

MANUFACTURING ENGINEERING TECHNOLOGY

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 Manufacturing Engineering Technology (MET) Bachelor of Science degree is critical to the competitive success of a wide variety of industry sectors in the global economy. Learning centers on the study of competitive engineering applications in current and future production technologies and methodologies.

Skills to support engineering activities include the ability to plan, design, implement, evaluate, and manage effective production solutions while meeting cost, quality, flexibility, and time goals. Students of this program become involved in product design; however, quality product design is only part of getting a product to market successfully. Manufacturing Engineering Technology graduates identify and integrate the ideal solutions for manufacturing products by selecting and organizing the correct equipment, materials, methods, and workforce to ensure transformation activities are value added. This engages the Manufacturing Engineering Technology graduate with other management and engineering professionals to meet the needs of a global manufacturing economy.

Program Objectives. The Manufacturing Engineering Technology degree program mission is to provide a broad-based applied education which prepares graduates to enter into, or augment a career in manufacturing and enable their success several years beyond completion of the degree. Graduates will be able to:

- apply knowledge of science, mathematics, and engineering technology
- 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 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 (25 credits):

ENG	101	Composition (4)
SPEE	100	Fundamentals of Speech Communication (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	104	Introduction to Chemistry (3)
STAT	154	Elementary Statistics (3)

Required Support Courses (12 credits):

ENG	271	Technical Communication (4)
MATH	127	Calculus II for Engineering Technology: Integration (2)
PHYS	212	Principles of Physics II (4)

COMS	171	Introduction to C++ Programming (2)
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Required for Major (60 credits):

MET	104	Introduction to Manufacturing Engineering Technology (1)
MET	142	Computer Aided Drafting (3)
MET	144	Product Development and Design (3)
MET	177	Materials Processing I and Metallurgy (4)
MET	277	Materials Processing II (4)
MET	322	Statics, Dynamics, and Mechanics of Materials (5)
MET	341	Advanced Computer Aided Design (4)
MET	347	Manufacturing Automation (4)
MET	387	Junior Design Project (1)
MET	407	Manufacturing Resource Planning and Control (4)
MET	423	Ergonomics and Work Measurement (3)
MET	424	Industrial 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 (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 (8 credits):

MET	104	Introduction to Manufacturing Engineering Technology (1)
MET	142	Computer Aided Design (3)
MET	177	Material Processing I and Metallurgy (4)

Additional electives required for minor (8 credits):

Required for Minor (Electives, 8 credits):

Choose 8 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 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.

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 142 (4) Computer Aided Drafting
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.

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 engineering students. Principles of CAD along with 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 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 341 (4) Advanced Computer Aided Design

This course emphasizes the use of CAD in design, analysis, and manufacturing. Topics include component design, mechanics, animation, finite element analysis, on-line collaboration, CNC machining and rapid prototyping using CAD.

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: supply chain management, 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. Students refine their design proposal and begin their senior design projects. 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 should be taken in the fall semester of the senior 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.

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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