

## Computer Integrated Mfg (CIMN)

### **CIMN 1001 Careers in Manufacturing**

**1 Credit**

This course is designed for students with little to no background in manufacturing who wish to learn more about the field in preparation for a manufacturing career. Primary topics covered include the manufacturing process, what it's like to work in manufacturing, various career pathways, the skills utilized in manufacturing environments, and clarification of degree and certificate programs.  
(1 contact hour)

### **CIMN 1050 Blueprint Reading and Shop Math**

**3 Credits**

*Prerequisite: MATH 0745 or placement into MATH 0850 or MATH 1080.*

This course introduces students to skills that will help them communicate and succeed in manufacturing environments. The main communication concepts that are addressed are shop mathematics, blueprint reading, welding symbols and geometric dimensioning and tolerancing (GD&T). It covers mathematical concepts such as fractions, decimals, the metric system, oblique triangles and right-triangle trigonometry, solving multiple input machining formulas, reading and applying cutting data charts, and interpreting cutting tool diagrams. Blueprint reading incorporates American Society of Mechanical Engineering (ASME) standards to examine basic concepts of mechanical drawings including line types and uses, orthographic and auxiliary views, title blocks, notes, section views, dimensions, tolerances, and Computer Numerical Control (CNC) fundamentals.  
(3 contact hours)

### **CIMN 1110 Machining Processes**

**3 Credits**

*Prerequisite: MATH 1080 or MATH 1400 or MATH 1650 (may be taken concurrently); or permission of instructor.*

This course introduces students to basic material removal processes and equipment used in manufacturing, including machine tools and accessories; cutting principles and chip formation; inspection and quality control; determination of feed, speed, depth of cut, material removal rate, and horsepower; process procedures for both producing and inspecting a part; and automation, robotics, numerical control, flexible manufacturing and computer integrated manufacturing (CIM). Laboratory experience includes the creation of operation sheets and inspection forms, selection or calculation of operating variables, machining and inspecting parts produced; and the analysis, evaluation and communication of results and conclusions. Students must provide safety glasses for use in the laboratory and a portable calculator capable of exponents and roots.  
(4 contact hours: 2 lecture, 2 lab)

### **CIMN 1160 Applied Electricity**

**2 Credits**

*Prerequisite: MATH 1080 or MATH 1400 or MATH 1650.*

This course, designed for mechanical and manufacturing technology students, provides a basic understanding of electricity as well as commonly used components and how these function. The course introduces students to electrical safety, electrical measurements, AC and DC circuits, common electrical components, and fundamentals of motors, transformers, controls, and programmable logic controllers (PLCs). Laboratory experience includes building and testing simple circuits from schematics, using test equipment, operating electrical, rotating equipment, relay logic and ladder control circuit programming of PLCs, and elementary analog and digital circuits.  
(3 contact hours: 1 lecture, 2 lab)

### **CIMN 1210 Materials Processing**

**3 Credits**

*Prerequisite: ENGR 1000, MATH 1080 or MATH 1400 or higher.*

This course, a continuation of CIMN 1110 Machining Processes, introduces students to the basic conserving, joining, and conditioning processes and equipment used in manufacturing including casting, forging, welding, powder metallurgy, plastics, metal forming, heat treatment and surface finishing, hot and cold working, additive manufacturing, and mechanical testing. Laboratory experience requires investigative experimentation into the engineering properties of materials, products of conditioning and welding processes, and the creation and evaluation of aluminum cast parts, with written and oral communication of the analysis, results, and conclusions. Students must provide safety glasses for use in the laboratory and a portable calculator capable of exponents and roots. This course, a continuation of CIMN 1110 Machining Processes, introduces students to the basic conserving, joining, and conditioning processes and equipment used in manufacturing including casting, forging, welding, powder metallurgy, plastics, metal forming, heat treatment and surface finishing, hot and cold working, additive manufacturing, and mechanical testing. Laboratory experience requires investigative experimentation into the engineering properties of materials, products of conditioning and welding processes, and the creation and evaluation of aluminum cast parts, with written and oral communication of the analysis, results, and conclusions. Students must provide safety glasses for use in the laboratory and a portable calculator capable of exponents and roots.  
(4 contact hours: 2 lecture, 2 lab)

**CIMN 1420 Computer Numerical Control Part Programming (CNC)****2 Credits**

*Prerequisite:* CIMN 1110 (may be taken concurrently) or proficiency test, CIMN 1050 (may be taken concurrently) or MATH 1080.

This course introduces students to the history and terminology of computer numerical control (CNC) and the development of CNC programs using International Standards Organization (ISO) coding system (G-codes) mode including part analysis, tool selection, program development, program input, tool path simulation, editing, speed and feed determination, and part manufacture. Laboratory experience includes writing simple CNC programs; entering, downloading, and simulating tool path; and examples of machining simple parts on CNC milling and turning centers.  
(3 contact hours: 1 lecture, 2 lab)

**CIMN 1430 Introduction to Computer Assisted Part Programming****2 Credits**

*Prerequisite:* CIMN 1110, CIMN 1420.

This course introduces students to Computer Aided Manufacturing (CAM) and the development of multi-axis CNC part programs and files ready for downloading to machining and turning centers. Laboratory experience includes blueprint analysis to determine part holding method, order of operations, tooling, feeds and speeds, creation of part and fixture geometry, definition of tool paths, graphical verification of tool path, and post processing to generate ISO or Conversational CNC code for milling machine, turning machine, machining center, turning center and wire machine applications.  
(3 contact hours: 1 lecture, 2 lab)

**CIMN 1450 Programming CNC Lathes****2 Credits**

*Prerequisite:* CIMN 1420.

This course, a continuation of CIMN 1420 Computer Numerical Control Part Programming (CNC), introduces students to advanced features of setting-up and programming CNC turning centers using ISO standard (G-codes) mode of programming including fixed cycles and multiple repetitive cycles (automatic repeat cycles) dealing with roughing, finishing and threading. Laboratory experience includes the production of parts conforming to print specification with progressively more comprehensive turning programs.  
(3 contact hours: 1 lecture, 2 lab)

**CIMN 1460 Programming CNC Machining Centers****2 Credits**

*Prerequisite:* CIMN 1420.

This is a continuation of CIMN 1420 Computer Numerical Control Part Programming (CNC), with emphasis on advanced features of setting-up and programming CNC machining centers using ISO standard (G-codes) mode programming, including the use of canned cycles involving drilling, drilling with dwell, peck drilling, tapping, boring, milling, machining at equal intervals, and pocket milling. Laboratory experience includes production of parts to print specifications with progressively more comprehensive machining programs.  
(3 contact hours: 1 lecture, 2 lab)

**CIMN 2190 Manufacturing Methods and Costs****3 Credits**

*Prerequisite:* CADT 1100 or CADT 2100, CIMN 1110.

This course introduces students to the principles of manufacturing (production) methods as well as costs and cost analysis that lead to more efficient utilization of manufacturing resources. Topics include an introduction to job order costs, budgetary cost control, standard costs, and direct costing; cost improvement methods; and economic analysis of engineering proposals. Laboratory experience includes independent research and problem solving projects involving the evaluation of alternative methods and procedures; cost estimating, cost studies, cost reporting, analysis of cost data, performance of productivity measurement, evaluation of engineering proposals, return-on-investment, interest, break-even analysis, depreciation, and cash flow.  
(4 contact hours: 2 lecture, 2 lab)

**CIMN 2240 Jig and Fixture Design****2 Credits**

*Prerequisite:* CIMN 1110, CADT 2100.

This course introduces students to the design and manufacture of jigs and fixtures, utilizing AutoCAD design software, with special emphasis on simplicity and economy, and incorporating geometric dimensioning and tolerancing (G, D&T). The course includes an overview of types of specialized workholding and tooling devices, including power, modular, welding, inspection, and computer numerical (CNC) jigs and fixtures; the identification of the source of design data; the analysis of sample parts for locating and supporting characteristics; and the development of a design plan. Laboratory experience includes design of template, vise-held, plate, angle-plate, channel and box, and vise-jaw jigs and fixtures from sample parts.  
(4 contact hours: 1 lecture, 3 lab)

**CIMN 2390 Fluid Power Technology****3 Credits**

*Prerequisite:* PHYS 1100, PHYS 1200 or PHYS 1550 or PHYS 1610.

This course introduces students to the field of fluid power, including theory and applications, energy input devices, energy output devices, energy modulation devices, and auxiliary system components; storage and distribution systems as well as fluids conditioning and contamination, with emphasis on fluids, equipment, and system operation. Laboratory experience includes the assembly of standard components to perform typical industry standard fluid power system applications. Students must provide an approved set of safety goggles and a portable calculator capable of calculating exponents and roots.  
(4 contact hours: 2 lecture, 2 lab)

**CIMN 2840 Repair and Maintenance Capstone****2 Credits**

*Prerequisite: CIMN 2390 (can be taken concurrently), MECT 2150.*

This capstone course integrates prior learning and rigging as related to industrial maintenance and repair. Students will learn principles and applications of industrial safety, and rigging, hydraulic, pneumatic, and mechanical systems. The course will also review basic industrial skills including measurement, blueprint reading, tools, and basic calculations.

(2 contact hours)

**CIMN 2875 Design and Manufacturing Capstone****3 Credits**

*Prerequisite: CADT 2100, CIMN 1110, CIMN 2240 or MECT 2230.*

This capstone course integrates prior learning in product and machine design, manufacturing and automation. Students will utilize their skills to design, analyze, manufacture, and evaluate one or more functional and marketable products. Students will use concepts of machine and product design, manufacturing principles, and automation in a team environment resulting in the related documentation and prototype ready for manufacture.

(5.25 contact hours: 0.75 lecture, 4.5 lab)