4th Year Manufacturing Technology

COURSE OUTLINE

1. Course Title: **NIMS Precision Machining Course Outline**
2. CBEDS Title: **Mechanics and Engineering Technology**
3. CBEDS Number: 4030
4. Job Titles:

CNC Machinist	Mold Maker
Tool and Die Maker	Part Programmer

5. Course Description:

A one-year standards-based course provides students with the ability to become credentialed in metalworking skill areas that are nationally recognized and are portable. The two-level program is certified by the National Institute for Metalworking Skills, Inc. In Level I, students will learn core tool and machining skills in three major areas: basic bench operations, basic metal cutting operations, and basic inspection and quality assurance functions. Integrated throughout the course are career preparation standards, which include communication, interpersonal skills, problem solving, and skills necessary to seek and keep a job.

Student Outcomes and Objectives:

Students will:

1. Develop an understanding of metal working technologies by making precision machined parts
2. Follow written and verbal instructions: safety, metal working skills and housekeeping organization
3. Develop problem identification and solving skills.
4. Develop teamwork and group skills
5. Demonstrate the ability to read a blueprint and draw part sketches
6. Interpret drawings, measure and inspect parts produced, machine or fabricate assignments within specified tolerances
7. Earn up to 8 NIMS Credentials
8. Develop the qualifications and ability to obtain an entry level positioning the Precision Machining Industry.

Integrated throughout the course are career preparation standards, which include basic academic skills, communication, interpersonal skills, problem solving, workplace safety, technology, and employment literacy.

Pathway

Recommended Sequence	Courses
Introductory	Beginning Metal Manufacturing Technology
Skill Building	2nd Year Manufacturing Technology – Metal Art /Adv Manufacturing
Advanced Skill	3rd Year Manufacturing Technology – Adv Machining and Fabrication. 4th Year Manufacturing Technology – NIMS Certification

6. Hours: Students receive up to 180 hours of classroom instruction.

7. Prerequisites: 3rd Year Manufacturing Technology or special arrangement by teacher

8. Date (of creation/revision): July 2011

9. Course Outline

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Upon successful completion of this course, students will be able to demonstrate the following skills necessary for entry-level employment.

Instructional Units and Competencies	Hours	Model Curr. Standards	CA Academic Content Standards	CAHSEE
A. ORIENTATION: 1. Demonstrate knowledge of course outline. 2. Demonstrates awareness of course objectives and competencies. 3. Introduction to math problems related to the metalworking industry. 4. Introduce the value of participation in youth organizations.	5			
I. CAREER PREPARATION A. Career Planning and Management. 1. Know the personal qualifications, interests, aptitudes, knowledge, and skills necessary to succeed in careers. a. Students will identify skills needed for job success b. Students will identify the education and experience required for moving along a career ladder. B. Understand the scope of career opportunities and know the requirements for education, training, and licensure. a. Students will describe how to find a job. b. Students will select two jobs in the field and map out a timeline for completing education and/or licensing requirements. C. Know the main strategies for self-promotion in the hiring process, such as completing job applications, resume writing, interviewing skills, and preparing a portfolio. a. Students will write and use word processing software to create a resume, cover letters, thank you letters, and job applications. b. Students will participate in mock job interviews. *D. Develop a career plan that is designed to reflect career interests, pathways, and post-secondary options.* *E. Students will conduct a self—assessment and explain how professional qualifications affect career choices.* *F. Understand the role and function of professional organizations, industry associations, and organized labor in a productive society.* *G. Contact two professional organization and identify the steps to become a member.* *H. Understand the past, present and future trends that affect careers, such as technological developments and societal trends, and the resulting need for lifelong learning.* *I. Students will describe careers in the manufacturing industry sector.* *J. Students will identify work-related cultural differences to prepare for a global workplace.*	5 Additional hours are integrated throughout the course	Manufacturing & Product Development Industry 3.0, 4.0, 5.0, 6.0 7.0 , 8.0, 9.0 NIMS Precision Machining Standards Level I: 10.1.1 10.1.3 10.1.4 11.1.1 11.1.2	Language Arts (8) R 1.3, 2.6 W1.3, 2.5. LC 1.4,1.5, 1.6 LS1.2, 1.3, 1.7 (9/10) R2.1,2.3,2.6 W2.5 LC1.4 LS 1.1, 2.3 (11/12) R2.3 W2.5 LC1.2 Math (7) NS1.2, 1.3 1.7 MR 1.1,1.3,2.1 2.7,2.8, 3.1	Lang. Arts R 8.2.1 (9/10) R 2.1, 2.3 W2.5 Math (7) NS 1.2, 1.3, 1.7 MR 1.1, 2.1, 3.1

J. Technology.
   1. Understand past, present and future technological advances as they relate to a chosen pathway and on selected segments of the economy.
   2. Understand the use of technological resources to gain access to, manipulate, and produce information, products and services.
   3. Use appropriate technology in the chosen career pathway.

K.. Problem solving and Critical Thinking.
   1. Understand the systematic problem-solving models that incorporate input, process, outcome and feedback components, and apply appropriate problem-solving strategies and critical thinking to work-related issues and tasks.

L. Use and apply critical thinking and decision make to make informed decisions, solve problems, and achieve balance in the multiple roles of personal, home, work and community life.

M. Health and Safety.
   1. Know policies, procedures, and regulations regarding health and safety in the workplace, including employers' and employees' responsibilities.
   2. Understand critical elements of health and safety practices related to a variety of business environments.

N. Responsibility & Flexibility.
   1. Understand the qualities and behaviors that constitute a positive and professional work demeanor.
   2. Understand the importance of accountability and responsibility in fulfilling personal, community, and work-place roles and how individual actions can affect the larger
   3. Understand the need to adapt to varied roles and responsibilities.

O. Ethics and Legal Responsibilities
   1. Know the major local, district, state, and federal regulatory agencies and entities that affect the industry and how they enforce laws and regulations.
   2. Understand the concept and application of ethical and legal behavior consistent with workplace standards.
      a. Contact a business and obtain a copy of their rules for employment.
      b. Role play difference ethical scenarios.
   3. Understand the role of personal integrity and ethical behavior in the workplace.

P. Leadership and Teamwork.
   1. Understand the characteristics and benefits of teamwork, leadership, citizenship in the school, community, and workplace settings for effective performance and attainment of goals.
   2. Understand the ways in which professional associations, such as Skills USA, CITEA and competitive career contribute to promote employability.
   3. Know multiple approaches to personal conflict resolution and their and understand how to interact with others in ways that demonstrate

respect for individual and cultural differences and for the attitudes and feelings of others.				
II. CONTENT SKILL AREAS: A. SAFETY 1. The learner will receive safety instruction through oral, visual, tactile, and cognitive methodologies. This should include, but not be limited to, paper/computer testing, lecture, and demonstrations. An oral examination will be administered on the proper sequence of operations and will differentiate between safe and unsafe practices. 2. The learner must demonstrate safe practices on all equipment through successful performance on written and oral tests (matrixes examinations), and real-time demonstrations to the instructor (tools, equipment, materials). Examination preparation activities will include reading, writing, technical explanations (oral), and demonstration techniques. 3. The learner will understand the occupational exposure to blood and other potentially infectious materials and possible transmission. The learner will: a. Demonstrate knowledge of classroom procedures and earthquake, fire, and emergency drills. b. Know and demonstrate proper safety procedures for handling equipment. c. Satisfactorily complete a written safety exam. d. Demonstrate safe practices on all equipment through application. e. Demonstrate knowledge and understanding of handling hazardous materials. f. Demonstrate interpretation of Material Safety Data Sheets (MSDS's) in shop environment. g. Describe employee accident procedures. h. List ways in which bloodborne pathogens commonly occur. i. Explain how appropriate housekeeping methods protect against exposure to bloodborne pathogens. j. List important steps to take if exposed to a bloodborne pathogen. B. LEGAL CONSIDERATIONS 1. The learner will: a. Demonstrate ethical responsibility. b. Understand loss prevention/shrinkage from internal theft and inventory loss. c. Identify and protect against robbery and suspected theft. d. Understand the consequences of theft, loss, and misuse of property. C. LEADERSHIP SKILLS 1. The learner will: a. Display appropriate professional behavior via initiative, creativity, self-control, and interest/enthusiasm. b. Demonstrate leadership skills by working independently, making appropriate decisions, working well with others, and taking constructive criticism.	5	OSHA-10 Manufacturing & Produce Development Industry Std. 6.0, 6.1, 6.2, 6. 6.6	R 2.1, 2.3, W2.2 (2.6)d WOEL2.3(1.5),(1.6) 12 (1.2)	EW1.5, 2.3f, 2.6a & b ER2.6

Competency	Hours	Model Curriculum Standards	CA Academic Content Standards	CAHSEE
Module 1 – Task Planning and Management				
Designed to provide basic skills needed for using hand tools and performing bench metal work. Included is the use of arbor presses, work holding and hand tools, hacksaws, files, reamers, taps and dies, finishing tools, bushings, bearings, and assembly tools. Manual Operations – Layout Designed to provide basic skills for layout hole locations, radii, and surfaces to match the drawing and specifications. The student is required to perform all work necessary to produce the part given the raw material, drawing, process plan, layout tools and measuring instruments. 1.1.1 Task Processing Planning - Develop a process plan for a part requiring milling, drilling, turning, or grinding. Complete an operation sheet detailing the process plan and required speeds, feeds, depth of cuts, etc.	30	Mfg. & Product Develop. Industry Sector Foundation Standards 6.0 6.4 Machine & Forming Technology Pathway C1.0, 1.1, 1.2, 1.3 C2.0, 2.2 C3.0, 3.2 Marketing, Sales, & Service Industry Sector D1.0, 1.6 D3.0, 3.1, 3.2, 3.3, 3.4	EW1.3 p44; ER2.5 p50 ; EWA2.6a p52; EWO1.6 p53; EW1.5 p59; EW2.3d p60; EW2.3f p60; EW2.6a p61; EW2.6b p61; ESA 2.2f p64; EWA2.1c p70; EWA2.4a p70; EWO1.2 p72; ELSS1.8c p73; ESA2.3c p7 MNS1.2 p29; MNS1.3 p29; MMG1.2 p32; MMG2.4 p32; MMG3.1 p32; MMG1.1 p34; MMR2.1 p34; MMR2.8 p34; MA3.0 p38; MA5.0 p38; MA13.0 p39; SPS1c p26; SPS2d p27; SPS3f p27	EW1.5, 2.3f, 2.6a & b, MNS1.2, 1.3 MMG1.1, 1.2, 2.4, 3.1, MMR2.1, 2.8, MA3.0, 5.0, 13.0
2.1 Module 2 – Manual Operations – Bench Metal				
Designed to provide basic skills needed for operating standard engine lathes. Given access to an appropriate turning machine and accessories, raw material, process plan, drawing, and precision measurement and cutting tools, the student produces a part. The student is required to perform all necessary practices. 2.1.1 Bench work: Tap holes. Use files, scrapers, and coated abrasives to deburr parts. Use arbor presses to perform interference fits. Use bench vises and hand tools appropriately.	30		ER2.5 p50; EWA2.6a p52; ER2.6 p57; EW1.5 p59; EW2.3f p60; EW2.6a – 2.6b p61; ESA2.2f p64; EW1.5 p69; EWA2.1c & 2.1e p70; EWO1.2 p 72; ELSS1.8c p73 MNS1.2 p29; MNS1.3 p29; MMG1.2 p32 SPS2d p27; SPS3f p27; SP1d p31; SIE1b & c p52; SIE1L p52 SSH10.3.2 p43; SSH11.2.5 p48	ER2.6, EW1.5, 2.3f 2.6a & b, MNS1.2, 1.3, MMG1.1, .2, 2.4, 3.1, MMR2.8, MA3.0
2.1.2 Layout: Layout the location of hole centers and surfaces with an accuracy of +/-.015.			EW1.3 p44; ESA2.3 p48; EWA2.6a p52; EW2.3f p60; EW2.6a & b p61; ESA2.2d & f p64; ELSS1.8c p73 MNS1.3 P29; MNS1.2 P29; MMG1.1 p32; MMG1.2 p32; MMG2.4 p32; MMG3.1 p32; MMR2.8 p 34; MA3.0 p38 SSH10.3.2 p43; SSH11.2.5 p48	
3.1 Module 3 – Turning Operations				
Designed to provide basic skills needed for operating standard engine lathes. The student is required to perform all work to produce a part given raw the material, process plan, drawing, tooling, and measurement instruments. 3.1.1 Between Centers Turning – Set up and perform straight turning operations between centers.			EW1.3 p44; ESA2.3 p48; ER2.5 p50; EWA2.6a p52; ER2.6 p57; EW1.5 p59; EW2.3f p60; EW2.6a & b p61; EWA2.1c & e p70; EWO1.2 p72; ELSS1.8c p 73; ESA2.3c p74 MNS1.2 p29; MNS1.3p29; MAF1.5 p30; MMG1.2p32; MMR2.1 p34;MMR2.8p34; MA3.0 p38; MA5.0 p38 SPS1c p26; SPS1f p26; SPS2d p27; SP1d & gp31;	ER2.6 EW1.5 EW2.3 MNS1.2, .3, MAF1.5, MMG1.2, MMR2.1, .8 MA3.0, 5.0

			SIE1c p52; SIE1L p52 SSGH8.12.9 p39; SSH10.3.2 p43	
3.1.2 Chucking – Set up and perform chucking operations for turning.			EW1.3 p44; ESA2.3 p48; ER2.5 p50; EWA2.6a p52; ER2.6 p57; EW1.5 p59; EW2.3f p60; EW2.6a & b p61; EWA2.1c & e p70; EWO1.2 p72; ELSS1.8c p 73; ESA2.3c p74 MNS1.2 p29; MNS1.3 p29; MAF1.5 p30; MMG1.2 p32; MMR2.1 p34; MMR2.8 p34; MA3.0 p38; MA5.0 p38 SPS1c p26; SPS1f p26; SPS2d p27; SP1d & g p31; SIE1c p52; SIE1L p52 SSGh8.12.9 p39; SSH10.3.2 p43	
4.1 Module 4 – Milling Operations	**Hours**	**Model Curricu Standards**	**CA Academic Standards**	**CAHSEE**
Designed to provide basic skills needed for operating standard vertical and horizontal milling machines. The student is required to perform all work to produce a part given raw the material, process plan, drawing, tooling, and measurement instruments. <u>4.1.1 Power Feed Milling</u> - Setup and operate a horizontal or vertical milling machine using power speeds and feeds, depth of cuts and coolant needs. Perform routine milling.	40		ESA2.3 p48; ER2.5 p50; EWA2.6a p52; ER2.6 p57 EW2.3f p60; EW2.6a & b p61; ESA2.2f p64; EWO1.2 p72 ELSS1.8c p 73; ESA2.3c p74 MNS1.2 p29; MNS1.3 p29; MMG1.2 p32; MMG3.1 p32; MMR2.1 p34; MMR2.8 p34; MMR3.3 p34; MA3.0 p38; MA5.0 p38; MA13.0 p3 SPS1c & f p26; SPS2d p 27; SP1d p31; SIE1L p52 SSGH8.12.9 p39; SSH10.3.2 P43; SSE12.2.8 p59	ER2.6 EW2.3fE W2.6a & b MNS1.2,. 3, MMG1.2, 3.1, MMR2.1, .8, 3.3 MA3.0, 5.0, 13.0
4.1.2 Vertical Milling – Setup and operate vertical milling machines. Perform routine milling, and location of holes centers within +/- .005".			ESA2.3 p48; ER2.5 p50; EWA2.6a p52; ER2.6 p57 EW2.3f p60; EW2.6a & b p61; EL1.7 p63 ESA2.2f p64; EWO1.2 p72 ELSS1.8c p 73; ESA2.3c p74 MNS1.2 p29; MNS1.3 p29; MMG1.2 p32; MMG3.1 p32; MMR2.1 p34; MMR2.8 p34; MMR3.3 p34; MA3.0 p38; MA5.0 p38; MA13.0 p39 SPS1c & f p26; SPS2d p 27; SP1d p31; SIE1L p52 SSGH8.12.9 p39; SSH10.3.2 p43; SSE12.2.8 p59	
5.1 Module 5 – Surface Grinding Operations				
Designed to introduce the basic operations of a standard surface grinder. The student is required to (1) select, mount, and dress a grinding wheel and (2) produce a part given a block squared on a mill, a process plan, drawing, and hand and precision measuring tools. <u>5.1.1 Grinding Wheel Safety</u> – Ring test grinding wheels, perform visual safety inspection, mount and dress a grinding wheel in preparation for surface grinding.	15		ESA2.3 p48; ER2.2 p 49; ER2.5 p50; ER2.6 p57; EW2.3f p60; EW2.6a & b p61 ESA2.2f p64; EWA2.1c & e p70; EWA2.3c p70; EWO1.2 p72; ELSS1.8c p73; ESA2.1a p74 SPS1c p26; SPS3f p27; SPT7c p29; SIE1L p52	ER2.6, EW2.3f2. 6a&bMN S1.2, .3 MMG1.2 MA13.0
<u>5.1.2 Horizontal Spindle, Reciprocating Table</u> – Set up and operate manual surface grinders with a 10" and smaller diameter wheel. Perform routine surface grinding, location of surfaces, and squaring of surfaces. Perform wheel dressing.			ESA2.1 p48; ER2.5 p50; EW2.3f p60; EW2.6a & b p61; ESA2.2f p64; ER2.3 p66; EWA2.1c & e p70; EWS2.3c p70; EWO1.2 p72; ELSS1.8c p73; ESA2, 1a p74 MNS1.2 p29; MNS1.3 p29; MMG1.2 p32; MA13.0 p39; MG9.0 p42MNS1.2 p29; MNS1.3 p29; MMG1.2 p32; MA13.0 p39; MG9.0 p42	

6.1 Module 6 – Drill Press and Power Saw Operations	**Hours**	**Model Curric Standards**	**CA Academic Standards**	**CAHSEE**
Designed to introduce the basic operation of standard hand and power feed presses. The student is required to produce a part given the raw material, process plan, drawing, tooling, and measuring instruments. 6.1.1 Drill Press – Set up and operate drill presses. Perform routine drill press operations.	10		ESA2.3 p48; ER2.5 p50; EWA2.6a p52; ER2.6 p57; EW1.5 p59; EW2.3f p60; EW2.6a & b p61; ESA2.2f p64; EWA2.1c & e p70; EWI1.2 p72; ELSS1.8c p73 MNS1.2 p29; MNS1.3 p29; MMG1.2 p32; MMG2.4 p32; MMG3.1 p32; MG20.0 p43; SPS1c p26; SPS2d p27; SIE1c p52	ER2.6, EW1.5, 2.3, 2.6a&b MNS1.2, .3, MMG1.2, 2.4, 3.1
6.1.2 Power Saw – Set up and operate power saws for cutoff operations.			ESA2.3 p48; ER2.5 p50; EWA2.6a p52; ER2.6 p57; EW1.5 p59; EW2.3f p60; EW2.6a & b p61; ESA2.2f p64; EWA2.1c & e p70; EWI1.2 p72; ELSS1.8c p73 MNS1.2 p29; MMG1.2 p32 SPS2d p27; SIE1c p52	
7.1 Module 7 – Quality Control, Inspection, and Process Adjustment				
Designed to provide skills needed for basic inspection of machined parts and the process control, adjustment, and improvement of the machining processes used to manufacture those parts. Emphasis will be on teamwork, quality control, and continual improvement. All participants will be required to work as team members and prove or disprove their suggestions. 7.1.1 Part Inspection Develop an inspection plan and inspect simple parts using precision tools and practices. Prepare reports on the compliance of the parts.	10		ESA2.3 p48; EW1.5 p59; EW2.3f p60; EW2.6a & b p61; ESA2.2d & f p64; ELSS1.8c p73 MNS1.2 p29; MNS1.3 p29; MAF1.1 p30; MAF3.2 p31; MMG1.1 p32; MMG1.2 p32; MMG3.1 p32; MMG3.3 p33; MMG1.1 p34; MMR2.1 p34; MMR2.8 p34SIE1b p52; SIE1c p52	EW1.5, 2.3f, 2.6a & b ER2.6
7.1.2 Process Plan – Follow a sampling plan. Inspect the samples for the required data. Enter the data on appropriate charts. Graph the data. Respond to the warning conditions indicated by the process charts.			ESA2.3 p48; EWA2.6a p52 ER2.6 p57; EW2.3d p60; EW2.3f p60;EW2.6a & b – p61; EL1.7 p63; ESA2.2d & f p64; EWO1.2 p72; ELSS1.8c p73; ESA2.3c p74; ESA2.4a p75 MNS1.2 p29; MNS1.3 p29; MAF1.5 p30; MMG1.1 p32; MMG1.2 p32; MMG3.1 p32; MMG3.5 p33; MMR2.1 p34; MMR3.3 p34; MA13.0 p39; MG15.0 p43SPS1c p26; SPS1f p26; SIE1c p52	
7.1.3 Participation in Process Improvement – Analyze the performance of a production process as a member of a process team. The team shall formulate process adjustments for improvements where appropriate, notify the supervisor of the proposed adjustments and/or improvements. Where authorized, perform the strategies for process adjustment and/or improvement.			ESA2.3 p48; EWA2.6a p52; EW1.5 p59; EW2.3f p60; EW2.6a & b p61; ESA2.2f p64; ER2.3 p66; EW1.6 p69; EWA2.1c p70; EWA2.4a p70; EWO1.2 p72; ELSS1.8c p73; ESA2.1a p74; ESA2.3c p7 MNS1.2 p29; MNS1.3 p29; MAF1.1 p30; MAF3.2 p31; MMG1.1 p32; MMG1.2 p32; MMG3.1 p32; MMG3.3 p33; MMG1.1 p34; MMR2.1 p34; MMR2.8 p34; MMR3.3 p34; MG15.0 p43SIE1b p52; SIE1c p52	
8.1 Module 8 – General Maintenance				
An introduction to all issues involved in the general housekeeping, preventive maintenance, and tooling maintenance in the metalworking field. Demonstration of appropriate actions regarding bench work and layout areas, conventional lathe areas, computer numerical control (CNC) machine areas, and the general facility is required. Specific maintenance of machines and tooling will be required along with preventive maintenance procedures.	10		ESA2.3 p48; ER2.2 p49; ER2.6 p57; EW2.3f p60; EW2.6a p61; ESA2.2f p64; EER2.3 p66; EW1.5 p69; EWA2.1c p70; ELSS1.8c p73; ESA2.1a p74; ESA2.3c p74 SPS3f p27	

Manual Operations – Layout Designed to provide basic skills for layout hole locations, radii, and surfaces to match the drawing and specifications. The student is required to perform all work necessary to produce the part given the raw material, drawing, process plan, layout tools and measuring instruments. 8.1.1 General Housekeeping and Maintenance – Keep tools, workstations, workbenches, and manual equipment clean, safe and maintain upkeep.				
8.1.3 Tooling Maintenance – Inspect and assess the condition of tooling. Refurbish tooling where appropriate. Refer tooling for repair or regrind where appropriate.			ESA2.3 p48; ER2.2 p49; ER2.6 p57; EW2.3f p60; EW2.6a p61; ESA2.2f p64; EER2.3 p66; EW1.5 p69; EWA2.1c p70; ELSS1.8c p73; ESA2.1a p74; ESA2.3c p74 SPS3f p27	
9.1 Module 9 – Industrial Safety and Environmental Protection	**Hours**	**Model Curric Standards**	**CA Academic Standards**	**CAHSEE**
Designed to introduce safety procedures for the handling of work materials, operation of machines and tooling, and the handling and storage of hazardous wastes. The student is required to demonstrate safe workplace practices given written and oral instructions. 9.1.1 Machine Operations and Material Handling – Perform assigned responsibilities while adhering to safe practices in accord with Occupational Safety Health Administration (OSHA) requirements and guidelines. Document safety activities as required.	10		ESA2.3 p48; ER2.2 p49; EWA2.6a p52; EW1.5 p59; EW2.3d p60; EW2.3f p60; EW2.6a p61; EL1.7 p63; ESA2.2d & f p64; ER2.3 p66; EWA2.1e p70; EWA2.3c p70; EWO1.2 p72; ELSS1.8c p73; ESA2.1a p74 SPS3f p27 SSH11.2.1 p48; SSH11.8.7 p51; SSE12.2.7 p59; SSE12.3.1 p60	EW1.5, 2.3f 2.6a
9.1.2 Hazardous Materials Handling and Storage – Handle and store hazardous materials as assigned while adhering to safe practices in accordance with OSHA and U.S. Environmental Protection Agency (EPA) requirements and guidelines. Document safety activities as required.			ESA2.3 p48; ER2.2 p49; EWA2.6a p52; EW1.5 p59; EW2.3d p60; EW2.3f p60; EW2.6a p61; EL1.7 p63; ESA2.2d & f p64; ER2.3 p66; EWA2.1e p70; EWA2.3c p70; EWO1.2 p72; ELSS1.8c p73; ESA2.1a p74 SPS3f p27 SSH11.2.1 p48; SSH11.8.7 p51; SSE12.2.7 p59; SSE12.3.1 p60	
10.1 Module 10 – Career Management and Employee Relations				
Designed to introduce career opportunities and functions of the metalworking industries. The Learner will develop a career plan and an understanding of organizational structures and employment relationships. Interviewing skills and team skills will be practiced. 10.1.1 Career Planning Develop and explain a short-term career plan and résumé.	10		EWA2.5 p52; EW1.5 p59; EW2.3f p60; EW2.6a p61; ESA2.2f p64; EW1.6 p69; EWO1.2 p72; ELSS1.8c p73; ESA2.1a p74; ESA2.3c p74 SS p60; SSE12.4.3 - p60	

10.1.2 Job Application and Interviewing – Complete job application form and demonstrate interviewing skills			ESA2.3 p48; EWA2.5 p52; EW2.3d p60; EW2.3f p60; EW2.6a & b p61; EL1.7 p63; ESA2.2d p64; ER2.3 p66; EWO1.2 p72; ELSS1.8c p73; ESA2.3c p74 SSE12.4.2 p60	
10.1.3 Teamwork and Interpersonal Relations – Demonstrate approp interpersonal skills in job performance evaluations, group communica and decision making, and conflict resolution.			EW1.3 p44; ESA2.3 p48; EWA2.6a p52; EW1.5 p59; EW2.3f p60; EW2.6a p61; ESA2.2f p64; EWA2.3c p70; EWO1.2 p72; ESA2.1c p74; ESA2.3c p74	
10.1.4 Employment Relations – Understand and explain employment rights and responsibilities in metalworking companies.			ESA2.3 p48; EWA2.6a p52; EW1.5 p59; EW2.3f p60; EW2.6a & b p61; ESA2.2f p64; ER2.3 p66; EW1.5 p69; EW1.6 p 69; EWA2.1e p70; EWA2.3c p70; EWO1.2 p72; ELSS1.8c p73; ESA2.1a p74; ESA2.3c p74 SSH10.3.4 p43	
11.1 Module 11 – Industry Experience				
Expand skill levels working in a machining/manufacturing environment by using cooperative education and/or community classroom methodologies. 11.1.1 Industrial Experience – Explore and understand the machining/ manufacturing environment.	3		EWA2.6a p52; *EW1.5 p59; EW2.3f p60; EW2.6a p61;* ESA2.2f p64; EWA2.1e p70; EWO1.2 p72; ELSS1.8c p73; ESA2.1a p74 SSH10.3.5 p43	EW1.5, 2.3f, 2.6A
11.1.2 Related Classroom Experience – Discuss and develop an ann list of high-quality personal, technical, and job-related skills necessary to be an employable person in the specific occupation.			EWA2.5 p52;EW1.5 p59; EW2.3f p60;EW2.6a p61; ESA2.2f p64; EWO1.2 p72; ELSS1.8c p7 SSH11.8.7 p51; SSE12.2.3 p59	

10. Additional recommended/optional items
    a. Articulation: None.
    b. Academic credit: 10 Elective Credits
    c. Instructional strategies:
        Lecture Discussion
        Laboratory
        Projects
    d. Instructional materials: Teacher and NIMS Certification Generated
    e. Certificates: NIMS Certifications:
        Machining Level 1:
        - Module 1: Task Planning and Management
        - Module 2: Manual Operations
        - Manual Milling
        - Manual Turning Between Centers
        - Manual Turning between centers
        - Manual Center Grinding
        - Manual Drill Press Operations
        - CNC Turning: Programming Setup & Operations
        - CNC Milling: Programming Setup & Operations