NAM-Endorsed Manufacturing Skills Certification System: Overview and Update

Emily Stover DeRocco
President
The Manufacturing Institute
The Public Supports Manufacturing

**Chart 5.** Percentage of respondents who believe the manufacturing industry is very important to our

- Economic prosperity: 86%
- Standard of living: 85%
- National security: 77%

**Chart 10.** Ranking by respondents of the type of new industry facility they would support to create 1,000 new jobs in their community

<table>
<thead>
<tr>
<th>Facility</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing facility</td>
<td>1</td>
</tr>
<tr>
<td>Energy production facility</td>
<td>2</td>
</tr>
<tr>
<td>Healthcare facility</td>
<td>3</td>
</tr>
<tr>
<td>Technology development center</td>
<td>4</td>
</tr>
<tr>
<td>Communications hub</td>
<td>5</td>
</tr>
<tr>
<td>Retail center</td>
<td>6</td>
</tr>
<tr>
<td>Financial institution</td>
<td>7</td>
</tr>
</tbody>
</table>

(Aggregate ranking of sectors by all respondents)
# Manufacturing Jobs for Someone Else

## Chart 11. Ranking by respondents of industry preference if they were beginning their career today

<table>
<thead>
<tr>
<th>Industry</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology industry</td>
<td>1</td>
</tr>
<tr>
<td>Energy industry</td>
<td>2</td>
</tr>
<tr>
<td>Healthcare industry</td>
<td>3</td>
</tr>
<tr>
<td>Communications industry</td>
<td>4</td>
</tr>
<tr>
<td>Manufacturing industry</td>
<td>5</td>
</tr>
<tr>
<td>Financial services industry</td>
<td>6</td>
</tr>
<tr>
<td>Retail industry</td>
<td>7</td>
</tr>
</tbody>
</table>

(Aggregate ranking of sectors by all respondents)

## Chart 12. Percentage of respondents who strongly agree or agree with each statement

- **I would encourage my child to pursue a career in manufacturing**: 33%
- **Our school system encourages students to pursue careers in manufacturing**: 19%
- **My parents encouraged me to pursue a career in manufacturing**: 17%
The Skills Gap in Manufacturing

- 82% of manufacturers report a moderate-to-serious skills gap in skilled production.
- 74% of manufacturers report that this skills gap has negatively impacted their company’s ability to expand operations.
- 69% of manufacturers expect the skills shortage in skilled production to worsen in the next 3-5 years.
- 5% of all jobs in manufacturing unfilled due to lack of qualified workers.
In these tough economic times, business innovation is a strategic imperative.

A highly skilled and educated workforce is the most critical element for innovation success.

Source: The Innovation Imperative in Manufacturing – How the United States Can Restore Its Edge
Manufacturing Jobs Require Higher Skills

Manufacturing Employment by Skill Group, 2003 through 2010


Index 2003=100

2003 2004 2005 2006 2007 2008 2009 2010
“I advise each of my staff that every worker hired is a million-dollar investment for this company. I’m calculating that most hires are under 45 years old; we intend to keep them for at least 20 years, and our average annual salary/benefits package is $55,000. In other words, we can’t afford to make a mistake—to hire someone without the right skills. Verifiable skills certification programs can make the difference between a good investment and a high-risk.”

Dennis Rohrs,
Human Resource Manager
Fort Wayne Metals, Inc.
Providing competency-based, customized education and training for the manufacturing workforce…today and tomorrow
Advanced Manufacturing Competency Model

High Quality Middle Class Jobs

Occupation-Specific Certifications

Entry Level Industry Certifications

Ready for Work, Ready for College
I. Personal Effectiveness Competencies

II. Academic Competencies

III. Workplace Competencies

IV. Industry-wide Technical Competencies

- Automation
- Aerospace
- Energy
- Pharmaceutical & Medical
- Food Processing
- Automotive
- Machinery
- Motor Vehicles
- Construction
- Transportation & Logistics
- Paper, Wood & Printing
- Metal Fabrication
- Chemical
- Plastics & Rubber
- Computer & Electronics
The NAM-Endorsed Manufacturing Skills Certification System

- Aligned to the Manufacturing Competency Model
- Nationally Portable
- Third-Party Validated (ISO/ANSI Preferred)
- Industry-Driven
- Data Based and Supported
Founding Partners & Certifications

- **ACT**
  - National Career Readiness Certificate

- **Manufacturing Skill Standards Council**
  - Certified Production Technician

- **American Welding Society**
  - Welding Certifications (8 different credentials)

- **National Institute for Metalworking Skills**
  - Machining, Metalforming, and CNC (52 different credentials)

- **Society of Manufacturing Engineers**
  - Certified Manufacturing Technologist
  - Certified Manufacturing Engineer
Priority Sectors Include:

- Aerospace/Defense
- Automation
- Life Science: Biotechnology, Pharmaceutical & Medical Device
- Construction
- Energy
- Plastics and Composites
- Transportation, Distribution, and Logistics
Automation Pathway

- International Society of Automation (ISA)
  - Certified Automation Professional
  - Certified Control Systems Technician

- Packaging Machinery Manufacturing Institute (PMMI)
  - Mechatronics Certificate
Transportation, Distribution, and Logistics Pathway

- **Manufacturing Skill Standards Council**
  - Certified Logistics Associate
  - Certified Logistics Technician

- **American Society of Transportation and Logistics**
  - Global Logistics Associate
  - Professional Designation in Logistics and Supply Chain Strategy
  - Certified in Transportation and Logistics

- **APICS - The Association for Operations Management**
  - APICS Certified in Production and Inventory Management
  - APICS Certified Supply Chain Professional
What’s Next

- NAM Endorsement of Additional Certifications – Quality, Construction, Fabrication
- Industry Pathway Development - Aerospace, Energy, Life Sciences
- Manufacturers Endorsed Schools
Deployment and National Scope

States with national philanthropic funding for deployment (AL, AR, CT, FL, IL, IN, IA, KS, MS, NV, NY, NC, OH, TN, TX, WA, WI)

States with grassroots efforts and strategic partnerships advocating for deployment (AZ, CA, GA, ID, KY, MD, MI, MN, MO, NE, NM, OK, OR, PA, SC, VT, VA, WV)
Dream!t Do!t®
Recruiting Students Into Advanced Manufacturing Careers

Where The Thought becomes The Thing

Dream!t Do!t®
Your Future is Here for the Making

www.DreamIt-DoIt.com
NAM-Endorsed Manufacturing Skills Certification System in Action

Audrey S. Theis, Ph.D.
President
Key Links, Inc.
Models

- High school to community college
- ABE/bridge programs to credit certificate/diploma/degree
- Continuing education to for-credit
- Community college integration into current for-credit programs of study
- Pre-apprenticeship to apprenticeship
- Community college to four-year institutions

There is no “one size fits all” model for implementation.

Assess the assets of your college and the needs of your students and employers.

Find the “low-hanging fruit” and get started!
Three Models in Action

- **Alamo Community Colleges, San Antonio, TX**
  - *High School to Community College*

- **Forsyth Tech Community College, Winston-Salem, NC**
  - *Integration into For-Credit Programs of Study*

- **Lorain County Community College, Cleveland, OH**
  - *Community College to Four-Year Programs of Study*
Alamo Community Colleges: Advanced Technology and Manufacturing Academy

High School to Community College Model
Industry-Driven High School Academies

- Alamo Area Aerospace Academy
- Information Technology & Security Academy
- Health Professions Academy
- Advanced Technology and Manufacturing Academy
A Cooperative Effort

- The Alamo Colleges
- Industry Partners: San Antonio Manufacturers Association
- Independent School Districts, Charter and Private Schools
- Multiple Cities: San Antonio, New Braunfels, Seguin, Floresville, Boerne
- Chambers of Commerce
- Local Universities
- Many More Partners
The Academy Program Model

- High School Juniors and Seniors Region-Wide
- Students Enrolled in their Home High School
- 2½ Hours at an Academy Each Day, Multiple Sites
- Industry-Driven Curriculum/Work Ready Skills
- Dual Credit: 27-35 college credits aligned to certifications
- No personal cost to student or parents
- Industry Paid Internships
- First NAM cohort of 24 students to graduate with a high school diploma, college Certificate and NCRC/MSSC Certifications in Spring 2012.
### Aligning Education, Certification, and Career Pathways

**Advanced Technology Manufacturing Academies at the Alamo Colleges**

### Education Pathway

**Bachelor of Applied Arts & Science / Engineering Discipline**
- (*Potential path not currently articulated*)
  - Texas State, UTSA, St. Mary’s University *

**Associate in Applied Science**
- Manufacturing Operations Technician
- CNC Manufacturing Technician
  - 63-69 hours / 2 years full time
  - 21 courses
  - Day/evening curriculum

**High School Year 2**
- CNC Tool Operator Certificate or Manufacturing Operations Maint. Assistant
- Dual Enrollment
- 6 courses / 17 credit hours

**High School Year 1**
- Dual enrollment
- Marketable Skills Certificate - Machining
- 5 courses / 14 credit hours

### Certification Pathway

- SME
- AWS Certified Welder D.1.1
- MSSC Maintenance Awareness
- MSSC Manufacturing Practices
- MSSC Quality Practices and Measurement
- MSSC Safety
- Career Readiness Certificate
- MSSC Manufacturing Practices
- MSSC Maintenance Awareness
- Career Readiness Certificate
- MSSC Quality Practices & Measurement
- MSSC Safety
- Career Readiness Certificate

### Career Pathway

- Plant Engineer
- Mechanical Engineer
- Management
  - $50k - $140k (11-3051, 17-2141)
- CNC Technician
- Manufacturing Maintenance Technician
- Production workers/assemblers
  - $21k - $54k (51-4010, 51-2092, 51-2031)
- Entry level operators
- Maintenance helpers
- Team Assemblers
  - $17k - $54k (51-2092, 51-2031)
- Maintenance Helper
  - $17k - $40k (49-9098)

---

**National Career Readiness Certificate**
- Personal Effectiveness
- Academic Competencies
- Workplace Competencies

### Key Links

**Applied STEM (High School)**
- Dual Enrollment - Career Academy – Youth Development Programs

**Out of School/Low Skill Youth/Adults**
- WIA/Career Centers – ESL/VEStL - GED/ABE
  - “Bridge” and Foundation Programs

**Skilled Adults**
- Retraining/Lay Offs – Continuing Education Company Specific Apprenticeship

Produced with support from
Forsyth Technical Community College

Integration into For-Credit Programs of Study
Four focus program areas:

- Mechanical Engineering Technologies
- Machining Technologies
- Industrial System Technologies
- Welding

Curriculum of all programs reviewed for alignment with industry certifications; gaps identified and filled
Alignment with Industry Requirements

- Industry Certifications Offered:
  - National Career Readiness Certificate (NCRC) (Reading for Information, Applied Math, Locating Information)
  - Manufacturing Skills Standards Council (MSSC) (Safety and Maintenance Awareness)
  - American Welding Society (AWS)
  - National Institute for Metalworking Skills (NIMS)
# Aligning Education, Certification and Career Pathways

For the Mechanical and Engineering Fields at Forsyth Technical Community College, Winston Salem, NC

## Education Pathway

- **Bachelor of Science Engineering Technology or Some Other Engineering Discipline** (This is a potential path not an articulated one)
  - NCSU, NCA&T, UNC-C, ECU

- **Associate in Applied Science (Mechanical Engineering Technology)**
  - 71 Credit Hours
  - 26 Courses
  - Day Curriculum

- **Certificate Program (CAD)**
  - 13 Credit Hours
  - 4 Courses
  - Day Curriculum

## Certification Pathway

- SME
- NIMS Level 1 Manual Drill Press Operations
- NIMS Level 1 Manual Milling
- NIMS Level 1 Job Planning, Benchwork, and Layout
- NIMS Level 1 Measurement, Materials, and Safety
- Career Readiness Certificate

- NIMS Level 1 Manual Drill Press Operations
- NIMS Level 1 Manual Milling
- NIMS Level 1 Job Planning, Benchwork, and Layout
- NIMS Level 1 Measurement, Materials, and Safety
- Career Readiness Certificate

## Career Pathway

- **Mechanical Engineer**
- Maintenance Engineer
- Plant Engineer
  - $51k - $79k (17-2141)

- **Mechanical Engineering Technology Technician**
  - $34k - $62K (17-3027)

- **Mechanical Drafters**
  - $30k - $51K (17-3013)

---

### National Career Readiness Certificate
- Personal Effectiveness
- Academic Competencies
- Workplace Competencies

---

### High School
- Dual Enrollment - Career Academy - Youth Development Programs

### Out of School/Low Skill Youth/Adults
- WIA/Career Centers - ESL/VESL - GED/ABE
  - "Bridge" and Foundation Programs

### Skilled Adults
- Retraining/Lay Offs – Continuing Education
  - Company Specific Apprenticeship

Produced with support from **Key Links**
Lorain County Community College

Community College to Four-Year Programs of Study
LCCC’s Educational Pipeline

<table>
<thead>
<tr>
<th>K-12 Initiatives</th>
<th>Associate Degree and Certificate Programs</th>
<th>Bachelor’s and Master’s Degrees through University Partnership</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-Secondary Enrollment Options</td>
<td>100 plus Associate Degree and Certificate Programs</td>
<td>Over 40 Bachelor and Master Degree Offerings</td>
</tr>
<tr>
<td>Early College High School</td>
<td>Fall 2009: Alternative Energy Technology, Wind Turbine Major</td>
<td>• Ashland University</td>
</tr>
<tr>
<td>Project Grad</td>
<td>Allied Health and Nursing</td>
<td>• Bowling Green State University</td>
</tr>
<tr>
<td>Tech Prep</td>
<td>Arts and Humanities Business (including ENTREPRENEURSHIP!) Engineering Technologies</td>
<td>• Cleveland State University</td>
</tr>
<tr>
<td></td>
<td>Health, Physical Education and Recreation</td>
<td>• Kent State University</td>
</tr>
<tr>
<td></td>
<td>Science and Math</td>
<td>• Ohio University</td>
</tr>
<tr>
<td></td>
<td>Social Sciences and Human Services</td>
<td>• Ohio State University</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• University of Akron</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• University of Toledo</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Youngstown State University</td>
</tr>
</tbody>
</table>

18,298 students (120% increase since 2000) | 3,000 students

Impacting 21,000 students plus another 11,000 through Continuing Education Offerings
Unique Infrastructure and Partnerships

- University Partnership: bachelors’ & masters’ degrees offered onsite
- First Advanced Technologies Center in Ohio
- Member of National Coalition of Advanced Technology Centers
- NSF National Center for Welding Education & Training (Weld-Ed)
LCCC/NAM PROJECT GOALS

• Engage faculty and college leadership to align current programs with NAM endorsed skills certifications (institutional)

• Engage community and employers to promote value and use of skills certifications (community)

• Support state leaders in taking critical next steps to facilitate statewide adoption of the skills certification system (state)
Focus Program Areas:

• Mechanical Design
• Quality
• Welding
• Machining
• Automation

Curriculum of all programs reviewed for alignment with industry certifications; gaps identified and filled
Alignment with Industry Requirements

Industry Certifications Offered:

- National Career Readiness Certificate (NCRC) (Reading for Information, Applied Math, Locating Information)
- Manufacturing Skills Standards Council (MSSC)
- American Welding Society (AWS)
- National Institute for Metalworking Skills (NIMS)
# Aligning Education, Certification and Career Pathways

For the Quality Assurance Industry at Lorain County Community College

## Education Pathway

**Masters and PhD**
- Bachelor of Science / Engineering Discipline
  - University of Akron
  - Cleveland State University

**Associate in Applied STEM/Science**
- 63 Credit Hours / Two Years Full Time
- 24 Courses
- Day / Evening Curriculum

**STEM Diploma Program**
- 36 - 37 Credit Hours / One Year Full Time
- 14 Courses
- Day / Evening Curriculum

**STEM Certificate Program**
- 23 - 24 Credit Hours / One Year Part Time
- 9 Courses
- Day / Evening Curriculum

## Certification Pathway

<table>
<thead>
<tr>
<th>SME Engineering Technologist</th>
<th>MSSC CPT</th>
<th>NIMS</th>
<th>NCRC</th>
</tr>
</thead>
</table>

## Career Pathway

<table>
<thead>
<tr>
<th>Quality Technologist</th>
</tr>
</thead>
<tbody>
<tr>
<td>$24.51 / hour (17-3020)</td>
</tr>
</tbody>
</table>

| Quality Technician or Inspector |
| Quality Process Control Specialist |
| Reliability Lab Specialist |
| $22.54 / hour (17-3026) |

| Quality Control Inspector |
| $15.76 / hour (51-9061) |

| Quality Inspector |
| Process Control Technician |
| Quality Corrective Action Analyst |
| $15.84 / hour (51-4120) |

## Employer Job Title / Wage Range

| Quality Engineer / Acid Etch Technician / CMM Lab Engr. |
| 7 – 12 years experience |
| $24.00 to $28.00 / hour |

| Lab Tech / First Piece Quality Inspector |
| 5 – 10 years experience |
| $15.80 / hour |

| Destructive Testing / Teardown |
| 0 – 5 years experience |
| $13.00 – $15.00 / hour |

---

**National Career Readiness Certificate**
- Personal Effectiveness
- Academic Competencies
- Workplace Competencies

---

**Key Links**

Produced with support from

---

**Applied STEM (High School)**
- Dual Enrollment - Career Academy - Youth Development Programs

**Out of School / Low Skill Youth/Adults**
- WIA/Career Centers – ESL/VESL - GED/ABE "Bridge" and Foundation Programs

**Skilled Adults**
- Retraining / Lay Offs – Continuing Education Company Specific Apprenticeship
INSTITUTIONAL ENGAGEMENT

• Orientation sessions with NAM for faculty, department chairs and other college leadership
• Ownership of the initiative by the Provost and Dean of Engineering
• Regular faculty planning meetings and updates on progress
• Celebrations of success involving and showcasing faculty!
State of Play and Action Agenda in Iowa

- **Activities to date**
  - Lumina Foundation for Education

- **Strategic Leadership in Iowa**
  - Policy Leaders
  - Industry Leaders
  - Education Leaders
Key Components of Success: Implementation Checklist

Getting to Action
Four Key Areas of Activity

Key Areas for Action:

- Planning and Research
- Design and Development
- Implementation
- Continuous Improvement
Lessons Learned

- Every college/every state is in a different place in terms of readiness for implementation.
- You already have many of the pieces in place!
- The “steps” to implementation are not necessarily linear, but some do build off others.
- Earlier pilots have many tools to share, so there is no need to worry about “starting from scratch.”
- You can participate in a national Learning Network to learn about how others have achieved results.
PLANNING & RESEARCH

1. Identify Regional Economic Demands (Data Validation)
2. Create an Asset Map
3. Determine Advanced Manufacturing Career Pathways
4. Develop a Timeline for Action
Identify State/Regional Economic Demands

- Collect relevant data about your state/region

- Consider the spectrum of manufacturing activity in your state/region in both Advanced Manufacturing and High-Tech

- Analyze the data to identify potential growth industries; projected worker demand; high-demand occupations; cross-cutting skill requirements

- Use data driven decision-making to determine the economic development priorities of the state/region

- Ask and answer: how your Skills Certification initiative can be designed to support state/regional economic development priorities?
Create an Asset Map

Identify:

- Manufacturing-related programs of study
- Existing career pathways
- State initiatives that support manufacturing
- Manufacturing organizations and associations
- Career awareness and student recruitment activities
- Government programs/external funding
- STEM-related initiatives
Determine Advanced Manufacturing Career Pathways

- Select targeted high-growth industries
- Determine which high-demand occupations to target for certification efforts
- Identify which high-demand occupations will support which high-growth industries
- Identify the career pathways/programs of study that support those high-demand occupations
Develop a Timeline for Action

- Develop a timeline that reflects major milestones for action, based on your targeted career pathways.

- Use the timeline to benchmark your planned vs. actual progress of implementation.
Critical Components of Success

DESIGN AND DEVELOPMENT

1. Develop a Timeline for Action
2. Engage Industry Leaders & Build Demand
3. Engage Faculty and College Leadership
4. Audit Programs of Study
Engage Industry Leaders & Build Demand

- Partner with NAM/MI to identify a few manufacturing champions in your state/region

- Provide an orientation session to key manufacturers in your state/region regarding the certification system

- Develop marketing tools that stress the benefits of industry certification
Engage Faculty and College Leadership

- Provide an in-depth orientation to key stakeholders at the college level so “buy-in” begins early
- Identify strategies for ongoing engagement, such as regular faculty sessions to share progress
- Establish mechanisms for sharing best practices among faculty
Audit Programs of Study

- Determine which programs of study to target for initial certification efforts
- Analyze the curriculum in those programs of study against the requirements of targeted industry certifications
Critical Components of Success

IMPLEMENTATION

1. Align and Map Certifications to Programs
2. Align to STEM
3. Assess Faculty and Implement Professional Development
4. Develop Certification Partnerships
5. Deploy Dream It. Do It. & Student Recruitment Strategies
6. Develop Feeder Systems
Align and Map Certifications to Programs

- Identify and/or develop new instructional modules to fill identified gaps in curriculum
- Determine where in the sequence of instruction the various certification exams should be given
Align to STEM

- Identify the critical applied math, science, engineering, and technology skills imbedded in certification requirements

- Aggressively build applied STEM skills into all career technical curricula
Assess Faculty and Implement Professional Development

- Put a mechanism in place to help faculty assess their current knowledge and skills relative to the certification requirements in their content area

- Determine which faculty have which industry certifications
Develop Certification Partnerships

- With the Institute, identify a point of contact with relevant certification sponsors
- Develop a working relationship with relevant certification sponsors
- Take steps to get required programs accredited
Deploy Dream It. Do It. & Student Recruitment Strategies

- Develop a student recruitment strategy
- Implement a student recruitment strategy
- Incorporate various forms of media into your strategy
- Leverage the Dream It. Do It. campaign
Develop Feeder Systems

- Identify all possible systems that might feed potential students into career pathways
  - Consider WIA, Adult Basic Education, Continuing Education, returning military, displaced workers, etc.

- Develop strong linkage mechanisms that help assess baseline skills and form seamless connections with manufacturing programs of study
Critical Components of Success

REASSESS FOR CONTINUOUS IMPROVEMENT

1. Develop Benchmarks
2. Drive a Policy Agenda
3. Sustain the Certification System
Develop Benchmarks

- Identify key performance indicators to serve as benchmarks for measuring progress.
- Collect data on a regular basis to assess actual vs. planned progress.
Drive a Policy Agenda

- Identify “big picture” policy barriers that are impeding progress and develop an agenda for driving needed policy interventions

- Leverage local successes to promote regional and statewide change
Sustain the Certification System

- Develop a comprehensive plan for sustaining the certification effort
Work Session

Critical Issues and Questions
Curriculum Alignment

Examples in Practice
MSSC Credit Course Integration

Maintenance Awareness

Safety

Process and Production

Quality Measures

- 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
- WLDG 1200  
  Introduction OXY and Arc Welding
- ELPT 1311  
  Basic Electrical Theory
# Academy AAS Crosswalk

<table>
<thead>
<tr>
<th>Manufacturing Operations Technician</th>
<th>Production Tool Operator / Maintenance Assistant (Academy)</th>
<th>CNC Manufacturing Technician</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 1301</td>
<td></td>
<td>ECON 1301</td>
</tr>
<tr>
<td>ENGL 1301</td>
<td></td>
<td>ENGL 1301</td>
</tr>
<tr>
<td>PHYS 1305</td>
<td></td>
<td>PHYS 1305</td>
</tr>
<tr>
<td>SPCH 1321</td>
<td></td>
<td>SPCH 1321</td>
</tr>
<tr>
<td>ITSC 1301</td>
<td></td>
<td>ITSC 1301</td>
</tr>
<tr>
<td>MATH 1333</td>
<td></td>
<td>MATH 1333</td>
</tr>
<tr>
<td>ELPT 1419</td>
<td></td>
<td>ELPT 1319</td>
</tr>
<tr>
<td>ENTC 1301</td>
<td></td>
<td>ENTC 1301</td>
</tr>
<tr>
<td>INMT 2303</td>
<td></td>
<td>INMT 2303</td>
</tr>
<tr>
<td>WLDG 1313</td>
<td></td>
<td>MCHN 1302</td>
</tr>
<tr>
<td>MCHN 1320</td>
<td></td>
<td>MCHN 1320</td>
</tr>
<tr>
<td>MCHN 1438</td>
<td></td>
<td>MCHN 1438</td>
</tr>
<tr>
<td>MCHN 2266</td>
<td></td>
<td>MCHN 2266</td>
</tr>
<tr>
<td>QCTC 1243</td>
<td></td>
<td>MCHN 1426</td>
</tr>
<tr>
<td>RBTC 2447</td>
<td></td>
<td>RBTC 2447</td>
</tr>
<tr>
<td>WLDG 1428</td>
<td></td>
<td>MCHN 1330</td>
</tr>
<tr>
<td>WLDG 2439</td>
<td></td>
<td>MCHN 2403</td>
</tr>
<tr>
<td>ELPT 1420</td>
<td></td>
<td>MCHN 2431</td>
</tr>
<tr>
<td>ELPT 1441</td>
<td></td>
<td>MCHN 2434</td>
</tr>
<tr>
<td>ELPT 2419</td>
<td></td>
<td>MCHN 2435</td>
</tr>
<tr>
<td>ELMT 1305</td>
<td></td>
<td>MCHN 2438</td>
</tr>
</tbody>
</table>

General Education, not covered specifically in the Academy

24 of 31 SCh Crosswalk

19 of 31 Crosswalk
# Chronological Crosswalk

## Year 1

<table>
<thead>
<tr>
<th>Precision Metal Workers: Manufacturing Operations Technician (2766)</th>
<th>Precision Metal Worker: Production Tool Operator / Maintenance Assistant (2768)</th>
<th>CNC Manufacturing Technician (2051)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Machine Shop I</td>
<td>MCHN 1302</td>
<td>MCHN 1302</td>
</tr>
<tr>
<td>Precision Tools and Measurement</td>
<td>MCHN 1368</td>
<td>MCHN 1368</td>
</tr>
<tr>
<td>Contemporary Mathematics II (Math for Liberal Arts Majors II)</td>
<td>MATH 1333</td>
<td>MCHN 1320</td>
</tr>
<tr>
<td>Pumps, Compressors and Mechanical Drives</td>
<td>INMT 2303</td>
<td>MCHN 2266</td>
</tr>
<tr>
<td>Composition I</td>
<td>ENGL 1301</td>
<td>ENGL 1301</td>
</tr>
<tr>
<td>Fundamentals of Electrical I</td>
<td>ELPT 1419</td>
<td>MCHN 1368</td>
</tr>
<tr>
<td>Basic Fluid Power</td>
<td>ELMT 1305</td>
<td>MCHN 1320</td>
</tr>
<tr>
<td>Robotics I</td>
<td>ENTC 1301</td>
<td>ENTC 1301</td>
</tr>
<tr>
<td>Computer Integrated Manufacturing</td>
<td>RBTC 2447</td>
<td>MCHN 1320</td>
</tr>
<tr>
<td>Quality Assurance</td>
<td>QCTC 1243</td>
<td>MCHN 1320</td>
</tr>
<tr>
<td>Advanced Oxy-Fuel Welding and Cutting</td>
<td>WLDG 2439</td>
<td>MCHN 1320</td>
</tr>
<tr>
<td>Fundamentals of Electrical II</td>
<td>ELPT 1420</td>
<td>MCHN 1320</td>
</tr>
<tr>
<td>Introduction to Economics</td>
<td>ECON 1301</td>
<td>MCHN 1320</td>
</tr>
<tr>
<td>Introduction to Blueprint Reading for Welders</td>
<td>WLDG 1313</td>
<td>MCHN 1320</td>
</tr>
<tr>
<td>Programmable Logic Controllers I</td>
<td>ELPT 2419</td>
<td>MCHN 1320</td>
</tr>
<tr>
<td>Motor Control</td>
<td>ELPT 1441</td>
<td>MCHN 1320</td>
</tr>
<tr>
<td>Introduction to Shielded Metal Arc Welding (SMAW)</td>
<td>WLDG 1428</td>
<td>MCHN 1320</td>
</tr>
<tr>
<td>Business and Professional Communication</td>
<td>SPCH 1321</td>
<td>MCHN 1320</td>
</tr>
<tr>
<td>Practicum (or Field Experience) - Machine Tool Technology/Machinist</td>
<td>MCHN 2266</td>
<td>MCHN 1320</td>
</tr>
</tbody>
</table>

**Total Credit Hours Required: 31**

---

## Year 2

<table>
<thead>
<tr>
<th>Precision Metal Workers: Manufacturing Operations Technician (2766)</th>
<th>Precision Metal Worker: Production Tool Operator / Maintenance Assistant (2768)</th>
<th>CNC Manufacturing Technician (2051)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Machine Shop I</td>
<td>MCHN 1302</td>
<td>MCHN 1302</td>
</tr>
<tr>
<td>Precision Tools and Measurement</td>
<td>MCHN 1368</td>
<td>MCHN 1368</td>
</tr>
<tr>
<td>Contemporary Mathematics II (Math for Liberal Arts Majors II)</td>
<td>MATH 1333</td>
<td>MCHN 1320</td>
</tr>
<tr>
<td>Pumps, Compressors and Mechanical Drives</td>
<td>INMT 2303</td>
<td>MCHN 2266</td>
</tr>
<tr>
<td>Composition I</td>
<td>ENGL 1301</td>
<td>ENGL 1301</td>
</tr>
<tr>
<td>Fundamentals of Electrical I</td>
<td>ELPT 1419</td>
<td>MCHN 1368</td>
</tr>
<tr>
<td>Basic Fluid Power</td>
<td>ELMT 1305</td>
<td>MCHN 1320</td>
</tr>
<tr>
<td>Robotics I</td>
<td>ENTC 1301</td>
<td>ENTC 1301</td>
</tr>
<tr>
<td>Computer Integrated Manufacturing</td>
<td>RBTC 2447</td>
<td>MCHN 1320</td>
</tr>
<tr>
<td>Quality Assurance</td>
<td>QCTC 1243</td>
<td>MCHN 1320</td>
</tr>
<tr>
<td>Advanced Oxy-Fuel Welding and Cutting</td>
<td>WLDG 2439</td>
<td>MCHN 1320</td>
</tr>
<tr>
<td>Fundamentals of Electrical II</td>
<td>ELPT 1420</td>
<td>MCHN 1320</td>
</tr>
<tr>
<td>Introduction to Economics</td>
<td>ECON 1301</td>
<td>MCHN 1320</td>
</tr>
<tr>
<td>Introduction to Blueprint Reading for Welders</td>
<td>WLDG 1313</td>
<td>MCHN 1320</td>
</tr>
<tr>
<td>Programmable Logic Controllers I</td>
<td>ELPT 2419</td>
<td>MCHN 1320</td>
</tr>
<tr>
<td>Motor Control</td>
<td>ELPT 1441</td>
<td>MCHN 1320</td>
</tr>
<tr>
<td>Introduction to Shielded Metal Arc Welding (SMAW)</td>
<td>WLDG 1428</td>
<td>MCHN 1320</td>
</tr>
<tr>
<td>Business and Professional Communication</td>
<td>SPCH 1321</td>
<td>MCHN 1320</td>
</tr>
<tr>
<td>Practicum (or Field Experience) - Machine Tool Technology/Machinist</td>
<td>MCHN 2266</td>
<td>MCHN 1320</td>
</tr>
</tbody>
</table>

**Total Credit Hours Required: 69**

---

Future changes to this degree plan call for SCH reduction closer to 60 by replacing WLDG 2439 & 1428 with WLDG 1200. The program drops to 63 SCH, the student still gets an introduction to welding techniques in general, and the program is more in alignment with the Academy curricula.

**Direct Crosswalk**

**General Education courses**

**Total Credit Hours Required: 64**
U.S. Talent Pipeline

New Technology to Match Supply and Demand
U.S. Talent Pipeline Platform

Demand

U.S. Talent Pipeline

Supply

Production | Engineering | IT/Design | Management | TDL | Production

Guard/Reserve | Community Colleges | Workforce Offices | Veterans | General Public | High Schools
U.S. Talent Pipeline

**Get Started**
- Create Digital Portfolio
- Build and upload online resume

**Create Profile**

**Assess Yourself**
- Assess Skills/Interests
- See how MOC/MOS map to high demand careers
- Optional ACT WorkKeys Profile CRC

**Explore Careers**
- Day-in-Life Videos
- View job opportunities (state/region, industry)
- Identify Skill Gaps to obtain the job
- Communicate with industry/career mentors

**Identify Learning**
- Find required education or training
- Required Certifications
- Virtual Training Option
- Mentors & Internships

**Match + Connect**
- Search for jobs
- Employers can connect based on match strength
- Connect and Interview

---

**Web 2.0 Elements** (Discussions, Content Sharing, Wikis, Chat, Networks)

**3rd Party Integration** (Assessments, Educational Content, etc.)

**Reporting + Analytics**
Digital Portfolios

Chris Smith’s Resume

Address: 10121 Brokers Tip Lane
Fayetteville, North Carolina 28301
Apt. 201
United States

Phone Numbers: 910-303-3929
910-394-8393

Primary Email: chris.smith@gmail.com

IM Screen Names: GSmith (AIM)
Smithc (Gtalk)

Website: http://www.chris-smith.com/

Summary

Personal Summary: Hi, My name is Chris and I’ve been in the U.S. Army for the past 10 years. I’ve had the pleasure of working in a variety of environments and I’m eager to make the transition to a civilian career outside of the Army.

Keywords: Biology, Healthcare

Career Levels: Experienced (Non-manager)

Total Work Experience: 10+ years

Current Status: I am currently employed, but am ready for a change.

Date Available: Dec 2010

Languages: English (Fluent), Spanish (Beginner)

Citizenship: United States

Interests/Hobbies: Helping People, Science, Reading

Birthday: June 2, 1974

Gender: Male

Ethnicity: White/Non-Hispanic

Community: Biotechnology, Healthcare

Work Experience

Position: Active Army Occupational Medicine Officer
Date Held: May 2000 - Present
Location: Fayetteville, North Carolina - United States
Function: Medical/Health
Job Description: Serving my country as an occupational medicine Officer on the U.S. Army Health
Did you know that the leadership and technical skills you have acquired during your military service translate well into civilian occupations. Thousands of employers are desperate for highly skilled labor and are looking to hire you.

Your local ACAP office has access to an exciting new tool called Pipeline, a user-friendly environment for career exploration, interest and skills assessment, education and training connections and direct access to regional job openings.

It all starts at ACAP. Get started today!
Hi Andrew,

FTCC has invited you to apply for the Welding Technology Program.

The Welding Technology curriculum provides students with a sound understanding of the science, technology and applications essential for successful employment in the welding and metal industry.

Instruction includes consumable and non-consumable electrode welding and cutting processes.

Learn More About This Program

Apply Today!
You can now apply for this program or, if you have already found another program, you can decline this invitation.

Apply For This Position  Decline This Invitation

Welding Technology
Successful graduates of the Welding Technology curriculum may be employed as entry-level technicians in welding and metalworking industries. Career opportunities also exist in construction, manufacturing, fabrication, sales, quality control, supervision, and welding related self-employment.
Fayetteville Technical Community College

Fayetteville Technical Community College is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools to award associate degrees, diplomas and certificates. Contact the Commission on Colleges at 1866 Southern Lane, Decatur, Georgia 30033-4097 or call 404-679-4500 for questions about the accreditation of Fayetteville Technical Community College. The Commission is to be contacted only if there is evidence that appears to support an institution's significant non-compliance with a requirement or standard.

School Overview

Company:
FTCC

Type:
Degree Program:

Location:
GSX Corporation
PO Box 25236
2201 Hull Road
Fayetteville, North Carolina 28303

Visit Our Website

School Description

Located in Fayetteville, NC, FTCC is one of 58 institutions in the North Carolina Community College System. You may want to read our purpose statement or just have a look around our Directory.

Visit The Fayetteville Technical Community College Foundation. The Foundation provides scholarships and other resources for students and promotes the academic environment of the College.

Fayetteville Technical Community College is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools to award associate degrees, diplomas and certificates. Contact the Commission on Colleges at 1866 Southern Lane, Decatur, Georgia 30033-4097 or call 404-679-4500 for questions about the accreditation of Fayetteville Technical Community College. The Commission is to be contacted only if there is evidence that appears to support an institution's significant non-compliance with a requirement or standard.

Vision and Mission Statement

“Serve our community as a learning-centered institution to build a globally competitive workforce supporting economic development”
Integrated Talent Solution Drives Economic Development

Talent Development

- Jobs
- Global Competitiveness
- Innovation

The pipeline

Opportunities → Careers
Right Skills Now for Manufacturing

Fast-Track Training for High-Quality Manufacturing Jobs
A Real Need for Talent…Right Now

It’s really frustrating and continues to be a real issue for manufacturers like me when we hear the unemployment numbers but yet we cannot find people skilled to come to work for our companies. We are constantly interviewing and finding that the people we bring in do not have the math skills that are required to operate our equipment. We can buy all of the equipment we need but we cannot find the skilled labor we need to advance our companies.

--Darlene Miller, President, PERMAC Industries, Minneapolis, MN
Fast-Track to Jobs

- Providing workers and students with fast-track skills for employment
- Providing manufacturers just-in-time talent from the lab/classroom to the shopfloor
- Accelerating and expanding lifelong learning opportunities for a flexible, technical workforce
Gaining Skills for Today’s and Tomorrow’s Manufacturing

Academic, Personal, and Career Skills + Technical Skills = Nationally portable, industry-recognized credentials

- Personal effectiveness: *show up on time, ready for work*
- Essential academic skills in reading, writing, math, and using and locating information: *communicate effectively and interpret key instructions*
- Workplace skills: *work in teams and problem-solve*

Hands-on experience + practical application of:
- Safety
- Precision Measurement Tools and gages
- Quality Assurance
- Material Composition
- Engineering Drawings, Symbols & Notation
- CNC

Right Skills Now for Manufacturing
Fast track training

- Transitioning Military
- Unemployed/underemployed
- Job seekers

1 semester + internship
- Measurement, Materials and Safety
- Job Planning, Benchwork and Layout
- CNC Operator - Turning Level 1
- CNC Operator - Milling Level 1

Associate of Applied Science (Machine Tool Technology AAS)

2+2 Bachelor of Science

Job!
WE NEED the RIGHT SKILLS NOW
I HAVE the RIGHT SKILLS NOW
## Costs and Sustainability*

### Faculty Release Summary

<table>
<thead>
<tr>
<th>Faculty Time (hours)</th>
<th>CRC</th>
<th>NIMS</th>
<th>MSSC</th>
<th>AWS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional Development</td>
<td>0</td>
<td>88</td>
<td>0</td>
<td>80</td>
</tr>
<tr>
<td>Curriculum Alignment</td>
<td>0</td>
<td>8</td>
<td>160</td>
<td>0</td>
</tr>
<tr>
<td>Site/Program Accreditation</td>
<td>0</td>
<td>220</td>
<td>8</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>0</td>
<td>316</td>
<td>168</td>
<td>80</td>
</tr>
</tbody>
</table>

### Cost Summary

<table>
<thead>
<tr>
<th>Cost (dollars)</th>
<th>CRC</th>
<th>NIMS</th>
<th>MSSC</th>
<th>AWS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional Development</td>
<td>$0</td>
<td>$160</td>
<td>$100</td>
<td>$4,744</td>
</tr>
<tr>
<td>Curriculum Alignment</td>
<td>0</td>
<td>130</td>
<td>500</td>
<td>2,300</td>
</tr>
<tr>
<td>Site/Program Accreditation</td>
<td>0</td>
<td>1,500</td>
<td>500</td>
<td>2,300</td>
</tr>
<tr>
<td>Student Assessments</td>
<td>8,460</td>
<td>4,668</td>
<td>900</td>
<td>360</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>$8,460</td>
<td>$6,328</td>
<td>$1,630</td>
<td>$12,404</td>
</tr>
</tbody>
</table>

* Forsyth Tech Community College Actual Implementation Costs
Employer Engagement

Building the Demand Side
Employer Engagement Strategy

A data-driven, multi-faceted approach:

- 2011 Skills Gap Report by Deloitte/MI
- Business Case for Adoption: Return on Value study by University of Phoenix
- Industry Outreach Strategy
  - National Champions
  - Regional Champions
- Employers Take Action: Collateral Materials targeting HR Managers
2011 Skills Gap Report

- **Skilled Production Jobs**: The hardest jobs to fill are those that have the biggest impact on performance.

- **Outdated Approaches**: Many manufacturers depend on outdated approaches for finding the right people, developing their employees’ skills, and improving their performance.

- **Technological Advances**: The changing nature of manufacturing work is making it harder for talent to keep up.

- **Skills Gap**: High unemployment is not making it easier to fill positions, particularly in the areas of skilled production and production support.

- **Growing Challenge**: The skills gap is expected to take the biggest toll on skilled production jobs, and will likely widen as time passes.
Manufacturing organizations associated multiple values with using or anticipating using the skills credentialing system.

- Lower recruiting costs
- Lower entry-level training costs
- Improved employee retention
- Improved opportunities for advancement
- Improved employee engagement and input
- Lower relocation costs
- Improved workplace safety

Source: University of Phoenix Research Institute
Challenges to Credentialing

- Some manufacturers are hesitant to change the status quo, even though hiring credentialed workers is a cost-neutral process.
- A disconnect exists between some company executives and human resources managers.
- NAM-endorsed credentials do not yet result in the same type of market impact as more familiar IT certifications.
- Lack of courses aligned with certification requirements and flexible course availability at community colleges makes it challenging to obtain certification.

Source: University of Phoenix Research Institute
Role: Serve as national champions for deployment of the NAM-Endorsed Skills Certification System

- Endorse the systemic approach
- Encourage and lead manufacturing education alignment in their state
- Implement the credentials within corporate hiring process
  - Encouraged for hiring
  - Preferred for hiring
  - Required for hiring
- Implement for incumbent workers, where appropriate
- Support alignment of Federal and state policy
National Champions

- Large OEM’s willing to communicate across supply chain
  1. NAM Members
  2. Certification partners and allied associations
  3. Key global employers in each state / region [Duke, General Dynamics]

- Small and Medium manufacturers engaged in deployment and utilizing credentials
  1. NAM Members
  2. Key employers in each state / region [College Advisory Boards]
Regional Champions

- **Role:** Champion regional deployment
  - Endorse systemic approach
  - Lead alignment of manufacturing education in region
  - Implement credentials within hiring process
    - Encouraged for hiring
    - Preferred for hiring
    - Required for hiring
  - Support college implementation [e.g. internships, hiring graduates, equipment, etc.]
  - Support communication and outreach with peers
  - Implement for incumbent workers, where appropriate
  - Support alignment of Federal and state policy
Case Study: Employer Engagement in Ohio

Goals:
- Introduce certifications & benefits to employers, individuals, region
- Solicit employer input on certification pathways
- Solicit participants to pilot certifications with incumbent workers and/or new hires

Strategies:
- Initial meetings with high stakes employers convened with MI leadership
- MAGNET (MEP) focus on regional employers
- LCCC focus on college employer partners
Two-Pronged Strategy

MAGNET (Manufacturing Extension Center)
• Board members identified partner companies needing production level workers now or near future
• Board members personally invited company leadership to attend informational session

COMMUNITY COLLEGE
• Recruited companies with existing partnerships
• Held series of three informational workshops – companies agreed to attend all three sessions
Employer Sessions

- **Session one**
  - introduction of skills certification system
  - review of draft pathways

- **Session two**
  - employer testimonials
  - review of wages in pathways
  - recruitment of companies to pilot assessments with incumbent workers

- **Session three**
  - Final review of education, certification, and career pathways and feedback on wages
  - Review of pilot certifications with individual companies
Employers: Take Action!

- Understand your talent strategy
- Define your current and anticipated needs
- Decide which certifications are the right fit
- Integrate nationally-portable, industry-recognized credentials
- Get your company on board
- Adopt policies and procedures to reflect the new talent strategy
- Communicate the need and engage the community
- Help prospective and current employees earn the certifications
- Begin to grow your talent pool and develop your workforce
- Standardize, appraise, and sustain your talent strategy