

# ADVANCED MANUFACTURING TECHNOLOGY

## Programs

- Advanced Manufacturing Technology Bachelor in Applied Science (<https://catalog.gvltec.edu/school-advanced-manufacturing-transportation-technology/advanced-manufacturing-technology/advanced-manufacturing-technology-bas/>)

## Courses

### **MFG 110 Introduction to Manufacturing CAD (2-3-3)**

*Offered Fall, Spring and Summer Semesters*

This course introduces the basic skills and terminology required for the visualization, interpretation and sketching of 2D technical drawings used in the machine tool and manufacturing trades. The course includes an introduction to 3D CAD modeling and how CAD data supports manufacturing processes. The course emphasizes industrial and manufacturing applications utilizing 3D SolidWorks as the CAD software.

### **MFG 300 Manufacturing Processes and Application (3-1-3)**

*Offered Fall Semester*

This course covers technologies and processes used in modern manufacturing. Engineering principles and technological concepts for diverse methods of production are introduced, including plastics processing, metal forming and other methods of manufacturing and materials processing.

### **MFG 310 Manufacturing Quality (3-0-3)**

*Offered Summer Semester*

Prerequisites: MFG 300, MAT 109 or MAT 110 and MAT 120

This course introduces the principles of quality control and quality management systems in manufacturing environments. Various technologies used for dimensional and mechanical inspection are introduced, as well as industry certifications for quality assurance.

### **MFG 311 Work Design, Ergonomics and Safety (3-0-3)**

*Offered Fall Semester*

This course covers the role of manufacturing management in maintaining a safe work environment. Topics covered include regulatory frameworks for safety and environmental management and the design of work cells and work plans to promote employee health and enhance productivity.

### **MFG 312 Manufacturing Enterprise Resource Management (3-0-3)**

*Offered Fall Semester*

Prerequisites: MFG 300, MFG 310, MFG 330

This course introduces students to concepts of enterprise resource planning (ERP) for manufacturing firms. Topics covered include product lifecycle management (PLM), change management, bill of materials management, purchasing and procurement. ERP and PLM software will be utilized.

### **MFG 313 Strategic Sourcing and Procurement (3-0-3)**

*Offered Fall Semester*

Pre- or Co-requisite: MAT 110 (or higher) (required)

This course focuses on supplier management and purchasing in the global economy. Strategic management concepts to control cost and quality in the procurement of goods and services will be applied and aligned to the business objectives. Students will examine make versus buy decisions, outsourcing, contract negotiation, taxation and supplier quality management.

### **MFG 314 Finance for Manufacturing (3-0-3)**

*Offered Fall Semester*

Pre or Co-requisites: MAT 110 (or higher) or MAT 120 (required)

This course introduces basic concepts, terminology and application of finance, accounting and economics as applied to the management of manufacturing firms. Financial analyses will be performed to identify and resolve business problems.

### **MFG 321 Advanced Manufacturing I (2-3-3)**

*Offered Spring Semester*

This course introduces students to the principles of operation of metrology tools, CNC machine tools, metal forming, and heat treatment.

### **MFG 322 Advanced Manufacturing II (2-3-3)**

*Offered Summer Semester*

Prerequisite: MFG 321

This course expands the concept of technologies and processes used in modern manufacturing. A study of principles of operation of the tools of automation and process control, including electrical circuits, mechanical systems, sensors, robotics, and programmable logic controllers.

### **MFG 323 Advanced Manufacturing III (2-3-3)**

*Offered Fall Semester*

Prerequisite: MFG 322

This course provides advanced study of the technologies and tools used in modern manufacturing and provides advanced applications in the operation of plastics processing, metal casting and forging, 3D printing technologies, welding technologies, assembly, and fabrication tools.

### **MFG 330 Manufacturing Project Management (3-0-3)**

*Offered Fall Semester*

Prerequisite: MFG 310

This course covers the fundamentals of project planning and execution in manufacturing environments. Students learn to define project requirements, identify subtasks, develop, build and manage a project schedule and budget, manage risk and close out a project.

### **MFG 340 Computer-Aided Design for Manufacturing Engineering (2-3-3)**

*Offered Spring Semester*

Prerequisite: MAT 120

Co-requisite: MAT 109 or MAT 110 (required)

This course covers construction and assemblies of three-dimensional objects using computer-aided design software, parametric modeling and tolerance analysis. Principles of machine design will be applied to translate these models into dimensioned and annotated drawings for manufacturing.

### **MFG 350 Production Process Planning (3-0-3)**

*Offered Fall Semester*

Co-requisite: MFG 330 (recommended)

This course introduces the principles of planning, inventory control and supply chain management in manufacturing environments. Topics include the economics of production, workflows and documentation, facility considerations and overall operational efficiency.

### **MFG 360 Leadership in Manufacturing (3-0-3)**

*Offered Summer Semester*

Prerequisite: MFG 330

This course covers theories of leadership and modern strategies of leadership development as applied in manufacturing environments. Topics include leadership styles, managing and leading change, team communication and ethics. Leadership concepts and skills will be applied in team settings.

**MFG 370 Principles of Lean Manufacturing (3-0-3)**

*Offered Spring Semester*

Prerequisite: MFG 310

This course covers the evolution of manufacturing systems, the principles and design of lean manufacturing systems and methods of continuous process improvement. Topics include operational models of manufacturing systems, statistical process control and the DMAIC problem-solving method.

**MFG 401 Advanced Metrology (3-3-4)**

*Offered Fall Semester*

This course covers geometric dimensioning and tolerance, accuracy and precision and dimensional metrology to ensure quality fit of manufactured parts. Other destructive and nondestructive testing techniques to quantify mechanical properties of manufactured components are introduced. Topics covered include programming and operating coordinate measurement machines, optical metrology systems and other precision measurement tools.

**MFG 402 Additive Manufacturing (3-3-4)**

*Offered Fall Semester*

This course covers the skills required to design and manufacture a part using industrial 3D printing technology, including metal additive manufacturing. Topics include metallurgy for additive manufacturing, post-processing design optimization, multi-jet printing and fuse deposition modeling.

**MFG 481 Industry Capstone Project I (1-3-2)**

*Offered Summer Semester*

This course introduces systematic manufacturing process design concepts and focuses on problem definition, solution ideation, research, intellectual property concepts and risk assessment. Students will begin defining a real-world manufacturing challenge with industry sponsors and mentors.

**MFG 482 Industry Capstone Project II (0-6-2)**

*Offered Fall Semester*

This course reinforces concepts of manufacturing technologies, lean manufacturing, project management and professional communications through an industry-sponsored capstone project. Students solve a real-world manufacturing challenge in teams, guided by industry and faculty mentors.