MET - Mechanical Engineering Technology

MECHANICAL ENGINEERING TECHNOLOGY COURSES

MET 120. Computer Aided Drafting. 3 Credits.
Computer based drafting methods are taught with a major emphasis on 'Hands On' practice using 2-D AutoCAD software in the computer lab, along with the various methods of editing, manipulation, visualization and presentation of technical drawings. This course includes the basic principles of engineering drawing/hand sketching, dimensioning and tolerancing.

MET 200. Manufacturing Processes and Methods. 3 Credits.
Application and characteristics, both physical and chemical, of the materials most commonly used in industry as well as procedures and processes used in converting raw materials into a finished product.

MET 225. Material Science Laboratory. 1 Credit.
A laboratory course dealing with the standard methods of inspecting and testing materials used in engineering applications with emphasis on laboratory reports, including presentation and interpretation of experimental data. Pre- or Corequisite: CET 220.

MET 240. Computer Solid Modeling. 3 Credits.
A treatment of modern 3-D parametric solid modeling techniques including introduction of the software utilized sketching, parts and assembly creation techniques, orthographic views extraction and manufacturing drawing generation. Presentations include exploded views and animation. Prerequisites: MET 120.

MET 295. Topics. 1-3 Credits.
Study of selected topics.

MET 300. Thermodynamics. 3 Credits.
The basic laws of thermodynamics, properties of fluids, heat, and work and their applications in processes and cycles and an introduction to conduction heat transfer. Prerequisites: CHEM 121N, MATH 211, and PHYS 111N or PHYS 231N.

MET 305. Fundamentals of Mechanics. 3 Credits.
Selected topics in statics and strength of materials are applied to mechanical engineering technology. Coverage includes force systems, equilibrium, friction, and stress-strain relationships and their application to the mechanical behavior of materials. Prerequisites: PHYS 111N and MATH 211.

MET 310. Dynamics. 3 Credits.
A fundamental treatment of coplanar and three-dimensional kinematics and kinetics of particles and rigid bodies, including relative motion, mass moments of inertia, Newton's laws, work and energy, impulse and momentum, and simple vibrations. Prerequisites: MATH 211, CET 200, and PHYS 111N or PHYS 231N.

MET 320. Design of Machine Elements. 3 Credits.
A rapid review of the fundamental principles of strength of materials and working stresses followed by practical analyses of fundamental machine elements such as shafts, springs, and screws. Prerequisites: MATH 211, a grade of C or better in CET 220 and PHYS 111N or PHYS 231N.

MET 330. Fluid Mechanics. 3 Credits.
The study of fluid statics and dynamics, including momentum, energy, Bernoulli's equation, laminar and turbulent flow and friction in pipes, fluid machinery, and open-channel flow. Prerequisites: MET 310.

MET 335W. Fluid Mechanics Laboratory. 1 Credit.
A laboratory course dealing with the verification of fluid equations and principles and the characteristics of fluid machinery with emphasis on laboratory report writing, including presentation and interpretation of experimental data. This is a writing intensive course. Prerequisite: A grade of C or better in ENGL 211C or ENGL 221C or ENGL 231C. Pre- or corequisite: MET 330.

MET 350. Thermal Applications. 3 Credits.
A study of basic applications of thermodynamics. Topics include the basic steam and gas turbine power plant, introduction to refrigeration systems, psychrometrics, basic conduction and convection heat transfer including heat exchangers and surveys of other energy conversion systems. Prerequisites: MET 300.

MET 356. Automation and Controls. 3 Credits.
A study of the design and analysis of feedback control system. Includes the fundamentals of programmable controllers as well as practical applications of interfacing mechanical, electrical, pneumatic and hydraulic feedback control circuits. Computer simulation software is used to model system responses. Pre- or corequisite: EET 350. Prerequisite: MATH 211.

MET 386. Automation and Controls Laboratory. 1 Credit.
Laboratory and computer simulation of control systems including programmable controllers as well as practical applications of interfacing mechanical, electrical and pneumatic control systems. Pre- or corequisite: MET 370.

MET 395. Topics. 1-3 Credits.
Study of selected topics. Prerequisite: permission of the instructor.

MET 396. Topics. 1-3 Credits.
Study of selected topics. Prerequisite: permission of the instructor.

MET 400. Computer Numerical Control in Production. 3 Credits.
Principles of computer numerical control consistent with most recently developed standards, industry practices, and CAD/CAM systems including such topics as types of CNC machines, CNC milling, CNC turning and CNC electro-discharge machinery. A significant portion of the course includes programming in multiple axes. Prerequisites: Senior standing.

MET 410. Advanced Manufacturing Processes. 3 Credits.
A course in nontraditional manufacturing processes including ultrasonic machining, abrasive jet machining, waterjet cutting, electromechanical machining, electrical discharge machining, plasma arc machining and chemical milling. Semester project is required. (qualifies as a CAP experience) Prerequisites: MET 300.

MET 415. Introduction to Robotics. 3 Credits.
An introductory course in robotics dealing with the history and development of robots, mechanical components and control systems, actuators, robot programming and utilization. Included are laboratory experiments in robot motion and programming. Prerequisites: MET 310 and EET 350.
MET 420. Design for Manufacturing, 3 Credits.
Principles of design for manufacturing, materials and process selection for
design, design for assembly, design for production and case studies. Also
includes impact of product design, design for maintenance, recyclability,
disassembly, quality and robustness. Semester project requires redesign of an
existing product for manufacturing. Prerequisite: MET 200.

MET 426. Introduction to Mechatronics, 3 Credits.
A study of the mechatronics concepts and their application on actual
problems encountered in engineering practice. Includes the basics of
electromechanical systems, electrical circuits, solid-state devices, digital
circuits and motors, all of which are fundamental to understanding
mechatronic systems. Prerequisites: EET 355 or MAE 225.

MET 427. Mechatronic System Design, 3 Credits.
A study of the integrated modeling and optimal design of a physical system,
which includes sensors, actuators, electronic components, and its embedded
digital control system. Includes simultaneous optimal design practice with
respect to the realization of the design specifications related to different
engineering domains. Prerequisites: EET 355 or MAE 225.

MET 430. Mechanical Subsystem Design, 3 Credits.
Fundamental principles required for the correct design of the separate
elements which compose the machine with attention given to problems of
synthesis and the interrelationships of the design of elements within the
sub-assembly. Topics include stress analysis of screws, belts, clutches,
brakes, chains and thin and thick cylinders, and lubrication and bearings.
Prerequisites: MET 320.

MET 431. Modeling and Simulation of Mechatronic Systems, 3 Credits.
The course provides foundations, principles, methods, and tools for
modeling and simulation of electro-mechanical components and systems
using appropriate modeling techniques. The course is focused on the
multi-body dynamics systems, fluid, hydraulic, and electrical systems.
Prerequisite: Senior standing.

MET 440. Heat Transfer, 3 Credits.
A study of conduction, convection and radiation heat transfer and heat
exchangers. Emphasis is on applications and problem solving using current
techniques, and modern correlations. Prerequisite: MET 300.

MET 445. Computer Integrated Manufacturing, 3 Credits.
Principles of computer integrated manufacturing, system integration,
arboriculture and data base development. Topics include part design
specifications, process engineering, fixed automation and process planning.
Prerequisite: Senior standing.

MET 450. Energy Systems, 3 Credits.
A study of the application of thermodynamics to power plants, engines,
compressors, turbines, and associated systems. A detailed study is made of
fossil fuel power plants with an introductory study of nuclear power and
other energy conversion systems. Prerequisites: MET 350.

MET 455. Lean Engineering, 3 Credits.
This course looks at the history of lean and six sigma philosophies, their
principles and implementation methodologies for creating a world class
enterprise. Topics in Lean include five s, value stream mapping, cellular
manufacturing, pull system, performance metrics, Lean supplier network,
Lean product development and Lean implementation models. Semester
research report is a course requirement. Class activities may involve physical
simulation of production environment. Prerequisites: Senior standing.

MET 460. Refrigeration and Air Conditioning, 3 Credits.
The design and application of refrigeration and air conditioning systems.
Studies are made of compressors, condensers, evaporators, psychometric
processes, load calculations and air distribution systems. High performance
vapor compression systems, absorption systems and other cycles are
analyzed. Prerequisites: MET 330 and MET 350.

MET 465. Geometric Dimensioning and Tolerancing, 3 Credits.
Methods and rules of dimensioning and tolerancing, calculation of fits, and
gotemetical tolerances using ANSI-Y14.5M, tolerances of form, orientation,
and profile, including flatness, straightness, circularity, cylindricity,
angularity, etc. Student work consists of designing and detailing various
product drawings. Prerequisites: Senior Standing.

MET 471. Nuclear Systems I, 3 Credits.
Reactor physics principles as applied to the design and operation of various
types of commercial nuclear power reactors. Topics include sources of
radiation and interaction with matter, neutron interactions, diffusion theory,
and reactor kinetics. Prerequisites: MATH 211 and PHYS 111N.

MET 472. Nuclear Systems II, 3 Credits.
Complete study of the nuclear fuel cycle, from mining through fabrication,
fuel management in an operating commercial power reactor, spent fuel
management, and fuel reprocessing, with emphasis on chemical engineering
considerations. Prerequisites: MET 471, CHEM 121N and CHEM 122N or
equivalent.

MET 474. Naval Architecture I, 3 Credits.
This course includes fundamentals of ship and marine vessel design,
including ship geometry, hydrostatics, intact and damage stability, marine
structures, resistance and propulsion, and shipbuilding and construction
of marine vessels. Students will learn how these topics apply to naval and
commercial ships, sailing vessels, and recreational small craft. Prerequisites:
MAE 220 or CET 220, MAE 303 or CEE 330 and MET 330.

MET 475. Marine Engineering I, 3 Credits.
This course includes: fundamental principles of naval architecture including
nomenclature, geometry, stability, hydrostatics, structures, and motions;
ship design processes; and a basic introduction to shipboard systems such as
HVAC, refrigeration, power generation, propulsion, hydraulics, electronics,
cargo handling systems, seawater systems, freshwater systems, and fuel, lube
and other oil systems. Prerequisites: MET 330 and MET 350.

MET 476. Marine Engineering II, 3 Credits.
This course builds upon MET 475 and provides a more in-depth look on
how the marine shipbuilding industry is using various software including
SIEMENS PLM, 3D CAD modeling and new technologies like laser
scanners and augmented reality to reshape the future of shipbuilding,
maintenance, and repair processes. Focus will be based on model-based
learning and creating a "digital thread" of information. Students will practice
what they learn on shipbuilding concepts using commercial software
that is widely used across automotive, aerospace, and marine industries.
Prerequisites: MET 475.

MET 480. High Performance Piston Engines, 3 Credits.
A study of the fundamental principles and performance characteristics of
spark ignition and diesel internal combustion engines. Overview of engine
types and their operation, engine design and operating parameters; ideal and
semi-empirical models of engine cycles; combustion, fluid flow and thermal
considerations in engine design and performance. Laboratory evaluation of
engine performance using flow and dynamometer systems. (cross-listed with
MAE 477/MAE 577) Prerequisite: MET 350 or MAE 312.

MET 485. Maintenance Engineering, 3 Credits.
This course looks at maintenance systems: predictive, preventative and
corrective; large scale maintenance systems, principles of reliability
engineering, maritime logistics: planning for maintenance and repair, using
and ordering spare parts, technical manuals, system specifications, and
shipyard operations. Prerequisites: EET 305 and MET 200.

MET 490. Lean Enterprise, 3 Credits.
The history of lean philosophy, founding principles, and the extension of
these principles to above-shop-floor activities to create a lean enterprise.
Topics include five s, value stream mapping, cellular manufacturing, pull
system, performance metrics, point of use storage, built-in-quality, mistake
proofing and lean implementation models. Research report on one of the
lean principles is a course requirement. Prerequisites: MET 200.

MET 495. Topics in Mechanical Engineering Technology, 1-3 Credits.
Study of selected topics. Prerequisite: permission of the instructor.

MET 496. Topics in Mechanical Engineering Technology, 1-3 Credits.
Study of selected topics. Prerequisite: permission of the instructor.