

# Manufacturing Engineering Technology

*College of Science, Engineering & Technology*  
*Department of Automotive & Manufacturing*  
*Engineering Technology*

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Chair: Dr. Harry Petersen

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The Bachelor of Science degree in Manufacturing Engineering Technology prepares the student for a career in manufacturing. Students study the design, development, analysis, planning, materials, supervision, and fabrication of industrial and consumer goods. Graduates obtain positions in manufacturing industries where they organize workers, materials and machines so a reliable product can be produced efficiently.

**Program Goals.** Overall the program strives to prepare students entry into the technical workforce with well developed skills. In particular, the department strives to ensure that its graduates have an ability to:

- apply knowledge of science, mathematics, and engineering technology
- design, and conduct experiments as well as analyze and interpret data
- design a system, component, or process to meet specified needs
- function effectively in teams
- identify, formulate, and solve engineering technology problems
- have an understanding of professional and ethical responsibilities
- communicate effectively

**Accreditation.** The program is accredited by the Technology Accreditation Commission (TAC) of the Accreditation Board for Engineering and Technology (ABET), 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, Telephone: 410-347-7700.

**Admission to Major** is granted by the department. Minimum university admission requirements are:

- a minimum of 32 earned semester credit hours.
- a minimum cumulative GPA of 2.00 (C).

Contact the department for application procedures.

## MANUFACTURING ENGINEERING TECHNOLOGY BS

**Required General Education (22 credits):**

ENG 101 Composition (4)

SPEE 100 Fund. of Speech Comm. (3) **or**  
 SPEE 102 Public Speaking (3)  
 MATH 115 Precalculus Mathematics (4)  
 MATH 121 Calculus I (4)  
 PHYS 211 Principles of Physics I (4)  
 CHEM 105 Introduction to Chemistry (3)

**Required Support Courses (15 credits):**

ENG 271 Technical Communication (4)  
 MATH 127 Calculus II for Engineering Technology: Integration (2)  
 STAT 154 Elementary Statistics (3)  
 PHYS 212 Principles of Physics II (4)  
 COMS 171 Introduction to C++ Programming (2)

**Required for Major (60 credits):**

MET 104 Introduction to Manufacturing Engineering Technology (1)  
 MET 141 Computer Aided Drafting (4)  
 MET 144 Product Development and Design (3)  
 MET 177 Materials Processing and Metallurgy I (4)  
 MET 245 Computer Aided Design (3)  
 MET 277 Materials Processing II (4)  
 MET 322 Statics, Dynamics, and Mechanics of Materials (5)  
 MET 347 Manufacturing Automation (5)  
 MET 387 Junior Design Project (1)  
 MET 407 Manufacturing Resource Planning and Control (4)  
 MET 423 Ergonomics and Work Measurement (3)  
 MET 424 Industrial and Construction Safety (2)  
 MET 425 Project and Value Management (4)  
 MET 426 Logistics and Transportation (2)  
 MET 427 Quality Management Systems (3)  
 MET 488 Senior Design Project I (1)  
 MET 489 Senior Design Project II (2)  
 AET 334 Fluid Power Systems (3)  
 AET 378 Composite Materials (3)  
 EET 113 DC Circuits (3)

**Minor Required: None.**

## MANUFACTURING ENGINEERING TECHNOLOGY MINOR

**Total Credits (16 credits)**

**Required for Minor (9 credits):**

MET 104 Introduction to Manufacturing Engineering Technology (1)  
 MET 141 Computer Aided Drafting (4)  
 MET 177 Material Processing and Metallurgy I (4)

**Additional electives required for minor (7 credits):**

**Required for Minor (Electives, 7 credits):**

Choose 7 credits of MET/AET courses:

## POLICIES/INFORMATION

**GPA Policy.** A minimum GPA of 2.0 is required.

Refer to the College regarding required advising for students on academic probation.

**Department Grade Policy.** All courses in the MET Major, and the required Communications, Basic Science,

and Mathematics courses must be completed with a grade of "C" or better.

**P/N Grading Policy.** No more than 1/4 of all undergraduate credits may be P/N, except those courses offered P/N only.

**Residency.** A minimum of 50 percent of the credits for a major or minor in Manufacturing Engineering Technology must be taken at Minnesota State University, Mankato.

Prerequisites and co-requisites must be observed unless written permission is obtained from the instructor and the Department of AMET. A flow chart of prerequisites is available in the Department Office.

The scheduling of all department courses is done yearly, based on enrollment and staffing. To obtain a current yearly class schedule, contact the Department.

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## COURSE DESCRIPTIONS

### **MET 104 (1) Introduction to Manufacturing Engineering Technology**

An overview of careers, technology and requirements for individuals interested in Manufacturing Engineering Technology. Hands-on experience is gained in a variety of new technologies. Careers in engineering and technology are examined along with professional organizations and ethics. The course is intended as a first step toward a career in manufacturing.

### **MET 141 (4) Computer Aided Drafting**

Fundamentals of technical drawings and use of AutoCAD as a drawing instrument. Conventions, standards and practices for 2D and 3D technical drawings. Lab projects cover introduction to AutoCAD, basic construction, geometric and editing techniques, orthographic and auxiliary drawings, dimensioning, and surface modeling.

### **MET 144 (3) Product Development and Design**

Analysis and application of key steps in the product realization process. External and internal factors affecting strategic product life-cycle management are emphasized along with the relationship of design to marketing and manufacturing activities and product development cost implications. Students work individually and in teams on a competitive semester-long design project assessing customer needs, product specifications, generation and selection of concepts, prototype development, test and product production planning. Concentrates on development of verbal, written and e-communication skills. Provides knowledge and practice in conducting effective project management.

Coreq: MET 141

### **MET 145 (2) Computer Graphics**

A course intended for civil engineering students. Principles of AutoCAD along with civil engineering applications are covered.

### **MET 177 (4) Materials Processing I and Metallurgy**

Fundamentals of machine technology and metallurgy.

Theory and step-by-step procedures are used to provide instruction on how to turn materials into products. Students learn to perform machining on a lathe, mill, and drill press, and also inspect the products. Basics of metal processing, plastic molding, and other processes are discussed. Coreq: MET 141

### **MET 245 (3) Computer Aided Design**

Computer Aided Designing covers a process of developing and analyzing solid parametric models for mechanical applications. Course includes solving technical designing problems based on real-world applications as well as creation of technical documentation: working and assembly drawings. Introduction to the Finite Element Analysis is included in the course. Currently used CAD systems are Mechanical Desktop from Autodesk Inc. and Pro-Engineer from PTC, Inc.

Pre: MET 141

### **MET 277 (4) Materials Processing II**

A study of the principles of manufacturing technologies, measurements and equipment used in processing of an end product. Advanced manufacturing processes including casting, forging, sheet metal forming, material removal, joining, and powder metals are discussed. Topics also include materials treatment, preparation, and design for manufacture.

Pre: MET 177, Coreq: MET 245

### **MET 322 (5) Statics, Dynamics, & Mechanics of Materials**

Course covers principles of force equilibrium, stress and strain, shear and torsion, bending moments, force diagrams, deformations of beams, stress/strain analysis, kinematics and kinetics of rigid bodies, work, energy, and power.

Pre: PHYS 211 and MATH 121

### **MET 345 (1-2) CAD Projects**

Advanced applications of computer aided design. Solid and parametric systems.

Pre: MET 245

### **MET 347 (4) Manufacturing Automation**

CNC programming, computer-aided manufacturing (CAM), flexible automations, machining centers, robotics, programmable logic controllers, tooling systems.

Pre: MET 277; Coreq: COMS 171, MATH 121

### **MET 387 (1) Junior Design Project**

An examination of manufacturing design and research, along with a review of topics such as ethics, professionalism, measurement, statistics, and career development/placement. This course prepares the student for MET 488, Senior Design Project I, where the design proposal, design project and final report are completed.

Pre: MET 104; Coreq: STAT 154

### **MET 407 (4) Manufacturing Resource Planning and Control**

Planning and control of plant resources in globally competitive manufacturing environments. Studies hard and soft technology assets applied to systematic resource management in the manufacturing supply chain. Approaches to manufacturing problems related to design integration,

production scheduling, staffing, plant layout, material flow, and inventory issues are examined. Evaluation of demand patterns and product mix are discussed in selection and application of traditional, contemporary or mixed production and inventory control methods. Examines arrangement and layout of physical facilities and modern techniques for efficient utilization of production space. Decision making tools and techniques to engage employees in product production improvement are studied and applied through a variety of simulation methods.

Pre: MET 245 and MET 277

#### **MET 423 (4) Ergonomics & Work Measurement**

Investigates work design and environmental stresses from heat, noise, vibration, repetitive motion, illumination, force, and posture in worker-machine systems. Principles and practical applications of time and motion studies in manual and automated work settings are studied. Regulatory and legal implications are reviewed in the context of human factors. Presents ethical behavior and dilemmas in organizations. The impact of work design on quality, throughput, safety, ergonomics and scheduling are linked with methods of improvement. Concepts of work simplification, standardization, job rating and time study are simulated through software manipulation.

Pre: STAT 154

#### **MET 424 (2) Industrial Safety**

Techniques of developing safety practices in an industrial environment. Topics include OSHA, current legislation, cost analysis, personal protection, employee selection, psychological aspects, product safety, hazard materials and catastrophe control.

#### **MET 425 (4) Project and Value Management**

Studies planning, organizing, directing, and reporting for industrial project management. Organizational factors of structure and culture and the impact each has on project management are evaluated. Students work through situational case studies individually and in project teams, using project management tools. Students develop their interpersonal and group dynamics skills for effectively leading project teams and create investment proposals for analysis using time value of money, and cash flows. Principles of engineering economy are enhanced through spreadsheet modeling for industry applications.

Coreq: MET 407

#### **MET 426 (2) Logistics and Transportation**

Fundamentals of logistics: control of materials, WIP, finished goods, costs of logistics. Theory and step-by-step procedures are used to analyze logistic systems, packaging and transportation, including global logistics.

#### **MET 427 (3) Quality Management Systems**

This course is focused on quality assurance systems, management philosophies, methodology, function and impact of quality systems in manufacturing operations. Development and application of statistical process control tools.

Coreq: MET 407, MATH 121.

#### **MET 488 (1) Senior Design Project I**

An examination of manufacturing design and research

along with topics such as ethics, professionalism, measurement, statistics, and career development/ placement. This course also prepares the student for MET 489, Senior Design Project II, where the design proposal, design project, and final report are completed. This course must be taken in the spring semester of the junior year.

Coreq: STAT 154

#### **MET 489 (2) Senior Design Project II**

A continuation of MET 488.

Pre: MET 488, ENG 271

#### **MET 492 (1-4) Seminar: Manufacturing**

Selected manufacturing topics.

#### **MET 497 (1-10) Internship: Manufacturing**

Manufacturing work experience in an area pertinent to the student's objective. Consent of internship coordinator required prior to the beginning of employment and registration. Typically done between the junior and senior year.

Pre: 50% of major

#### **MET 499 (1-4) Individual Study**