

PRECISION MACHINING II

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