGEMENT/ _____** • Florida State Colleges; USF Polytechnic • Day/evening/hybrid **BACHELOR OF SCIENCE / ENGINEERING DISCIPINES** • USF, UF, UCF, FSU, FAU, FIU,UWF, UNF, private • Day/evening/hybrid	↔	• ISA Certified Automation Professional • SME Manufacturing Engineer • SME Manufacturing Technologist	↔	• Mechatronics Engineer (17-2199.05) • Manufacturing Engineer (17-2199.04) • Mfg Technologist (17-3029.06) • Plant Engineer $51k - $79k
ASSOCIATE IN (APPLIED) SCIENCE – ENGINEERING TECHNOLOGY • 60 Credit Hours/ Two Years Full Time • Day /evening/online/hybrid **ASSOCIATE OF ARTS/ ENGINEERING** • 60 Credit Hours/ Two Years Full Time • Day/evening/hybrid	↔	• College technical certificates • ISA Certified Control Systems Technician • NIMS Level 1, Measurements, Materials, and Safety • Fluid Power certificates	↔	• Robotics Technician (17-3024.01) • Manufacturing Technician (17-3029-09) • Electrical Technician (17-3023) • Mechanical Engineering Technicians (17-3027) • Industrial Engineering Technicians (17-3026) • Computer control programmer (51-4012) $23k - $39K
COLLEGE CREDIT CERTIFICATE PROGRAM • Minimum of 12 Credit Hours/ Less than 1 Full Year • (future alignment to appropriate credentials)	↔	• Engineering Technology Support Certificate • MSSC: Maintenance Awareness; Safety; Quality; Manufacturing Processes and Materials; Certified Production Technician (CPT) • NIMS Level 1, Measurements, Materials,& Safety	↔	• Electro-Mechanical Technician (17-3024) • CNC Operators (51-4011) • Automation Maintenance Technician $17k - $27K
HIGH SCHOOL CAREER PROGRAM Machine Operator/ Maintenance • Less than One Year Full Time	↔	• MSSC CPT (Maintenance Awareness; Safety; Quality; Manufacturing Processes and Materials; • Florida Ready to Work Certificate	↔	• Operator • Production Worker (51-9199) $17K - $27K

Florida Ready to Work (ACT Career Readiness)
Personal Effectiveness * Academic Competencies Workplace Competencies

Applied STEM (High School)	**Out of School/Low Skill Youth/Adults**	**Skilled Adults**
Dual Enrollment - Career Academy – Youth Development Programs	WIA/Career Centers – ESL/VESL - GED/ABE "Bridge" and Foundation Programs	Retraining/Lay Offs – Continuing Education Company Specific Apprenticeship

(Credit hours are based on semester courses)

National Perspective



ASQ, SME, FMA, ISA, etc

MSSC, NIMS, AWS

NCRC

High Quality Middle Class Jobs

Occupation-Specific Certifications

Entry Level Industry Certifications

Ready for Work, Ready for College

Career Paths – Life Long Learning

Florida's A.S. Engineering Technology Degree

60 semester hours

I. General Education – 15 - 18 credit hours

II. ET Core - 18 credit hours

III.8 Specialization Tracts – 24 to 27 credit hours

Florida's A.S. Engineering Technology Degree

60 semester hours

I. General Education – 15 - 18 credit hours

English
Math
Humanities
Science
Social Science

II. ET Core - 18 credit hours

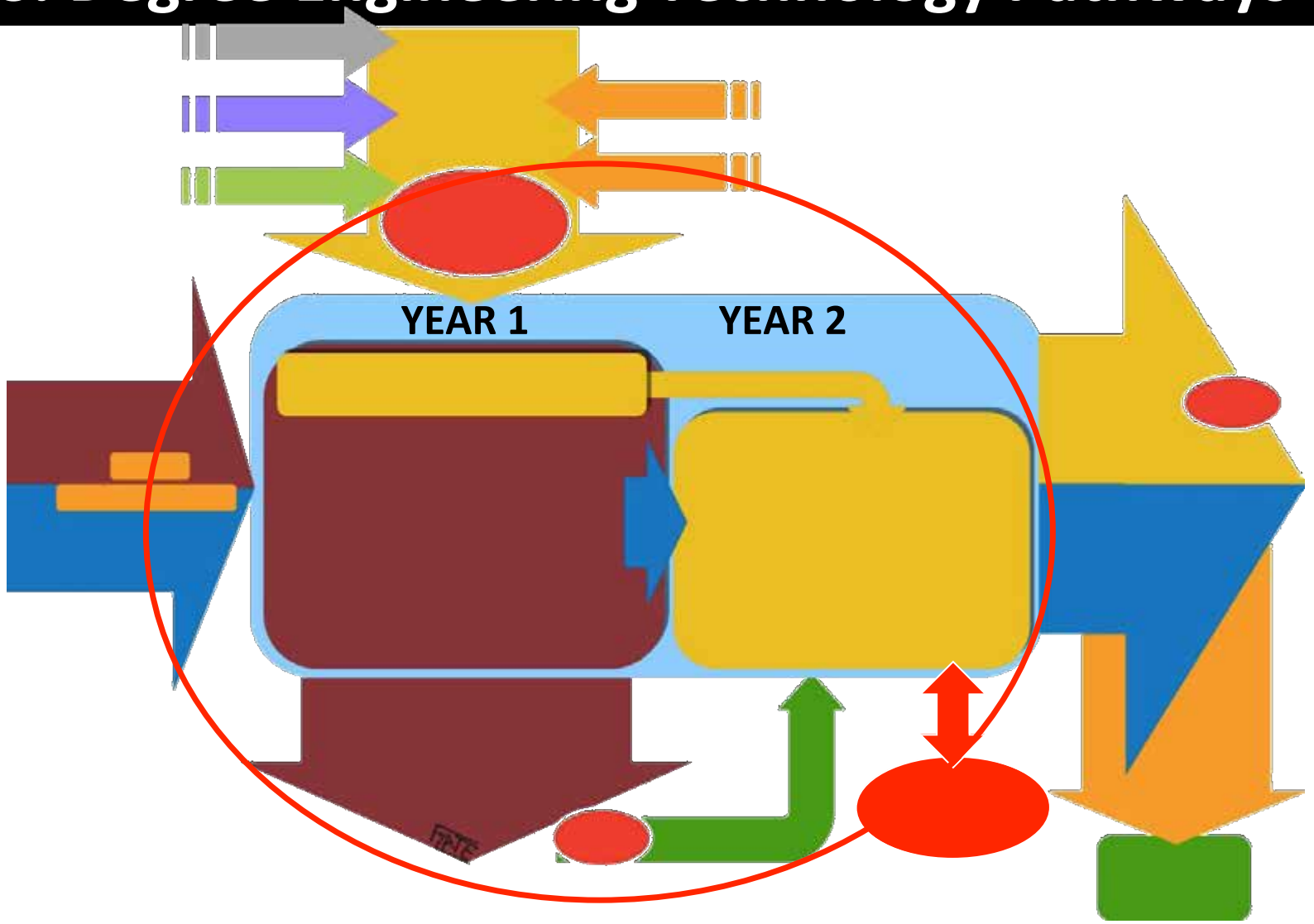
Computer Aided Design
Manufacturing Processes & Materials
Mechanics & Instrumentation
Electronics
Quality
Safety

III. 10 Specialization Tracts – 24 to 27 credit hours

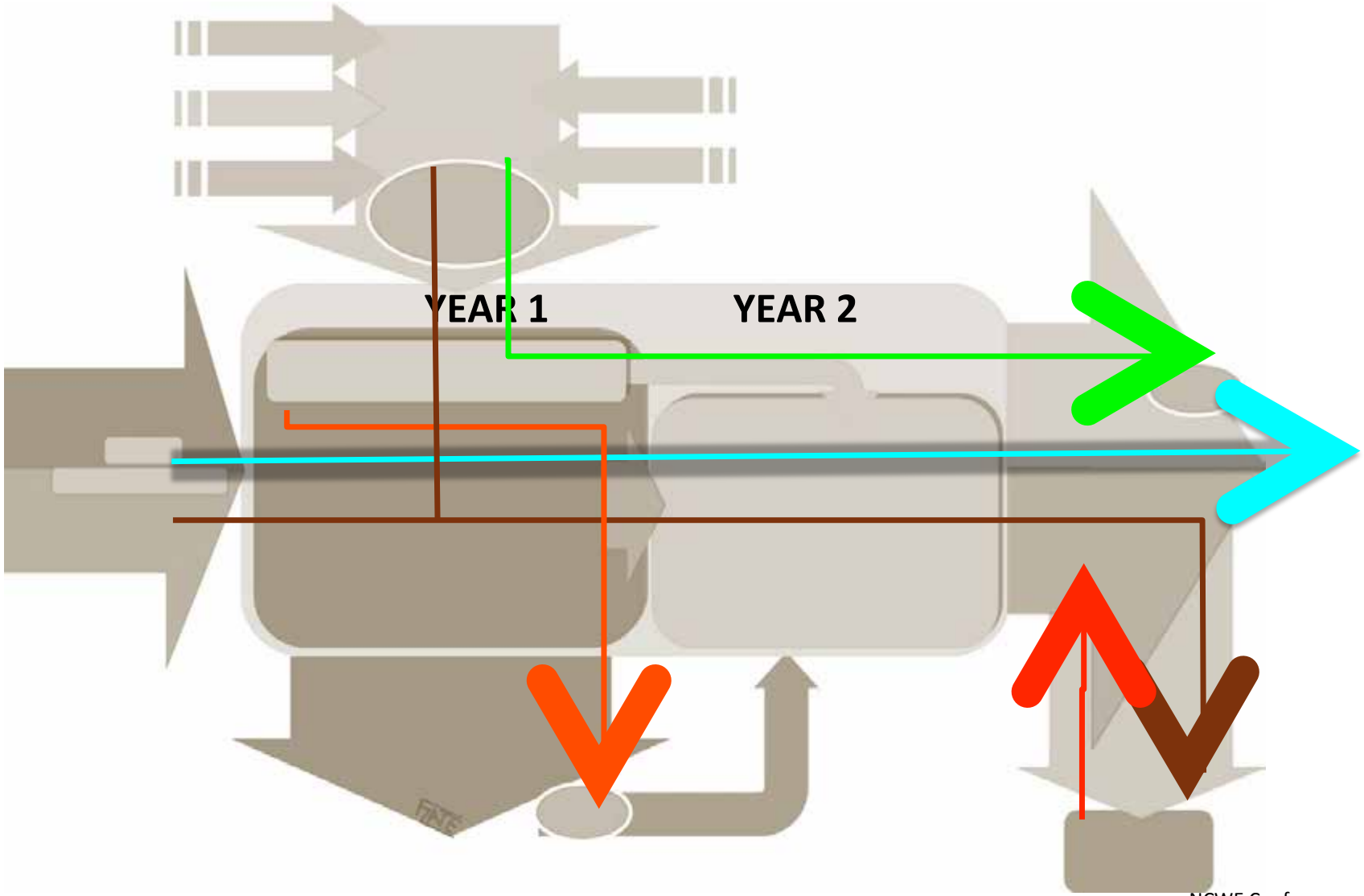
Advanced Manufacturing
Biomedical Systems
Electronics
Quality
Digital Manufacturing
Advanced Technology
Digital Design & Modeling
Mechanical Design & Fabrication
Alternative Energy Systems
Industrial Energy Efficiency

A.S. Engineering Technology Pathways

A.S. Degree Engineering Technology Pathways



A.S. Engineering Technology Pathways



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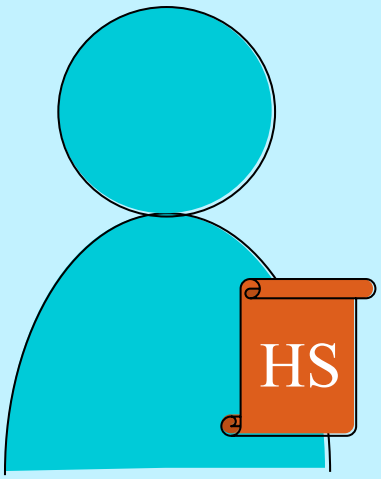
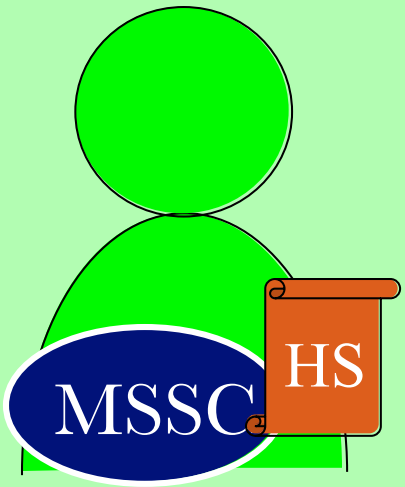
A.S. Engineering Technology Pathways

HS Grad / GED with no Technical Program - *wants AS/AAS Degree*



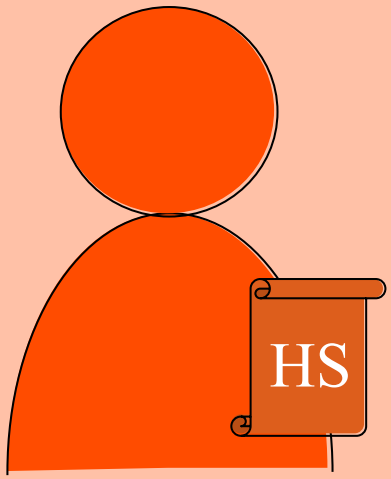
AS Degree (and optional certificates)

HS Grad / GED with MSSC Certification (from HS or work experience)



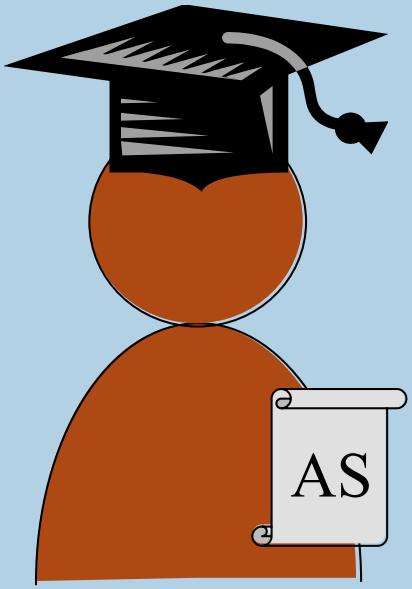
AS Degree & MSSC CPT (and optional certificates)

HS Grad / GED without Technical Program



College Certificate & MSSC CPT

AS ET Graduate



BS Applied Science or BS Eng Tech

ET Degree Technical Core

Quality
Safety
Electronics
Manufacturing Materials & Processes
Mechanical Measurements & Instrumentation
Computer Aided Drafting

MSSC®

Engineering Technology Support Certificate (18 Cr)
Prepared to take MSSC Certification Exams)

ET Degree Technical Core

Quality
Safety
Electronics
Manufacturing Materials & Processes
Mechanical Measurements & Instrumentation
Computer Aided Drafting

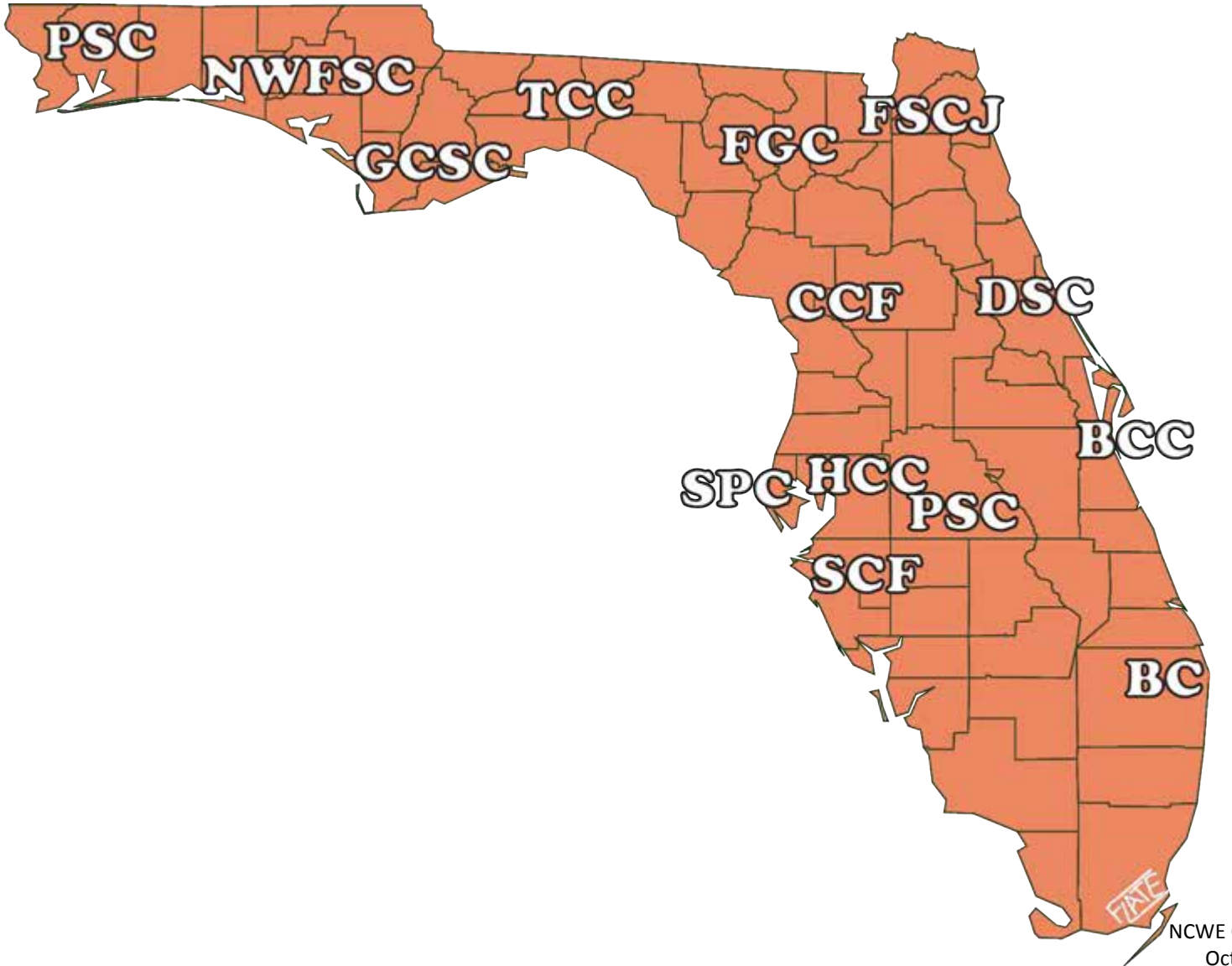
MSSC®

National Certification

Engineering Technology Support Certificate (18 Cr)
Prepared to take MSSC Certification Exams)

Academic Credential

FLATE's Engineering Technology Network



FLATE's Engineering Technology Network

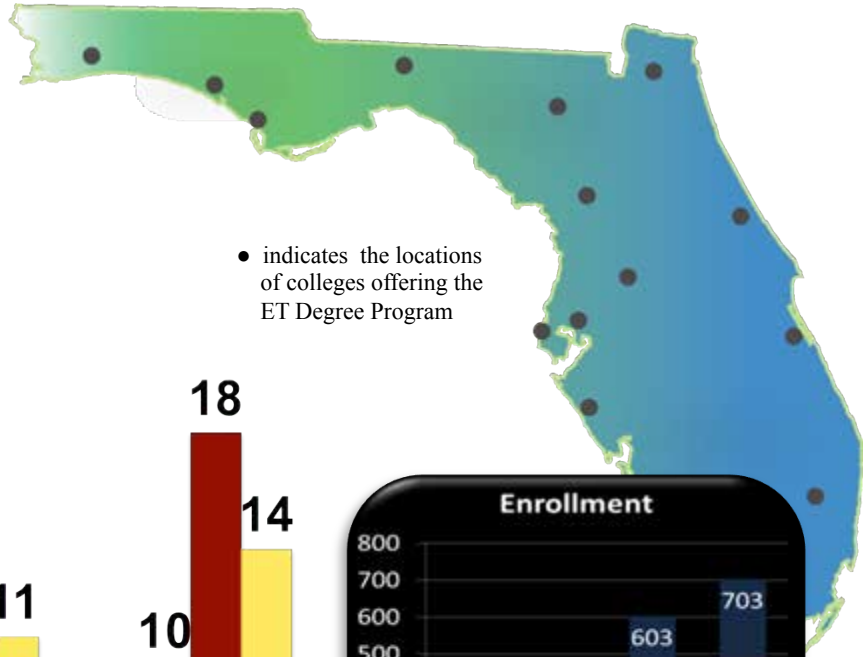
SPECIALIZATION	COLLEGES & LOCATIONS
Quality	College of Central Florida (CF) - Ocala Florida Gateway College (FGC) - Lake City St. Petersburg College (SPC) - Clearwater Tallahassee CC (TCC) - Tallahassee
Electronics	Eastern Florida SC (EFSC) - Cocoa, Palm Bay Broward College (BC) - Coconut Creek State College of Florida (SCF) - Venice St. Petersburg College (SPC) - St. Pete
Advanced Manufacturing	Florida Gateway College (FGC) - Lake City Florida State College (FSCJ) - Jacksonville Gulf Coast SC (GCSC) - Panama City Hillsborough CC (HCC) - Tampa Polk State College (PSC) - Lakeland Tallahassee CC (TCC) - Tallahassee
Mechanical Fabrication & Design	Gulf Coast SC (GCSC) - Panama City Florida State College (FSCJ) - Jacksonville Northwest Florida SC (NWFSC) – Niceville Tallahassee CC (TCC) - Tallahassee

SPECIALIZATION	COLLEGES & LOCATIONS
Advanced Technology	Eastern Florida SC (EFSC) - Cocoa, Palm Bay Tallahassee CC (TCC) - Tallahassee
Biomedical Systems	Broward College (BC) - Coconut Creek St. Petersburg College (SPC) - Clearwater
Digital Design & Modeling	College of Central Florida (CF) - Ocala Gulf Coast SC (GCSC) - Panama City Northwest Florida SC (NWFSC) - Niceville State College of Florida (SCF) - Venice St. Petersburg College (SPC) - St. Pete Tallahassee CC (TCC) - Tallahassee
Alternative Energy Systems	Eastern Florida SC (EFSC) - Cocoa, Palm Bay Broward College (BC) - Coconut Creek Gulf Coast SC (GCSC) - Panama City Tallahassee CC (TCC) - Tallahassee
Industrial Energy Efficiency	Florida State College (FSCJ) - Jacksonville
Digital Manufacturing	Gulf Coast SC (GCSC) - Panama City

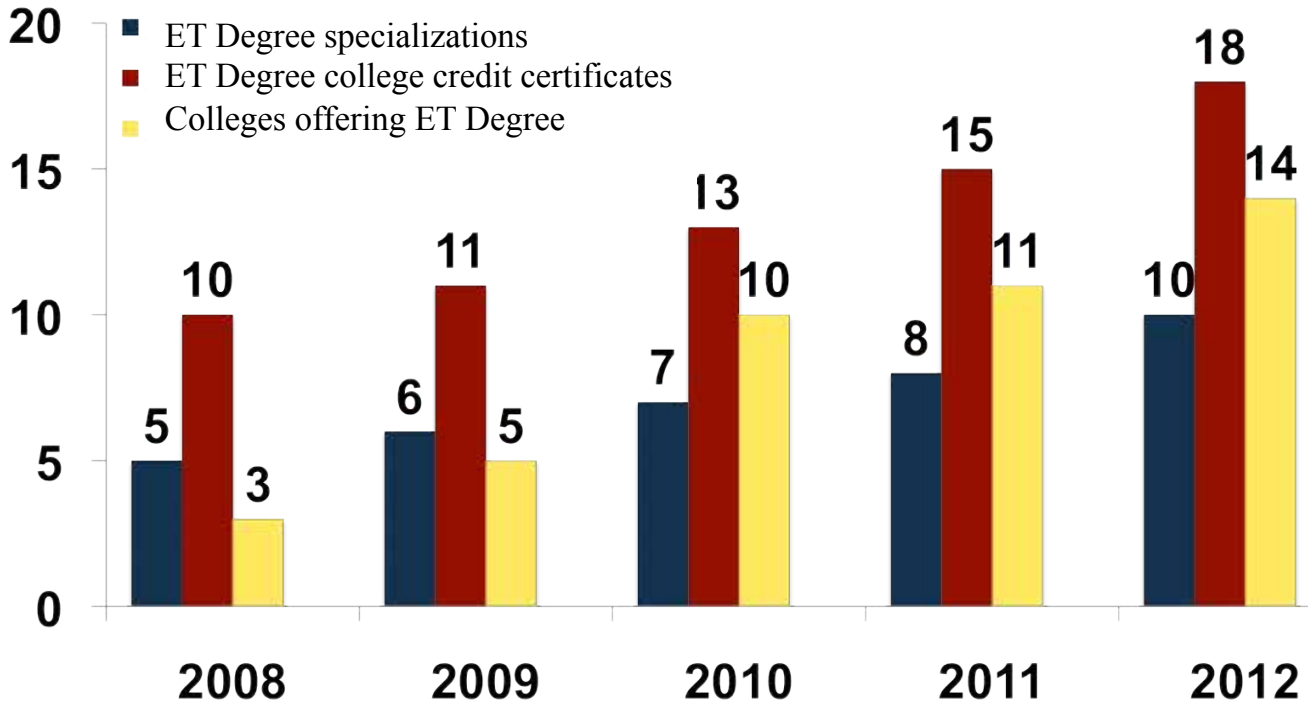
Impact Florida. Lead Nationally.

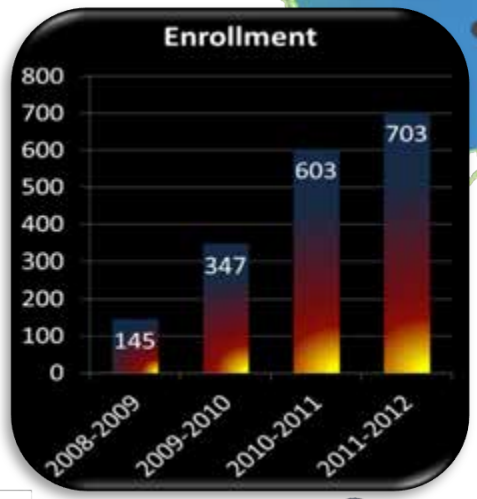
Engineering Technology A.S. Degree

Key Milestones 2008 - 2013



- indicates the locations of colleges offering the ET Degree Program





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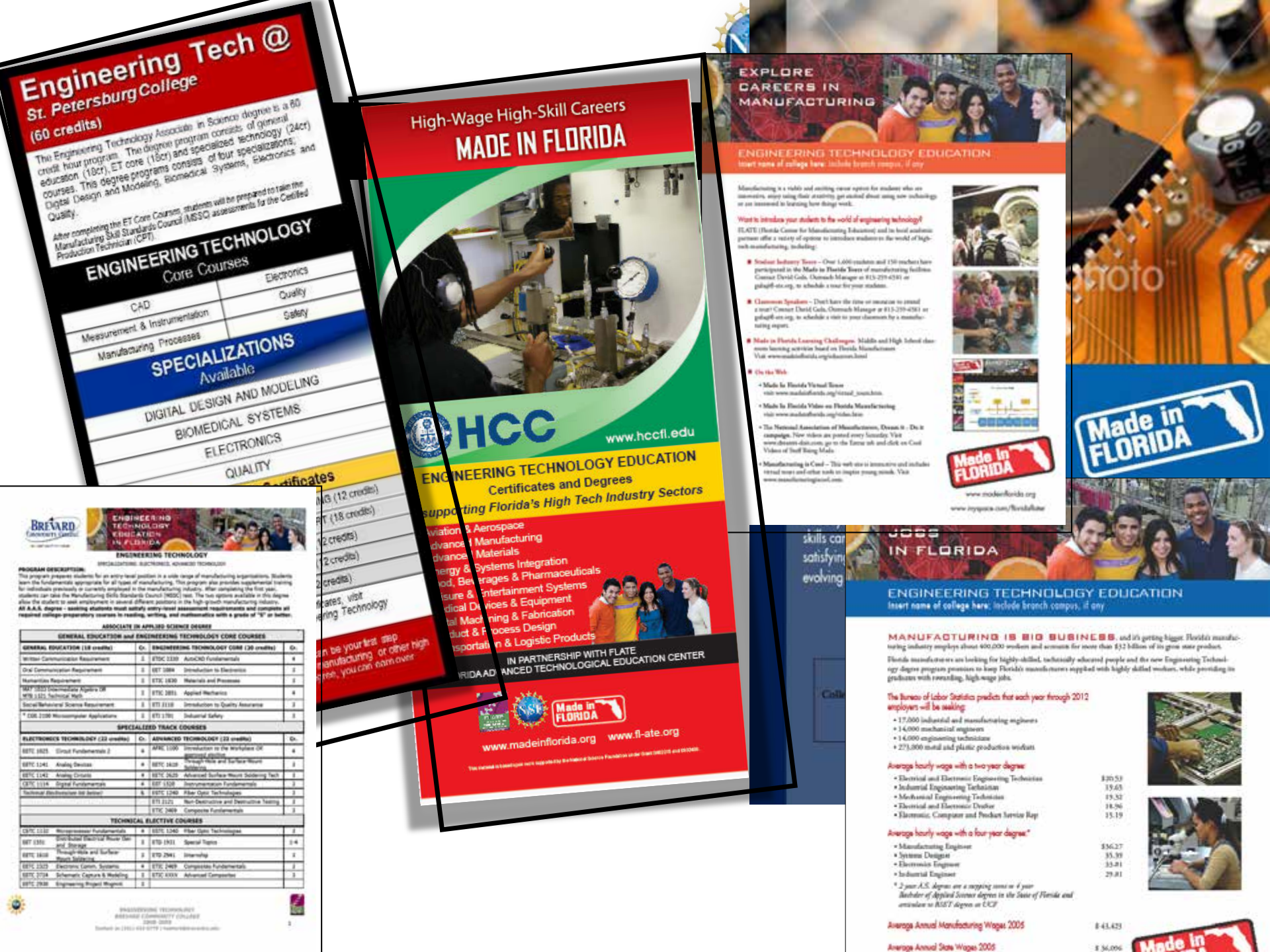
FLATE's Engineering Technology Network

posters


Engineering Tech @
St. Petersburg College
(60 credits)
The Engineering Technology Associate in Science degree is a 60 credit hour program. The degree program consists of general education (18cr), ET core (18cr) and specialized technology (24cr) courses. This degree programs consists of four specializations; Digital Design and Modeling, Biomedical Systems, Electronics and Quality.
After completing the ET Core Courses, students will be prepared to take the Manufacturing Skill Standards Council (MSSC) assessments for the Certified Production Technician (CPT).
ENGINEERING TECHNOLOGY
Core Courses
CAD
Measurement & Instrumentation
Manufacturing Processes
Electronics
Quality
Safety
SPECIALIZATIONS
Available
DIGITAL DESIGN AND MODELING
BIOMEDICAL SYSTEMS
ELECTRONICS
QUALITY
High-Wage High-Skill Careers
MADE IN FLORIDA
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Certificates and Degrees
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Advanced Materials
Energy & Systems Integration
Food, Beverages & Pharmaceuticals
Leisure & Entertainment Systems
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EXPLORE CAREERS IN MANUFACTURING
ENGINEERING TECHNOLOGY EDUCATION
Insert name of college here; include branch campus, if any
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MANUFACTURING IS BIG BUSINESS, and it's getting bigger. Florida's manufacturing industry employs about 400,000 workers and accounts for more than $32 billion of its gross state product.
The Bureau of Labor Statistics predicts that each year through 2012 employers will be seeking:
• 17,000 industrial and manufacturing engineers
• 14,000 mechanical engineers
• 14,000 engineering technicians
• 273,000 metal and plastic production workers
Average hourly wage with a two year degree:
• Electrical and Electronic Engineering Technician $30.53
• Industrial Engineering Technician 19.65
• Mechanical Engineering Technician 19.52
• Electrical and Electronic Drafter 18.96
• Electronic, Computer and Product Service Rep 15.19
Average hourly wage with a four year degree:*
• Manufacturing Engineer $36.27
• Systems Designer 35.39
• Electronics Engineer 33.01
• Industrial Engineer 29.81
* 2 year A.S. degrees are a stepping stone to 4 year Bachelor of Applied Science degrees in the State of Florida and articulate to BSET degrees at UCF
Average Annual Manufacturing Wages 2005 $ 43,425
Average Annual State Wages 2005 $ 36,096
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BREVARD COMMUNITY COLLEGE
ENGINEERING TECHNOLOGY EDUCATION IN FLORIDA
ENGINEERING TECHNOLOGY
PROGRAM DESCRIPTION:
ASSOCIATE IN APPLIED SCIENCE DEGREE
GENERAL EDUCATION and ENGINEERING TECHNOLOGY CORE COURSES
SPECIALIZED TRACK COURSES
TECHNICAL ELECTIVE COURSES

Thank you!

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