

experiences through which students participate in all aspects of a manufacturing enterprise, from materials and processes to safety, design, automation, quality and lean manufacturing. Armed with these skills, MFET graduates can pursue rewarding, growth-oriented careers in such diverse industries as plastics, automotive, biomedical, electronics, aerospace, machining and other high-value manufacturing sectors.

Program Emphasis

MFET program has two options: Electronics and Fabrication. Upon successful completion of the program, students will be able to: A) For the Electronics Option: (1) Utilize and operate various test equipment, and use measurement results to support product development; (2) Demonstrate the knowledge of design tools used in electronics industry for product development; (3) Identify and apply quality control tools used in electronics manufacturing industry; (4) Explain and apply the fundamentals of electronics applications and theory; (5) Describe different types of materials, process flows, equipment and techniques used to manufacture electronics products. B) For the Fabrication Option: (1) Identify and utilize CAD/CAM (Computer-Aided Design/Computer-Aided Manufacturing) applications in various manufacturing processes; (2) Explain product design to optimize manufacturing efficiency; (3) Identify and apply quality control tools and instruments used in a manufacturing environment; (4) Demonstrate proficiency in programming and operation of NC/CNC (Numerical Control/Computer Numerical Control) equipment; (5) Describe different types of materials, process flows, equipment and techniques used in manufacturing.

Statement of Goals

The Manufacturing Engineering Technology (MFET) program is developed with two specific goals: 1) To train students with a high level of technical and non-technical skills, and prepare them for the highly competitive world of today's manufacturing. 2) To provide a continuous path for students to acquire a firm foundation of skills and knowledge in the field of manufacturing, transfer successfully to a 4-year college or university.

Manufacturing Engineering Technology

Description

Manufacturing Engineering Technology (MFET) program provides students the opportunity to acquire highly valued skills in an innovative, hands-on learning environment. The program features integrating

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Career Options

Areas of employment include manufacturing engineering or engineering technician, manufacturing operation management, equipment maintenance and troubleshooting, quality and production control, production planning, and automation. All MFET major

courses are transferable to 4-year colleges/universities. MFET graduates may also further their education by transferring to a number of four-year colleges and universities.

Academic Programs

The certificates of completion and achievement and associate degree require completion of the courses listed below. Additional general education and graduation requirements for the associate degree are listed in the catalog. The associate degree requires a minimum of 60 units.

Certificate of Completion: Manufacturing Fundamentals*

The Certificate of Completion on Manufacturing Fundamentals provides fundamental knowledge for students to enter the workforce in a manufacturing field.

Courses:	Units
MFET 101, Introduction to Manufacturing Engineering Technology	3
MFET 105, Print Reading and Symbolology.....	3
MFET 115, Properties of Materials	3
MFET 120, Manufacturing Processes.....	4
Total Units = 13	

*This is a department award in recognition of information on the transcript and does not imply that graduation requirement has been met.

Certificate of Completion: Advanced Manufacturing*

The Certificate of Completion in Advanced Manufacturing furthers student's knowledge with the innovative experience and exposure to modern manufacturing practices.

Courses:	Units
MFET 150, Manufacturing Automation.....	3
MFET 210, Statistical Process Control	3
MFET 110, Industrial Safety	2
MFET 230, Lean Manufacturing	3
Total Units = 11	

*This is a department award in recognition of information on the transcript and does not imply that graduation requirement has been met.

Certificate of Achievement: Manufacturing Engineering Technology

Electronics Manufacturing

The Certificate of Achievement in Electronics Manufacturing focuses in the manufacturing of electronic devices and related products.

Courses:	Units
MFET 101, Introduction to Manufacturing Engineering Technology	3
MFET 105, Print Reading and Symbolology.....	3
MFET 115, Properties of Materials	3
MFET 120, Manufacturing Processes	4
MFET 150, Manufacturing Automation	3
MFET 210, Statistical Process Control	3
ENGN 128, Electronics for Technology.....	3
MFET 220, Programmable Logic Controllers.....	3
MFET 110, Industrial Safety	2
MFET 230, Lean Manufacturing.....	3
Total Units = 30	

Certificate of Achievement: Manufacturing Engineering Technology

Fabrication Manufacturing

The Certificate of Achievement in Fabrication Manufacturing focuses in the manufacturing of non-electronic devices and related products.

Courses:	Units
MFET 101, Introduction to Manufacturing Engineering Technology	3
MFET 105, Print Reading and Symbolology.....	3
MFET 115, Properties of Materials	3
MFET 120, Manufacturing Processes	4
MFET 150, Manufacturing Automation	3
MFET 210, Statistical Process Control	3
MACT 150, Intro/Computer Num Control (CNC) and Elec Dis Mach	4
MFET 110, Industrial Safety	2
MFET 230, Lean Manufacturing.....	3
and Select one course from:	
MACT 160M, Introduction to CAD/CAM.....	4
or	
MACT 160S, Introduction to CAD/CAM	4
Total Units = 32	

Associate in Science Degree Manufacturing Engineering Technology - Option: Electronics

The Associate in Science Degree in Manufacturing Engineering Technology with Electronics Option prepares students with necessary skills, knowledge and

experience to take on important roles as team members or leaders in an electronics manufacturing enterprise.

Courses:	Units
MFET 101, Introduction to Manufacturing Engineering Technology	3
MATH 096, Intermediate Algebra and Geometry.....	3
ENGN 110, Science for Technical Applications	4
TEHW 101, Introduction to Technical Writing.....	3
MFET 105, Print Reading and Symbology	3
MFET 115, Properties of Materials	3
MFET 120, Manufacturing Processes	4
MFET 150, Manufacturing Automation	3
MFET 210, Statistical Process Control	3
ENGN 128, Electronics for Technology	3
MFET 220, Programmable Logic Controllers	3
MFET 110, Industrial Safety	2
MFET 230, Lean Manufacturing	3
Select one course from:	
ENGE 111, Introduction to Computer-Aided Design ...	3
or	
ENGE 151, Engineering Drawing	2
or	
TECI 101, Basic Technical Illustration	3
and Select one course from:	
MFET 250, Manufacturing Capstone Course	4
or	
ENGN 275, Engineering Technology Industrial Internship	4
Total Units = 48-49	

Associate in Science Degree Manufacturing Engineering Technology - Option: Fabrication

The Associate in Science Degree in Manufacturing Engineering Technology with Fabrication Option prepares students with necessary skills, knowledge and experience to take on important roles as team members or leaders in a fabrication manufacturing enterprise.

Courses:	Units
MFET 101, Introduction to Manufacturing Engineering Technology	3
MATH 096, Intermediate Algebra and Geometry	5
ENGN 110, Science for Technical Applications	4
TEHW 101 Introduction to Technical Writing	3
MFET 105, Print Reading and Symbology	3
MFET 115, Properties of Materials	3
MFET 120, Manufacturing Processes	4
MFET 150, Manufacturing Automation	3
MFET 210, Statistical Process Control	3
MACT 150, Intro/Computer Num Control (CNC) and Elec Dis Mach	4
MFET 110, Industrial Safety	2
MFET 230, Lean Manufacturing	3

and Select one course from:

ENGE 111, Introduction to Computer-Aided Design ..	3
or	
ENGE 151, Engineering Drawing	2
or	
TECI 101, Basic Technical Illustration	3
and Select one course from:	
MACT 160M, Introduction to CAD/CAM	4
or	
MACT 160S, Introduction to CAD/CAM	4
and Select one course from:	
MFET 250, Manufacturing Capstone Course	4
or	
ENGN 275, Engineering Technology Industrial Internship	4
Total Units = 50-51	

Courses

Manufacturing Engineering Technology (MFET)

101 Introduction to Manufacturing Engineering Technology

**3 hours lecture, 3 units
Grade Only**

This course is designed for students who are interested in the field of Manufacturing Engineering Technology (MFET). The course introduces manufacturing principles, including manufacturing systems, design concepts, process and material selection, computer-integrated manufacturing, quality control and management, global competitiveness and manufacturing costs, safety and environmental concerns. It also provides an overview of the MFET program structure, job perspectives for graduates, salary ranges and various career options in manufacturing. (FT) Associate Degree Credit & transfer to CSU and/or private colleges and universities.

101A Introduction to Manufacturing I

**1 hour lecture, 1 unit
Grade Only**

Limitation on Enrollment: This course is not open to students with previous credit for Manufacturing Engineering Technology 101 or Engineering Technology 120.

This project-based module is designed for high school and entry college students who might be interested in the field of Manufacturing Engineering Technology (MFET). The module discusses common manufacturing terminologies, current business trends,

and design process involved with product and process development. It also provides an overview of the MFET program, job perspectives for graduates, salary ranges and various career options in manufacturing. (FT) Associate Degree Credit & transfer to CSU and/or private colleges and universities.

101B Introduction to Manufacturing II

1 hour lecture, 1 unit
Grade Only

Prerequisite: Manufacturing Engineering Technology 101A or Engineering Technology 120, each with a grade of "C" or better, or equivalent.

Limitation on Enrollment: This course is not open to students with previous credit for Manufacturing Engineering Technology 101.

This project-based module is designed for high school and entry college students who might be interested in the field of Manufacturing Engineering Technology. The module introduces manufacturing principles in a product realization process, automation, quality control and management, and lean manufacturing. (FT) Associate Degree Credit & transfer to CSU and/or private colleges and universities.

101C Introduction to Manufacturing III

1 hour lecture, 1 unit
Grade Only

Prerequisite: Manufacturing Engineering Technology 101B with a grade of "C" or better, or equivalent.

Limitation on Enrollment: This course is not open to students with previous credit for Manufacturing Engineering Technology 101.

This project-based module is designed for high school and entry college students who might be interested in the field of Manufacturing Engineering Technology. The module introduces environmental and safety rules, regulations and practices in manufacturing enterprises. In this module, students also apply previous knowledge and training in manufacturing engineering technology to work in teams, build robots that are capable of performing various challenging tasks and compete at the end of the module. (FT) Associate Degree Credit & transfer to CSU and/or private colleges and universities.

105 Print Reading and Symbology

3 hours lecture, 3 units
Grade Only

Advisory: English 51 and Mathematics 35, each with a grade of "C" or better, or equivalent or Assessment Skill Levels W5 and M30.

Limitation on Enrollment: This course is not open to students with previous credit for Manufacturing Engineering Technology 105A or 105B.

This course is a study of the types of symbols and engineering notations used for mechanical, electrical, electronic, hydraulic and pneumatic drawings. Representative drawings are used to demonstrate concepts and practice in interpreting the symbols and notations. Students view and handle typical parts represented by the symbols. This course is designed for students who are currently working in a manufacturing plant or pursuing a career in an engineering technology field. (FT) Associate Degree Credit & transfer to CSU and/or private colleges and universities.

105A Print Reading I

1.5 hours lecture, 1.5 units
Grade Only

Advisory: Mathematics 35 with a grade of "C" or better, or equivalent, or Assessment Skill Level M30.

Limitation on Enrollment: This course is not open to students with previous credit for Manufacturing Engineering Technology 105 or Engineering Technology 124 or 130.

This project-based module teaches student basic sketching techniques, print layout, views, and fundamentals of working and pictorial drawings. Students also learn drawing and annotation standards for different mechanical parts, the principles of dimensioning and tolerancing and their applications and practices in industrial prints. The module is designed for students who are interested in studying manufacturing. (FT) Associate Degree Credit & transfer to CSU and/or private colleges and universities.

105B Print Reading II

1.5 hours lecture, 1.5 units
Grade Only

Prerequisite: Manufacturing Engineering Technology 105A or Engineering Technology 124 or 130, each with a grade of "C" or better, or equivalent.

Limitation on Enrollment: This course is not open to students with previous credit for Manufacturing Engineering Technology 105.

This project-based module teaches student different types of scales, precision measurement instruments, methods for geometric tolerancing. Students also learn to interpret symbols and notes on electrical and electronic diagrams, precision sheet metal drawings and welding specifications. Module includes a final project in which students work in teams to generate a print for a part using different drafting symbols, notes, specifications and standards learned throughout the print reading modules. This module is designed for students who are interested in studying manufacturing.

(FT) Associate Degree Credit & transfer to CSU and/or private colleges and universities.

110 Industrial Safety

**2 hours lecture, 2 units
Grade Only**

Advisory: English 51 and English 56, each with a grade of "C" or better, or equivalent, or Assessment Skill Levels W5 and R5.

The course is a study of safety fundamentals in an industrial environment and their relationship to accident prevention. It introduces students to the Occupational Safety and Health Administration (OSHA) policies, procedures and standards for industries. Course topics include electrical safety, hazardous materials and conditions, fire protection, tools and machines, welding and cutting, personal protective equipment, hazard communication, construction, ergonomics and industrial hygiene. This course is designed for students who are currently or will be working in construction or general industries. Upon successful course completion, students may receive an OSHA 30-hour Construction and/or General Industry Outreach Training Completion Card. (FT) Associate Degree Credit & transfer to CSU and/or private colleges and universities.

115 Properties of Materials

**2.5 hours lecture, 1.5 hours lab, 3 units
Grade Only**

Advisory: English 51 and English 56 and Mathematics 95, each with a grade of "C" or better, or equivalent, or Assessment Skill Levels W5, R5 and M40; Engineering Technology 110 with a grade of "C" or better, or equivalent.

This lecture/lab course is a study of the chemical, physical and mechanical properties of industrial materials including metals, ceramics, polymers and composites. The course emphasizes the processes and tests used with different industrial materials during the manufacturing cycles. It also discusses function and structure as they relate to specific design considerations. This course is designed for students who are currently working in a manufacturing plant or pursuing a career in engineering and technology fields. (FT) Associate Degree Credit & transfer to CSU and/or private colleges and universities.

120 Manufacturing Processes

**3 hours lecture, 3 hours lab, 4 units
Grade Only**

Corequisite: Completion of or concurrent enrollment in: Manufacturing Engineering Technology 115 with a grade of "C" or better, or equivalent or Engineering 210 with a grade of "C" or better, or equivalent.

This lecture/lab course provides basic understanding of how raw materials, including metals, polymers, ceramics and composites, are converted to finished products. In this course, students study commonly used and advanced manufacturing processes, understand the pros & cons of different industrial techniques. Students also learn key terms in manufacturing, and identify various types of equipment in common manufacturing processes. This course is designed for students who are pursuing a career in engineering or engineering technology fields, or working in a manufacturing industry. (FT) Associate Degree Credit & transfer to CSU and/or private colleges and universities.

150 Manufacturing Automation

**2 hours lecture, 3 hours lab, 3 units
Grade Only**

Prerequisite: Manufacturing Engineering Technology 120 with a grade of "C" or better, or equivalent. This lecture/lab course introduces students to the principles of manufacturing automation, process and machine control, programmable logic controllers, robotics, part handling and assembly. Students also learn concepts of group technology, flexible manufacturing systems and their applications in manufacturing industries. Through lectures, hands-on experience and demonstrations, students gain knowledge and skills in modern manufacturing that are necessary for seeking rewarding employment opportunities. This course uses a project-based learning approach. It is intended for students, technicians, technologists and engineers who are interested in manufacturing automation. (FT) Associate Degree Credit & transfer to CSU and/or private colleges and universities.

150A Manufacturing Automation I

**1 hour lecture, 1.5 hours lab, 1.5 units
Grade Only**

Prerequisite: Manufacturing Engineering Technology 101 or 101C or 120 with a grade of "C" or better, or equivalent.

Limitation on Enrollment: This course is not open to students with previous credit for Manufacturing Engineering Technology 150 or Engineering Technology 126.

This project-based module introduces students to the principles of manufacturing automation, computer-integrated manufacturing (CIM) which includes process and machine control, programmable logic controllers and robotics. Students also learn different applications of automation to improve quality and productivity in

manufacturing industries. This module is designed for students who are interested in modern manufacturing. (FT) Associate Degree Credit & transfer to CSU and/or private colleges and universities.

150B Manufacturing Automation II

**1 hour lecture, 1.5 hours lab, 1.5 units
Grade Only**

Prerequisite: Manufacturing Engineering Technology 150A or Engineering Technology 126, with a grade of "C" or better, or equivalent.

Limitation on Enrollment: This course is not open to students with previous credit for Manufacturing Engineering Technology 150.

This project-based module covers additional automation topics and applications in manufacturing industry, including sensors and actuators, part handling and assembly. Students also learn the concepts of group technology, flexible manufacturing systems and their applications. This module is designed for students who like to gain further knowledge and experience in modern manufacturing practices. (FT) Associate Degree Credit & transfer to CSU and/or private colleges and universities.

210 Statistical Process Control

**2 hours lecture, 3 hours lab, 3 units
Grade Only**

Advisory: English 51 and English 56 and Mathematics 96, each with a grade of "C" or better, or equivalent, or Assessment Skill Level W5 and R5 and M50; and completion of Mathematics 119 or Psychology 258 with a grade of "C" or better, or equivalent.

This lecture/lab course familiarizes students with the applications of statistics in process and quality control function. Students learn to acquire, analyze and interpret data from a process to determine if it is in statistical control and capable of meeting customer's requirements. Statistical techniques include the use of basic graphs and diagrams, control charts, process mean and variability, process capability, sampling and normal distribution. The course also introduces students to the concepts of Six Sigma and design of experiments as part of quality control and improvement. This course is designed for students who are interested in process control, quality improvement and industrial management. (FT) Associate Degree Credit & transfer to CSU and/or private colleges and universities.

220 Programmable Logic Controllers

**2 hours lecture, 3 hours lab, 3 units
Grade Only**

Advisory: English 51 and English 56 and Mathematics 96, each with a grade of "C" or better, or equivalent, or Assessment Skill Levels W5 and R5 and M50.

This course assists students in developing and building fundamental knowledge of the operation, construction, interfacing and programming of programmable logic controllers (PLCs). Students learn different hardware components, input and output devices associating with PLCs, and PLC applications in various manufacturing systems. Students also acquire hands-on experience on constructing, operating, configuring and programming PLCs. The course is designed for students, technicians, technologists and engineers from industry who are interested in automation and the integration of PLCs in manufacturing. This course may be taken four times for credit. (FT) Associate Degree Credit & transfer to CSU and/or private colleges and universities.

230 Lean Manufacturing

**2 hours lecture, 3 hours lab, 3 units
Grade Only**

Prerequisite: Manufacturing Engineering Technology 150 and 210, each with a grade of "C" or better, or equivalent.

This overview course focuses on the terminology, tools, techniques, concepts and principles of Lean Manufacturing. Students are introduced to different Lean tools including value stream mapping, 5-S process, seven deadly wastes, standardized work flow, error proofing, setup reduction, integrated reliability, and production and inventory control. This course uses a project-based approach; provides students with theories, guided discussions, hands-on exercises and industrial case-studies. Course is open to all students who are planning to join industry or currently working in a company instituting Lean Manufacturing. (FT) Associate Degree Credit & transfer to CSU and/or private colleges and universities.

250 Manufacturing Capstone Course

**1 hour lecture, 9 hours lab, 4 units
Grade Only**

Prerequisite: Manufacturing Engineering Technology 101, 105 and 115, each with a grade of "C" or better, or equivalent.

Corequisite: Completion of or concurrent enrollment in Manufacturing Engineering Technology 110 and 230, each with a grade of "C" or better, or equivalent. This is a capstone course for the Manufacturing Engineering Technology program. It provides students the opportunity to apply a combination of skills and

knowledge to solve an industrial manufacturing problem. Students work together in groups to tackle an integrated, technical problem selected by industry and approved by program faculty. Topics include, but are not limited to, manufacturing materials and processes, design, quality, lean manufacturing and automation. This course is intended solely for students enrolled in the last semester of the Manufacturing Engineering Technology program, and is a major requirement. (FT) Associate Degree Credit & transfer to CSU and/or private colleges and universities.

270 Work Experience

1- 4 units, 1 hour other

Letter Grade or Credit/No Credit Option

Limitation on Enrollment: Must obtain an Add Code from Work Experience Coordinator for enrollment. To receive credit a student must complete a minimum of seven units during the semester, including work experience.

A program of on-the-job learning experiences for students employed in a job related to their major. The combined maximum credit for all work experience courses from all disciplines may not exceed 16 units.

Associate Degree Credit & transfer to CSU and/or private colleges and universities.