Manufacturing Engineering Technology

Dr. Hazem Tawfik, Co-Chair
Hazem.Tawfik@farmingdale.edu
Dr. Jeff Hung, Co-Chair
Jeff.Hung@farmingdale.edu
Mechanical Engineering Technology
631-420-2046
School of Engineering Technology

Bachelor of Science Degree

This is a four-year program offered by the Mechanical Engineering Technology Department. Students may matriculate on a full-time or part-time basis.

Students receive hands-on experience using industrial equipment in the department’s well equipped computer, strength, design, materials, manufacturing, quality control, electromechanical control systems, and robotics laboratories. The department is particularly proud of its Institute for Research and Technology Transfer (IRTT) which contains automated commercial – Computer Numerical Control (CNC) Turning Center, CNC Machining Center, Coordinate Measuring Machine (CMM), Vision Guided Robotics System, Laser Cutting Machine, Thermal Spray – High Velocity Oxygen Fuel (HVOF) Machine, Rapid Prototyping Machine Hydrogen Fuel Cell and Biomass Energy Research. Advanced manufacturing computer programs such as: Computer Aided Manufacturing (CAM) that runs on the latest hardware and software systems. Up-to-date courses in Statistical Quality Control (SQC) and Statistical Process Control (SPC), Electronic Packaging Applications, Robotics and Automation systems, Electromechanical Control Systems and Tooling for Composites complement traditional courses such as Statics, Strength of Material Science providing graduates with a well-balanced and needed background.

Students also benefit from the close relationship between the College and local industry through a required senior project that provides the students with valuable integrating capstone experience. The graduate serves as the integrator and implementer of new designs, manufacturing and production operations. He or she provides the applied technical expertise to translate design information into the necessary tools, instruction, procedures, operation sequences and controls to coordinate the cost-effective manufacturing of high quality products.

Typical Employment Opportunities

- Industrial Designer
- Mechanical Designer
- Process Designer
- Junior Designer
- Manufacturing Designer
- Technical Writer
- Chief Designer
- Senior Quality Control (QC) Supervisor
- Numerical Control (NC) Programmer

Manufacturing Engineering Technology (BS) Program Outcomes:

- Graduates will have the knowledge and skills and will assume leadership positions in process and systems design, manufacturing operations, maintenance, technical sales or service functions in a manufacturing enterprise.
• Graduates will be able to apply the technologies of materials, manufacturing processes, tooling, robotics and automation, production operations, maintenance, quality control, industrial organization and management, and statistical models to provide solution for manufacturing and industrial problems.
• Graduates will exhibit an understanding of the necessity for personal integrity, ethical behavior, cultural awareness and lifelong learning.

This program is accredited by the ETAC/ABET, www.abet.org

Fall 2017: Subject to Revision

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<th>Liberal Arts and Sciences</th>
<th>(60 credits)</th>
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<td>EGL 102 Composition II: Writing About Literature</td>
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<td>Basic Communication (GE)</td>
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<td>The Arts (GE)</td>
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<td>Foreign Language (GE)</td>
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<td>Social and Behavioral Science (GE)</td>
<td>3</td>
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<td>American/Other World/Western Civilization History (GE)</td>
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<td>Humanities (GE)</td>
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<td>Natural Science*</td>
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<tr>
<td>PHY 135 College Physics I (GE)</td>
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<td>PHY 136 College Physics II (GE)</td>
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<td>MTH 110 Statistics (GE)</td>
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<td>Liberal Arts &amp; Sciences elective</td>
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* For Natural Science Elective, at least one chemistry course.

Please refer to the General Education and Writing-Intensive Requirement Sections of the College Catalog and consult with your advisor to ensure that graduation requirements are satisfied.

<table>
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<tr>
<th>Support Courses</th>
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<td>BUS 300 Operations Management</td>
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<tr>
<td>Required: Mechanical/Manufacturing Courses</td>
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<td>MET 104 Computer Aided Drafting and Design (CADD)</td>
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MET 109 Computer Programming and Applications 2
MET 117 Manufacturing Processes 2
MET 127 Advanced Manufacturing Processes 2
MET 201 Statics 3
MET 205W Material Science 3
MET 206 Strength of Materials 3
MET 207 Tool Design 3
MET 230 Electrical Principles 3
MET 252 Quality Control (Metrology) 3
MET 305 Tooling for Composites 3
MET 307 Electromechanical Control Systems 3
MET 351 Computer Aided Manufacturing(CAM) 3
MET 406 Electronic Packaging Applications 3
MET 409 Statistical Quality Control(SQC) 3
MET 410W Senior Project 3
MET 415 Robotics 3
Technical Electives 15

(AET,BCS,BUS,CON,EET,IND,MET courses in consultation with department chair)

Total Credits: 126

Degree Type: BS
Total Required Credits: 126

Course Descriptions

**EGL 101 Composition I: College Writing (GE)**
This is the first part of a required sequence in college essay writing. Students learn to view writing as a process that involves generating ideas, formulating and developing a thesis, structuring paragraphs and essays, as well as revising and editing drafts. The focus is on the development of critical and analytical thinking. Students also learn the correct and ethical use of print and electronic sources. At least one research paper is required. A grade of C or higher is a graduation requirement. Note: Students passing a departmental diagnostic exam given on the first day of class will remain in EGL 101; all others will be placed in EGL 097. Prerequisite is any of the following: successful completion of EGL 097; an SAT essay score (taken prior to March 1, 2016) of 7 or higher; an SAT essay score (taken after March 1, 2016) of 5 or higher; on-campus placement testing. Credits: 3

**EGL 102 Composition II: Writing About Literature**
This is the second part of the required introductory English composition sequence. This course builds on writing skills developed in EGL 101, specifically the ability to write analytical and persuasive essays and to use research materials.
correctly and effectively. Students read selections from different literary genres (poetry, drama, and narrative fiction). Selections from the literature provide the basis for analytical and critical essays that explore the ways writers use works of the imagination to explore human experience. Grade of C or higher is a graduation requirement. Prerequisite(s): EGL 101
Credits: 3

PHY 135 College Physics I (GE)
An integrated theory/laboratory general college physics course without calculus. Topics will include fundamental concepts of units, vectors, equilibrium, velocity and acceleration in linear and rotational motion, force, energy, momentum, fluids at rest and in motion, and oscillatory motion. Laboratory problems, experiments and report writing associated with the topics studied in the theory are performed. Prerequisite(s): MTH 129 Corequisite(s): PHY 135L Credits: 4

PHY 136 College Physics II (GE)
A continuation of PHY 135. Topics will include heat, electricity, magnetism, light and optics. Prerequisite(s): PHY 135 Corequisite(s): PHY 136L Credits: 4

MTH 110 Statistics (GE)
Basic concepts of probability and statistical inference. Included are the binomial, normal, and chi-square distributions. Practical applications are examined. Computer assignments using Minitab form an integral part of the course. Prerequisite(s): MP2 or MTH 015 Credits: 3

MTH 129 Precalculus with Applications
This is a precalculus course with applications from various disciplines including technology, science, and business. Topics include families of functions, mechanics of functions, exponential and logarithmic functions, trigonometric functions and complex numbers. The emphasis is on applications and problem solving. A graphing calculator is required. Note: Students completing this course may not receive credit for MTH 117. Prerequisite(s): MP3 or MTH 116 Credits: 4

MTH 130 Calculus with Applications
This is a calculus course for those not majoring in Mathematics, Engineering Science or Computer Science. Topics include the derivative, differentiation of algebraic, trigonometric, exponential and logarithmic functions, applications of the derivative and the definite integral. Applications are taken from technology, science, and business. Problem solving is stressed. A graphing calculator is required. Note: Students completing this course will not receive credit for MTH 150. Prerequisite(s): MP4 or MTH 117 or 129 Credits: 4

MTH 236 Calculus II with Applications
A continuation of Calculus I with Applications. Topics include techniques of integration, applications of the definite integral, multivariable calculus, and an introduction to Differential Equations. Applications are taken from technology, science and business. Problem solving is emphasized. A graphing calculator is required. Prerequisite(s): MTH 130 or MTH 150 Credits: 3

BUS 300 Operations Management
This course undertakes an examination of the role of operations within manufacturing and service organizations. Emphasis is placed upon recognizing operational opportunities and tradeoffs, and employing quantitative and qualitative tools and decision support systems to assist strategic and operational decision-making. The general functions of operations management as applied to the transformation process are covered. Some of the important topics include but not limited to Forecasting, Statistical Quality Control, Inventory Management, Linear Programming, and Transportation Models. Note: Students who have previously completed IND 301 cannot receive credit for BUS 300. Prerequisite(s): BUS 240 or MTH 110 Credits: 3

MET 104 Computer Aided Drafting and Design (CADD)
This course introduces computer aided drafting and design (CADD) in 2D drafting and 3D solid modeling. Students will learn traditional drafting techniques, such as orthographic projection, dimensioning, and tolerancing, and apply their drafting skill through 2D CAD software. Students will also learn 3D solid modeling based on parametric constraints, dimensions and features such as extrude, revolve, sweep, loft, hole, fillet and shell. In addition, the course teaches students how to create assemblies and 2D engineering drawings from the existing 3D solids. Laboratory exercises will be assigned to the students for hands-on experience with the related topics. This course is equivalent to the combination of GPH103, GPH104, and MET211. Corequisite(s): MET 104L Credits: 3

MET 109 Computer Programming and Applications
This is an introductory course in a computer programming language. Programs are specifically written to be used in the areas of statics, strength of materials, machine design, heat transfer, and fluid mechanics. Applications of the theoretical concepts are covered in the required laboratory. Corequisite(s): MET 109L Credits: 2

MET 117 Manufacturing Processes
The main purpose of this course is to introduce the mechanical engineering technology student to the principles and operation of mechanical equipment such as lathes, drill press, milling machines and measuring requirements and measuring instruments. Several manufacturing processes such as welding, powder metallurgy, sheet metal forming, extrusion, etc. are also covered. Individual laboratory projects will be assigned to each student to reinforce the topics covered in the theory. Corequisite(s): MET 117L Credits: 2

MET 127 Advanced Manufacturing Processes
This course is a continuation of MET 117. Topics emphasize the theory and operation of manual and numerically controlled milling machines and machining centers. Additional topics covered are the gear shaper, indexing head, point-to-point drilling and milling, and three axis measurement. Laboratory projects will be assigned to reinforce the topics covered in theory. Prerequisite(s): MET 117 Corequisite(s): MET 127L Credits: 2

MET 201 Statics
This is a basic course in statics. The main objective of this course is to provide student with a basic understanding of the principles of statics. Topics such as resultant of a force, equilibrium of forces, moments, couples, analysis of simple trusses, centroids, center of gravity, moments of inertia and friction are covered in this course. Applications of the theoretical concepts are covered in the required laboratory. Note: Students completing this course cannot receive credit for CON 106. Prerequisite(s): MTH 130 and PHY 135 Corequisite(s): MET 201L Credits: 3

MET 205W Material Science
This is a theory and laboratory course designed to give students a basic understanding of crystal structures, effects of cold work and annealing on metal structures and properties, phase diagrams, heat treatment of steel, corrosion of materials, failure analysis of ferrous and non-ferrous alloys, ceramics, plastics and composite materials. Laboratory experiments are associated with the topics covered in the theory. Students will write technical reports throughout the semester as well as final presentations to help them communicate effectively in specific writing related to their fields. This is a writing-intensive course. Prerequisite(s): EGL 101 with a grade of C or higher Corequisite(s): MET 205L Note: Students cannot get credit for MET 205 and 205W; MET 205W can be used to fulfill the writing intensive requirement, which is offered at the discretion of the Automotive & Mechanical Engineering Technology Department. Credits: 3

MET 206 Strength of Materials
This is a basic course in Strength of Materials. The main objective of this course is to introduce the concepts of stress, strain, torsion, bending and shear stresses. It also covers shear moment diagrams, deformations and modes of failure, Mohr's Circle; also included are topics in thermal and combined stresses. Laboratory demonstration of experiments and testing equipment are emphasized. Prerequisite(s): MET 201 or CON 106 Corequisite(s): MET 206L Credits: 3
**MET 207 Tool Design**
This course covers the fundamentals of tool design, with main focus on the principles of jigs and fixtures design. Topics covered include: General tool design, economics of tool design, materials used for tooling, work holding principles, jig design, fixture design, die design and operation, power presses, metal cutting, forming and drawing. Students will be using Computer Aided Design (CAD) software packages in designing different jigs and fixtures. Applications of the theoretical concepts and hands-on 3D CAD modeling are covered in the required laboratory. Prerequisite(s): MET104, MET127 Corequisite(s): MET 207L Credits: 3

**MET 230 Electrical Principles**
This hands-on and theory course introduces electrical principles to Mechanical and Manufacturing Engineering Technology and Facility Management Technology students. Emphasis will be on power systems that utilize alternating current. Course topics include resistive and R-L-C series and parallel circuits, instrumentation, single and three-phase circuits that contain motors, transformers, starters and low voltage controls, and an overview of electronic applications to mechanical systems. Electrical logic (ladder) diagrams will be stressed throughout the semester. Laboratory assignments will reinforce the topics covered by theory through relevant experiments performed by the student and will include the writing of laboratory reports. Prerequisite(s): MTH 130 and PHY 136 Corequisite(s): MET 230L Credits: 3

**MET 252 Quality Control (Metrology)**
This course covers different aspects of dimensional metrology principles, calibrations, and practices. Common measurement tools and methods used in the industry will be introduced. Topics covered include: Gage Blocks, Fixed Gages, Height Gages, Plug Gages, Dial Gages, Angle Measurements, Pneumatic Gages, Surface Metrology, Optical Metrology, Load Cells Calibration, Introduction to GD&T, and Gage R&R Analysis. Laboratory exercises covered include: Gage Blocks Stacking and Calibration, Dial Gages & Plug Gages in Inspection, Micrometer Calibration, Transducers & Load Cell Calibration, Surface Roughness measurements and analysis, Angle measurements using Sign Bar, Gear Inspection, Air Gage Inspection, Inspection of Flatness, Straightness, Perpendicularity. Prerequisite(s): MET 104, MET 127 Corequisite(s): MET 252L Credits: 3

**MET 305 Tooling for Composites**
This is a theory and laboratory course covering an introduction to advanced composite materials and design of production tools and parts. Some included topics are: mold designs, open mold process, resin transfer molding, vacuum infusion process, compression molding, filament winding, and inspection and repair. Design assignments will be given to students which require utilizing the computer laboratories to use the 3-dimensional (3D) parametric design software packages. Prerequisite(s): MET 207 Corequisite(s): MET 305L Credits: 3

**MET 307 Electromechanical Control Systems**
This course covers the fundamentals and physical principles of electro-pneumatic and hydraulic control circuits. Pneumatic and hydraulic components such as directional control valves, flow control valves, and pressure control valves will be covered. The course also covers programmable logic controller (PLC) using Allen-Bradley MicroLogix controller. Students will be designing and troubleshooting PLC controlled hydraulic and electro-pneumatic circuits in the laboratory. Automation Studio software will be used in designing and simulation of control circuits. Prerequisite: MET 230 Corequisite: MET 307L Credits: 3

**MET 351 Computer Aided Manufacturing(CAM)**
This course provides the student with experience in computer graphics NC programming techniques. Students will generate 2-D and 3-D parts on CAM software and analyze the tool paths required for various types of machining operations. Programs will be processed to produce EIA-NC code which will then be loaded into a CNC machine to manufacture a part. Students will also create 2-D and 3-D files on CAD software and learn how to export the CAD files to CAM software. Prerequisite(s): MET 127 Credits: 3
MET 406 Electronic Packaging Applications
This is a theory and laboratory course covering an introduction to electronic packaging application with the printed circuit board design of analog and digital schematics. Also included in the course is application of thermal, radio frequency, electromagnetic, shock and vibration effects. Laboratory will reinforce the topics covered in theory through projects using the College’s computer graphics equipment. Prerequisite(s): MET 207 Corequisite(s): MET 406L Credits: 3

MET 409 Statistical Quality Control (SQC)
Students will be introduced to techniques for determining the quality of mass manufactured products by means of statistical analysis. State-of-the-art computers and software will be used to generate and analyze process control charts and histograms, plus continuous variables, and attribute control charts. Tests for special causes and capability analysis of a process will be addressed. Prediction of the probable percentage defective in a monitored process as well as the producer’s and customer’s risk will be emphasized. Students will learn to define the Acceptance Quality Level (AQL) and the military sampling plans (MIL Standard). Applications of the theoretical concepts are covered in the required laboratory. Prerequisite(s): MET 109, MET 252, MTH 110 Corequisite(s): MET 409L Credits: 3

MET 410W Senior Project
An independent investigation of a technical problem of interest to both the student and a faculty member who shall act as Project Advisor. The project selected will utilize skills and knowledge acquired in earlier MET studies. Required for graduation from the Bachelor of Science program in Manufacturing Engineering Technology. Prerequisite(s): Approval of this department chair. Credits: 3

MET 415 Robotics
Students will be introduced to robotics from both a theoretical and practical aspect. Different types of robots and their applications in industry will be covered. Financial management and return on investment of the robotics applications will be discussed. Additional topics included are motion transmission and control of robot mechanisms, robot programming, the use of robots in an integrated manufacturing cell, and practical uses of the robot vision system. Hands-on experience on actual working robots and the application of the theory will be provided in the laboratory. Prerequisite: MET 307 Corequisite(s): MET 415L Credits: 3

Admission to Farmingdale State College - State University of New York is based on the qualifications of the applicant without regard to age, sex, marital or military status, race, color, creed, religion, national origin, disability or sexual orientation.