Precision Machining II is a more in-depth study of skills learned in Precision Machining I, with a stronger focus on CNC setup/operation/programming. Classroom activities will concentrate on precision set-up and inspection work, as well as machine shop calculations. Students will develop skills in advanced machining and measuring parts involving tighter tolerances and more complex geometry. A continued focus on safety will also be presented.

- DOE Code: 5784
- Recommended Grade Level: Grade 12
- Recommended Prerequisites: Precision Machining I
- Credits: 2-3 credits per 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 105- Abrasive Processes I
    - MTTC 110- Turning and Milling
  - Vincennes University
    - PMTD 117- Basic Machining I
    - PMTD 118- Basic Machining II

**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 apply and adapt skills for project and job planning to ensure quality parts creation.

**Standards**
- PMII-1.1 Employ job process planning
PMII-1.2 Apply basic problem solving to projects
PMII-1.3 Follow basic decision making rules

**Domain – Job Execution**

**Core Standard 2** Students apply hand and machine tool processes to create machined parts per industry specifications.

**Standards**
- PMII-2.1 Perform advanced benchwork
- PMII-2.2 Demonstrate precision layout procedures
- PMII-2.3 Perform advanced turning operations
- PMII-2.4 Perform advanced milling operations
- PMII-2.5 Demonstrate proper grinding wheel safety
- PMII-2.6 Perform precision surface grinding operations
- PMII-2.7 Perform drill press setup operations
- PMII-2.8 Utilize CNC programming and machine tools to perform complex machining tasks
- PMII-2.9 Perform advanced benchwork

**Domain – Quality Process Control and Inspection**

**Core Standard 3** Students assess quality control and inspection processes to ensure compliance with industry and national standards.

**Standards**
- PMII-3.1 Perform proper piece part inspection and documentation
- PMII-3.2 Critique process control and improvement procedures

**Domain – General Maintenance**

**Core Standard 4** Students integrate preventive maintenance schedules and tasks into daily class activities to ensure safe and accurate equipment usage.

**Standards**
- PMII-4.1 Demonstrate general housekeeping and maintenance procedures
- PMII-4.2 Perform preventive maintenance tasks
- PMII-4.3 Perform tooling maintenance tasks

**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**
- PMII-5.1 Assess machine operations and material handling safety procedures
- PMII-5.2 Distinguish hazardous materials handling and disposal procedures for specific materials
- PMII-5.3 Implement appropriate 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**
- PMII-6.1 Interpret written technical instructions
- PMII-6.2 Create technical specifications documents
PMII-6.3 Utilize appropriate industry language in all communications
PMII-6.4 Utilize effective listening skills

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

Standards
PMII-7.1 Perform advanced arithmetic operations
PMII-7.2 Solve product specification problems using geometric functions as appropriate
PMII-7.3 Apply algebraic operations as appropriate in product design and creation
PMII-7.4 Use applied trigonometry
PMII-7.5 Research and apply statistics

Domain – Engineering Drawings and Sketches
Core Standard 8 Students create products within specified dimensions.

Standards
PMII-8.1 Interpret orthographic prints
PMII-8.2 Work with/from standard GD&T orthographic prints
PMII-8.3 Utilize GD&T datum, symbology and tolerances

Domain – Measurement
Core Standard 9 Students perform proper measurement procedures using appropriate instruments to ensure finished products meet given specifications.

Standards
PMII-9.1 Select and use precision measuring instruments
PMII-9.2 Use precision surface plate instruments
PMII-9.3 Convert units of measurements and dimensions to other units

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

Standards
PMII-10.1 Utilize cutting theory
PMII-10.2 Select and implement proper tooling processes
PMII-10.3 Evaluate and select proper materials based on properties
PMII-10.4 Examine the capabilities of machine tools
PMII-10.5 Select proper cutting fluids and coolants for product creation

Domain – Personal/Professional Development and Employment Relations
Core Standard 11 Students establish personal and professional development plans to prepare for careers.

Standards
PM1-11.1 Maintain a continuing education plan that identifies the need for further education and training options
PM1-11.2 Prepare for exams leading to certifications recognized by business and industry
PM1-11.3 Strengthen skills needed to enter the workforce
PM1-11.4  Evaluate resources that keep workers current in the career field
PM1-11.5  Strengthen skills and attitudes needed for lifelong learning
PM1-11.6  Continually practice effective money management strategies
PM1-11.7  Strengthen career planning skills
PM1-11.8  Continually complete job applications
PM1-11.9  Keep current resumes and cover letters
PMII-11.10 Continually develop effective interviewing skills
PMII-11.11 Build ongoing teamwork and interpersonal relations
PMII-11.12 Maintain organizational structures and work relations
PMII-11.13 Maintain proper employment relations
PMII-11.14 Continually apply acceptable work place ethics and behavior
PMII-11.15 Maintain group participation and teamwork
PMII-11.16 Utilize personal group leadership skills