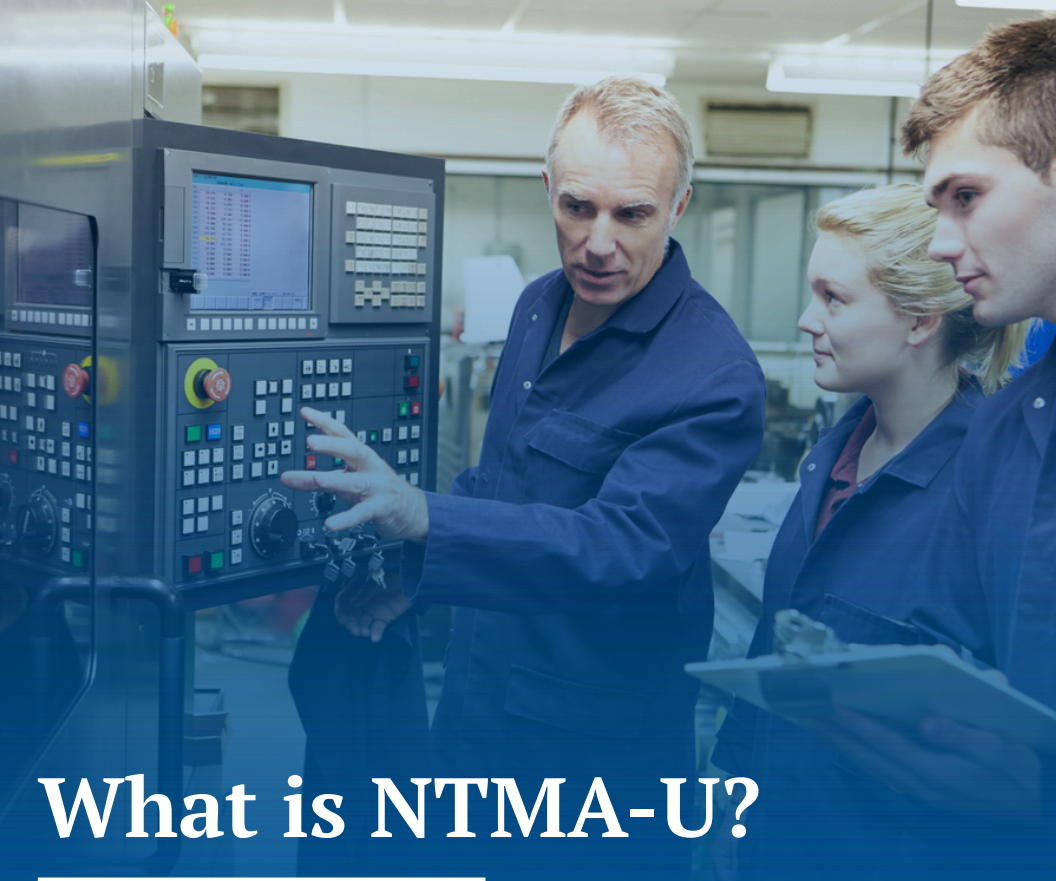
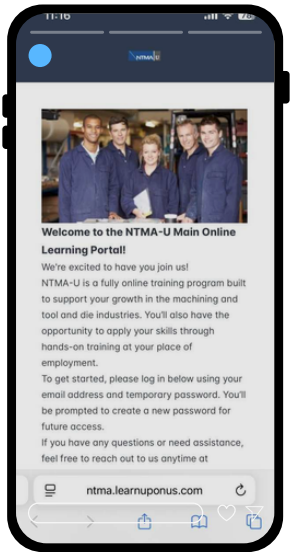
NTMA U

Become a recognized CNC machinist - ***anywhere, anytime***



What is NTMA-U?

Designed by industry professionals, NTMA-U is the foundation of NTMA's Training and Education program, providing real-world knowledge to students and preparing them to thrive in a fast-evolving industry. Whether you're already in the industry and looking to brush up or learn new skills, or someone brand new to the concept of machining, NTMA-U can fit your needs. Courses can be taken individually or as part of a Department of Labor-approved, registered apprenticeship program that serves the entire U.S. manufacturing sector.

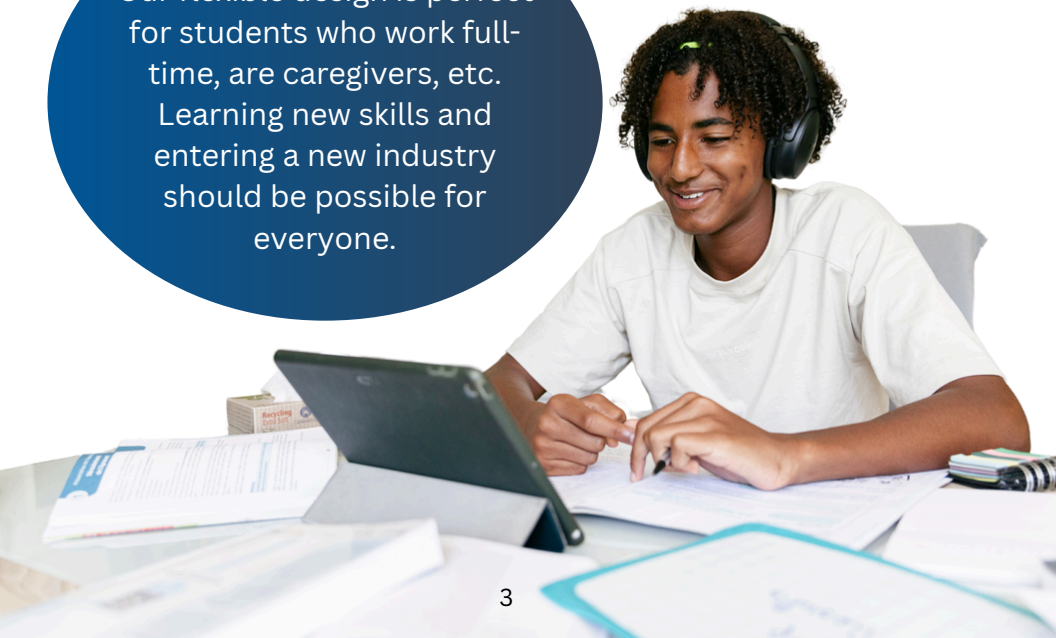


NTMA-U is designed with students in mind first.

Our newly redesigned interface runs smoothly on **any smart phone, tablet, or other device** - so you can do your coursework on the go!

Anytime, anywhere

Our flexible design is perfect for students who work full-time, are caregivers, etc. Learning new skills and entering a new industry should be possible for everyone.



Why choose a career in machining?

American manufacturing relies heavily on CNC machinists in several sectors - aerospace, automotive, healthcare, and defense. There is high demand for new members of the workforce.

The U.S. Bureau of Labor Statistics predicts a **5% growth** in machinist opportunities from 2022 to 2032, higher than the average.

Due to turnover from retirements, there are approximately **44,000 machining jobs** predicted to open up each year.

Are you someone who:

- Enjoys working with machinery
- Is interested in tech
- Likes to solve problems?

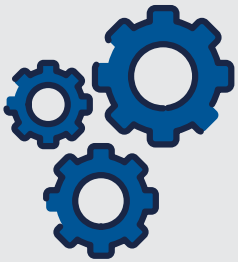
Machining may be for you!

But don't just take our word for it.

Read real testimonials from former NTMA-U students!

"My time spent in the course **gave me a greater understanding** of the manufacturing process and the tools used. This reinforced existing knowledge and I learned new skills hand on. Ultimately, **my success in the class led to interviews and a full time position** in the Quality department with Penn United."

Anita Chiaraville
Quality Assurance Tech at Penn United Technologies



"As a combat veteran, I found it surprisingly dificult to find stable employment. When I started NTMA-U, I was skeptical if a career in manufacturing was a good fit for me as a single father. **Becoming a certified journeyman has given us access to benefits** that give me peace of mind for my son and I. We live a comfortable lifestyle and I feel that **I have a fulfilling career** and life in general."

Aaron Brinkley
Machinist at Penn United Technologies

Course Directory

0-0960 Shop Safety

38 contact hours

Recommended For: Apprentices, entry-level workers, and any personnel working in or around manufacturing environments

Course Textbook: *No textbook necessary*

This highly recommended course provides essential safety training for individuals working in or around manufacturing environments. Participants will gain foundational knowledge of workplace safety practices, hazard communication, and emergency response protocols. Although not required for the apprenticeship program, this course equips learners with critical skills to promote a safe and compliant workplace, aligned with OSHA standards and industry best practices.

Course Objectives:

- Identify and apply basic shop safety practices in a manufacturing environment.
- Demonstrate safe operation procedures for a drill press.
- Recognize and understand machine guarding requirements and their importance
- Explain the purpose and proper use of Lock-out/Tag-out procedures
- Interpret and utilize information from MSDS/SDS documents for workplace chemicals
- Understand and apply Hazard Communication Standards
- Reference key OSHA fact sheets and understand their relevance to workplace safety
- Identify risks associated with blood borne pathogens and apply appropriate precautions
- Demonstrate basic first aid procedures and understand their role in emergency response

1-1100 Basic Blueprint

38 contact hours

Recommended For: Individuals entering manufacturing or technical fields, including apprentices and entry-level workers

Course Textbook: *The Technology of Manufacturing Blueprint Reading for Machinist Training*

This foundational course introduces learners to the essential principles of blueprint reading and sketching as applies in manufacturing environments. Participants will learn proper terminology, symbols, and standards used in technical drawings. The course emphasizes the interpretation of various blueprint views and details, including isometric projections, dimensioning techniques, tolerances, section views. Learners will also develop skills in sketching, using drafting lines and geometric equations, and converting fractions to decimals-core competencies for interpreting and creating accurate technical documentation.

Course Objectives:

- Recognize and use standard blueprint terminology and symbols
- Interpret and sketch different types of view, including orthographic and isometric
- Apply dimensioning techniques and understand tolerances in technical drawings
- Preform fraction to decimal conversions relevant to blueprint interpretation
- Identify and use various drafting lines and line types
- Apply geometric equations to create accurate sketches
- Interpret and draw offset, auxiliary, and broken section views
- Utilize blueprint symbols correctly for effective communication in manufacturing contexts

1-1120 Basic Math

42 contact hours

Recommended For: Apprentices, entry-level workers, and individuals preparing for work in manufacturing and technical trades

Course Textbook: *New Practical Mathematics for Metalworking Trainees*

This course provides an introduction to the fundamental math skills required for success in shop and manufacturing environments. Emphasizing practical application, learners will develop proficiency in working with fractions, converting fractions to decimals, and calculating angles-essential tools for accurate measurement, layout, and machining. The course is designed to build confidence in applying math concepts directly to real world shop activities.

Course Objectives:

- Understand and apply basic arithmetic operations used in shop settings
- Work confidently with fractions in measurement and calculation tasks
- Convert fractions to decimals for use in technical drawings and machining
- Calculate angles for layout, fabrication, and machining operations
- Apply math skills to support accurate and efficient shop work

1-1200 Precision Machining Technology 1

42 contact hours

Recommended For: Apprentices, entry-level machinist, and individuals pursuing careers in manufacturing and precision machining

Course Textbook: *Precision Machining Technology - NIMS*

This course provides a comprehensive introduction to the safe and effective use of machine tools in a conventional machine shop environment. Emphasizing safety as a primary focus, the course covers fundamental topics such as metallurgy of steel and iron, basic metal cutting operations, machine setup, and part production. Learners will gain an understanding of shop equipment, including hand tools, measuring instruments (rules, calipers, micrometers), and cutting tools. This course also explores essential concepts such as terminology, layout procedures, print reading, and quality measurement-equipping learners with the foundational skills required for success in machining and manufacturing careers.

Course Objectives:

Upon successful completion of this course, Learners will be able to:

- Demonstrate proper safety procedures in a machine shop setting
- Understand basic metallurgy principles related to steel and iron
- Identify and describe metal cutting operations used in part production
- Operate standard shop machinery and understand machine terminology
- Perform accurate measurements using rules, calipers, and micrometers
- Interpret blueprints and layout components for machining
- Set up machines for basic operations and select appropriate cutting tools
- Apply quality control practices to ensure accuracy in manufactured parts

2-1200 Precision Machining Technology 2

42 contact hours

Prerequisites: Completed **Precision Machining Technology 1** or have equivalent experience

Recommended For: Individuals with foundational machining knowledge seeking to expand technical skills.

Course Textbook: *Precision Machining Technology - NIMS*

This intermediate course builds upon foundational machining skills with a continued emphasis on shop safety and precision measurement. Learners will explore the metal removal process in greater depth using common machine shop equipment, including the drill press, engine lathe, milling machine, and surface grinder. The course covers proper use of work holding devices and techniques for securely supporting and locating work pieces. In addition, learners will be introduced to advanced inspection and machining technologies, including the coordinate measuring machine (EDM), preparing them for more complex manufacturing tasks and quality assurance processes.

Course Objectives:
Upon successful completion of this course, learners will be able to:

- Demonstrate ongoing adherence to shop safety protocols
- Use precision measurement tools to ensure part quality
- Perform metal removal operations using the drill press, engine lathe, milling machine, and surface grinder
- Select and apply appropriate work holding devices for various machining processes
- Understand the functions and applications of the CMM, optical comparator, and EDM
- Apply intermediate-level machining techniques to produce accurate and complex parts
- Integrate quality assurance tools into the machining workflow

2-1100 Intermediate Blueprint Reading 2

38 contact hours

Prerequisites: Completed **Basic Blueprint** or have equivalent experience.

Recommended For: Individuals with foundational blueprint knowledge seeking to enhance their interpretation skills for manufacturing applications.

Course Textbook: *Blueprint Reading for Machinist Training*

This course is designed to improve proficiency in reading and interpreting blueprints within a manufacturing context. Building on basic blueprint concepts, learners will explore the relationship between technical drawings and the machining processes used to produce parts. Topics include advanced interpretation of lines, views, and dimensioning, as well as applications of various drafting techniques. The course also reinforces practical skills such as fraction-to-decimal conversion, use of geometric equations, and understanding complex views including offset sections, auxiliary views, broken sections, and symbol interpretation.

Course Objectives:
Upon successful completion of this course, learners will be able to:

- Improve speed and accuracy in reading complex blueprints
- Interpret and relate blueprint drawings to specific manufacturing processes
- Identify and apply advanced line types and drafting conventions
- Understand and use orthographic, isometric, offset, auxiliary, and broken section views
- Perform fractional to decimal conversions accurately for dimensional interpretation
- Apply geometric equations in layout and sketching tasks
- Accurately interpret symbols used in manufacturing blueprints
- Analyze how blueprint details correspond to machining and part production requirements

2-1120 Applied Math

42 contact hours

Prerequisites: Completed **Basic Math** or have equivalent experience.

Recommended For: Individuals seeking to strengthen math skills for technical and manufacturing applications.

Course Textbook: *New Practical Mathematics for Metalworking Trainees*

This course is designed to enhance mathematical efficiency and understanding for use in manufacturing environments. It focuses on the application of essential math skills-such as measurement, calculation, and problem solving-in support of interpreting blueprints and executing machining processes. Emphasis is placed on how mathematical concepts directly relate to the manufacturing of parts, including dimensional accuracy, tolerancing, and geometry commonly used in technical drawings and machine shop operations.

Course Objectives:

Upon successful completion of this course, learners will be able to:

- Apply mathematical principles to interpret and verify blueprint dimensions
- Perform calculations related to part fabrication and machining processes
- Convert units, including fractions to decimals, as required for accurate measurements
- Solve geometric problems involving shapes, angles, and layout dimensions
- Understand the mathematical basis for tolerancing and its impact on part quality
- Increase accuracy and efficiency in applying math in real world activities
- Relate mathematical concepts directly to manufacturing outcomes and part specifications

3-2300 CNC with Simulator

38 contact hours

Prerequisites: Completed **Precision Machining Technology 1** or have equivalent experience.

Recommended For: Individuals interested in CNC operation, programming, or pursuing careers in precision machining

Course Textbook: *No textbook necessary.*

This course provides an introduction to the tools, technology, and principals of Computer Numeric Control (CNC) machining. Students will learn the fundamentals of G&M codes, the Cartesian Coordinate System, and how these apply to CNC programming and operations. Emphasis is placed on safety, machine setup, program creation, and operational skills needed to produce quality planning, use of wear offsets, and techniques for controlling part dimensions-building a strong foundation for entry-level CNC programming and machine operation.

Course Objectives:

Upon successful completion of this course, learners will be able to:

- Understand the function and components of CNC machines
- Explain the principals of the Cartesian Coordinate System in CNC applications
- Interpret and write basic G&M code programs
- Follow safety protocols for CNC machine operation and setup
- Plan machining processes for part production using CNC equipment
- Perform basic CNC machine setups and adjustments
- Create and test simple CNC programs for part manufacturing
- Use wear offsets to adjust and control part dimensions accurately
- Demonstrate foundational operational skills necessary for CNC machining

3-2500 Intermediate Applied Math

42 contact hours

Prerequisites: Completed **Applied Math** or have equivalent experience.

Recommended For: Advanced apprentices, machinist, and individuals preparing for precision machining or advanced set up roles.

Course Textbook: *New Practical Mathematics for Metalworking Trainees*

This third course in the applied mathematics series is designed to further develop the mathematical skills essential for advanced shop activities and precision machining. Emphasis is placed on right triangle trigonometry, the proper application of the Pythagorean Theorem, and the use of trigonometric functions in real world manufacturing scenarios. Students will learn to solve problems involving angles and lengths, and apply trigonometric concepts using sine bars and gage blocks for accurate machine setups.

Course Objectives:

Upon successful completion of this course, learners will be able to:

- Apply the Pythagorean Theorem to solve shop related measurement problems
- Understand and use basic trigonometric functions (sine, cosine, tangent) in manufacturing contexts
- Solve right triangle trigonometry problems relevant to part layout and machining
- Set up accurate machining angles using sine bars and gage blocks
- Relate trigonometric problem-solving to blueprint dimensions and machining processes
- Increase efficiency and accuracy in mathematical applications within the shop environment

3-1500 Intermediate Blueprint Reading w/ GDT

38 contact hours

Prerequisites: Completed **Basic Blueprint & Intermediate Blueprint Reading 2** or have equivalent experience.

Recommended For: Individuals seeking to deepen their understanding of engineering drawings and manufacturing specifications.

Course Textbook: *Intro to Geometric Tolerancing and Dimensioning*

This course builds on blueprint reading skills by introducing the fundamental symbols and concepts of Geometric Dimensioning and Tolerancing (GD&T) as they apply to engineering and manufacturing drawings. Students will learn how to interpret GD&T callouts, understand feature control frames, and apply this knowledge to accurately assess part specifications and functionality in a manufacturing environment. This course bridges the gap between traditional blueprint interpretation and the precision requirements of modern engineering documentation.

Course Objectives:
Upon successful completion of this course, learners will be able to:

- Identify and interpret basic GD&T symbols on engineering drawings
- Understand the purpose and structure of feature control frames
- Explain the importance of GD&T in defining part geometry and allowable variation
- Relate GD&T concepts to real world manufacturing and inspection processes
- Interpret engineering drawings that include both conventional and GD&T annotations
- Communicate effectively using GD&T terminology in technical settings

4-2720 Metallurgy

38 contact hours

Prerequisites: None.

Recommended For: Students and professionals in manufacturing, machining, welding, and materials-related fields

Course Textbook: *Material Science.*

This course introduces students to the fundamental nature and properties of metallic materials used in manufacturing. It explores the history and development of metals, their physical and chemical characteristics, and the principles of thermodynamics and chemical reactions involved in steel production. The course examines the full process of iron and steel making-from raw material to finished product-and emphasizes how different alloying and forming methods affect mechanical properties. Key forming processes such as casting, forging, extrusion, and rolling are analyzed and compared to illustrate their influence on material performance and product quality.

Course Objectives:

Upon successful completion of this course, learners will be able to:

- Describe the historical development and origins of various metals
- Identify key physical and chemical of metals used in manufacturing
- Understand the thermodynamics and chemical reactions involved in steel production
- Recognize how alloying affects the mechanical properties of metals
- Compare and contrast metal forming processes, including casting, forging, extrusion, and rolling
- Relate material properties to their appropriate industrial applications
- Apply basic metallurgical principles to evaluate material selection in manufacturing context

4-2800 Advanced Math

38 contact hours

Prerequisites: Completed **Intermediate Applied Math** or have equivalent experience

Recommended For: Advanced apprentices, machinists, toolmakers, and technicians involved in precision layout or complex machining operations.

Course Textbook: *New Practical Mathematics for Metalworking Trainees*

This fourth course in the applied mathematics series builds on previously developed skills to explore more advanced mathematical concepts used in manufacturing and shop environments. Emphasis is placed on solving complex geometric problems through the application of the Law of Sines and the Law of Cosines. These tools are essential for handling non-right triangle calculations, particularly in precision layout, inspection, and advance machining setups.

Course Objectives:

Upon successful completion of this course, learners will be able to:

- Understand and apply the Law of Sines in manufacturing related geometry problems
- Solve non-right triangle problems using the Law of Cosines
- Interpret and apply complex angular and linear relationships in shop applications
- Relate advanced trigonometric concepts to blueprint interpretation and layout
- Enhance accuracy and efficiency in machining setups requiring advanced math solutions
- Integrate these mathematical principles into real world measurement and fabrication task

4-2900 Quality Control/SPC/Inspection

38 contact hours

Prerequisites: Completed **Intermediate Blueprint with GDT** or have equivalent experience

Recommended For: Manufacturing, machining, and quality assurance personnel; apprentices in precision trades

Course Textbook: *No textbook necessary.*

This course provides an introduction to the principles and practices of quality control in the manufacturing of mechanical parts. Emphasizing the importance of inspection and accuracy, students will learn how to verify part dimensions, orientation, and location using industry standard tools and techniques. The course builds on blueprint reading and Geometric Dimensioning and Tolerancing knowledge, teaching students how to apply these concepts in real world inspection scenarios. In addition, the course introduces the fundamentals of Statistical Process Control (SPC) and the role of statistics in monitoring and improving manufacturing processes.

Course Objectives:

Upon successful completion of this course, learners will be able to:

- Understand the importance of quality control in manufacturing environments
- Use inspection tools and equipment to verify par conformance to specifications
- Apply blueprint reading and GD&T knowledge during part inspections
- Measure and confirm dimensions, locations, and orientations of mechanical part
- Understand basic statistical concepts related to quality control
- Apply SPC techniques to monitor and analyze manufacturing processes
- Document and communicate inspection results accurately and effectively

5-2420 Manufacturing Technology

38 contact hours

Prerequisites: Completed **Precision Machining Technology 1** or have equivalent experience.

Recommended For: Students and professionals in machining, manufacturing, and industrial technology programs.

Course Textbook: *No textbook necessary.*

This course provides a practical overview of machining processes used in modern manufacturing, with a focus on the properties and behavior of various metals during cutting operations. Students will examine how different materials respond to machining, and how to properly adjust speeds and feed rates to optimize performance and tool life. The course also covers the selection and application of a variety of cutting tools, providing foundational knowledge for effective and efficient machining practices.

Course Objectives:

Upon successful completion of this course, learners will be able to:

- Identify the machining characteristics of different metals and alloys
- Adjust spindle speeds and feed rates based on material type and cutting conditions
- Select appropriate cutting tools for various machining operations
- Understand the relationship between material properties, tool selection, and machining performance
- Apply best practices to optimize machining efficiency and surface finish
- Troubleshoot common machining issues related to material variability and tool wear

5-2500 GD&T

38 contact hours

Prerequisites: Completed **Intermediate Blueprint Reading 2** or have equivalent experience.

Recommended For: Individuals in engineering, drafting, machining, inspection, and quality control roles

Course Textbook: *Into to Geometric Tolerancing and Dimensioning*

This course provides an in-depth study of Geometric Dimensioning and Tolerancing (GD&T) as applied to engineering and manufacturing drawings. Students will learn to interpret and apply GD&T symbols and terms in accordance with industry standards. Topics include the fundamentals of feature control frames, positional Tolerancing, and the use of data frames and conversion tables. Through practical examples and exercises, students will develop the skills needed to understand and communicate precise dimensional and tolerance requirements in manufacturing and inspection environments.

Course Objectives:

Upon successful completion of this course, learners will be able to:

- Identify and interpret standard GD&T symbols and terminology
- Understand and apply feature control frames to engineering drawings
- Explain and use positional Tolerancing to define allowable variation in part features
- Read and apply information from data frames and conversion tables
- Relate GD&T principles to manufacturing processes and inspection techniques
- Improve accuracy and clarity in technical communication through the use of GD&T

5-2800 Advanced Applied Blueprint Math 1

38 contact hours

Prerequisites: Completed Advanced Math or have equivalent experience.

Recommended For: Experienced machinist, toolmakers, and individuals working with complex part geometrics and technical drawings.

Course Textbook: *New Practical Mathematics for Metalworking Trainees*

As the fifth course in the applied mathematics series, this class focuses on advanced mathematical techniques necessary for interpreting and solving complex geometric features and unknown surfaces commonly found on blueprints. Through the integration of higher level math concepts and technical drawing analysis, learners will develop the problem solving skills required to accurately calculate and verify intricate part geometrics in manufacturing environments.

Course Objectives:

Upon successful completion of this course, learners will be able to:

- Analyze advanced blueprints to identify and define unknown surfaces
- Apply appropriate mathematical techniques to solve for missing dimensions or surface features
- Interpret complex geometric relationships as they relate to part layout and machining
- Use mathematical problem solving strategies to support manufacturing processes
- Improve accuracy in fabrication by precisely calculating irregular or non-standard features
- Integrate applied math skills with blueprint reading and machining tasks

6-2420 Jig and Fixture

38 contact hours

Prerequisites: Completed **Intermediate Blueprint Reading 2** or **Precision Machining Technology 2** or have equivalent experience

Recommended For: Machinist, toolmakers, manufacturing engineers, and individuals involved in tooling and production planning

Course Textbook: *Basic Jig & Fixture*

This course introduces the principles and practices involved in the design and application of jigs, fixtures, and dies used in manufacturing. Learners will explore the purpose and functionality of key components including bushings, locating devices, and work holding systems. The course emphasizes how properly designed tooling enhances precision, repeatability, and efficiency in production operations. Real world examples and design exercises will support the development of foundational skills in jig and fixture design.

Course Objectives:
Upon successful completion of this course, learners will be able to:

- Understand the role of jigs, fixtures, and dies in manufacturing processes
- Identify and apply various types of bushings used for guiding tools
- Select and design appropriate locating devices to ensure part accuracy and repeatability
- Utilize work holding devices effectively for different machining and fabrications tasks
- Analyze part requirements to determine suitable jig and fixture solutions
- Apply design principles to create or modify basic tooling for specific manufacturing applications
- Improve production consistency through the use of well-designed fixtures and tooling

6-2410 Moldmaking

38 contact hours

Prerequisites: Basic knowledge of machining or manufacturing processes recommended

Recommended For: Toolmakers, mold technicians, machinist, and individuals pursuing careers in plastics manufacturing or tooling design

Course Textbook: *Moldmaking*

This course provides a comprehensive introduction to the principles and practices of moldmaking, with a focus on injection molding. Learners will explore the injection molding process, the structure and function of mold components, and the techniques used to produce cavities, cores, and other essential parts. Topics include mold heating and cooling systems, runner and gate designs, venting, and hot runner systems. The course also examines how moldmaking supports quality and efficiency in plastic part production.

Course Objectives:
Upon successful completion of this course, learners will be able to:

- Understand the injection molding process and its role in manufacturing
- Identify the main components of an injection mold and descried their functions
- Explain the principles of mold heating, cooling, and thermal regulation
- Describe the function and design of runners, gates, venting systems, and hot runner configurations
- Understand various methods for producing mold cavities, cores, and other internal features
- Analyze mold designs for efficiency, part quality, and manufacturability
- Apply foundational moldmaking concepts to real world tooling and production scenarios

6-2800 Advanced Applied Blueprint Math 2

38 contact hours

Prerequisites: Completed **Advanced Applied Blueprint Math 1** or have equivalent experience

Recommended For: Experienced machinist, toolmakers, engineers, and professionals interpreting complex technical drawings

Course Textbook: *New Practical Mathematics for Metalworking Trainees*

This sixth course in the applied mathematics series focuses on advanced problem-solving techniques for identifying and calculating unknown surfaces found in complex blueprints. Learners will build on previously mastered skills to tackle challenging geometric and dimensional problems using higher level applied math. This course is essential for professionals who must interpret detailed engineering drawings and ensure precision in manufacturing and machining applications.

Course Objectives:

Upon successful completion of this course, learners will be able to:

- Analyze complex blueprints to identify unknown surface dimensions and geometry
- Apply advanced mathematical techniques to solve multi-variable geometry problems
- Integrate trigonometric, algebraic, and geometric concepts in real world manufacturing scenarios
- Accurately calculate dimensions of irregular or hidden surfaces
- Enhance precision and efficiency in machining and part layout through mathematical analysis
- Interpret advanced technical drawings with greater confidence and accuracy

6-1300 Diemaking

38 contact hours

Prerequisites: Completed basic manufacturing or machining courses or have equivalent experience

Recommended For: Tool and Die apprentices, machinists, and individuals pursuing careers in metal stamping or automated manufacturing

Course Textbook: *Basic Diemaking*

This course provides foundational knowledge in diemaking as it relates to automated manufacturing and metal stamping operations. Students will explore the design, construction, and function of various types of stamping dies, including blanking, piercing, bending, and forming dies. Emphasis is placed on understanding standard die components, die clearances, and the materials and terminology used in the construction and application of stamping dies. The course prepares learners for further specialization in tool and die technology and high-precision manufacturing processes.

Course Objectives:
Upon successful completion of this course, learners will be able to:

- Identify and describe the main types of metal stamping dies and their functions
- Understand how dies process sheet metal through forming, blanking, and other operations
- Recognize and define standard die components and their roles in die construction
- Apply concepts of die clearance in relation to material type and thickness
- Use correct diemaking terminology in technical communication
- Select appropriate materials for die construction based on application requirements
- Demonstrate a basic understanding of die design principles as applied in automated manufacturing

0-0950 Advanced Diemaking

38 contact hours

Prerequisites: Completed **Diemaking** or have equivalent experience

Recommended For: Advanced Tool and Die apprentices, die makers, and manufacturing technicians working in stamping and automated production

Course Textbook: *Advanced Diemaking*

This advanced level course builds upon foundational diemaking knowledge by exploring complex die designs and their applications in automated manufacturing systems. Learners will study die-to-press relationships, automatic feed systems, and the functionality of inverted, compound, and progressive dies. The course also covers advanced stamping principles, including the chip-off and parting methods, as well as secondary operations such as trimming, shaving, notching, and side-action piercing. Instruction culminates in drawing and redraw dies, combination dies, and related computation procedures essential for high-precision die design and function.

Course Objectives:
Upon successful completion of this course, learners will be able to:

- Analyze die-to-press relationships and integrate automatic feed systems
- Explain the construction and application of inverted, compound, and progressive dies
- Differentiate between progressive die operations using blank-through, chip-off, and parting principles
- Identify and design dies for secondary operations such as notching, trimming, having, and semi-piercing
- Understand and apply the principles of side-action and shear-form dies
- Design and evaluate drawing and redraw dies for deep forming operations
- Apply basic computation procedures used in die layout and development
- Troubleshoot complex die designs to improve production efficiency and part quality

4000-7 Dimensional Metrology

42 contact hours

Prerequisites: Completed **Basic Blueprint** or have equivalent experience.

Recommended For: Advanced Tool and Die apprentices, die makers, and manufacturing technicians working in stamping and automated production.

Course Textbook: *No textbook necessary.*

This course provides a comprehensive introduction to dimensional metrology with a focus on precision measurement in the manufacturing environment. Students will learn the proper use of common hand-held measuring tools, the interpretation and application of Geometric Dimensioning and Tolerancing (GD&T), and how to assess measurement quality in accordance with industry standards. The course also introduces foundational statistical concepts used in quality control, including probability, data organization, distributions, hypothesis testing, and linear regression.

Course Objectives:
Upon successful completion of this course, learners will be able to:

- Properly select and use common hand-held measurement tools
- Interpret GD&T symbols and apply them to blueprint analysis
- Assess measurement quality and ensure conformance to tolerances
- Understand and apply concepts of probability and descriptive statistics
- Organize and analyze measurement data using sample space and random variable concepts
- Apply binomial and normal distribution principles to real world measurement scenarios
- Use the central limit theorem and compute confidence intervals
- Preform hypothesis testing, and identification of Type I and II errors
- Analyze data using linear regression and correlation techniques relevant to manufacturing quality control

Counts as first year of a fully registered apprenticeship program!

Pre-Apprenticeship Program

This program combines four NTMA-U online training courses with supporting reading materials and hands-on exercises, utilizing either physical part or blueprints to reinforce learning outcomes. Designed with flexibility in mind, the course can be successfully completed with minimal resources-only: a textbook, internet enabled device, writing tools, and a workspace are required.

Ideal for schools, training centers, and individuals preparing for entry into formal apprenticeship programs or skilled trades careers.

Students will learn how to:

- Interpret and apply basic blueprint reading techniques
- Preform fundamental shop calculations
- Use manual and electronic measurement instruments accurately
- Understand essential quality control processes and procedures
- Operate basic shop equipment in a safe and effective manner
- Describe common manufacturing processes and their applications

Pre-Apprenticeship Program Courses - 160 Hours

- 1-1100 Basic Blueprint
- 1-1120 Basic Math
- 1-1200 Precision Machining Technology 1
- 4-2900 Quality Control/SPC/Inspection
- CNC Mini Course

Registered Apprenticeship Program

The NTMA Registered Apprenticeship Program is a comprehensive three-year hybrid training program designed to develop a highly skilled and credentialed manufacturing workforce. **This program combines the flexibility of online instruction with required On-the-Job Learning (OJL) at an approved manufacturing facility,** providing a robust foundation in both the theoretical and practical aspects of the precision machining trade.

This hybrid apprenticeship model integrates the best of both time-based and competency-based approaches:

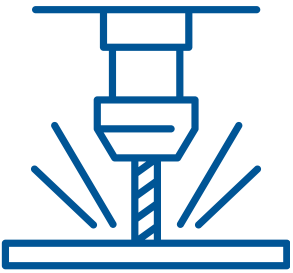
Time-Based: Apprentices must also demonstrate mastery of specific job skill through evaluations and assessments

Hybrid Blend: Apprentice must fulfill both time requirements and competency demonstrations to complete the program

Flexibility: Apprentices may accelerate their training by testing out of certain courses or receiving credit for prior experience and demonstrated skills, potentially completing the program in less than three years

Already in the industry?

Students with work experience or previous education may qualify for transfer credit for our program.



Registered Apprenticeship Courses

Year One - 160 Hours

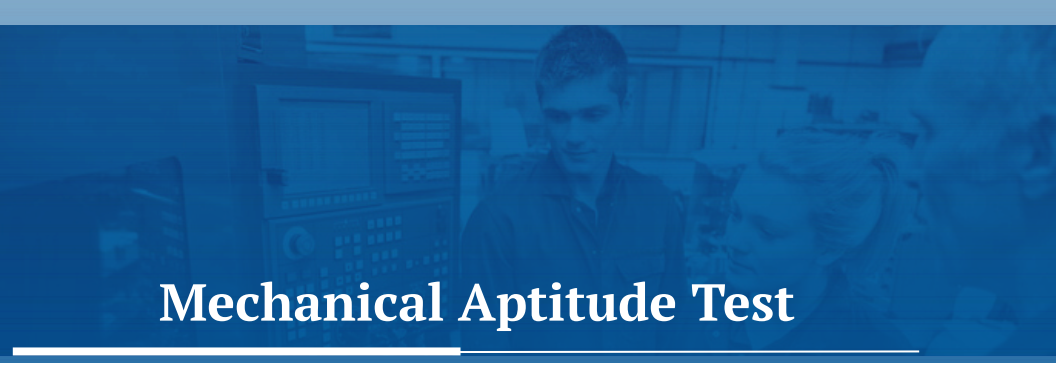
- 1-1100 Basic Blueprint
- 1-1120 Basic Math
- 1-1200 Precision Machining Technology 1
- 4-2900 Quality Control/SPC/Inspection

Year Two - 164 Hours

- 2-1200 Precision Machining Technology 2
- 3-1500 Intermediate Blueprint with GDT
- 2-1120 Applied Math
- 3-2500 Intermediate Applied Math

Year Three - 152 Hours

- 3-200 CNC with Simulator
- 4-2720 Metallurgy
- 4-2800 Advanced Math
- 5-2420 Manufacturing Technology



Mechanical Aptitude Test

In today's market, it's important to know quickly if an external or internal candidate has the basic mechanical aptitude to do the job. Bad decisions have expensive and far-reaching consequence. Utilizing online testing during your employee screening and selection process can help you identify employees with the best chance to succeed.

NTMA's Mechanical Aptitude Test was developed in consultation with industry experts to assess the understanding of basic mechanical principles, along with the applications of those principles to everyday shop situations. This test is appropriate for candidates who will work in a technical setting on and around manufacturing equipment.

The Mechanical Aptitude Test is divided into four sections, each including 20-25 questions and taking approximately 20-25 minutes to complete. The entire test can take up to 2 hours and must be completed in one sitting. We strongly recommend that the test is proctored at an employer's or school's location.

Sections:

- Mechanical and Spatial Relations
- Mechanical Reasoning
- Applied Mathematics
- Theoretical Reasoning

Pricing

All courses are $149 for NTMA members and $449 for non-members.

Mechanical Aptitude Tests are $40 each for NTMA members or $35 each when purchasing 10 or more tests. For non-members, the tests are $150 each.

All textbooks can be purchased directly from NTMA.

Ready to start your journey?

Contact us today!

ntmausupport@ntma.org

216-264-2837

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