WISCONSIN TECHNICAL COLLEGE SYSTEM | where futures begin

Wisconsin Technical College System

50-420-xxx Machine Tool Apprenticeship Greening Competencies - SAGE project

Course Outcome Summary

Course Information

Description This is a bank of competencies that are designed to be included in the courses of the Machine Tool Apprenticeship related instruction. The suggested courses for each competency are:

- Competencies one – four should be taught in the Materials and Metallurgy course
- Competency five should be taught in the CNC Programing and Planning course
- Competency six should be taught in the Cutting Tools course
- Competency seven should be introduced in Mechanical Hardware and Hand Tools course, but assessed in each of the Machine courses (Turning, Milling, Drilling, Grinding, CutOff, and EDM)
- Competencies eight and nine should be taught in the Communications course.

Course Competencies

1 Identify recyclable materials, (e.g. metals, fluids, rags, plastics, garnet, water)

Assessment Strategies
research report on recyclable materials used in machine tool process at your place of employment

Criteria
report includes one solid material and one fluid
report includes information related to the economic and environmental impact of the recyclable materials and cross-contamination
report includes the current standard practices for recycling the materials selected (handle, disposal, reuse, traceability)
report indicates a method to provide traceability (material certification) of left-over stock/materials if applicable
report includes containment and strategies to eliminate cross-contamination for recyclable materials (stainless steels, steels, aluminum, beryllium copper, lubricants, cutting fluids)
report identifies chemical characteristics of the fluid type selected

Learning Objectives
Identify the value of different materials
Identify the change in value of cross-contaminated materials

Identify the impacts of the various coolants on machines
Explain traceability(material certification)
Identify the chemical characteristics of fluid types
Explain the fluid disposal methods for all fluids and ramifications for improper disposal
Identify environmental impacts of disposal of materials
Identify laws that protect the environment

2 Recognize the value of recycled materials, the cross-contamination issues, the traceability of recycled materials, causes and effects of recycling or not recycling

Assessment Strategies
research report on recyclable materials used in machine tool process at your place of employment

Criteria
report includes one solid material and one fluid
report includes information related to the economic and environmental impact of the recyclable materials and cross-contamination
report includes the current standard practices for recycling the materials selected (handle, disposal, reuse, traceability)
report indicates a method to provide traceability (material certification) of left-over stock/materials if applicable
report includes containment and strategies to eliminate cross-contamination for recyclable materials (stainless steels, steels, aluminum, beryllium copper, lubricants, cutting fluids)
report identifies chemical characteristics of the fluid type selected

Learning Objectives
Identify the value of different materials
Identify the change in value of cross-contaminated materials
Identify the impacts of the various coolants on machines
Explain traceability(material certification)
Identify the chemical characteristics of fluid types
Explain the fluid disposal methods for all fluids and ramifications for improper disposal
Identify environmental impacts of disposal of materials
Identify laws that protect the environment

3 Identify chemical characteristics of fluid types: synthetic, semi-synthetic, water soluble.

Assessment Strategies
research report on recyclable materials used in machine tool process at your place of employment

Criteria
report includes one solid material and one fluid
report includes information related to the economic and environmental impact of the recyclable materials and cross-contamination
report includes the current standard practices for recycling the materials selected (handle, disposal, reuse, traceability)
report indicates a method to provide traceability (material certification) of left-over stock/materials if applicable
report includes containment and strategies to eliminate cross-contamination for recyclable materials (stainless steels, steels, aluminum, beryllium copper, lubricants, cutting fluids)
report identifies chemical characteristics of the fluid type selected

Learning Objectives
Identify the value of different materials
Identify the change in value of cross-contaminated materials
Identify the impacts of the various coolants on machines

Explain traceability(material certification)
Identify the chemical characteristics of fluid types
Explain the fluid disposal methods for all fluids and ramifications for improper disposal
Identify environmental impacts of disposal of materials
Identify laws that protect the environment

4 Use MSDS sheets to ensure personal safety and practice environmental stewardship

Assessment Strategies
quiz using MSDS

Criteria
You answer 100% of the questions correctly

Learning Objectives
Identify the standard information on MSDS
Explain how to interpret the information on the MSDS

5 Plan work efficiently

Assessment Strategies
Case Study Machine Tool Planning Project (students use options for materials, machine, tooling, procedures, and fluid that are found in their workplance)

Criteria
case study includes review of the print
case study includes selection of material (type and size), machine, tooling, procedures, fluid
case study justifies the selection of material
case study includes the factors that would impact the time to complete the job
case study identifies the expected waste and reusable stock
case study justifies the selection of machine
case study justifies the selection of tooling
case study justifies the selection of procedures
case study justifies the selection of fluid

Learning Objectives
Create examples of justifying a decision
Estimate waste based on raw materials used
Recognize the various types of materials that can be used for a particular job
Identify factors that would impact the time to complete a job

6 Describe the machinist's role in the predictive maintenance cycle of tooling and cutting fluids

Assessment Strategies
Oral, Written or Graphic Assessment

Criteria
product includes how proper tooling impacts machining
product includes how the predictive maintenance cycle of tooling relates to energy usage and sustainability

Learning Objectives
Explain the role of predictive maintenance in conserving energy
Describe how proper tooling and machining practices impact machining efficiency

7 Describe the machinist's role in the predictive maintenance cycle of machines.

Assessment Strategies

Oral, Written or Graphic Assessment

Criteria
product includes how maintenance impacts machining
product includes how the predictive maintenance cycle of machines relates to energy usage and sustainability

Learning Objectives
Identify the basic machine maintenance items
Explain the role of predictive maintenance in conserving energy
Describe how proper machining practices impact machining efficiency
Check readings on fluids (refractometer)

8 Practice energy stewardship in the facility

Assessment Strategies
On-the-job log book (personal on-the-job diary)

Criteria
log book is maintained for at least one semester
log book shows what energy issue you identified and what you did about it
log book includes at least one entry per week

Learning Objectives
Identify the items that impact energy use in manufacturing
Identify the machinist's role as an energy steward
Identify the monthly energy costs of your employer
Identify the items in an energy audit

Demonstrate 5S concepts

Assessment Strategies
Before/After Pictures of a selected project/space

Criteria
after pictures include evidence of sorting
after pictures include evidence of sweeping
after pictures include evidence of straightening
after pictures include evidence of standardizing
after pictures include evidence of sustaining

Learning Objectives
Identify the 5 S's
Explain the relationship between efficiency and organization
Explain the relationship between safety and organization

WISCONSIN TECHNICAL COLLEGE SYSTEM

Client Reporting System

CLI330 - Demographics for Program Students* for Apprentice PRI and Comparables (Industrial sector)

Run On: 2/20/2013 12:56:57 PM

Fiscal Year: 2012
District: --All Districts

Program Number	Program	Total Enrolled	Full-time (24 Credits or more)	Part-time (Less Than 24 Credits)	FTEs*	Academically Disadvantaged	Economically Disadvantaged	LEP	Disabled	Total Disadvantaged**	Single Parent	Displaced Homemaker	Incarcerated	NTO Enrollee	Total Special Population***
504131	Industrial Electrician Apprentice	206	1	205	35.7	0	2	0	1	3	10	1	0	2	16
504138	Industrial Electrical Apprentice (BAT)	4	0	4	0.5	0	0	0	0	0	1	0	0	0	1
504142	Electrical & Instrumentation Apprentice	63	0	63	13.9	0	0	0	0	0	2	1	0	2	5
* 504201	Injection Mold Set-Up (Plastic) Apprentice	3	0	3	0.2	0	0	0	0	0	0	0	0	1	1
504202	Machinist Apprentice	66	0	66	10.3	1	0	0	1	2	4	0	0	2	7
504206	Machine Repair Apprentice	18	0	18	3.9	0	0	0	0	0	0	0	0	0	0
504231	Maintenance Mechanic/Millwright Apprentice	336	0	336	41.7	5	3	2	0	9	16	5	1	9	31
504351	Pipefitting Apprentice	26	0	26	3.2	0	0	0	0	0	2	0	0	2	4
504393	Tool & Die Apprentice	23	0	23	4.4	0	0	1	0	1	0	0	0	2	3
* 504394	Tool & Die Technologies Apprentice	16	0	16	2.2	0	0	0	0	0	1	0	0	0	1
504421	Welding Apprentice	3	0	3	0.2	0	0	0	0	0	0	0	0	0	0
504422	Pipe Fabricator	34	0	34	3.5	0	0	0	0	0	0	0	0	0	0
504571	Metal Fabricator Apprentice	4	0	4	0.5	0	0	0	0	0	0	0	0	0	0
504572	Metal Fabrication Apprentice	2	0	2	0.3	0	0	0	0	0	0	1	0	0	1
504641	Maintenance Technician Apprentice	13	0	13	2.4	0	0	0	0	0	0	0	0	0	0
506051	Instrumentation Apprentice	1	0	1	0.1	0	0	0	0	0	0	0	0	0	0

Systemwide Machine Trades Apprentice PRI enrollments for academic/fiscal year ending June 30, 2012.

* Program Students are students that are enrolled in a program and enrolled in course(s) in the program curriculum.
** Unduplicated Headcount of Academically Dis., Economically Dis., LEP, and Disabled.
*** Unduplicated Headcount of NTO, Single

WISCONSIN TECHNICAL COLLEGE SYSTEM

Client Reporting System

CLI330 - Demographics for Program Students* for Apprentice PRI and Comparables (Industrial sector)

Run On: 2/20/2013 12:56:57 PM

Fiscal Year: 2012
District: --All Districts

*machining-related diplomas + AAS

Program Number	Program	Total Enrolled	Full-time (24 Credits or more)	Part-time (Less Than 24 Credits)	FTEs*	Academically Disadvantaged	Economically Disadvantaged	LEP	Disabled	Total Disadvantaged**	Single Parent	Displaced Homemaker	Incarcerated	NTO Enrollee	Total Special Population***
104621	Industrial Mechanical Technician	70	7	63	21.9	16	31	0	2	35	13	0	0	7	36
106054	Instrumentation & Controls Engineering Technology	33	11	22	18.2	7	17	0	2	21	6	0	0	2	22
106171	Tool Design Engineering Technology	13	4	9	4.0	0	1	0	3	3	0	0	0	1	4
106201	Electro-Mechanical Technology	668	226	442	316.9	164	264	14	30	338	67	14	1	29	312
106202	Mechatronics	29	14	15	18.9	1	11	0	3	13	4	0	0	0	14
106211	Industrial Welding Technician	144	22	122	48.9	18	64	5	12	78	11	3	0	9	80
106283	Automated Manufacturing Systems Technology	110	12	98	29.0	18	44	0	8	57	8	1	0	4	54
106312	Industrial Automation, Controls & Networking	32	23	9	25.4	3	17	0	3	18	4	0	0	0	18
106631	Applied Instrumentation & Proc Control Automation	14	2	12	4.3	1	6	0	3	7	1	0	0	0	7
106632	Electronic & Computer Engineering Technology	98	29	69	43.5	23	61	6	6	66	9	0	0	0	63
106641	Automation Systems Technology	139	33	106	52.6	21	33	0	6	49	7	3	0	0	44
304202	Cnc Setup/Operation	10	0	10	3.9	5	6	0	2	8	1	0	0	0	7
304421	Production Welding	78	16	62	30.6	3	41	0	6	45	4	1	18	1	45
304422	Welding/Maintenance & Fabrication	127	0	127	28.9	37	63	1	7	77	22	1	0	8	73
314131	Electricity	170	46	124	74.6	33	91	3	11	99	17	2	1	3	96
314146	Electronic Systems Installation & Maintenance	33	11	22	15.0	14	19	1	2	23	4	1	0	3	22
314147	Manufacturing Electronics Maintenance	11	5	6	6.2	5	9	0	1	9	0	0	0	0	9
314201	Machine Tool Operation	379	106	273	174.6	95	179	9	26	209	39	8	6	14	199
314441	CNC Machine Operator/Programmer	27	2	25	9.2	3	18	1	1	18	2	0	0	1	18
314442	CNC Production Technician	84	9	75	19.5	37	60	0	4	66	13	0	1	0	63
314571	Metal Fabrication/Welding	208	47	161	78.7	38	86	4	15	108	16	1	0	4	97
314572	Metal Fabrication	12	0	12	3.1	3	2	0	2	5	1	0	0	1	3
314622	Industrial Mechanic	101	26	75	49.7	22	37	1	7	49	8	4	1	6	43
314623	Industrial Mechanic - Hvac	15	4	11	6.1	3	7	0	2	9	1	0	0	0	8
324201	Machine Tool Technician	170	72	98	100.3	16	69	4	11	76	24	2	0	5	84
324205	Machine Tooling Technics	246	101	145	134.0	82	117	6	16	161	30	0	4	8	134
324391	Tool And Die Making	75	20	55	33.5	17	34	3	1	40	1	1	0	4	35
324441	CNC Technician	130	53	77	77.0	17	43	0	12	54	10	3	0	3	55
324442	CNC/Tool & Die Technologies	36	11	25	13.5	3	11	0	6	12	3	0	0	2	13
324541	Automated Packaging Systems Technician	34	28	6	29.4	5	21	0	3	22	5	0	0	2	25
324621	Industrial Maintenance Technician	184	57	127	91.2	25	78	5	17	95	15	5	0	5	92

2yr AAS

short term

one year DIPLOMA

turned

* Program Students are students that are enrolled in a program and enrolled in course(s) in the program curriculum.
** Unduplicated Headcount of Academically Dis., Economically Dis., LEP, and Disabled.
*** Unduplicated Headcount of NTO, Single

Moraine Park Technical College CNC Approach

Manu Engineering B.A. and Industrial Automation Engineering Technology B.A. available

CNC/Tool and Die Technologies Two Year Technical Diploma

Credits from previous certificate plus:
45 additional credits

CNC Set-Up Operator Certificate
22 credits

Credits from previous certificate plus:

- Basic Machining – Milling – 1 cr.
- Basic Machining – Drilling/Grinding – 1 cr.
- Basics of Metrology – 1 cr.
- Introduction to Basic Machining – 1 cr.
- Beginning CAM – Mastercam – 2 cr.
- CNC Machining Center Programming – 2 cr.
- Occupational Math – 3 cr.

Entry Level CNC Certificate
11 credits

- Basic Programming – 3 cr.
- Mold and Die Print Reading – 2 cr.
- Occupational Math 1 – 2 cr.
- CNC Machining Center Operation – 2 cr.
- CNC Turning Center Operation – 2 cr.

Integrated ABE Courses

- ABE Math – 1 cr.
- ABE Reading – 1 cr.

ABE Developmental/ Remedial and college support services as needed

ABE and ELL Instruction and Skill-Building

Waukesha County Technical College Manu Technician to Tool and Die Approach

Engineering Technologist
Two-Year Technical Diploma

The Embedded Technical Diploma below ladders into this Technical Diploma

ABE
Developmental/
Remedial and
college support
services as
needed

CNC Set-Up Operator
Embedded Tech Diploma
17 credits

Industrial Math I – 2 cr.
CNC Turning Center Operation – 2 cr.
Machine Tool Operation Ib – 2 cr.

Integrated ABE Courses

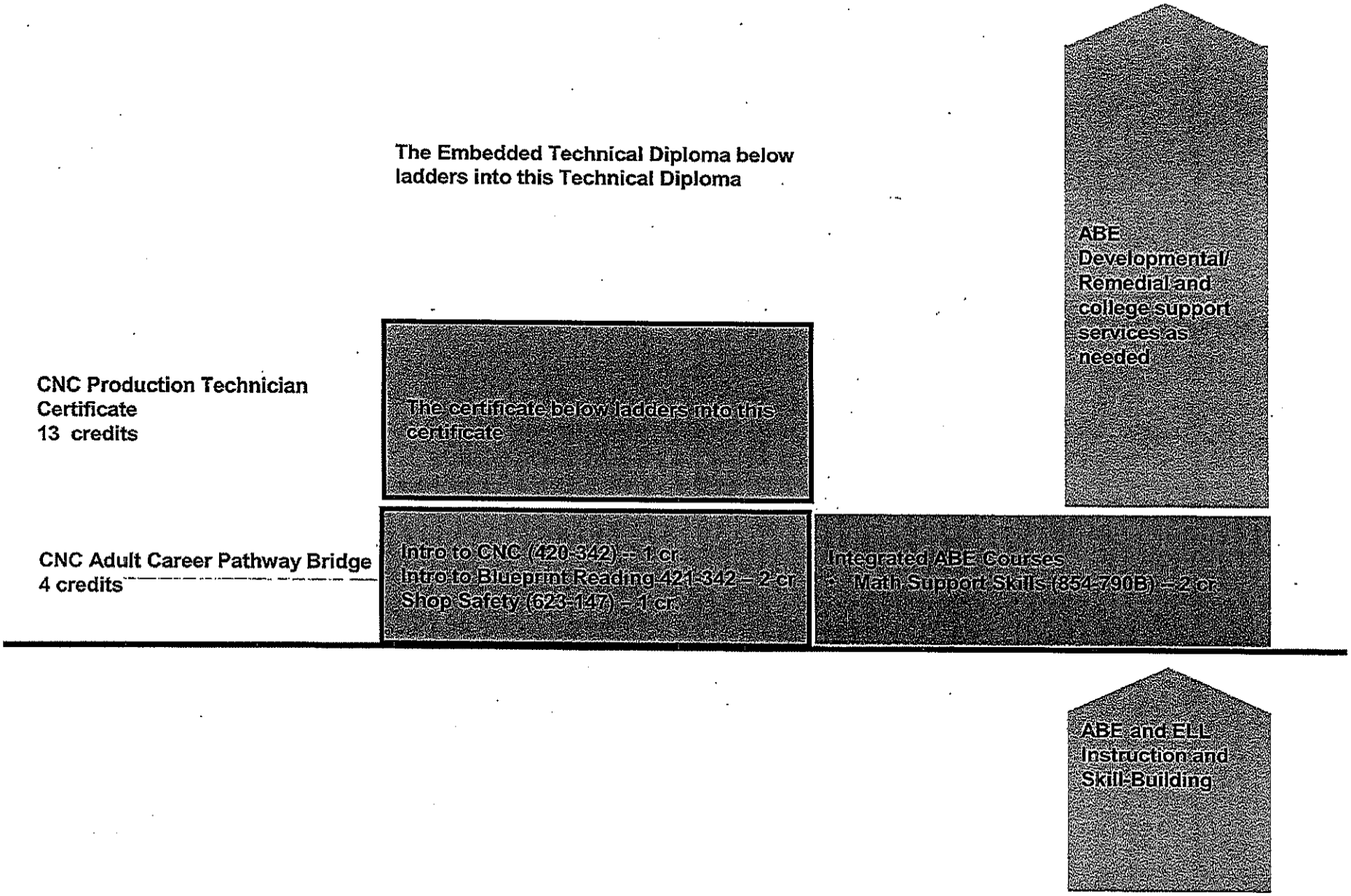
- Basic Skills for CNC Apps – 2 cr.
- Basic Skills for Industrial Math and Blueprint Reading – 3 cr.
- Basic Skills for CNC Turning Ctr. – 3 cr.

Entry Level CNC Technician
Certificate
6 credits

CNC Machining Center Op – 2 cr.
Industrial Blueprint Reading I – 2 cr.
Machine Tool Operation Ia – 2 cr.

ABE and ELL
Instruction and
Skill-Building

Gateway Technical College CNC Bridge to CNC Production Technician Approach



Madison Area Technical College Manufacturing Approach

Manufacturing-Related Degrees

The certificate below ladders into these manufacturing-related programs:

- Machine Tooling Technics
- Industrial Maintenance
- Industrial Mechanic
- Industrial Mechanic HVAC
- Welding
- Automated Manufacturing Systems Technician

Foundations In Manufacturing Certificate
9 credits

- Foundations in Manufacturing -- 2 cr.
- Interpreting Engineering Drawings -- 2 cr.
- Safety In the Workplace -- 1 cr.
- Elements of Basic Metrology -- 2 cr.
- Mathematics for Manufacturing -- 1 cr.
- Communications for Manufacturing -- 1 cr.

Integrated ABE courses:

- Student Success Applied to Manufacturing (Math, writing, reading, study skills, time management) -- 4 cr.

Discovering Manufacturing -- 4 Hours a week (non-credit)

ABE Developmental/ Remedial and college support services as needed

ABE and ELL Instruction and Skill-Building