**PRECISION MACHINING I**

*Precision Machining I* is designed to provide students with a basic understanding of the precision machining processes used in industry, manufacturing, maintenance, and repair. The course instructs students in industrial safety, terminology, tools and machine tools, measurement and layout. Students will become familiar with the setup and operation of power saws, drill press, lathe, milling machine, grinders and receive an introduction to CNC (computer controlled) machines.

- DOE Code: 5782
- Recommended Grade Level: Grade 11-12
- Recommended Prerequisites: None
- Credits: 2-3 credits a semester, maximum of 6 credits
- Counts as a Directed Elective or Elective for the General, Core 40, Core 40 with Academic Honors and Core 40 with Technical Honors diplomas
- This course is aligned with postsecondary courses for Dual Credit:
  - Ivy Tech
    - MTTC 101- Intro to Machining
  - Vincennes University
    - PMTD 110/L- Manufacturing Processes and Lab

**Dual Credit**

This course provides the opportunity for dual credit for students who meet postsecondary requirements for earning dual credit and successfully complete the dual credit requirements of this course.

**Application of Content and Multiple Hour Offerings**

Intensive laboratory applications are a component of this course and may be either school based or work based or a combination of the two. Work-based learning experiences should be in a closely related industry setting. Instructors shall have a standards-based training plan for students participating in work-based learning experiences. When a course is offered for multiple hours per semester, the amount of laboratory application or work-based learning needs to be increased proportionally.

**Career and Technical Student Organizations (CTSOs)**

Career and Technical Student Organizations are considered a powerful instructional tool when integrated into Career and Technical Education programs. They enhance the knowledge and skills students learn in a course by allowing a student to participate in a unique program of career and leadership development. Students should be encouraged to participate in SkillsUSA, the CTSO for this area.

**Content Standards**

**Domain – Project Planning and Management**

**Core Standard 1** Students develop skills for project and job planning to ensure quality parts creation.

**Standards**

- PMI-1.1 Demonstrate job process planning
- PMI-1.2 Examine basic problem solving
- PMI-1.3 Assess basic decision making rules
Domain – Tools and Processes
Core Standard 2 Students apply and adapt basic hand and machine tool processes to create machined parts per industry specifications.

Standards
PMI-2.1 Perform basic benchwork
PMI-2.2 Demonstrate basic layout procedures
PMI-2.3 Perform turning operations
PMI-2.5 Perform basic milling operations
PMI-2.6 Demonstrate proper grinding wheel safety
PMI-2.7 Perform surface grinding operations
PMI-2.8 Perform basic drill press operations
PMI-2.9 Develop basic CNC programming/operations

Domain – Quality Process Control and Inspection
Core Standard 3 Students analyze processes and finished products to ensure compliance with job specifications.

Standards
PMI-3.1 Evaluate proper piece part inspection procedures
PMI-3.2 Recognize and explain control and improvement processes

Domain – General Maintenance
Core Standard 4 Students integrate preventive maintenance schedules and tasks to ensure safe and accurate equipment upkeep.

Standards
PMI-4.1 Demonstrate general housekeeping and maintenance tasks
PMI-4.2 Identify routine preventive maintenance tasks
PMI-4.3 Recognize tooling maintenance procedures

Domain – Industrial Safety and Environmental Protection
Core Standard 5 Students apply concepts of industrial safety and recycling to meet industry and governmental environmental protection regulations and standards.

Standards
PMI-5.1 Evaluate machine operations and material handling safety procedures
PMI-5.2 Assess hazardous materials handling and disposal processes
PMI-5.3 Implement recycling of materials and environmental protection measures

Domain – Written and Oral Communications
Core Standard 6 Students communicate using appropriate subject terminology and definitions both in writing and speaking to ensure the accurate reflection of ideas.

Standards
PMI-6.1 Demonstrate technical reading skills
PMI-6.2 Develop writing skills for a technical field
PMI-6.3 Utilize proper speaking in an industrial environment
PMI-6.4 Exercise effective listening skills

Domain – Mathematics
Core Standard 7 Students select appropriate mathematical functions to perform various machining
processes.

Standards
PMI-7.1 Implement basic geometry applications in product design
PMI-7.2 Select appropriate algebraic operations in product design and creation process
PMI-7.3 Perform trigonometry functions as appropriate
PMI-7.4 Study applied statistics

Domain – Engineering Drawings and Sketches
Core Standard 8 Students draw sketches and interpret engineering drawings to determine product dimensions and specifications.

Standards
PMI-8.1 Examine and comprehend standard orthographic prints
PMI-8.2 Examine and comprehend standard GD&T orthographic prints
PMI-8.3 Identify and utilize GD&T datum, symbology and tolerances

Domain – Measurement
Core Standard 9 Students validate the proper use of precision measuring and layout instruments and inspection processes to ensure the quality of the finished product.

Standards
PMI-9.1 Differentiate between basic measuring instruments
PMI-9.2 Compare various precision measuring instruments
PMI-9.3 Recognize basic surface plate instruments
PMI-9.4 Convert metric measurements and dimensions to inches

Domain – Metalworking Theory
Core Standard 10 Students examine material properties and tooling processes to create finished products.

Standards
PMI-10.1 Explain cutting theory concepts
PMI-10.2 Identify appropriate tooling processes per product specifications
PMI-10.3 Evaluate the properties of various metals
PMI-10.4 Select appropriate machine tools for job completion
PMI-10.5 Examine the role of cutting fluids and coolants in the machining process

Domain – Personal/Professional Development and Employment Relations
Core Standard 11 Students establish a personal and professional development plan for their career.

Standards
PMI-11.1 Create a continuing education plan that identifies the need for further education and training options
PMI-11.2 Prepare for exams leading to certifications recognized by business and industry
PMI-11.3 Develop skills needed to enter the workforce
PMI-11.4 Evaluate resources that keep workers current in the career field
PMI-11.5 Demonstrate skills and attitudes needed for lifelong learning
PMI-11.6 Apply effective money management strategies
PMI-11.7 Adopt career planning skills
PMI-11.8 Create/complete job applications
PMI-11.9 Construct successful resumes and cover letters
PMI-11.10 Demonstrate effective interviewing skills
PMI-11.11 Build teamwork and interpersonal relations
PMI-11.12 Construct organizational structures and work relations
PMI-11.13 Develop employment relations
PMI-11.14 Comprehend and practice acceptable work place ethics and behavior
PMI-11.15 Accept group participation and teamwork
PMI-11.16 Evolve personal group leadership skills