

Mechanical Engineering Technology

MT107 Basic Machine Shop Practice

Cr-3

This course introduces the theory and practices of metal removal, as practiced in industry. The set-up and safe operation of conventional machine tools are stressed, along with their capabilities and limitations. Common processes such as drilling, grinding, milling, threading, and turning are used. Topics include speeds and feeds, metal cutting theory, cutting fluids, selection of tooling, fixturing, precision measurement, and layout procedures, along with basic blueprint reading and sketching.

MT112 Architectural Drafting

Cr-3

This course is an introduction to the standard drawing techniques and design concepts used for residential and light commercial buildings. Topics include foundations, framing, windows and doors, structural sections, floor plans, elevations, specifications, building codes, and perspectives. Prerequisite: MT140 Drafting and Design Using AutoCAD.

MT114 Manufacturing Processes

Cr-3

This course introduces traditional processes used in manufacturing and methods of processing raw materials into manufactured components. Materials such as plastics, metals, composites, and elements of micro-fabrication and nano-fabrication are covered. Assembly methods include plastics joining, fasteners, and automation.

MT121 Mechanical Drafting

Cr-5

This course covers the fundamentals of engineering drawing with an emphasis on the development of drawing skills. Topics include lettering, sketching, geometric construction, orthographic projections, dimensioning, sectioning, auxiliary views, screw threads, graphs-charts, pictorial drawings, and developments.

MT126 Statics: Mechanical

Cr-3

This course is a study of force systems and their actions on bodies at rest. Topics include force systems, equilibrium of force systems, distributed forces, friction, moments of inertia, centroids, and bending and shear diagrams. The Laboratory component emphasizes computer analysis. Prerequisite: MA121 Fundamentals of College Mathematics or a higher level mathematics course which includes trigonometry.

MT129 Statistical Quality Control

Cr-2

This applied statistics course provides measuring tools for quality control and process control in manufacturing. Topics include frequency distributions; measures of central tendency and of dispersion; natural tolerances, control charts for variables and for attributes; probability theory and applications to sampling and to operational characteristic (O-C) curves; acceptable quality level (AQL) sampling plans; Pareto charts; and, random number tables.

MT139 Mechanical Systems

Cr-4

This course is a study of the basic mechanical components in a complex mechatronics system. Topics include basic functions and physical properties of mechanical components and the roles they play in the system such as materials, lubrication requirements and surface properties, as well as troubleshooting techniques and strategies used to identify, localize and correct malfunctions. Concepts in systemic preventative maintenance and mechanical component safety are presented along with technical documentation such as data sheets and specifications of mechanical elements.

MT140 Drafting and Design Using AutoCAD

Cr-3

This course provides the foundation and problem-solving skills necessary to develop and interpret engineering drawings using the computer-aided drafting software (AutoCAD). Topics include assembly

and detail drawing composition; design for assembly/manufacturing (DFA/DFM); geometric dimensioning and tolerancing; tolerance control and standard fits; fasteners; gearing; sheet metal developments; weldments; functional drafting techniques; and the development of 2-D and 3-D CAD generated drawings and system operations.

MT141 Machining Fundamentals

Cr-4

This course introduces the theory and practices of metal removal as applied in industry. The set-up and safe operation of conventional machine tools is stressed, along with their capabilities and limitations. Common processes such as drilling, grinding, milling, threading, and turning are utilized. Topics include speeds and feeds, metal cutting theory, cutting fluids, selection of tooling, fixturing, precision measurement, and layout procedures. Prerequisites: MT140 Drafting and Design Using AutoCAD, and either MA105 Technical Mathematics 1 or MA121 Fundamentals of College Mathematics 1(Spring semester)

MT149 Pneumatic and Hydraulic Systems

Cr-3

This course presents a study of fluid power technology using fluids or compressed air as the transfer media. Complete hydraulic and pneumatic systems, including power sources, reservoirs, pumps, compressors, lines, valves, and actuators. Additional topics include troubleshooting strategies used to identify, localize and correct malfunctions in pneumatic and hydraulic systems, preventative maintenance, and safety issues.

MT155 Introduction to Solid Modeling

Cr-3

This course is an introduction into the use of three-dimensional solid modeling CAD software. Topics include creating models using features such as protrusions, cuts, rounds, blends, revolutions, and sweeps. Model planning and design intent are stressed. Assemblies, drawings, documentation, and detailing are also covered, as well as output and interfaces with common software such as spreadsheets and word processing.

MT170 Oxy-Acetylene Welding Procedures

Cr-4

This course covers the theory, methods, and use of acetylene equipment to oxy-weld and cut in all positions. Welding supply fee required.

MT174 Electric Arc Welding

Cr-4

This course provides proficiency in oxy-acetylene welding procedures, including the theory and use of electric arc welding. Topics include welding ferrous and nonferrous metals in all positions, and the theory of pipe design and cutting. Welding supply fee required.

MT203 Design of Machine Elements

Cr-3

This course addresses the methods and theory of practical machine design. Topics include stress analysis, shaft design, kinematics of linkages, springs, gears, chains, belts, bearings and welding joints. The application of computer aided design software to some of the analysis problems are covered. An introduction to finite element analysis software are presented. Prerequisites: MT140 Drafting and Design Using AutoCAD and MT230 Strength of Materials: Mechanical.

MT204 Automatic Controls

Cr-3

This course includes the theory and use of hydraulic, pneumatic, and electrical devices to activate and regulate the displacement and position of machine components, basic energy principles applied to mechanical and electrical systems, relay ladder logic, and motor circuits. Prerequisite: MA106 Technical Mathematics 2 or higher level mathematics course containing algebra.

MT207 Computer Aided Manufacturing**Cr-3**

This advanced processes course covers the fundamental theory and application of CAM (computer-aided manufacturing) technology. Programming methods include conversational, G-M Code, and Symbolic FANUC Automatically Programmed Tools. Tool selection and calibrations, part zero, tool offsets, program editing, troubleshooting, and fixturing are also stressed. Rapid prototyping, Computer Integrated Manufacturing (CIM), Flexible Manufacturing Systems (FMS), group technology, robotics, and CAD/CAM systems are also discussed. (Fall semester) Prerequisites: MT141 Machining Fundamentals.

MT209 Materials Science**Cr-3**

This course covers the processing and performance of engineering materials as well as their physical and chemical properties. Topics include the chemistry of metals, plastics, and ceramics. Phase diagrams, heat treatment of metals, and micrographs are studied in the laboratory. Prerequisite: MA121 Fundamentals of College Mathematics AND either CH131 College Chemistry or CH141 General Chemistry 1 or PH151 General Physics 1, AND MT230 Strength of Materials: Mechanical or ES261 Mechanics of Materials.

MT210 Introduction to Vacuum System Maintenance**Cr-3**

This course prepares students to install, maintain, operate, troubleshoot, and repair vacuum and high vacuum systems and demonstrate vacuum and cryogenic safety practices. Students are introduced to the fundamentals of vacuum and pressure, pressure measurement, vacuum technology components, and vacuum system configurations. They demonstrate familiarity with the vacuum generation, measurement and gas flow utilized in modern manufacturing based on hands-on assembly and testing of a basic vacuum system. This course provides knowledge and skills in basic vacuum system operation and troubleshooting, including identification of operational issues, acquisition of operational data, and formulation of possible solutions. Prerequisite: MT149 Pneumatic and Hydraulic Systems, or permission by the instructor.

MT221 Tolerance Assembly Drafting**Cr-4**

This course integrates previous and current course work and applies it to the design of manufactured parts. Designing for easier and more economical manufacturing is emphasized. Topics include assigning tolerances based upon how the part is to function, common manufacturing process tolerances, limit dimensions, avoiding tolerance accumulation, datums, introduction to geometric dimensioning and tolerancing, ASME Y-14.5M-1994, and functional gaging. Prerequisite: MT140 Drafting and Design Using AutoCAD.

MT222 Tool and Design Drafting**Cr-4**

This course introduces the fundamentals of tool design. Topics include break-even charts, tool materials, workholding principles, 3-2-1 basis of location, jig and fixture design for different processes, presswork tooling, punch and die set, gaging and assembly tooling. Prerequisites: MT221 Tolerance and Assembly Drafting. (Spring Semester)

MT223 Electrical-Electronic Drafting**Cr-3**

This course covers basic electrical principles and electronic components, and several types of drawings to support design and documentation of electrical circuits. Topics include device symbols, schematics, ladder diagrams, logic diagrams, architectural electrical drawings, and basic electrical circuit principles such as voltage, current, resistance, Ohms law, and power. Prerequisites: MT140 Drafting and Design Using AutoCAD or CT102 Engineering Drawing and MicroStation CAD.

MT225 Applied Mechanics and Strength of Materials**Cr-4**

This course introduces the statics and strength of materials while emphasizing their uses in practical design situations. Topics include unit conversions, force vectors, moment of a force, and equilibrium of concurrent and coplanar force systems, stress, strain, shear and bending moment diagrams, and bending and deflection of beams. Prerequisites: MA106 Technical Mathematics 2 or higher level mathematics course which includes trigonometry.

MT226 Industrial Materials**Cr-3.5**

This course introduces the properties of commonly used materials. Topics include the method used to evaluate material that will be used in the manufacturing of a part. Prerequisites: MA105 Technical Mathematics 1 and MT114 Manufacturing Processes.

MT229 Building Systems Drafting**Cr-3**

This course covers the various types of service system drawings, such as heating, ventilation and air conditioning (HVAC), water supply, drainage distribution, fire protection, and control systems. Both residential and commercial applications are emphasized, along with CAD drawing methods. Prerequisite: MT112 Architectural Drafting.

MT230 Strength of Materials: Mechanical**Cr-4**

The course introduces the fundamentals of strength of materials. Topics in stress analysis are included. Laboratory activities focus on testing procedures, reporting, and computer analysis. Prerequisites: MT126 Statics Mechanical, CT121 Statics Civil, or ES271 Engineering Science.

MT231 Lean Six Sigma**Cr-4**

This course covers basic functions and challenges of managers in the manufacturing and business environment, focusing on lean manufacturing, small businesses, and entrepreneurship. Topics include: Total Quality Management, continuous improvement, value-added activities and analysis, waste analysis, Just-In-Time, applications of Statistical Quality Control, and other current management methods and techniques. Lab activities may include off-site projects. Prerequisites: MT114 Manufacturing Processes or MA121 Fundamentals of College Mathematics 1.

MT242 Advanced MicroStation CAD**Cr-3**

This is an advanced level course using MicroStation. Topics include theory and operational concepts for three-dimensional CAD drawings and models, solid modeling, rendering, display, and editing techniques. Prerequisites: CT102 Engineering Drawing and MicroStation CAD

MT247 Introduction to Robotics**Cr-4**

This course introduces the application of automated material handling devices in the manufacturing environment. Topics include classification of robots and their work envelopes, system components, programming methods, sensors and applications, economic justification, safety consideration, and industrial applications. Automatic guided vehicles and automatic storage/retrieval systems are discussed.

MT251 Advanced AutoCAD**Cr-3**

This is an advanced course using AutoCAD. Topics include menu customization, theory and operational concepts for three-dimensional CAD drawings and models, solid modeling, rendering and editing techniques. Prerequisites: MT140 Drafting and Design Using AutoCAD

MT252 Fluid Mechanics**Cr-4**

This course covers the fundamental topics and applications of fluid mechanics. Topics include fluid properties, fluid statics, conservation of energy and mass, pipe and duct flow, pumps, and measurement of fluid properties and states. An introduction to heat transfer is included, applying theory to thermal and hydraulic systems. Prerequisite: MA121

Fundamentals of College Mathematics or a higher level mathematics course which includes trigonometry

MT256 Advanced Solid Modeling Cr-3

This course covers advanced solid modeling concepts and techniques. Topics include creating complex parametric models and assemblies using all feature types; creating detail and assembly drawings with various sectioning and view techniques; measurements; surfaces; and motion and analysis models. Model and assembly pre-planning are emphasized. Prerequisites: MT155 Introduction to Solid Modeling

MT270 Welding Procedures for MIG and TIG Cr-4

This course covers the theory and use of TIG (Tungsten Inert Gas) and MIG (Gas Metallic Arc) welding, including non-ferrous and ferrous metals in all positions. Topics include plasma welding, cutting, and safety procedures. Prerequisite: MT170 Oxy-Acetylene Welding Procedures. Welding supply fee required.

MT271 Metallurgy for Welders Cr-3

This course provides a fundamental knowledge and understanding of metallurgy as applied to welding. Topics include heat treating, physical testing, and metallography.

MT272 Advanced Electric Arc Welding Procedures Cr-4

This course continues with instruction of the principles and practices of gas arc (TIG) and gas metallic arc (MIG) welding on ferrous and non-ferrous metals and pipe. Topics include special arc cutting techniques such as air carbon arc, oxygen arc, underwater cutting, plasma cutting, along with theory and safety. Welding supply fee required. Prerequisite: MT174 Electric Arc Welding Procedures.

MT273 Welding Certification Cr-5

This course discusses welding codes. Topics include set regulations covering permissible materials, service limitations, fabrication, inspection, testing procedures, and qualifications of welding operations. Emphasis is placed on preparation for the New York State Welding Certificate Exam. Welding supply fee required. Prerequisite: MT272 Advanced Electric Arc Welding Procedures.

MT276 Welders Ornamental Iron and Blacksmithing Cr-4

This course covers the design and fabrication of wrought iron and sculpture. Topics include the theory of blacksmithing and the use of the forge on various metals. Safety is stressed. Welding supply fee required.

MT277 Welders Blueprint Reading and Metal Fabrication Cr-4

This course covers weldment design factors. Topics include the interpretation of trade drawings, as well as the specification and use of welding symbols. Welding supply fee required.

MT278 Welding Inspection and Quality Control Testing Cr-4

This course presents the American Welding Society standards. Topics include the standards of testing of welds, preparation of test samples, methods of inspection and quality control, and fundamentals and interpretations of the American Welding Society, the American Society of Mechanical Engineers, and the American National Standards Institute welding codes. Welding supply fee required.

MT279 Sheet Metal Fabrication Cr-3

This course introduces students to the knowledge and skills required for the fabrication of sheet metal products, with special attention paid to the needs of regional industry. Gas metal arc welding (GMAW) or "MIG" and gas tungsten arc welding (GTAW) or "TIG" welding processes will

be used as well as specialized sheet metal fabrication equipment, to include shear, brake, English wheel, and pin roller. Welding supply fee required.

MT291 Introduction to Machining Cr-4

This course introduces fundamental concepts of machining. Topics include safety, blueprint reading, precision measurement tools, machining a work piece to drawing specification, use of manual machines (milling, lathe, etc.), proper tooling and work-holding methods, and how to determine sequential machining operations of complex parts.

MT292 Introduction to CNC Milling Cr-4

This course introduces fundamental concepts of CNC milling centers. Topics include safety, blueprint reading, shop math, machining a work piece to drawing specification, introduction to CNC programming, set-up for milling machines, use of CNC milling machines, proper tooling and work-holding methods, and how to determine sequential machining operations of complex parts. Corequisite: MT291 Introduction to Machining.

MT294 Introduction to CNC Turning Centers Cr-4

This course introduces fundamental concepts of CNC Turning centers. Topics include safety, blueprint reading, Geometric Dimensioning and Tolerancing (GD&T), machining a work piece to drawing specification, introduction to CAM programming software, use of CAD to create drawings, introduction to CNC programming for lathes, use of CNC lathe, proper tooling and work-holding methods, and how to determine sequential machining operations of complex parts. Corequisite: MT293 Advanced CNC Milling.

MT295 Advanced CNC Turning Centers Cr-4

This course introduces advanced concepts of CNC Turning centers. Topics include safety, blueprint reading, live tools, C & Y axis programming, soft Jaws, machining a work piece to drawing specifications, CAM programming software, use of CAD to create drawings, manual programming for lathes, set-up of CNC lathe, proper tooling and work-holding methods and how to determine sequential machining operations of complex parts. Corequisite: MT294 Introduction to CNC Turning Centers.

MT296 Multi-Axis CNC Machining Cr-4

This course introduces fundamental concepts of Multi-Axis CNC Turning and Milling centers. Topics include safety, blueprint reading, machining a work piece to drawing specification, CAM programming software, CNC programming for Multi-Axis lathes, CNC programming for 4 and 5 axis machining centers, use of CNC milling machines and lathes, proper tooling and work-holding methods, advanced machining setups and tooling for milling machines and lathes, and topics on CNC wire EDM machining. Corequisite: MT295 Advanced CNC Turning Centers.

MT297 CNC Capstone Cr-4

In this capstone course students utilize and demonstrate the skills learned in the CNC/Machinist program. Students design, program, manufacture, and inspect the part they design, CAM and CAD software are utilized for design and programming purposes. The final project is manufactured and inspected to design specifications. Corequisite: MT296 Multi-Axis CNC Machining.