

APPLIED INDUSTRIAL TECHNOLOGY (MANUFACTURING TECHNOLOGY) (ATMT)

ATMT-1000 Mechanical & Spatial Relations 4 Credits

Relationship between two-view and three-view images. Basics of visualizing three-dimensional objects from two-dimensional front, side, and top views. Perceptual ability, spatial views, matching parts and figures. Visualization of shapes or patterns that can result from fitting together cut-up pieces. Graphically describing size and shape to represent basic mechanical elements along with cube counting.

Lecture: 4 hours

Prerequisite(s): Departmental Approval: Admission to any Applied Industrial Technology program.

ATMT-1100 Manufacturing Skills I 3 Credits

Stresses relationship of engineering drawing to applications of manufacturing part including lines, views, dimensioning, metric system, calculating cut of points, freehand lettering, sketching, and use of drafting tools to construct blueprint. Includes fraction to decimal conversion, drafting line using geometric equations, line types, orthographic views, isometric views, offset sections, auxiliary sections, symbols, and broken sections.

Lecture: 3 hours

Prerequisite(s): Departmental approval: sponsorship in approved apprenticeship program offered by a member company, or acceptance to PMT certificate program.

ATMT-1110 Manufacturing Skills II 2 Credits

Provides skills in layout techniques and operations, including bolt hole circles, location of surfaces related by non-right angle triangles, and points of tangency. Includes layout drawing by sketching proper views from actual part.

Lecture: 2 hours

Prerequisite(s): ATMT-1100 Manufacturing Skills I or concurrent enrollment; or departmental approval: Admissions to Manufacturing Technology apprenticeship program

ATMT-1120 Machine Operations I 6 Credits

Introduction to machine shop practices to produce manufacturing parts. Includes operation of machinery, terminology, safety, measurement, layouts, print reading, machine set-ups, hand tools, measuring tools, cutting tools, and processes in production work flow. Emphasis on use of typical equipment found in conventional machine shop. Extensive hands-on projects.

Lecture: 1 hour. Laboratory: 15 hours

Prerequisite(s): Departmental approval: Admissions to Manufacturing Technology apprenticeship program.

ATMT-1200 Machine Tool Theory 4 Credits

Presents foundation for study of manufacturing methods, processes, related equipment, and tools of industry, requiring student to understand shop safety practices, job planning, feeds and speeds, layout tools and procedures, hand tools and bench work, metal cutting saws, drilling machines, lathe, milling machines, jig bore and jig grinder, surface grinder, E.D.M, and abrasives.

Lecture: 4 hours

Prerequisite(s): Departmental approval: Admissions to Manufacturing Technology apprenticeship program.

ATMT-1300 Manufacturing Procedures 2 Credits

Principles of blanking and/or piercing dies; bending; screw and dowel holes; die life; punches; pilots; die block construction; strippers and stock guides; shredders and knockouts; nest gages; pushers; die stops; stock material utilization; strip layouts; and die sets. Includes techniques and theory of building stamping dies with topics including cutting and forming operations, primary die components, and internal parts of complete die.

Lecture: 2 hours

Prerequisite(s): ATMT-1200 Machine Tool Theory or concurrent enrollment, and departmental approval: Admissions to Manufacturing Technology apprenticeship program.

ATMT-1500 Manufacturing Tech Skills I 4 Credits

Advanced study of relationship of engineering drawings to applications of machine shop production of precise parts, die, and mold components, to provide students with theory on use of coordinate measuring machine (CMM) for machine tool trades. Machine shop engineering drawing mathematics, used in development and production of part from print in machine shop, will be stressed. Application of engineering drawing skills on projects made in shop. Emphasis on geometric dimensioning. Students will learn to read and comprehend advanced engineering drawings from various industries.

Lecture: 4 hours

Prerequisite(s): ATMT-1200 Machine Tool Theory, and departmental approval: Admissions to Manufacturing Technology apprenticeship program.

ATMT-1600 Introduction to CAD 2 Credits

Introduction to computer systems and computer-aided drafting (CAD) software as tools used to produce engineering drawings. Keyboarding and computer operating skills are overlaid with software commands. Command topics include line coordinate systems, circles and arcs, geometry creation, text styles, editing geometry and text, controlling drawing display, drawing aids, layers, blocks, hatching, and dimensioning.

Lecture: 1 hour. Laboratory: 2 hours

Prerequisite(s): ATMT-1300 Manufacturing Procedures or concurrent enrollment, and departmental approval: Admissions to Manufacturing Technology apprenticeship program.

ATMT-1809 Special Topics: Introduction to Manufacturing
2 Credits

This course is designed to show students the reality of modern manufacturing of new innovation, making an impact, and a chance to play a role in the future. It will provide activities to expand students' knowledge and awareness of the manufacturing industry; and discover how diverse the careers are in design, engineering, or even the business side of the industry.

Lecture: 1 hour. Laboratory: 2 hours

Prerequisite(s): None.

ATMT-1811 Special Topics: Manufacturing Machine Tools and Operations
2 Credits

This course is designed to look at the different tools used across various areas in the manufacturing and construction industry. The basic use of tools in assembly work, construction and the manufacturing of parts for industry. Studying how these tools help to make work easier and make it possible to help industries thrive. Discussing and analyzing how math is infused the construction and manufacturing industry. Demonstrating how blueprint is used in assembly, construction and the manufacturing industry.

Lecture: 1 hour. Laboratory: 2 hours

Prerequisite(s): None.

ATMT-1812 Special Topics-Industrial Applications
3 Credits

This course covers basic measurement, formulas and functions typically encountered within an industrial environment.

Lecture: 3 hours

ATMT-1950 Field Experience
2 Credits

Online course and shop experience in manufacturing technology. Topics are manufacturing specific in disciplines pertaining to company applications. supply inventory control, outsourcing, supplier tracking and UCC coding.

Other Required Hours: 24 hours per week.

Prerequisite(s): ATMT-1100 Manufacturing Skills I or concurrent enrollment, and departmental approval: admission to Applied Industrial Technology - Manufacturing Technology program.

ATMT-2120 Machine Operations II
6 Credits

Theory and application of use of engine lathe, planning machines, milling machines, grinders, quality control, metallurgy, and fasteners. Emphasis on use of typical equipment found in conventional machine shop. Extensive hands-on projects.

Lecture: 1 hour. Laboratory: 15 hours

Prerequisite(s): ATMT-1120 Machine Operations I.

ATMT-2300 Advanced Manufacturing Procedures
2 Credits

Capabilities of computer aided design (CAD) systems are covered. Students will be required to produce working engineering drawings. Instruction in tool path generation, local CNC programming and 2D simulation, including capabilities of computer aided manufacturing (CAM) systems.

Lecture: 1 hour. Laboratory: 2 hours

Prerequisite(s): ATMT-1600 Introduction to CAD, and departmental approval.

ATMT-2400 Advanced Diemaking
2 Credits

Provides a study of important advanced elements of die function and performance. Course will act as a resource for apprentices, tool designers, and others who need a working reference on design, construction, and use of stamping dies.

Lecture: 2 hours

Prerequisite(s): ATMT-2500 Manufacturing Technology Skills II, and departmental approval.

ATMT-2410 Advanced Moldmaking
2 Credits

Study of fundamentals of mold construction, processes and construction of plastic molds such as compression, transfer, pressure molding of non-ferrous alloys, rubber molds, dies cast molds, and injection molds. Includes foundations of mold construction, depending on design of part, material used, equipment available, and ingenuity of moldmaker.

Lecture: 2 hours

Prerequisite(s): ATMT-2500 Manufacturing Technology Skills II, and departmental approval.

ATMT-2420 Advanced Precision Machining
2 Credits

Advanced study of relationship of materials, fixtures, and special machining operations as they relate to applications of machine shop production of precise parts, dies, and mold components. Provides theory on use of machining exotic materials, hard turning, machining of plastics, fourth and fifth axis programming, coolants and specialty inserts. Includes practical applications and machine shop mathematics formulas used in fixture and holding device design. Provides knowledge of castings, weldments, tool coatings and manufacturing methods that are becoming part of today's technology such as waterjets and lasers. Covers advanced metallurgy processes, and standard procedures for troubleshooting all types of manufacturing projects.

Lecture: 2 hours

Prerequisite(s): ATMT-2500 Manufacturing Technology Skills II, and departmental approval.

ATMT-2500 Manufacturing Technology Skills II
4 Credits

Study of relationship of engineering drawings to applications of manufacturing part for CNC machines, screw machines, mold, and die components. Topics include dimension and tolerance; form tolerances; calculation of tolerance using equations; calculation of tolerances using standard shop formulas; profile and run out tolerances; location tolerances; geometric dimensioning; geometric applications; transferring engineering drawing using computer graphics; and development of engineering drawing with computer.

Lecture: 4 hours

Prerequisite(s): ATMT-2300 Advanced Manufacturing Procedures or concurrent enrollment, and departmental approval.

ATMT-2600 CNC Programming/Operations**2 Credits**

Fundamentals of computer application as aid to machining processes. Emphasis on engineering drawing analysis, using trigonometry and other forms of mathematics to determine programming points; ascertaining implied part dimensions; determinations of machining parameters; calculation of speeds; feeds and tool offset; establishment of work zero and tool home positions. Manual programming of computer numerical control (CNC) machines using G-codes; tooling and set-up of CNC lathes and milling machines for machining operations; verification of toolpaths by simulation; and operating CNC machines to produce mechanical parts.

Lecture: 1 hour. Laboratory: 2 hours

Prerequisite(s): ATMT-2300 Advanced Manufacturing Procedures or concurrent enrollment, and departmental approval.

ATMT-2620 CAM Principles**2 Credits**

Study of geometric modeling, using selected CAD/CAM packages to graphically model parts in 2D, 3D wire-frame and solid, generating G-codes, post-processing G-codes into formats interpretable by given CNC controllers. Topics include editing G-codes with verification of toolpaths in 3D and solid model simulation; downloading path programs into CNC turning and milling centers; and machining parts. Use of metrology methods to check dimensional and geometrical accuracy of produced parts.

Lecture: 1 hour. Laboratory: 2 hours

Prerequisite(s): ATMT-2600 CNC Programming/Operations, and departmental approval.

ATMT-2700 Manufacturing Technology Skills III**4 Credits**

Advanced study of manufacturing methods, processes, related equipment, and tools of industry, requiring student to understand standard requirements to being a Journeyman Tool and Diemaker, Moldmaker, Precision Machinist, Precision Screw Machine operator, or Precision CNC operator. Topics include practices of job planning, maximum use of shop supplies, and how to work independently, efficiently and effectively. Scope is to demonstrate thin margin that is required to making a job profitable, helping student to troubleshoot problems that may occur with effective problem solving methods and technique.

Lecture: 4 hours

Prerequisite(s): ATMT-2500 Manufacturing Technology Skills II, and departmental approval.

ATMT-2990 Manufacturing Operation Principles**3 Credits**

Capstone course in Manufacturing Technology. Topics include manufacturing flow, quoting, tool and materials supply inventory control, outsourcing, supplier tracking and UCC coding.

Lecture: 3 hours

Prerequisite(s): ATMT-2700 Manufacturing Technology Skills III or concurrent enrollment.