MANUFACTURING TECHNOLOGIES (MFG)

MFG 0905 Foundations of Manufacturing Math (2 Credits)
First course in Manufacturing Mathematics, a study of arithmetic and algebraic operations applied to manufacturing circumstances. Fractions, decimals, tolerances, percentages, powers and roots, the metric system, as well as ratios and proportions are studied in depth.
Prerequisite or corequisite: MFG 1405 (Unless student places out of MFG 0905)

MFG 1000 Math for Welders (3 Credits)
Math for Welders is a classroom-based course focused on the in- depth study of arithmetic, algebraic, geometric, and trigonometric operations applied to the welding trade. Topics include fractions, decimals, ratios, proportions, algebraic expressions and equations, geometric principles applied to triangles and circles, and trigonometric functions.

MFG 1004 Manufacturing Processes (4 Credits)
Based on lectures, students study the theoretical concepts involved in the process of designing and manufacturing parts, as well as the develop the understanding, knowledge and skills required in engineering design and manufacturing processes, including Measurements, Math and Blueprints. Lab (Shop) studies emphasize Measuring, Variations and Tolerances, Benchwork and Layout, Workholding, Drilling, Milling, Turning, Grinding and other manufacturing operations as times allows. Exercises in the Lab (Shop) will involve setup, procedures and execution for various manufacturing processes, using a variety of tools, machines and materials.
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* 104, MFG* 102 - legacy college dependent

MFG 1010 Parametric Design (3 Credits)
Introduction to computer-based design using SolidWorks® parametric 3D CAD software. The course focuses on Parametric Modeling and topics include: Design Intent and Process, Sketching Techniques, Model Development Techniques, Process-Specific Modeling, Design Changes, Editing Models, Patterning and Assembly Techniques. Students will participate in mostly individual and some group design projects as appropriate
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* 110

MFG 1020 Introduction to Welding (4 Credits)
Introduction to Welding is a lab course focused on Oxyfuel Cutting (OFC) and Shielded Metal Arc Welding (SMAW). This course covers: oxyfuel torch setup and cutting; welding machine setup and SMAW in the flat, horizontal, vertical, and overhead positions. Proficiency will be demonstrated through projects including cladded plates in each position. Welding skills and visual inspection techniques will be developed by example and through instruction. The importance of shop floor etiquette, workplace cleanliness, and safe work practices will be emphasized.
Prerequisite or corequisite: MFG 1050 (A grade of C- or higher if taken as a prerequisite)
Additional fees may apply

MFG 1028 Blueprint Reading for Welders (3 Credits)
Blueprint Reading for Welders is a classroom-based course focused on the study of blueprint reading as it applies to the welding trade. Topics include, lines and their uses, auxiliary views, sectional views, basic and special dimensioning, dimensioning practices for holes, chamfers, angle, tapers, diameters, radii, and geometric tolerancing. The second half of this course focuses on interpreting drawings related to the welding field. Topics include various weld and joint type symbols that are used in welding blueprints. Supplemental symbols are also covered, including size, shape, location, and finish requirements of various weldments. Interpretation of testing requirements on simple and complex blueprints is introduced.
Previous: Legacy Equivalent(s): MFG* 128

MFG 1049 Introduction to Metal Fabrication (3 Credits)
Introduction to Fabrication is a classroom and lab-based course focusing on skills and concepts related to fabrication and repair with a focus on practical applications. Lecture topics include fabrication basics, pipe and tubing, bending and straightening, vehicle welding, and best welding practices. The lab portion concentrates on SolidWorks and metrology as related to fabrication. SolidWorks is a computer aided design program that is used to model parts and create blueprints for fabrication and CNC. Metrology is the study and practice of accurate and consistent measurement of parts utilizing industry standard measuring tools.
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* 149

MFG 1050 Welding Theory I (3 Credits)
Welding Theory I is a classroom-based course focused on the equipment, supplies, and techniques used in Oxyfuel Cutting (OFC), Shielded Metal Arc Welding (SMAW), Gas Metal Arc Welding (GMAW), and Flux Core Arc Welding (FCAW). Subjects covered will support and augment the hands-on experience covered in Introduction to Welding.

MFG 1200 Automation Fundamentals (3 Credits)
Automation fundamentals explores the interoperation of the mechanical and digital systems that form the backbone of automated manufacturing systems. Students will learn to follow the intended workflow of the system and subsystems in order to troubleshoot issues within these systems. Subsystems will include automated material handling, storage and retrieval, assembly, and inspection operations. Topics include System troubleshooting, I/O troubleshooting, Component Troubleshooting, and Introduction to Local Area Networks.
Additional fees may apply

MFG 1210 Circuit Design and Diagnostics (4 Credits)
Circuit Design and Diagnostics is a foundational course that will introduce the student to electrical and electronic components, circuits, circuit design, and faulty circuit diagnosing. Topics include fundamentals of electricity and electronics, basic circuits, methods of power generation, advanced electronic circuits, and electronic communication and data systems.
Corequisite: MFG 1330
Additional fees may apply

MFG 1220 Digital Concepts (3 Credits)
This course covers the operation, application, and troubleshooting of TTL and CMOS electronic logic devices, their use in combinatorial and sequential logic circuits, the interface between the logic families, and the interface between digital and analog circuits. The course also provides a study of Boolean algebra, binary and hexadecimal number systems, binary codes, Karnaugh mapping, and the analysis of the basic components and circuits used in semiconductor switching.
Prerequisite or corequisite: MFG 1330 (with a C- or higher if taken as a prerequisite)
Additional fees may apply

MFG 1225 Digital Controls (3 Credits)
Advanced manufacturing systems rely on various feedback driven digital components for sequencing, timing, and control of automated operations. Digital Controls will discuss these components, and various methods of digital signal processing; including microcontrollers, microprocessors, variable frequency drives, and other programmable logic devices. Students will gain hands on experience interfacing inputs and outputs to logic devices, programming logic devices, and troubleshooting faults within these devices.
Prerequisites: MFG 1220 with a C- or higher
Additional fees may apply

MFG 1230 Industrial Fluid Power (3 Credits)
Fluid power is a very important component of modern manufacturing due to the unique capabilities not possible with other power systems. The applications of fluid power are expanding and the demand for trained personnel is steadily increasing. Thus, any person who wishes to be involved in the manufacturing process in a repair, control or engineering role should be familiar with the fundamentals of hydraulics and pneumatics. This introductory course is a study of the principles, concepts and equipment used in the field of hydraulics and pneumatics. Course emphasis is placed upon systems design, applications, maintenance, and repair. The following concepts are reviewed: fluid power principles, hydraulic pumps and pneumatic compressors, fluid power actuators, control valves, conductors, conditioning equipment, and other fluid power components.
Additional fees may apply

MFG 1235 Industrial Maintenance, Service and Repair (3 Credits)
Industrial Maintenance Service and Repair will introduce the student to the mechanical side of industrial maintenance. This includes proper safety practices, proper tool use, print reading. The different aspects of power transmission, pulleys, gears, chains etc. we have a focus on proper troubleshooting techniques for proper and timely resolution of malfunctions.
Additional fees may apply

MFG 1240 Motor Controls for Automation (3 Credits)
The process of motor control is integral to the flow of the product from raw materials to finished product. Industrial Motor Controls will familiarize the student with the following: AC and DC motor controls, schematic diagrams and control circuits, relays, contactors and motor starters, pilot devices, motor drives, and motor installation issues.
Prerequisites: MFG 1330, MFG 1337, MFG 1338
Additional fees may apply

MFG 1245 Programmable Logic Controllers Applications (3 Credits)
The incorporation of the PLC is one of the fastest growing sectors in the field of electronics as the PLC replaces electromechanical Control Systems, such as electromagnetic relays and Programmable Logic Devices (PLD's). Programmable Logic Controllers provides you with an overview of the PLC, its hardware, numbering systems and codes, logic fundamentals, programming timers and counters, program control and data manipulation instructions, math instructions, sequences and shift register instructions, PLC installation, editing and troubleshooting.
Prerequisites: MFG 1220
Additional fees may apply

MFG 1250 Robotic Automation (3 Credits)
Robotic systems are the prime movers of the automated manufacturing revolution. Robotic Automation is a comprehensive course that will allow the student to preview many of the technical aspects of robotic principles, power, design, control, and application. Robotic automation will introduce core concepts of electric, hydro, and pneumatic power, digital logic, digital control, electronic sensing systems, end-of-arm tooling, programming, and industrial automation. The course will compare and contrast different robotic systems, subsystems, and their uses. Students will apply this knowledge with hands on labs using industry standard robotic systems to create their own automated processes.
Additional fees may apply

MFG 1330 Mathematics for Electricity and Electronics (3 Credits)
Mathematics for Electricity and Electronics is intended for the student who needs in-depth knowledge of the mathematics of electronics and electricity. It will review several areas that the student may be familiar with and move into advanced areas that are necessary for the understanding of electronics functions and analysis of complex circuits, including: the basic laws of arithmetic, the powers of numbers, scientific notation, literal equations, trigonometry of the right triangle, basic geometric concepts of angles, fractional exponents, and frequency distribution.
Prerequisites: Placement into MATH 0900I or instructor permission
Previous: Legacy Equivalent(s): MFG* 133

MFG 1337 Circuit Theory (3 Credits)
The circuit is a fundamental building block for all electrical and electronic devices that make our life comfortable and efficient. There are several principles that determine the flow of electricity that any student of electricity or electronics must learn in order to understand the nature and abilities of electrical and electronic equipment. Circuit Theory I is an introduction to direct current (DC) circuits. Circuit Theory I will introduce the student to electrical/electronic components; the nature of electricity (voltage, current and resistance); Ohm's Law of measurement; the concept of energy and power; types of circuits (series, parallel, and series-parallel); Thevenin's and Norton's Theorems of circuits simplification, and magnesium and electro magnetism.
Prerequisites: Placement into MATH 0900I or instructor permission
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* 137

MFG 1338 Digital Fundamentals (3 Credits)
Digital circuitry is the foundation of computers and automated control equipment in our industries. Digital circuitry is the basis for many of our appliances, alarm systems and heating systems. Our newer automobiles utilize digital circuits and devices to make them safer and more energy-efficient. Consequently, a basic understanding of the elemental nature, design, theory, and operation of digital circuits is necessary for any electronics student. This course provides the foundation necessary for the understanding of digital logic. The student is introduced to the concepts of digital vs. analog waveforms, digital and other numbering systems, digital codes, and Boolean algebra. The student is then introduced to the various logic gates that are incorporated into all logic systems from that of a computer to a microprocessor in a household appliance. This course explores the combination circuits, data control devices, sequential logic (flip-flop and counters) circuits and shift registers, communications protocols, and finishes with an interface with the world of analog.
Prerequisites: Placement into MATH 0900I or instructor permission
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* 138

MFG 1340 Robotics (3 Credits)
Robotics provides the student with a brief history of the application of robotics to the manufacturing process to date and a vision of future applications of robotics. Robotics provides an overview of the robotic hardware, software, and programming necessary to specific applications. Robotics reviews the following: electromechanical systems, fluid power systems, sensing systems, end-of-arm tooling, programmable logic controllers (PLC's), digital electronics, programming, and industrial applications.
Prerequisites: MFG 1338, MFG 1343, MFG 1346
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* 140

MFG 1342 Electronic Circuits and Devices (3 Credits)
Electronic circuits and devices are commonplace in the industrial manufacturing process; consequently, a complete understanding of control circuits and devices is necessary for anyone who intends to have a career in manufacturing control, maintenance, or engineering. Electronic Circuits and Devices provides an introduction to electronic materials, components, circuits, devices and their applications. The course will provide an overview of semiconductors, diodes, transistors (bi-polar, field-effect and unijunction), applications of silicon-controlled rectifiers (SCR's) and triodes for alternating current (TRIAC's) to circuits, and application of components to rectifiers, amplifiers, and relays.
Prerequisites: Placement into MATH 0900I or permission by instructor
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* 142

MFG 1343 Industrial Motor Controls (3 Credits)
In the global economy of today, it is imperative that the manufacturing of each product is as cost-efficient as is physically possible. This efficiency is brought about through the application of the latest technology to the manufacturing process. The process of motor control is integral to the flow of the product from raw material to finished product. Industrial Motor Control will familiarize the student with the following: principles of solid-state control devices and their components (such as semiconductors, p-n junction, Zenor diodes, and transistors); alternating current (AC) and direct current (DC) motor controls; motor drives; control circuits; motor starters and pilot devices.
Prerequisites: Placement into MATH 0900I or instructor permission
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* 143

MFG 1344 Hydraulics and Pneumatics (3 Credits)
This course is an introduction to the fundamentals of hydraulics and pneumatics, which involves both theoretical and practical study, including problem solving. Topics will include valves, pumps, circuits, system troubleshooting, and controllers for major processing equipment.
Prerequisites: Placement into MATH 0900I or instructor permission
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* 144

MFG 1345 Electronic Variable Speed Drive (3 Credits)
The flow of product in the manufacturing process can be as simple as an on/off motor control switch or as complex as a variable speed drive that incorporates a feedback system. Most large and small companies utilize the more technologically advanced systems, hence they incorporate one or more variable-speed drive(s) in their production process. Electronic Variable-Speed Drive Systems will introduce the student to alternating current (AC) and direct current (DC) drive fundamentals, switching amplifier field current controllers, silicon- controlled rectifier (SCR) armature voltage controllers, brushless DC motor controllers, chopper circuits, voltage inverters, and flux vector drives.
Prerequisites: Placement into MATH 0900I or instructor permission
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* 145

MFG 1346 Programmable Logic Controllers (3 Credits)
The incorporation of the Programmable Logic Controller (PLC) is one of the fastest growing sectors in the field of electronics as the PLC replaces electromechanical control systems, such as electromagnetic relays and programmable logic devices (PLD's). Programmable Logic Controllers provides the student with an overview of the PLC, its hardware, numbering systems and codes, logic fundamentals, programming timers and counters, program control and data manipulation instructions, math instructions, sequencer and shift register instructions, and PLC installation, editing and troubleshooting.
Prerequisites: Placement into MATH 0900I or instructor permission
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* 146

MFG 1359 Industrial Maintenance (3 Credits)
The industrial maintenance course is designed to give the student an overview of the mechanical nature of industry. Even though electronic devices have made great inroads in industry, the mechanical nature of production remains nearly unchanged over the years. The expression the wheels of industry remains as true today as it did yesterday. This course will provide the skills necessary to install and to maintain the mechanical parts and machines that provide the ability of manufacturers to produce our manufactured products e.g., automobiles, appliances, etc. The course covers the following areas: safety, tools, fasteners, industrial print reading, belts and sheaves, chains and sprockets, gears and gearboxes, bearings, shafts, lubrication, seals and packings, pumps and compressors, fluid power, piping systems, and preventive maintenance.
Prerequisites: Placement into MATH 0900I or instructor permission
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* 159

MFG 1362 CNC Maintenance and Repair (3 Credits)
CNC Maintenance and Repair I provides the student with an introduction to computer numerical control (CNC) machinery including the CNC mill and CNC lathe. Topics include: CNC safety, basic CNC components, basic operations of a CNC, overview of the control unit and operator's unit, CNC part programming, CNC operation and interfacing (programmable machine controller (PMC) system), measurement devices, and troubleshooting techniques. CNC Maintenance and Repair I is designed to give the student an in- depth overview of the design, programming, and operation of CNC machinery, thereby providing the foundation for CNC maintenance and repair.
Prerequisites: Placement into MATH 0900I or instructor permission
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* 162

MFG 1400 Advanced Metrology with CMM (Coordinate Measuring Machines) (3 Credits)
This course is a lab course for a Advanced Metrology with CMM. This course would be taken after having successfully taking MFG 1420 Metrology. It meets hands on for a 3-hour lab. Labs start with drawing (sketching) exercises to add GDandT controls and symbols to engineered drawings using paper and pencil then machined parts are measured using methods of verifying GDandT tolerances by layout and inspection (using a surface plate, shop standards and the electronic height gage) and using a variety of Coordinate Measuring Machines to again measure the parts. Programming a DCMM with the PCDMIS language is presented at the end of the course. Some of the tools presented in the labs are surface plates, surface gage and indicator, electronic height stands, use of dowel pins and tooling balls, Gage 2000 CMM, FARO arm CMM, and Global 555 DCMM.
Prerequisites: MFG 1420 and MFG 1424
Prerequisite or corequisite: MFG 1425 or MFG 2439
Additional fees may apply

MFG 1405 Manufacturing Math (3 Credits)
A Manufacturing Mathematics course that focuses on the study of Algebra, Geometry, and Trigonometry as it applies to manufacturing circumstances. The algebra portion includes algebraic expression, writing equations, and solving equations. The geometry portion includes the study of geometric principles applied to lines, angles, triangles, other polygons, and circles. The trigonometry portion includes Sine, Cosine, and Tangent functions applied to right triangles; and the Law of Sines and the Law of Cosines applied to oblique triangles.
Prerequisites: MFG 0905 OR placement into MFG 1405
Previous: Legacy Equivalent(s): MFG* 105

MFG 1409 Introduction to MasterCAM (3 Credits)
This course introduces the student to computer-based CAD/CAM (Computer-Aided Drafting/ Computer-Aided Manufacturing) using MasterCAM software, an industry standard. CAD/CAM uses CAD drawing tools to describe geometries of an object. The CAM portion of the program defines the toolpath that directs the motion of a machine tool to create a product that is the exact shape that was drawn. This introductory course familiarizes the student to MasterCAM using mill, lathe, and solids tutorials.
Prerequisites: Placement into MATH 0900I or instructor permission
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* 109

MFG 1411 Manufacturing Materials and Processes I (3 Credits)
An introduction to the basic principles on which manufacturing processes are based, and to the basic materials produced by or used in these processes. Topics include: nature of materials and specifically metals; the basic processes in manufacturing metals and some non-metals; testing of engineering materials; ferrous and non-ferrous metals and alloys; fundamentals of metal casting, molding, and heat-treating processes; metal cutting, forming, welding, joining, and abrasive processes; metal machining processes; quality control measurement and inspection. Some topics include problem solving and algebra-based calculations.
Prerequisites: MATH 1010 (may be taken concurrently) or permission of instructor.
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* 111

MFG 1413 Principles of Quality Control (3 Credits)
This is the first course in Quality Control. Topics covered includes determination of Quality basics, problem solving tools, estimation of a process, standard deviation of a sample data, calculation of probability of simple events, use of control charts, and process capabilities. Student will develop SPC and TQM Manufacturing Plans.
Prerequisite or corequisite: MFG 1405
Previous: Legacy Equivalent(s): QUA* 114

MFG 1414 Quality and Lean Principles (3 Credits)
Introduction to Total Quality Performance systems, and Lean Methodology. Provide the students with an overview of the history of Total Quality Performance along with the theory and objectives. Students will learn some of the tools used for Quality Control inspection and observation along with the methods used in lean implementation for manufacturing operations. Also included possible tour(s) of manufacturing companies that are utilizing Lean mfg. methods. Students will get the opportunity to view a real-world Lean Manufacturing Operation (time permitting). Also, participate in hands- on Quality Improvement exercise, or Kaizen Event. The course includes the following topics: history of lean manufacturing, Toyota Production System [TPS], lean principles, root cause analysis [RCA], 5S, and an Introduction to Six-Sigma methodology.
Previous: Legacy Equivalent(s): MFG* 114, QUA* 114

MFG 1415 Safety in the Workplace (1 Credits)
This course provides and introduction to the safety and health issues encountered in a manufacturing environment. This course introduces students to the concepts of personal and work environment safety requirements of manufacturers as well as the governmental oversight agencies such as OSHA.
Previous: Legacy Equivalent(s): MFG* 115

MFG 1420 Metrology (3 Credits)
This course covers the scientific study of inspection, Metrology. Students will be instructed on correct measurement techniques as well as provided with hands-on exercises in order to complete inspection reports using a multitude of measurement instruments that are commonly used in the manufacturing industry.
Previous: Legacy Equivalent(s): MFG* 120

MFG 1424 Blueprint Reading 1 (3 Credits)
This is an initial course introducing the basic principles of blueprint reading. Topics include layouts of drawings, line types and their usage, orthographic projections, sectional and auxiliary views, sketching, dimensioning and tolerancing practices for holes, chamfers, angles, tapers, keyways, diameters and radii.
Previous: Legacy Equivalent(s): MFG* 124

MFG 1425 Blueprint Reading 2 with Geometric Dimensioning & Tolerancing (3 Credits)
This is an advanced level course in Blueprint Reading with an emphasis on Geometric Dimensioning and Tolerancing. Students will be instructed on the language and symbology used on blueprints to communicate form, fit, and function of mating components and assemblies.
Prerequisites: MFG 1424 or EGR 1120 with a C- or higher
Previous: Legacy Equivalent(s): MFG* 125

MFG 1453 Benchwork (2 Credits)
This course covers the fundamental principles used in semi-precision and precision layout. Students will be instructed on proper technique using hand tools, band saws, hole making tools, work holding devices, and deburring tools in order to fabricate workpieces from blueprints. Half of the course will be spent in lecture and half will be spent in lab completing hands-on projects.
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* 153

MFG 1467 Conventional Process Machining Lab (4 Credits)
This course is a combination of classroom theory and hands on lab experiences. This course is 8-hours classroom of lab each week to machine various projects. This course introduces a student to the fundamentals of metal machining technology machines. The student will learn how to operate lathes. Students perform basic lathe operations including turning, facing, knurling, drilling, reaming and tapping. The student also performs basic milling operations such as indicating a vise, tramming a head, use an edge finder, square a block, drill tap and ream holes on location. Speeds and feeds and basic machining principles are covered. In addition, the lab includes the associated use of measuring tools and instruments used in the inspection of class required projects. Student is introduced to ProtoTRAK CNC - digital read outs of X and Y machine coordinates.
Prerequisites: Placement into MATH 0900I or instructor permission
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* 167

MFG 1477 Machine Technology Fundamentals (4 Credits)
This course is a combination of classroom theory and hands on lab experiences. This course is 8-hours classroom of lab each week to machine various projects. This course introduces a student to the fundamentals of metal machining technology machines. The student will learn how to operate lathes, mills, grinders and sawing machines. Students perform basic lathe operations including turning, facing, knurling, drilling, reaming and tapping. The student also performs basic milling operations such as indicating a vise, tramming a head, use an edge finder, square a block, drill tap and ream holes on location. Speeds and feeds and basic machining principles are covered. The student also learns how to operate a surface grinder using all safety guidelines, mount and dress a wheel and grind surfaces flat and parallel. The student also learns to operate a bench grinder.
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* 177

MFG 1478 CNC Fundamentals (3 Credits)
This course is a combination of classroom theory and hands on lab experiences. This course is split with 3-hours classroom and 3-hours lab each week to machine various projects. This course introduces a student to the fundamentals of Computer Numerical Controlled machines. The student will learn conversational programming to operate lathes and milling machines. This is the first step to understand the Cartesian Coordinate System and basic steps and processes to machine parts to blueprint specifications. The students will also learn to operate CNC machines to understand and set tool offsets as well as loading programs. This also includes proper tool and cutter mounting for best performance. Cutter compensation is covered in both conversational and G-code language. This includes the set-up of vises and other work holding devices or fixtures. Indicating surfaces and datum identification is an important part of this class. Geometric Dimensions and Tolerances are explained to meet business and industry standards. Included is maintenance and machine care.
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* 178

MFG 1479 Career Awareness for Manufacturing (1 Credits)
This course will prepare students for the opportunities available in different manufacturing career pathways. Students will strengthen their skills in researching potential employers and in personal marketing, including building resumes and sharpening their interview skills.
Previous: Legacy Equivalent(s): MFG* 179

MFG 1501 Introduction to Injection Molding Technology (3 Credits)
This course provides students with a foundational understanding of injection molding terminology, machine controls, and startup and shutdown procedures. Students will learn to recognize and address common part defects, color variations, and shrinkage. Additionally, students will gain knowledge about the properties of frequently utilized molding materials. This course has Advanced Manufacturing and Materials Fees.
Additional fees may apply

MFG 1502 Injection Molding Design Lab (4 Credits)
In this course, students will gain a comprehensive understanding of injection molding principles, including mold design considerations, material selection, process optimization, and quality control techniques. They will learn to interpret design requirements, create mold designs using industry-standard software, and simulate molding processes to predict part quality and production efficiency. This course has Advanced Manufacturing and Materials Fees.
Prerequisites: MFG 1501
Additional fees may apply

MFG 1503 Injection Plastic Materials Lab (4 Credits)
The Injection Plastics Materials Lab is a practical, hands-on, course designed to provide students with comprehensive knowledge and skills in working with plastic materials for injection molding processes. They will learn hands-on techniques for preparing and handling plastic materials, setting up molds, adjusting processing parameters, and troubleshooting common issues encountered during the molding process. Practical exercises will focus on optimizing processing parameters to achieve desired outcomes in terms of part quality, consistency, and efficiency. This course has Advanced Manufacturing and Materials Fees.
Prerequisites: MFG 1501
Additional fees may apply

MFG 1504 Inject Mold Machine Setters (3 Credits)
The Injection Molding Machine Setters course is designed to equip students with specialized knowledge in the setup and operation of injection molding machines. This comprehensive curriculum encompasses crucial subjects, from machine readiness and parameter customization to problem-solving and equipment upkeep. Throughout the course, students will examine the complexities of setting up injection molding machines, covering tasks such as installing molds, loading materials, and adjusting tooling. The course prioritizes a deep understanding of the machine's components, their roles, and strategies for maximizing the efficiency to streamline production processes. This course has Advanced Manufacturing and Materials fees.
Prerequisites: MFG 1501
Additional fees may apply

MFG 2050 Welding Theory II (3 Credits)
Welding Theory II is a classroom-based course focused on the equipment, supplies, and techniques used in Gas Tungsten Arc Welding (GTAW), Plasma Arc Cutting (PAC), Resistance Welding (RW) and Pipe and Tube welding. Subjects covered will support and augment the hands-on experience covered in Advanced Welding and Advanced Fabrication.
Prerequisites: A grade of C- or higher in MFG 1050

MFG 2067 Metallurgy (3 Credits)
Metallurgy is a classroom-based introductory course covering the basic principles of metallurgy and describes their uses in industrial applications. This course will explain why certain material properties are desired and how these properties are attained.
Previous: Legacy Equivalent(s): MFG* 267

MFG 2070 Welding Automation and Processes (3 Credits)
Welding Automation and Processes is a lecture and lab- based course focused on automatic/specialty cutting and welding processes. Equipment covered in this course includes CNC controlled plasma, water jet, and laser cutting processes in addition to automated and manual laser welding processes, press brake forming, and robotic welding.
Corequisite: MFG 2080
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* 270

MFG 2073 Welding Codes, Testing, and Certification (3 Credits)
The Welding Codes, Testing, and Certification is a classroom and lab-based course focused on preparing to be certified in one or several welding processes. Certification tests are designed to ensure that the weldment meets specific standards as to the specific welding process, type and thickness of metal, joint design, position(s) and other requirements. This course will review American Welding Society (AWS) structural and aerospace welding specifications. Content covered in the classroom will tie in directly to projects and laboratories conducted during Advanced Welding.
Corequisite: MFG 2081
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* 273

MFG 2080 Advanced Fabrication (3 Credits)
Advanced Fabrication is a lab-based course focused on developing the skills needed for a career in fabrication. Proficiency will be demonstrated through projects utilizing a variety of fabrication equipment including rolls, brakes, punches, shears, and various welding methods.
Prerequisites: A grade of C- or higher in
MFG 1020 and MFG 1049 and MFG 1028
Additional fees may apply

MFG 2081 Advanced Welding (3 Credits)
Advanced Welding is a lab-based course focused on developing the skills needed for a career in welding. Proficiency will be demonstrated through projects including fillet welds, groove welds, and cladding performed in multiple positions. Welding skills and inspection techniques will be developed by example and through instruction. The importance of shop floor etiquette, workplace cleanliness, and safe work practices will be emphasized.
Prerequisites: A grade of C- or higher in MFG 1020 and MFG 1050
Additional fees may apply

MFG 2095 Cooperative Education Work Experience (3 Credits)

MFG 2216 Tool Design (4 Credits)
Covers the theory of subtractive and additive tools design. Presents the principles, practices, tools, manufacturing methodologies, and commercial standards of single point, jig, fixture, and die design, their fabrication and application through lectures, visual aids, and individual projects and design work. The laboratory portion provides practice in the design of metal cutting subtractive and additive tools.
Additional fees may apply
Previous: Legacy Equivalent(s): MFG 216

MFG 2230 Statistical Process Control (3 Credits)
Presents a practical management aid adapted from the science of statistics. Presents topics ranging from basic statistical concepts to techniques for cost and quality control, emphasizing control by charting and acceptance sampling. Uses the computer as an aid in calculation and control chart preparation.
Previous: Legacy Equivalent(s): MFG 230

MFG 2405 Principles of CNC w/Mastercam (3 Credits)
An introduction to computer numerical control (CNC) programming of 3-axis machine tools by generating 2D and 3D geometries using Mastercam® software. Topics include an introduction to CNC programming, coding, virtual set-up, virtual tooling, virtual operation, post-processing, and troubleshooting based on CNC practices. Students learn the basic principles and applications of numerically controlled software and hardware and get exposed to the programming of CNC milling machines and machining centers.
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* 205

MFG 2439 Geometric Dimension and Tolerancing (G, D, and T) (3 Credits)
An intermediate course in the interpretation of engineering drawings, beginning with the basics of dimensional tolerances and tolerance systems. Topics include: the mathematics of interpreting and specifying tolerances on dimensions, the system and rules of geometric tolerancing, and the basic nomenclature and standard symbols conforming to the latest ANSI/ASME Y14.5M-2018 standards as they pertain to manufacturing and engineering drawings.
Prerequisites: A grade of C- or higher in MFG 1424 or EGR 1120 (or permission of instructor)
Previous: Legacy Equivalent(s): MFG* 239

MFG 2444 CNC I (3 Credits)
This course introduces students to Computer Numerical Control programming for CNC Mills and CNC Lathe. Students will receive instruction on CNC control commands (G and M code) through the use of Simulator MCUs (Machine Control Units) as well as online resources.
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* B244 or MFG* 168

MFG 2445 CNC II (4 Credits)
This course introduces students to Computer Numerical Control (CNC) machining with topics including setup and tooling, programming NIMS Certification parts, and modification of programs to compensate for process variation, utilization of canned drilling cycles, circular interpolation, special milling cycles, looping and special features. Upon completion students will be able to setup CNC 3-axis mills; locate, load and proof the CNC program; execute the program; inspect parts; and modify program instructions via GandM code.
Prerequisites: MFG 2444
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* B245 or MFG* 256

MFG 2456 Advanced CNC (3 Credits)
This is an advanced level of CNC programming and operation in both lathes and machining centers. Topics include setup and tooling, programming simple parts, canned drilling cycles, circular interpolation, special milling cycles, cutter compensation, looping and macros and special features.
Prerequisites: A grade of C- or higher in MFG 1478 or permission of instructor
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* 256

MFG 2477 Advanced Machine Technology (4 Credits)
This course is a combination of classroom theory and hands on lab experiences. This course is split with 3-hours classroom and 5-hours lab each week to machine various projects. This course introduces a student to more advanced practices in metal machining technology machines. The student learns advanced techniques in operation of lathes, mills, grinders and sawing machines to manufacture parts to blueprint specifications to tighter tolerances. Advanced lathe operations include single point threading both external and internal. It also includes face grooves, internal and external grooving and boring and the use and understanding of carbide tooling. The milling portion includes machining more complex parts and utilizing the power of conversational programming and canned cycles. Achieving tighter tolerance parts becomes evident with the advanced techniques in the surface grinder using grinding vises, squaring blocks, gage blocks and indicators.
Prerequisites: A grade of C- or higher in MFG 1477 or instructor permission
Additional fees may apply
Previous: Legacy Equivalent(s): MFG* 277