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AMTEC Career Pathways

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Career Pathway Deliverables

AMTEC team partners develop a career pathway model to be used by AMTEC colleges and their respective high school and four-year postsecondary institution partners to increase accessibility, portability and graduation rates for students in automotive and elated technical fields.

- 1. 1 Review of the Literature
- 1. 2 Develop Career Pathway Model/Framework
- 1. 3 Generate empirical data a research from AMTEC members
- 1. 4 Conduct "Best Practice" Academies
- 1. 5 Disseminate Reports to AMTEC Executive Committee & NSF

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AMTEC Model Elements

Literature Findings For Effective Career Pathway	Element Present - Example
1. Employer Involvement in all Phases of the program	Governance Body - Boards/ Committee composed of majority Employers. Curriculum- Competencies, Standards, Labs Recruitment - Plant tours, High school fairs Retention - Mentoring, Internships Funding - Equipment, scholarships, donors Jobs – Internships and Pre or Apprenticeship Opportunities An Employer or Consortia of Employers – MOA between parties.
2. Institutional and Instructional transformation links education and career competencies and training	Connects high school to college career pathway Connects from workforce to college career pathway Allows for non-credit to credit conversion Values and aligns credits and industry certification
3.Warp around support services.	Provides career guidance, academic counseling, mentor financial assistance, internships or apprenticeship opportunities for student success
4. Partnerships	Employers, Schools, Colleges, Universities, Government, and CBOs
5. Continuous Improvement	Utilizes data to improve performance and student success
6. Sustainability	Makes good use of data to drive planning and implementation that involves the blending and/or reallocating of funding sources

Grade	Table 1 AMTEC Secondary Pathways
9-12	• Academic Foundation - 4 years of English, Math, Science and ACT Job Readiness Certification.
9-12	• STEM Foundation – 4 years AP level English, Math , Science, Technology
10-12	• Career Tech Ed, (CTE) College and Job Readiness Foundation – 3 Years that include Introduction and Awareness of Manufacturing; Information Technology; careers or applied manufacturing; and applications of manufacturing ***technologies. AMTEC strongly recommends dual credit and NAM industry certification courses (AMTEC, MSSC, NIMS, AWS) to ensure rigor and relevance.***
13-16+	• Grades 13th – 16th College and Work Options. Includes specialized and advanced career pathways that are part of life-long learning framework with many exit and entry points for individuals to obtain higher education credentials. Should include 2+2 Articulation between College and Universities.

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Sample CTE Recommended 4x4 Pathway

SAMPLE

Manufacturing: Manufacturing Production Process Development

Career Pathway Plan of Study for ▶Learners ▶Parents ▶Counselors ▶Teachers/Faculty

*This Career Pathway Plan of Study (based on the Manufacturing Production Process Development 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 Manufacturing Production Process Development 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	▶ Design Engineer ▶ Electrical and Electronic Technician and Technologist ▶ Electronics Engineer ▶ Engineering and Related Technician and Technologist ▶ Industrial Engineer ▶ Labor Relations Manager ▶ Manufacturing Engineer ▶ Manufacturing Technician ▶ Power Generating and Reactor Plant Operator ▶ Precision Inspector, Tester and Grader ▶ Process Improvement Technician ▶ Production Manager ▶ Purchasing Agent ▶ Supervisor
	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.	• Quality Assurance Concepts and Techniques • Safety in the Workplace • Strategies to Ensure Continuous Improvement in Manufacturing	
	Year 14	Speech/ Oral Communication	Computer Applications	Biological Science Physical Science	American History Geography		• Manufacturing Production Processes • Design for Manufacturability	
	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)	

League for Innovation CCTI College and Career Transitions Initiative

NCTEF

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

SAMPLE

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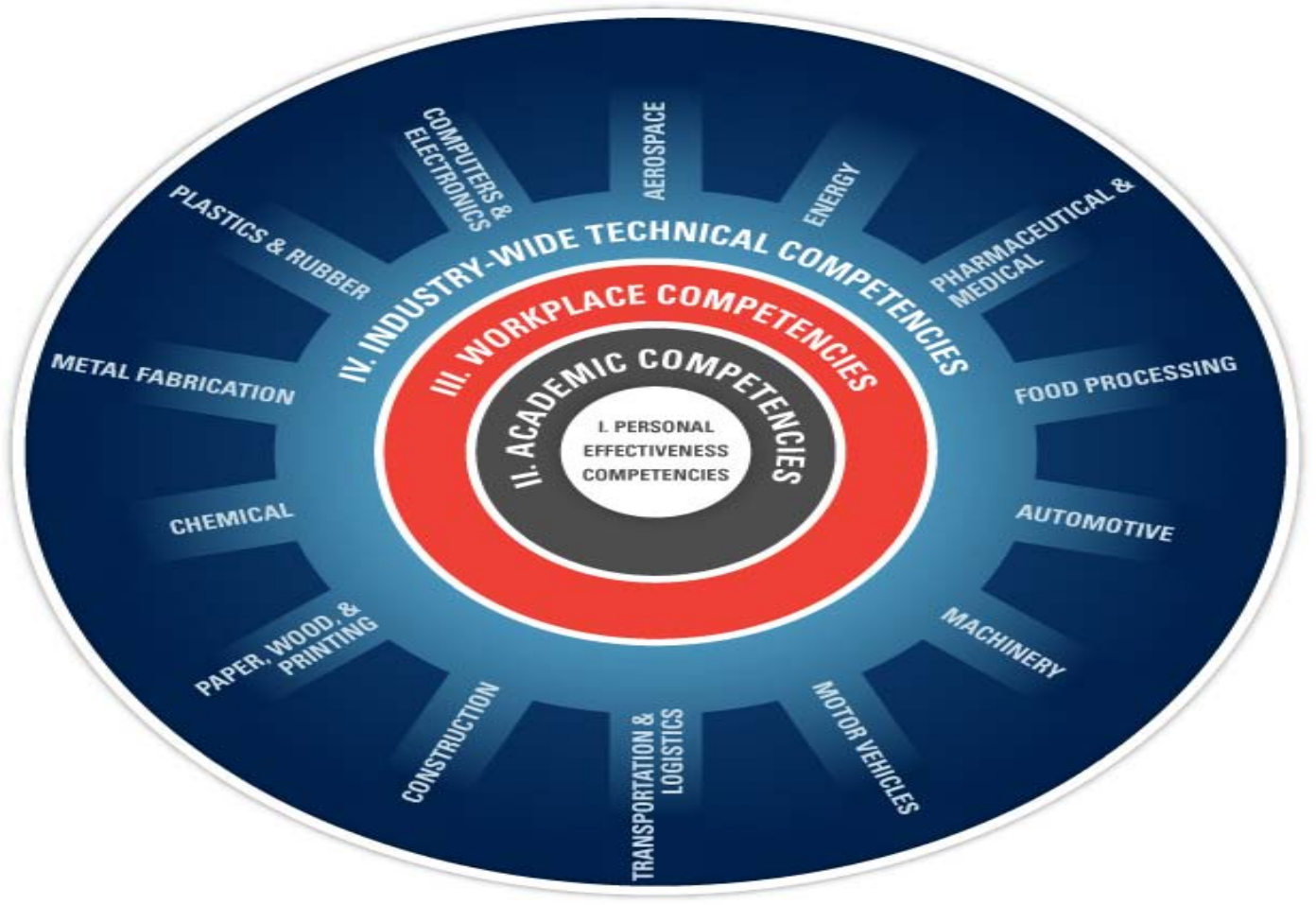
Competency Levels



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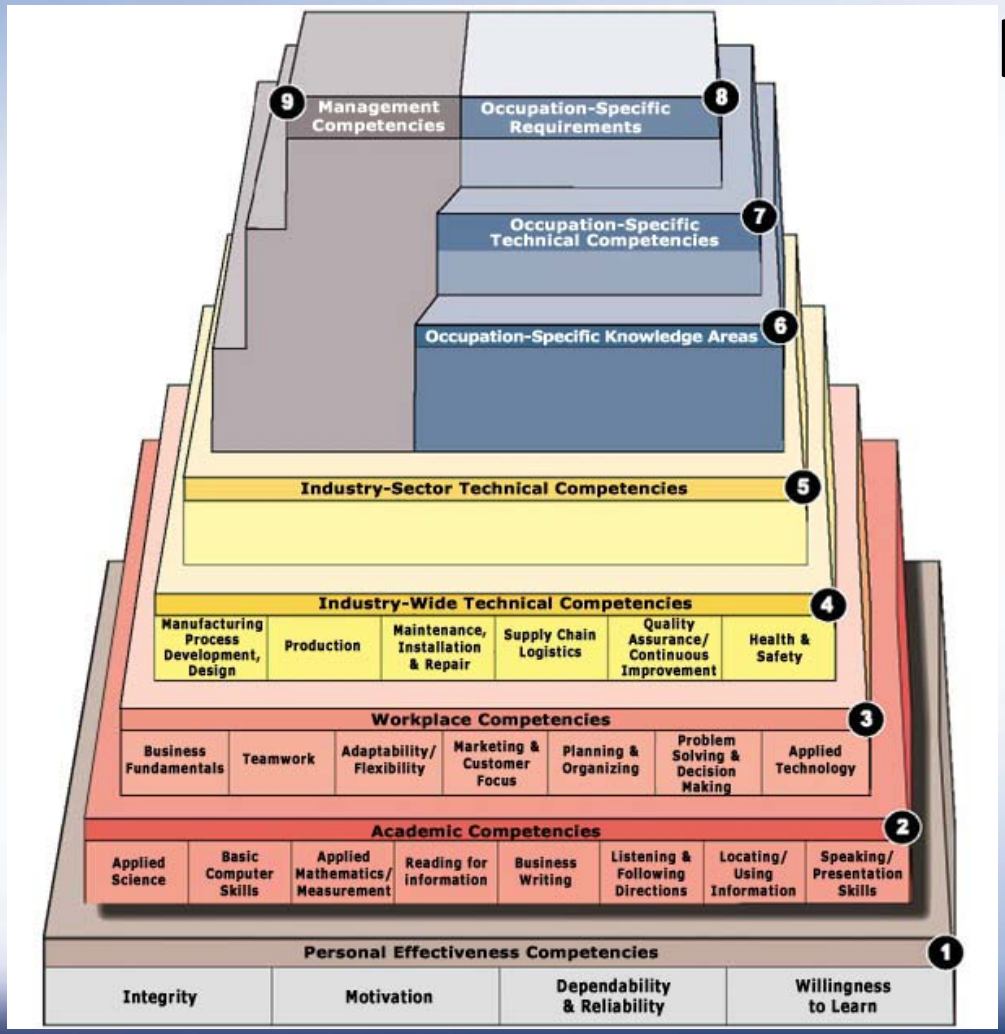
NAM - Advanced Manufacturing Competency



High Quality Middle Class Jobs

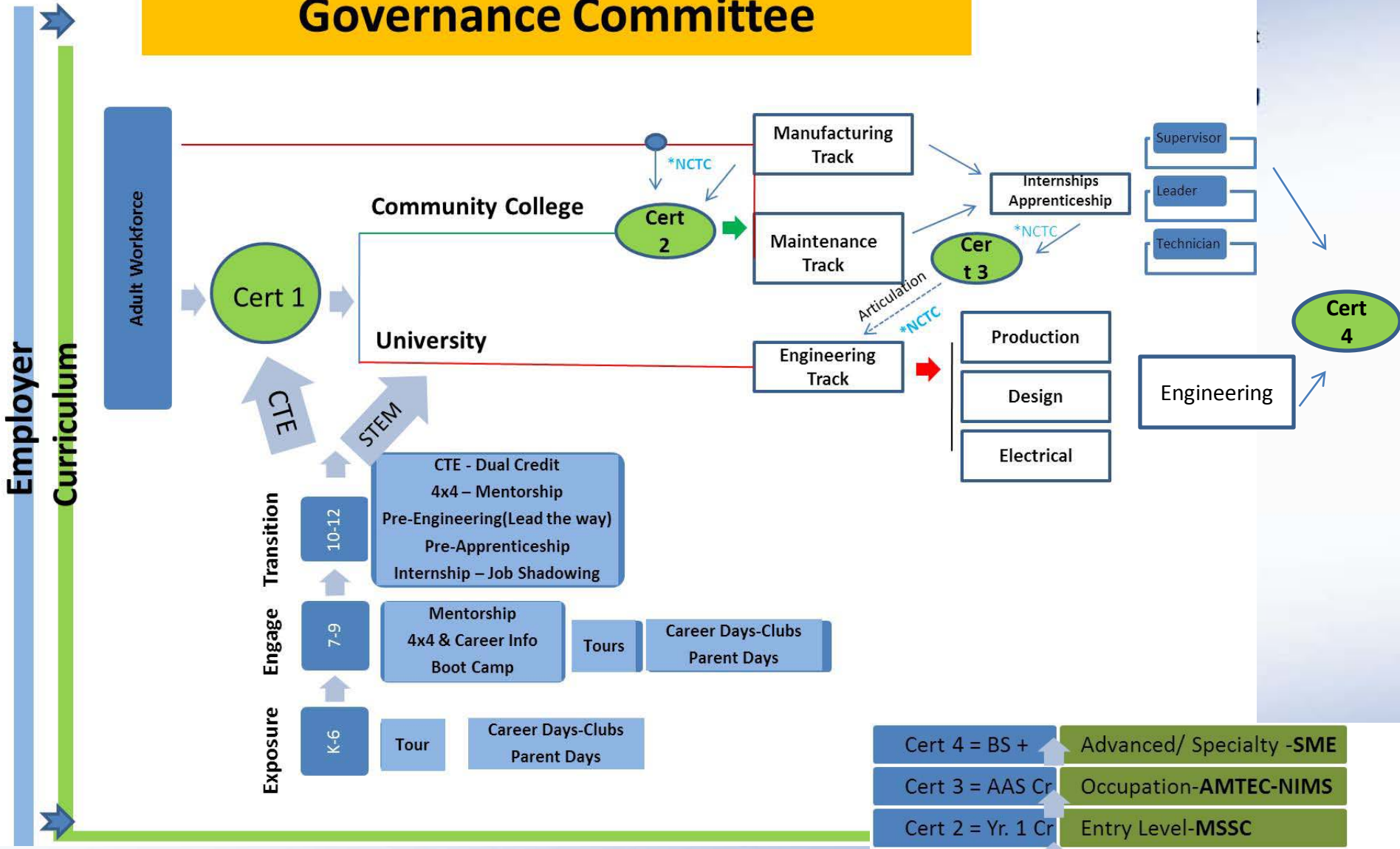
Career Paths – Life Long Learning

Occupation-Specific Certifications

Entry Level Industry Certifications

Ready for Work, Ready for College

Governance Committee



Cert 4 = BS +	Advanced/ Specialty -**SME**
Cert 3 = AAS Cr	Occupation-**AMTEC-NIMS**
Cert 2 = Yr. 1 Cr	Entry Level-**MSSC**
Cert 1	Job/College Ready-**ACT**

*NCTC-Non-Credit to Credit conversion

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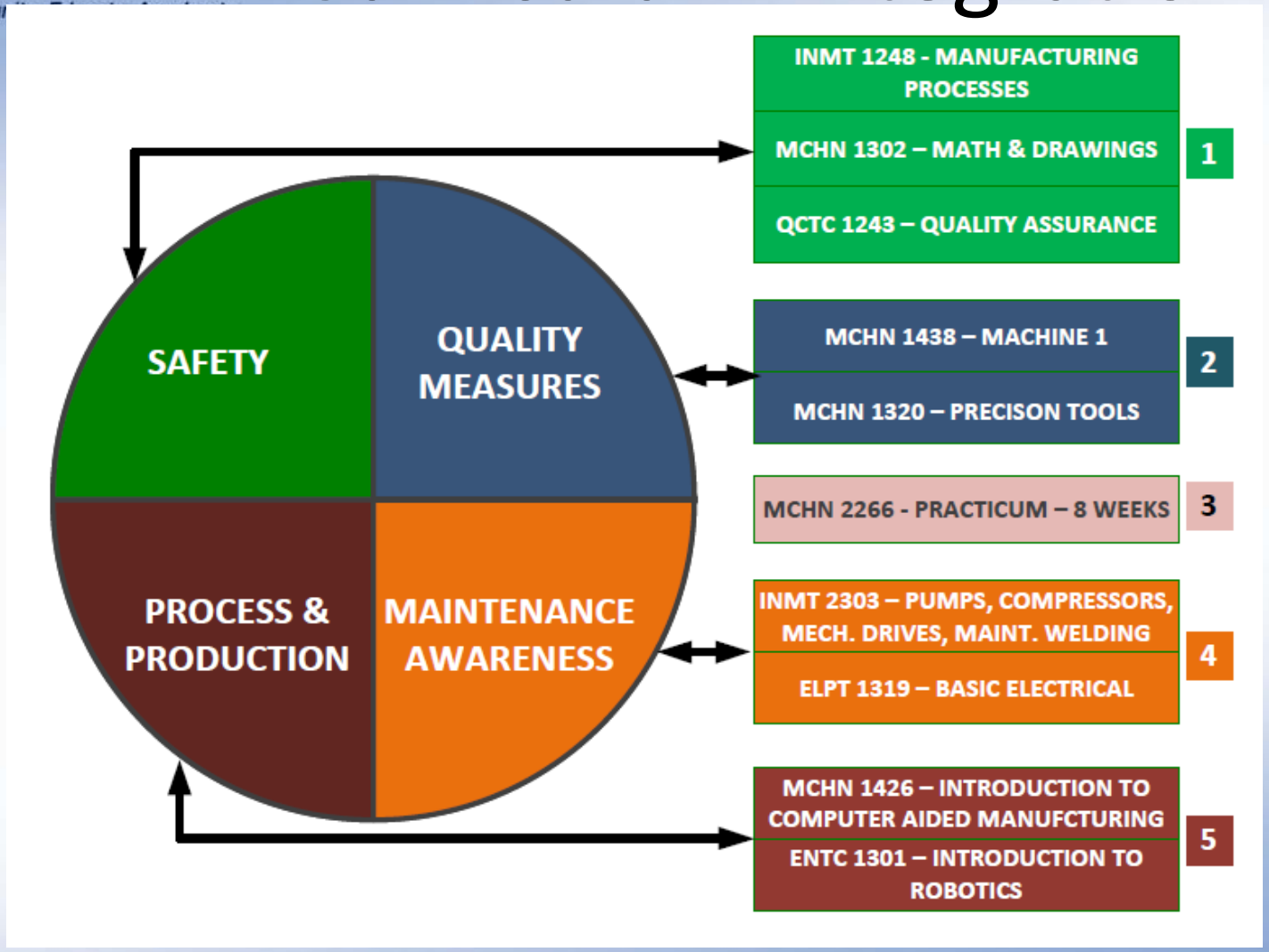
ATMA Curriculum Integration



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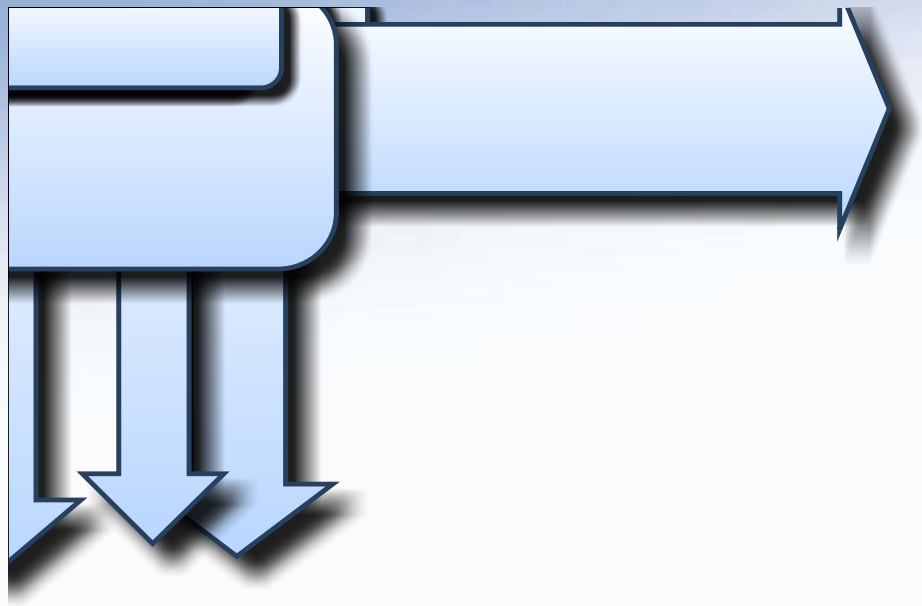

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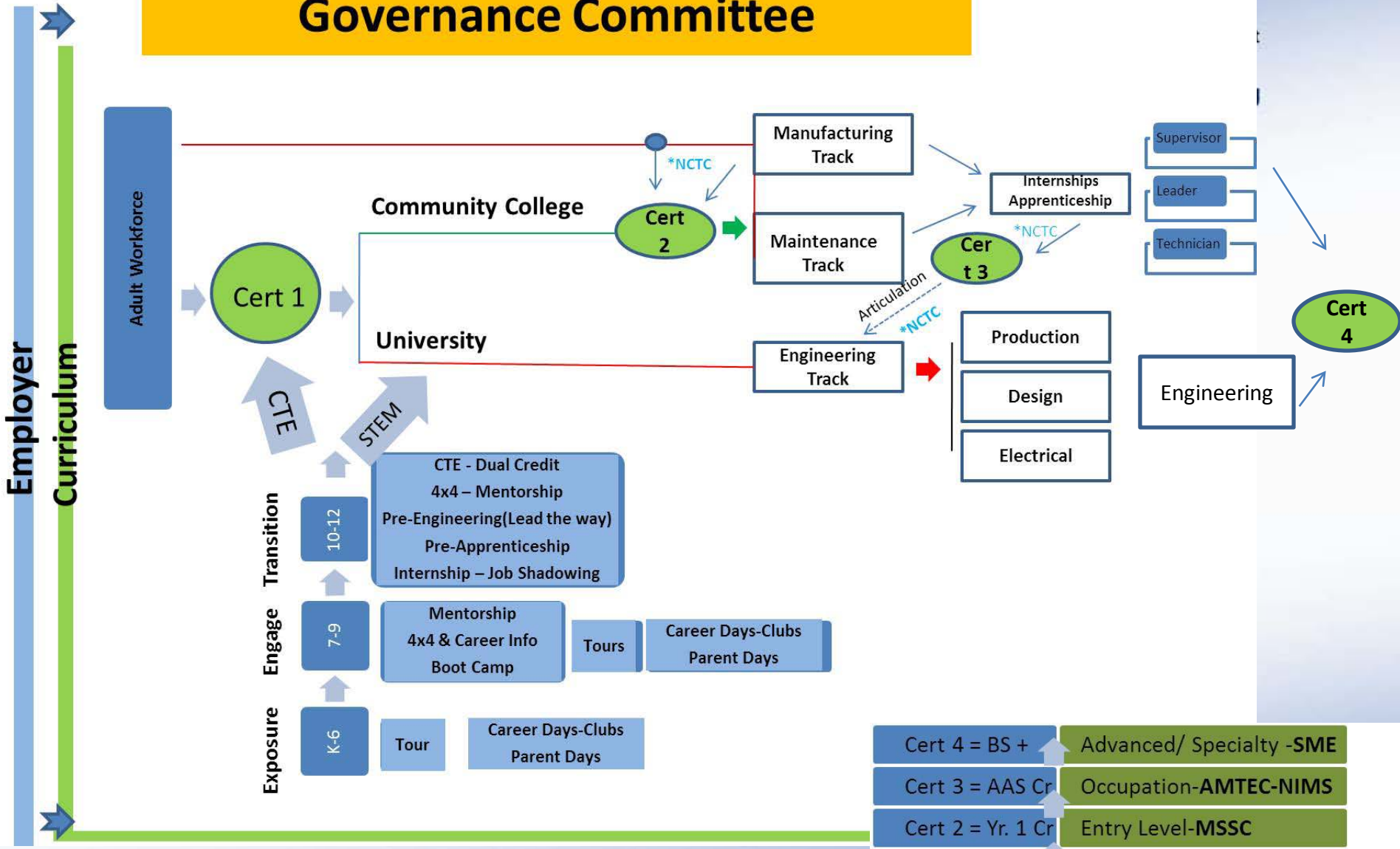

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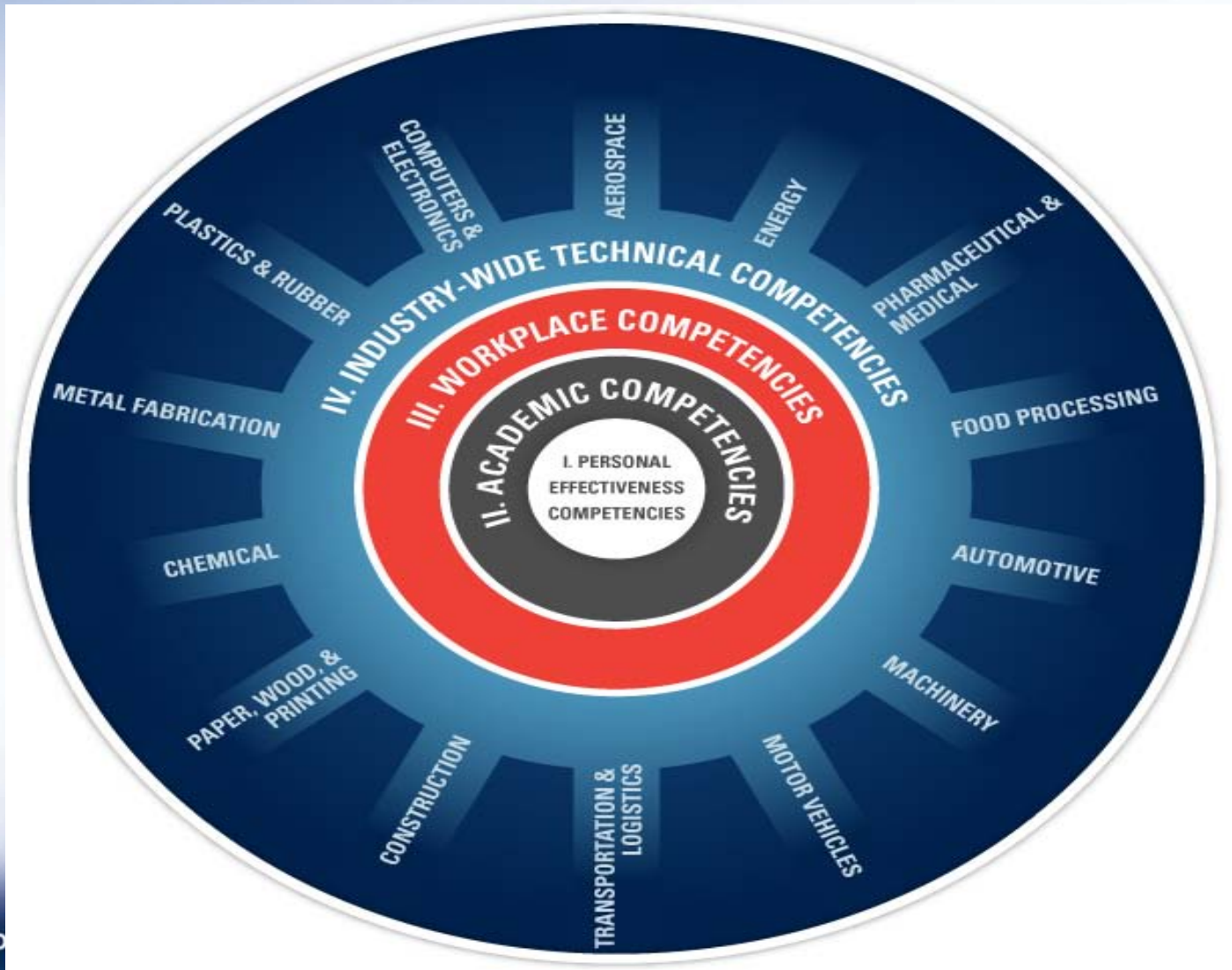
El Fin – The End



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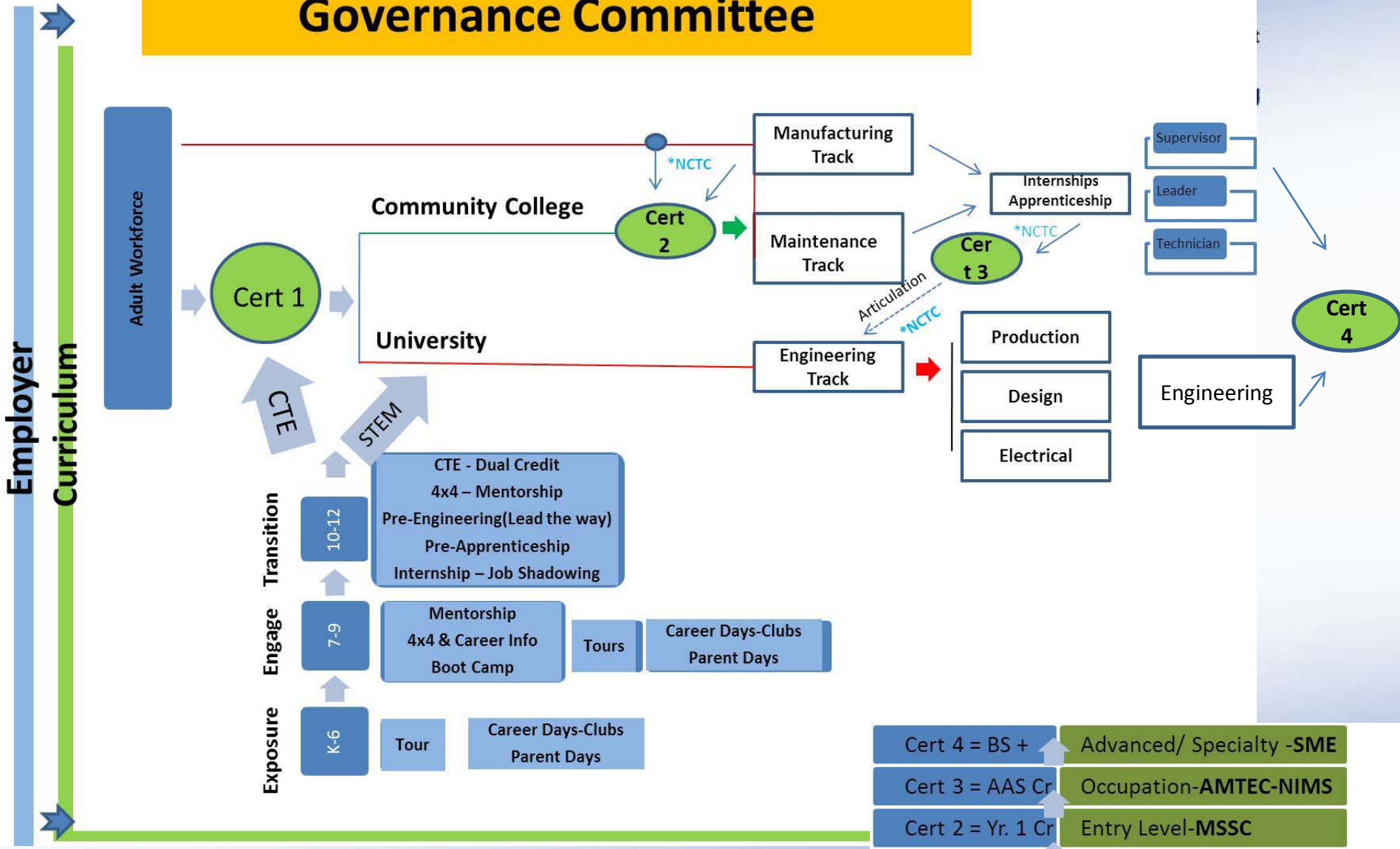

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National Center Goals

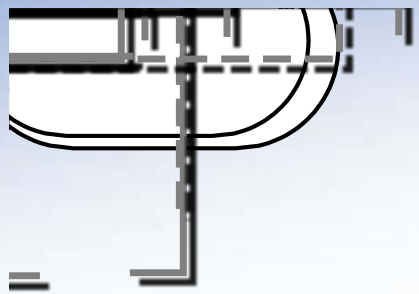
Goal 1 - Create business/industry partnerships to deliver core integrated systems maintenance technical education that meets the high priority needs of automotive manufacturers and suppliers.

Goal 2 - Increase secondary to postsecondary transition and postsecondary to employment to meet industry needs.

Goal 3 - Implement a collaborative support system to sustain and replicate the AMTEC model.

Goal 4 - Create and sustain the support process for the automotive core integrated systems education through assessment and continuous improvement.

Training and Education Map



MTA & MSSC Crosswalk

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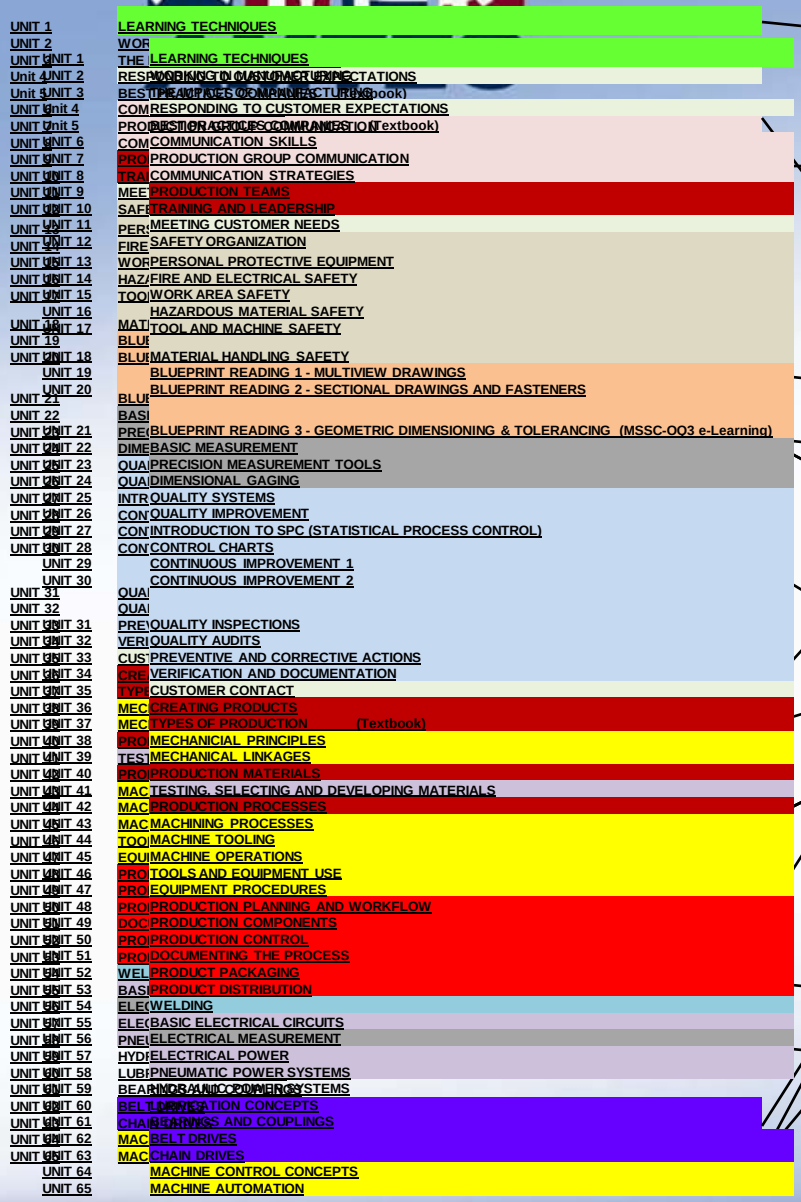


Pre GAP Analysis Correlation: 90%

Post-Analysis Course and Program realignment resulted in 100% Correlation

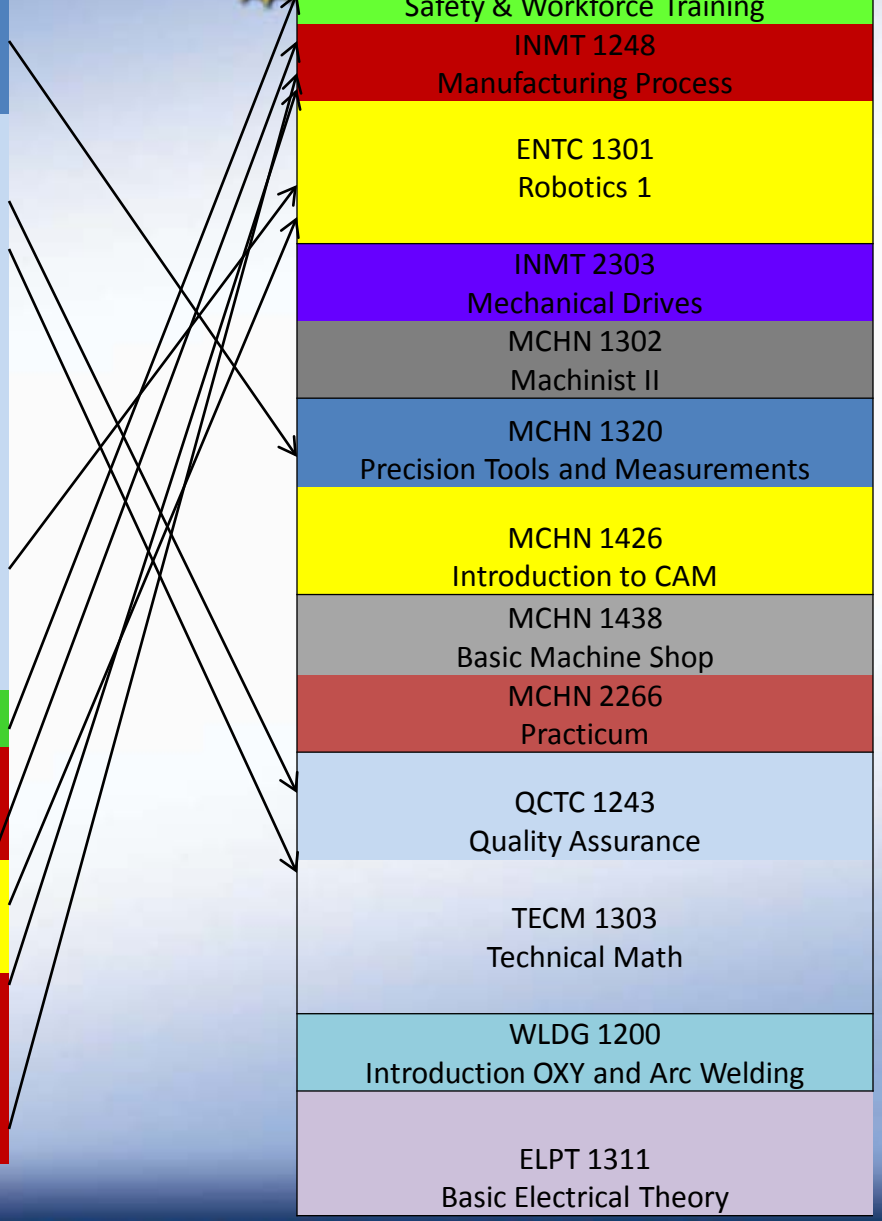
MTA & MSSC Crosswalk

UNIT 1	LEARNING TECHNIQUES
UNIT 2	WORKING IN MANUFACTURING
UNIT 3	THE IMPACT OF MANUFACTURING
Unit 4	RESPONDING TO CUSTOMER EXPECTATIONS
Unit 5	BEST PRACTICES COMPANIES (Textbook)
UNIT 6	COMMUNICATION SKILLS
UNIT 7	PRODUCTION GROUP COMMUNICATION
UNIT 8	COMMUNICATION STRATEGIES
UNIT 9	PRODUCTION TEAMS
UNIT 10	TRAINING AND LEADERSHIP
UNIT 11	MEETING CUSTOMER NEEDS
UNIT 12	SAFETY ORGANIZATION
UNIT 13	PERSONAL PROTECTIVE EQUIPMENT
UNIT 14	FIRE AND ELECTRICAL SAFETY
UNIT 15	WORK AREA SAFETY
UNIT 16	HAZARDOUS MATERIAL SAFETY
UNIT 17	TOOL AND MACHINE SAFETY
UNIT 18	MATERIAL HANDLING SAFETY
UNIT 19	BLUEPRINT READING 1 - MULTIVIEW DRAWINGS BLUEPRINT READING 2 - SECTIONAL DRAWINGS AND FASTENERS
UNIT 20	BLUE PRINT READING GEO & TOLERANCING

- MCHN 1171 Safety & Workforce Training
- INMT 1248 Manufacturing Process
- ENTC 1301 Robotics 1
- INMT 2303 Mechanical Drives
- MCHN 1302 Machinist II
- MCHN 1320 Precision Tools and Measurements
- MCHN 1426 Introduction to CAM
- MCHN 1438 Basic Machine Shop
- MCHN 2266 Practicum
- QCTC 1243 Quality Assurance
- TECM 1303 Technical Math
- WLDG 1200 Introduction OXY and Arc Welding
- ELPT 1311 Basic Electrical Theory

MTA & MSSC Crosswalk

UNIT 22	BASIC MEASUREMENT
UNIT 23	PRECISION MEASUREMENT TOOLS
UNIT 24	DIMENSIONAL GAGING
UNIT 25	QUALITY SYSTEMS
UNIT 26	QUALITY IMPROVEMENT
UNIT 27	INTRODUCTION TO SPC (STATISTICAL PROCESS CONTROL)
UNIT 28	CONTROL CHARTS
UNIT 29	CONTINUOUS IMPROVEMENT 1
UNIT 30	CONTINUOUS IMPROVEMENT 2
UNIT 31	QUALITY INSPECTIONS
UNIT 32	QUALITY AUDITS
UNIT 33	PREVENTIVE AND CORRECTIVE ACTIONS
UNIT 34	VERIFICATION AND DOCUMENTATION
UNIT 35	CUSTOMER CONTACT
UNIT 36	CREATING PRODUCTS
UNIT 37	TYPES OF PRODUCTION (Textbook)
UNIT 38	MECHANICIAL PRINCIPLES
UNIT 39	MECHANICAL LINKAGES
UNIT 40	PRODUCTION MATERIALS
UNIT 41	TESTING, SELECTING AND DEVELOPING MATERIALS
UNIT 42	PRODUCTION PROCESSES



MTA & MSSC Crosswalk

UNIT 42	PRODUCTION PROCESSES
UNIT 43	MACHINING PROCESSES
UNIT 44	MACHINE TOOLING
UNIT 45	MACHINE OPERATIONS
UNIT 46	TOOLS AND EQUIPMENT USE
UNIT 47	EQUIPMENT PROCEDURES
UNIT 48	PRODUCTION PLANNING AND WORKFLOW
UNIT 49	PRODUCTION COMPONENTS
UNIT 50	PRODUCTION CONTROL
UNIT 51	DOCUMENTING THE PROCESS
UNIT 52	PRODUCT PACKAGING
UNIT 53	PRODUCT DISTRIBUTION
UNIT 54	WELDING
UNIT 55	BASIC ELECTRICAL CIRCUITS
UNIT 56	ELECTRICAL MEASUREMENT
UNIT 57	ELECTRICAL POWER
UNIT 58	PNEUMATIC POWER SYSTEMS
UNIT 59	HYDRAULIC POWER SYSTEMS
UNIT 60	LUBRICATION CONCEPTS
UNIT 61	BEARINGS AND COUPLINGS
UNIT 62	BELT DRIVES
UNIT 63	CHAIN DRIVES
UNIT 64	MACHINE CONTROL CONCEPTS
UNIT 65	MACHINE AUTOMATION

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MTA & MSSC Crosswalk

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Literature Review
Types of career pathways

1.1.0 Secondary

1.1 Career Academies – A type of school-within-a-school or small learning community (SLC) that provides a college-preparatory curriculum with a career-related theme. Variations include dual credit & industry certification dimensions.

1.2 Tech Prep education takes the pathway concept a bit further by combining secondary and postsecondary programs. Tech Prep is a 4+2, 3+2 or 2+2 planned sequence of study in a technical field that culminates in an college credit towards associate degree or certificate.

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Literature Review
Types of career pathways

1.3 Career and Technical Education (CTE)- is a component of the high school curriculum. Hull (2006) notes, that CTE –despite its new name---suffers from the many negative perceptions as vocation education for the "not-so-smart" kids.

•High Quality CTE - **must be RIGOROUS high quality** career and technical education programs that are well-planned sequence of courses, which is focused on a career cluster, can positively affect student achievement during high school and student success following high school graduation.

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Literature Review
Types of career pathways

1. 4 STEM Based College Prep/Transition Pathways - that can include Hands-on high tech experiences like Robotics or IT camps and community outreach projects related to coursework and career studies.

- STEM Camps (Robotics, IT, Green, Energy) focus on "real-world" applications of Science, Technology, Engineering, and Math skills.
- Math and Science Clubs
- Honors and Advanced Placement Courses
- Early College

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Literature Review
Types of career pathways

1.5 Career Clusters - Pathways –Based on 16 U.S. DOE Career Clusters framework that is utilized to connect students with courses of study and careers via Career Assessments, and allows them to learn general, more transferable skills at the cluster level, with more specific skills and knowledge acquired at the career pathways and specialty levels.

- Aligns to 70+ career pathways,
- 1800 Career Specialties align to O'net.

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Literature Review
Types of career pathways

2.0 Post Secondary

2.1 Dual credit/concurrent enrollment technology pathways – College credit is earned via concurrent enrollment in technology or academic discipline pathway. Requires curricular alignment of secondary and postsecondary courses.

2.2 Early & Middle College – Allows eligible secondary students to earn up to an Associate Degree via a four year dual credit program

2. 3 Vertical Articulation Models– Community Colleges and Universities articulate a four year curriculum that allows the vast majority of the college technical/ occupational credits to transfer to university program (2+2).

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Literature Review
Types of career pathways

3.0 Employer Pathways

3. 1 Industry Certifications - CTE at the national and state level encouraging Credentialing (credit course) and Certifications (Industry), examples of career pathway industry certification programs:

- *IT Academies for* Microsoft, Cisco, Oracle
- *NAM Endorsed Certifications Project (MSSC, NIMS, ASE, and ACT).*
- AMTEC Mechatronics Certification Program (In development).

3.2 Employer and Cluster Boot Camps

- Robotics Boot Camps
- Green Technology Boot Camps
- WIA Summer Career Exploration Boot Camps
- Many high schools offer CTE exploratory experience

Literature Review

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Types of career pathways

- **3.3 Career Pathway Internships** – Utilize paid/unpaid internships to expose, engage, assess, and indoctrinate students into auto companies.
- **3.4 Apprenticeship / Pre Apprenticeship -** AMTEC members report that DOL Apprenticeships have been very successful and have historically been a workforce pipeline for the auto industry.
  - Apprentices are employees of the company while they are in training.
  - Apprentices earn DOL credentials yet this area has had limited interface with the education system and pathways as we think about them. **<u>This is an emerging AMTEC focus area.</u>**

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Literature Review
Types of career pathways

Dr. Heather Wathington, University of Virginia

Big Hairy Gorilla in the Room - A comprehensive review of Career Pathway literature revealed little rigorous research to support the effectiveness for most career pathways.

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Review of the Literature

Found at least six elements of strong, sustainable career pathways:

1. Institutional and instructional transformation that develop clear linkages and easy transitions between education and training.

2. “Wrap around” support services -- such as counseling, academic preparation, internships, financial aid, etc. -- to help students succeed;

3. Partnerships that make good use of data to drive planning and implementation; involves the blending and/or reallocating of funding sources.

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Review of the Literature

4. Employer involvement in all phases of the process;

5. Continuous improvement systems

6. Commitment to sustainability that involves the blending and/or reallocating of funding sources.

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