Metropolitan State University of Denver

Mechanical Engineering Technology (MET)

Mechanical Engineering Technology is a broad-based engineering technology program emphasizing both engineering and practical applications. MSU Denver students receive a solid foundation in engineering fundamentals with about 2/3 of the courses requiring some form of hands-on laboratory work. This allows students to experience the integration of theory and practice that is an enhancement to traditional engineering educations. Also, the MET program offers state-of-the-art computer-aided engineering technology courses to keep students current with engineering technology and computer applications used in industry. MET candidates have a strong interest in mechanical devices and the desire to apply mathematics and computers to engineering analysis and design. Students are allowed to choose between two concentrations: mechanical and computer-aided manufacturing.

Faculty – The faculty in the MET program gives top priority to teaching, and emphasizes high levels of faculty-student interaction as a critical part of each student's education. The faculty has many years of industrial experience and brings a wealth of expertise, relevancy, and currency to the classes. All current Full-Time Faculty members hold a Ph.D. degree.

Students – Faculty provide each student with individualized counseling, and advising in meeting graduation requirements. Many MET students work part-time or full-time. For the working student the department offers many courses during evening hours. Students may participate in campus clubs, such as American Society of Mechanical Engineers (ASME), Society of Automotive Engineers (SAE) Student Organizations. Other organizations have also had student chapters in the past such as American Society of Quality (ASQ), Society of Manufacturing Engineers (SME), and American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE). These clubs are active in promoting professional development, academic scholarships, and interaction with industry. They invite guest speakers to meetings, arrange field trips, host social functions, participate in inter-university design contests, and provide community service. If they choose, they can design, build, and test vehicles and systems for different national design competitions, including the SAE Mini Baja-West, ASME Human Powered Vehicle. Students have participated in the NASA sponsored Colorado Space Grant Consortium's Demo - Sat program for workforce development.

The primary goal of the Engineering Technology programs is to deliver a solid technical foundation that will enable graduates to perform well in a wide variety of employment situations. A cooperative education program enables the student to combine on-the-job work experience with classroom studies.
Metro State students graduate with an extensive engineering technology education enabling them to be valuable contributors in many industries both established and emerging. We offer day and evening courses to accommodate working students' schedules.

Accreditation – The Mechanical Engineering Technology Bachelor of Science degree program is accredited by the Engineering Technology Accreditation Commission (ETAC) of ABET, 415 North Charles Street, Baltimore, MD 21201, Telephone: (410) 347-7700, www.abet.org.

ABET | Engineering Technology Accreditation Commission

Metropolitan State University of Denver

MECHANICAL ENGINEERING TECHNOLOGY
Department of Engineering & Engineering Technology
For Students Starting Fall 2019

Mechanical Engineering Technology (MET) offers a rigorous bachelor's degree program that prepares students for the field of engineering technology – the aspect of technology that requires scientific and engineering knowledge and methods combined with technical skills to support engineering activities. The specialized fields within the Mechanical Engineering Technology Program include two concentrations: Manufacturing and Mechanical.

General Studies Requirements

Written Communication (6 credits)
- ENG 1010 - Composing Arguments **Credits:** 3
- ENG 1020 - Freshman Composition: Analysis, Research, and Documentation **Credits:** 3

Oral Communication (3 credits)
- CAS 1010 - Public Speaking **Credits:** 3

Quantitative Literacy (4 credits)
- MTH 1400 - Precalculus Mathematics **Credits:** 4
  (the sequence of MTH 1110 - College Algebra and MTH 1120 - College Trigonometry may be substituted for MTH 1400)

Arts and Humanities (6 credits)
- PHI 1030 - Introduction to Ethics **Credits:** 3
  - or PHI 3360 - Business Ethics
- See the General Studies section of the catalog for approved courses.

Historical (3 credits)
- See the General Studies section of the catalog for approved courses.

Natural and Physical Sciences (10 credits)
- CHE 1100 - Principles of Chemistry **Credits:** 4
- CHE 1150 - Principles of Chemistry Laboratory **Credits:** 1
- PHY 2311 - General Physics I **Credits:** 4
- PHY 2321 - General Physics I Laboratory **Credits:** 1

Social and Behavioral Sciences I (3 credits)
- See the General Studies section of the catalog for approved courses.

Social and Behavioral Sciences II (3 credits)
- ECO 2020 - Principles of Microeconomics **Credits:** 3

Global Diversity (0 or 3 credits)

Multicultural Requirement (0 or 3 credits)

The department recommends that this requirement be met along with the Arts & Humanities, Historical, or Social & Behavioral Sciences general studies choices.

General Studies Total: 38 credits

Required MET Core Courses

			Prerequisites	Credit Hours
____	CET 2150	Mechanics I: Statics	MTH 1410, PHY 2311 **Pre/CoReq:** PHY 2321	3
____	CET 3135	Mechanics of Materials w/ Lab	CET 2150, JMP 2610 **Pre/CoReq:** MTH 2410	4
____	CHE 1100	Principles of Chemistry	MTH 1110 or MTH 1120	4
____	CHE 1150	Principles of Chemistry Lab	**CoReq**: CHE 1100	1
____	JMP 2610	Intro to Technical Writing	ENG 1010	3
____	EET 2000	Electric Circuits & Machines	MTH 1120 or 1400, PHY 2020 or 2331	3
____	EET 2350	Advanced Technical Programming	MTH 1110 & 1120 or MTH 1400	3
____	EET 3010	Industrial Electronics	EET 1150 or EET 2000	4
	OR			
____	EET 3730	Process Control Systems	EET 1150 or EET 2000	2
	AND			
____	EET 3740	Programmable Logic Controllers	EET 1150 or EET 2000	2

Metropolitan State University of Denver

____	MET 1000	Intro to Mechanical Engineering Technology	(none)	3
____	OR			
____	MET 1040	Introduction to Engineering	(none)	3
____	MET 1010	Manufacturing Processes	(none)	3
____	MET 1200	Technical Drawing I	(none)	3
____	MET 1210	3D Modeling	MET 1200 or IND 1450 or CET 1215	3
____	MET 1310	Principles of Quality Assurance	Intermediate Algebra	3
____	MET 2200	Materials of Engineering	MTH 1110 or MTH 1400 **Pre/CoReq:** CHE 1100 or CHE 1800	3
____	MET 3110	Thermodynamics	MTH 1410, PHY 2311	3
____	MET 3160	Mechanics II: Dynamics	CET 2150, MTH 2410	3
____	MET 3185	Fluid Mechanics	MET 3160	3
____	MET 3410	Geometric Dimensioning & Tolerance	MET 1210, MET 1310	3
____	MET 4000	Project Engineering	Senior standing	3
____	MET 4100	Senior Project I*	CET 3135, JMP 2610, MTH 2420, Senior standing **Pre/CoReq:** MET 3070 or 3000, EET 2000	1
____	MET 4110	Senior Project II*	MET 4100	2
____	MTH 1410	Calculus I	MTH 1110 & MTH 1120, or MTH 1400	4
____	MTH 2410	Calculus II	MTH 1410	4

**These courses satisfy the University's Senior Experience requirement.*

Manufacturing Concentration – 22 credits

____	MET 3000	Manufacturing Analysis	MET 1010, MET 1310, MTH 1110 or 1400	4
____	MET 3100	N/C Computer Programming	MET 1010, MET 1210, MTH 1120	3
____	MET 3250	Tool Design & Production Tooling	MET 2200, MTH 1120	3
____	MET 3300	Statistical Process Control	MET 1310, MET 3000	3
____	MET 3330	Robotics for Manufacturing	MET 3100, EET 2000	3
____	MET 4080	Computer Aided Manufacturing	MET 3000, MET 3100, MET 3210 or EET 2350	3
____		Upper Division Elective		3

Mechanical Concentration – 21 hours

____	MET 3070	Machine Design	MET 2200, CET 3135, MET 3160	3
____	MET 3125	Heat Transfer w/ Lab	PHY 2311	3
____	MET 3320	Instrumentation Laboratory	MET 3185	3
____	MET 4070	Computer Aided Design	MET 3070, MET 3210, completion of General Studies	3
____	MET 4280	Advanced Energy Technology	MET 3125, PHY 2311, PHY 2321	3
____		Approved technical elective		3
____		Approved technical elective		3

MET Program Manufacturing Concentration Total: 129 credits

General Studies	38 credits
Required MET Core	69 credits
Concentration Area	22 credits

MET Program Mechanical Concentration Total: 128 credits

General Studies	38 credits
Required MET Core	69 credits
Concentration Area	21 credits

Recommended Mathematics Minor – 28 credits

____	MTH 1410	Calculus I	MTH 1110 & MTH 1120, or MTH 1400	4
____	MTH 2410	Calculus II	MTH 1410	4
____	MTH 2420	Calculus III	MTH 2410	4
____	MTH 3130	Adv. Matrix Methods for the Physical Sciences	MTH 2410	4
____	MTH 3210	Probability and Statistics	MTH 2410	4
____	MTH 3420	Differential Equations	MTH 2420	4
____	CS 1050	Computer Science I	permission of dept.	4
	OR			
____	CSS 1247	Intro to Programming: Visual Basic	CSS 1010 or permission of dept.	4

Mechanical Engineering Technology Minor – 18 credits

____	MET 1000	Intro to Mechanical Engineering Technology	(none)	3
	OR			
____	MET 1040	Introduction to Engineering	(none)	3
____	MET 1010	Manufacturing Processes	(none)	3
____	MET 1310	Principles of Quality Assurance	Intermediate Algebra	3
____	MET 2200	Materials of Engineering	MTH 1110 or MTH 1400 **Pre/CoReq:** CHE 1100 or CHE 1800	3
____		Approved technical elective		3
____		Approved technical elective		3

Additive Manufacturing Engineering Certificate - 18 credits

____	MET 1010	Manufacturing Processes	(none)	3
____	MET 1200	Technical Drawing I	(none)	3
____	MET 1210	3D Modeling	MET 1200 or IND 1450 or CET 1215 with a grade of “C” or better; or permission of instructor	3
	MET 1310	Principles of Quality Assurance	Intermediate algebra or equivalent with a grade of “C” or better	3
	MET 3260	Direct Digital Manufacturing	MET 1210 or IND 3660 with a grade of “C” or better	3
____	MET 3410	Geometric Dimensioning and Tolerancing	MET 1210 and MET 1310 with grades of “C” or better	3

Advanced Composite Materials and Manufacturing Certificate - 15 credits

Prerequisites

CHE 1800	General Chemistry I	MTH 1109 or MTH 1110 or MTH 1112 or a College Level Math (CLM) score of greater than or equal to 65 on the Accuplacer Exam or an Advanced Algebra and Functions (AAF) score of greater than or equal to 280 on the Accuplacer Exam	4
MTH 1110	College Algebra	An intermediate algebra course or one and one-half years of secondary school algebra or equivalent and appropriate score on the mathematics preassessment placement test.	4

Required

____ MET 1010	Manufacturing Processes	Intermediate algebra or equivalent with a	3

			grade of "C" or better	
	MET 1310	Principles of Quality Assurance	Intermediate algebra or equivalent with a grade of "C" or better	3
	MET 2200	Materials of Engineering	MTH 1110 or MTH 1400 with grades of "C" or better	3
	MET 3215	Composites Manufacturing	MET 1010 or IND 2830, and MET 2200, or permission of instructor	3
	MET 4370	Advanced Composite Structures: Design, Damage, Repair and Testing	MET 3215 with a grade of "C" or better	3

Engineering Manufacturing Certificate - 25 credits

	Ancillary Prerequisites	These credit hours are not counted in the credit hour total.		
	ENG 1010	Composing Arguments	Score of 95 or higher on the Accuplacer sentence skills exam or a C- or better in ENG 090 or a score of 20-94 on Accuplacer with secondary placement. Students with an ACT ENG score of 18 or higher or SAT verbal score of 430 or higher or SAT Evidence-based Reading/Writing score of 470 or higher are exempt from the placement exam if scores are not older than five years.	4
	MTH 1110	College Algebra for Calculus	An intermediate algebra course or one and one-half years of secondary school algebra or equivalent and appropriate score on the mathematics preassessment placement test.	4
	Required			
	AMS 1010	Survey of Advanced Manufacturing and Workplace Preparation	(none)	3
	MET 1010	Manufacturing Processes	(none)	3
	or			
	IND 2830	Manufacturing Materials and Processes	(none)	3
	MET 1310	Principles of Quality Assurance	(none)	3
	MET 3000	Manufacturing Analysis Credits	MET 1010 or IND 2830, MET 1310, and MTH 1110 or MTH 1400, all with a grade of "C" or better	4
	MET 3630	Lean Manufacturing Systems Engineering	MET 3000 with a grade of "C" or better	3
	MET 3980	Internship in Mechanical Engineering Technology	Major in Mechanical Engineering Technology; junior or senior status; permission of instructor	1-15
	or			
	AMS 4950	Professional Internship	Junior or Senior standing and completion of the following AMS Core courses with a grade of "C" or better: AMS 1010, AMS 3010, JMP 2610, CSS 1751, EET 1001, IND 1450 or CET 1215 or MET 1200, MET 1310, MET 2010, MET 3000 and MTH 1120; Or, Junior or Senior standing and the permission of the AMSI Director.	1-15
	Electives	**Students must complete 6 credit hours**		
	CET 1215	Engineering Graphics Credits	(none)	3
	EET 1001	Electronics: An Introduction	High school algebra	3
	IND 1450	Technical Drawing and CAD Credits	(none)	3
	IND 3660	Computer Aided Modeling	IND 1450 or CET 1215 or MET 1200	3
	JMP 2610	Introduction to Technical Writing	ENG 1010	3
	MET 1200	Technical Drawing I	(none)	3
	MET 1210	3D Modeling	MET 1200 or IND 1450 or CET 1215 with a grade of "C" or better; or permission of instructor	3
	MET 3300	Statistical Process Control	MET 1310 and MET 3000 with grades of "C" or better	3

Total: 25 credits

MET 1000 – Introduction to Mechanical Engineering Technology
Credits: 3 (3 + 0)
Description: This is an introductory course in mechanical engineering technology. Emphasis is placed on the design and creative process with examples from different areas within engineering technology. Students will learn how to develop the tools necessary to be successful in school and in industry by using theory, computer software, and working realworld problems. The engineering profession and its relation to current national, social, industrial, ethical, and international issues and problems will be discussed.

MET 1010 – Manufacturing Processes
Credits: 3 (2 + 2)
Description: Basic fundamentals in the operation of machine tools are studied, including measuring tools, benchwork and layout, and tool grinding. The student performs various machine operations using the engine lathe, milling machine, vertical drills, and surface grinders.

MET 1040 – Introduction to Engineering
Credits: 3 (2 + 2)
Prerequisite(s): Minimum performance standard score on math placement test
Description: This course is an introductory engineering course exposing students to a cross section of topics in contemporary civil, electrical and mechanical engineering disciplines to assist them with their education career choices. Students are taught to work in teams, introduced to the design process, utilize math and computer programs to analyze raw data and properly display their results in a presentation to their peers. The history of the engineering profession and its relation to current national, social, industrial, ethical, and international issues and problems will be discussed.

MET 1050 – Introduction to Space
Credits: 3 (2 + 2)
Description: This course introduces students to the challenges of working in space. Course activities lead to the design and construction of a working satellite for launch. The course is designed for both engineering and non-engineering students.

MET 1200 – Technical Drawing I
Credits: 3 (1 + 4)
Description: This is an introductory course in technical drawing. It covers the use of manual drawing instruments, lettering, various geometric constructions, and multi-view orthographic engineering drawings. It introduces 2-D technical drawing using computer-aided design software.

MET 1210 – 3D Modeling
Credits: 3 (2 + 2)
Prerequisite(s): MET 1200 with a grade of "C" or better; or permission of instructor
Description: This course is designed to familiarize students with functional 3-D modeling using an appropriate software package. The course covers the basic functions needed to create part models, assemblies, and drawings. Emphasis is on the design philosophy, used in creating parts and assemblies.

MET 2010 - CNC Machining & Inspection
Credits: 3
Description: This course introduces computer numerical control machine tools. Topics include CNC programming for machine setup, operation, and basic applications along with machined part inspection. Upon completion, students should be able to explain a CNC program, data input, and machine tool operation. Student will be able to compare dimension of physical components against technical drawings for quality control.

MET 1310 – Principles of Quality Assurance
Credits: 3 (3 + 0)
Prerequisite(s): Intermediate algebra or equivalent with a grade of "C" or better
Description: The course introduces the scope and function of quality assurance, including basic definitions, statistics, quality policy and objectives, manuals and procedures, concept of variation, inspection and sampling techniques, meteorology process control, methods and the elements of reliability. Current TQM and ISO 9000 standards are reviewed.

MET 2200 – Materials of Engineering
Credits: 3 (2 + 2)
Prerequisite(s): MTH 1110 or MTH 1400 with grades of "C" or better
Prerequisite(s) or Corequisite(s): CHE 1100 or CHE 1800 with grade of "C" or better
Description: This lecture/laboratory course deals with basic properties of metals and non-metals, including the properties and behavior that govern their selection and design. Materials covered include ferrous and nonferrous metals, composites, plastics, ceramics, glass, wood, rubber and adhesives.

MET 3000 – Manufacturing Analysis
Credits: 4 (4 + 0)
Prerequisite(s): MET 1010; MET 1310; and MTH 1110 or MTH 1400 with grades of "C" or better
Description: This course introduces the organizational and functional requirements for effective production. Tolerance charts and work piece control are used to plan the manufacturing sequence, select the preferred manufacturing equipment and the operational sequence.

MET 3070 – Machine Design
Credits: 3 (3 + 0)
Prerequisite(s): MET 2200, CET 3135, and MET 3160 with grades of "C" or better
Description: The art of designing machines to accomplish specific purposes is studied. The student is introduced to the fundamental principles required to design the separate machine elements. The economics of design are stressed along with strength and safety considerations. The lab work uses selected software, e.g., ALGOR and AutoCAD, to produce the preferred design.

MET 3100 – N/C Computer Programming
Credits: 3 (2 + 2)
Prerequisite(s): MET 1010, MET 1210, and MTH 1120 with grades of "C" or better
Description: The theory is reviewed to control machines numerically. Algorithms are developed to program NC machines. N/C language and programming emphasizes APT, Compact II and suitable post-processors. The lab work includes operation of machines to demonstrate the programming skills.

MET 3110 – Thermodynamics
Credits: 3 (3 + 0)
Prerequisite(s): MTH 1410 and PHY 2311 with grades of C or better, or permission of instructor
Description: The fundamental laws of thermodynamics are studied. Basic concepts of energy, the thermodynamic system, dimensions and units, and the ideal-gas equation of state are studied. The course also covers closed and open systems, heat engines as well as reversible and irreversible processes.

MET 3125 – Heat Transfer with Laboratory
Credits: 3 (2 + 2)
Prerequisite(s): PHY 2311 with a grade of "C" or better
Description: The three basic mechanisms of heat transmission are studied. Conduction, convection (free and forced), and radiant transmission are treated for both steady-state and transient conditions. The transient study is aided by computer solutions. The laboratory component provides experimental results for various conduction and convection tests. The student selects and installs thermocouples, calibrates equipment, records transient and steady-state data, analyzes results, compares data to theoretical predictions, and reports findings.

MET 3160 – Mechanics II - Dynamics
Credits: 3 (3 + 0)
Prerequisite(s): CET 2150 and MTH 2410 with grades of "C" or better; or permission of instructor
Description: This course covers the principles of dynamics: Students learn about kinematics which is the study of the geometry of motion of a body without reference to the forces that cause the resulting motion. The course also covers kinetics which is the study of the relation existing between the forces acting on the body, the mass of the body, and the motion of the body.

MET 3185 – Fluid Mechanics
Credits: 3 (2 + 2)
Prerequisite(s): MET 3160 with a grade of "C" or better or permission of instructor
Description: In this course, the following topics will be covered: physical properties of fluids, hydrostatics, kinematics, energy considerations, momentum, incompressible flow in pipes, compressible internal flow, pneumatic systems, flowloss calculations and flow measurement methods. Laboratory work will include calibration and use of equipment to measure hydrostatic forces on objects, verification of Bernoulli Equation, losses in piping system, flow profiles, and other fluid systems.

MET 3215 – Composites Manufacturing
Credits: 3 (2 + 2)
Prerequisite(s): MET 1010 and MET 2200 with grades of "C" or better, or permission of instructor
Description: This course is designed to provide students with working knowledge in design, manufacturing and selection of fiber-reinforced composite materials for engineering applications. The course introduces the various manufacturing methods utilized in modern industries, such as aerospace, automotive, and renewable energy. Topics will include inspection, damage control and repair techniques, as well as material handling, safety and environmental requirements. The course contains laboratory modules designed to provide hands-on experience to emphasize practical aspects of the topics covered.

MET 3250 – Tool Design & Production Tooling
Credits: 3 (2 + 2)
Prerequisite(s): MET 2200 and MTH 1120 with grades of "C" or better
Description: The course deals with production tooling requirements and tooling cost estimates. Design of tooling for turret lathes, automatic screw machines, multiple spindle lathes, and production milling machines is treated.

MET 3300 – Statistical Process Controls
Credits: 3 (3 + 0)
Prerequisite(s): MET 1310 and MET 3000 with grades of "C" or better
Description: This course focuses on statistical process control with emphasis on process capability, troubleshooting, analysis of variance and hypothesis testing.

MET 3310 – Thermodynamics II
Credits: 3 (2 + 2)
Prerequisite(s): MET 3110 and MTH 2410 with grades of "C" or better
Description: This, the second course in thermodynamics, deals with the consequence of the Second Law. The TDS equations are studied, as are entropy and efficiencies of some heat power engines. Standard gas and vapor cycles are investigated. The laboratory work includes various calorimetry, gravimetric and volumetric analyses, nozzles and internal combustion engine tests.

MET 3320 – Intrumentation Laboratory
Credits: 3 (2 + 2)
Prerequisite(s): MET 3180 or 3185 with a grade of "C" or better
Description: The student is introduced to standard mechanical tests and measurement techniques, e.g., installing thermocouples, strain gages, positioning static and total probes. ASME and ASTM test codes are studied, as are OSHA standards. Various physical property and system performance tests are set up, conducted and analyzed.

MET 3330 – Robotics for Manufacturing
Credits: 3 (2 + 2)
Prerequisite(s): MET 3100 and EET 2000 with grades of "C" or better
Description: The course examines robotic components utilized in robots and automated systems. Manufacturing automation is analyzed as the robot is integrated with other flexible automation equipment. The focus is how to apply and design robotic, integrated, manufacturing systems. The laboratory work supplements the lectures using industrial robots for different applications.

MET 3410 – Geometric Dimensioning and Tolerancing
Credits: 3 (2 + 2)
Prerequisite(s): MET 1210 and MET 1310 with grades of "C" or better
Description: Dimensioning practices as defined by ASME National Standards (Y14.5M-1994) are studied. Tolerance of form, tolerances of position, datums, concentricity, symmetry, and functional gaging concepts are also treated to produce low-cost and high-quality products.

MET 3610 - 3D Modeling

Prerequisite(s): MET 1200 with a grade of "C" or better

Description: This is a Pro/Engineer basic design course, which is designed to familiarize students with the basic functionality of Pro/Engineer software package. The course covers the basic functions needed to use Pro/E to create part models, assemblies, and drawings. Emphasis is on the Pro/E design philosophy, used in creating parts and assemblies.

MET 3630 - Lean Manufacturing Systems Engineering
Credits: 3 (3 + 0)
Prerequisite(s): MET 3000 with a grade of "C" or better
Description: This course introduces the student to production principles, planning, evaluation, deployment, and integration of Lean manufacturing theory and methods. The course covers the concepts of Lean and Six Sigma for both manufacturing and service businesses. Students are provided an overview of Lean, Six Sigma, and the Kaizen problem-solving methodologies.

MET 3735 - Computer Integrated Manufacturing

Credits: 3

Prerequisite(s): MET 3630 with a grade of "C" or better

Description: This lecture-based course emphasizes the integration of manufacturing enterprise using computer integrated manufacturing (CIM) technologies. It employs CAD/CAM interface and other CIM subsystems, database management, facility layout, product documentation, process planning, production planning and control, Group technology, teamwork, and manufacturing operations and management to bring about a student-designed CIM-oriented enterprise. Results of using CIM on all major elements of product design, and manufacturing production and operational control systems.

MET 3980 – Internship in Mechanical Engineering Technology
Credits: 1-15 (0 + 3-45)
Prerequisite(s): Major in Mechanical Engineering Technology; junior or senior status; permission of instructor
Description: Supervised by a faculty member within the major department, internships provide practical, hands-on experience in a professional field related to the major. Internship placements must be established prior to enrollment in this course in consultation with the Applied Learning Center.
To register with the Applied Learning Center, students must meet the following qualifications:

- Completed at least one semester at MSU Denver
- Sophomore, junior or senior status
- Declared major in an undergraduate program
- 2.5 minimum cumulative GPA at MSU Denver
- Currently enrolled and taking classes at MSU Denver

MET 4000 – Project EngineeringCredits: 3 (3 + 0)
Prerequisite(s): Senior standing
Description: The student is introduced to the project or team effort. The need for planning, control, and communication is stressed. Critical path methods are used to develop schedules. Figure-of merit methods are used to select preferred approaches/designs. Technical writing is stressed with an introduction to competitive proposal writing.

MET 4010 – Advanced Manufacturing Technology
Credits: 3 (3 + 0)
Prerequisite(s): Grades of "C" or better in MET 3000, MET 3330 and EET 2000; completion of General Studies requirements; and senior standing.
Description: The course includes micromonitor process control analysis, fiber optics technology, CMOS technology, ultra precision controlled devices with artificial intelligence systems, industrial robots, fiber optics, and imagineering future applications.

MET 4070 – Computer Aided Design
Credits: 3 (2 + 2)
Prerequisite(s): MET 3070 and MET 3210 with grades of "C" or better; completion of General Studies requirements; and senior standing.
Description: The student studies combined stresses, gearing, brakes, curved beams, etc., and undertakes the design of a complete machine. This is the second in the two-course machine design series. The analysis includes computer solutions.

MET 4080 – Computer Aided Manufacturing
Credits: 3 (2 + 2)
Prerequisite(s): MET 3000, MET 3100, and either MET 3210 or EET 2350 with grades of "C" or better
Description: This is an advanced, computer-aided manufacturing course. Computer applications in configuration control, purchasing, vendor ratings, production control, inventory control and final product acceptance documentation are treated. Appropriate computer and machining software will be used.

MET 4100 – Senior Project I
Credits: 1 (.5 + 1)
Prerequisite(s): CET 3135, JMP 2610, and MTH 2420 with grades of "C" or better; Senior Standing
Prerequisite(s) or Corequisite(s): MET 3070 or MET 3000, and EET 2000 with grades of "C" or better
Description: In this course, students are required to work on the planning and designing of a team project in consultation with faculty advisors and industry contacts.
University Requirement(s): Senior Experience

MET 4110 – Senior Project II
Credits: 2 (0 + 4)
Prerequisite(s): MET 4100 with a grade of "C" or better; Senior Standing
Prerequisite(s) or Corequisite(s): MET 4000
Description: In this course, the students complete the project they started in MET 4100. The project is built, tested, and demonstrated. Written technical reports and oral presentations on the project are required. Part of this course involves the student working with a faculty member who acts as a consultant.
University Requirement(s): Senior Experience

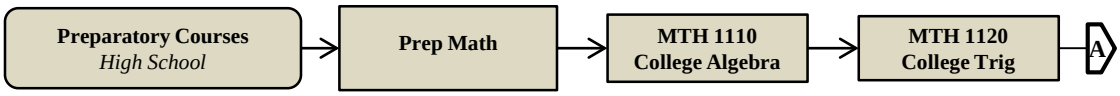
MET 4280 – Advanced Energy Technology
Credits: 3 (2 + 2)
Prerequisite(s): MET 3125, PHY 2311, and PHY 2321 with grades of "C" or better
Description: This course focuses on the study of global energy flows, as well as the sources and uses of energy. Biological energy and ecosystems are introduced from the viewpoint of the engineering technologist. Energy-related environmental problems, including air and thermal pollution and radioactivity, are examined.

MET 4370 - Advanced Composite Structures: Design, Damage, Repair and Testing
Credits: 3 (1.5+1.5)
Prerequisite(s): MET 3215 with a grade of "C" or better
Description: This lecture/laboratory course is the introduction of the student to the characterization methods for the anisotropic properties of advanced composite materials consisting of high-performance fibers suspended in polymeric matrices. This course includes study and practical application of design, damage control, composite repair, processes and tooling. Also overviews the concepts, principles, and methods employed for nondestructive evaluation (NDE) of composite structures and materials.

MET 4480 – Air Conditioning/Refrigeration
Credits: 3 (3 + 0)
Prerequisite(s): MET 3110 and MET 3125 with grades of "C" or better
Description: In this course, thermodynamics and heat transfer principles to the analysis and design of refrigeration systems and comfort conditioning systems for buildings are introduced. Refrigeration cycles are studied. Operation and rating of system components are evaluated with specific emphasis on heat flow in condensers, evaporators, and cooling towers. Temperature and humidity control, along with air handling equipment and ducting, are studied.

See Prerequisites for all classes

Metropolitan State University of Denver



Recommended course rotation:

Freshman Year

1st Semester (Fall)

16 hours

- **ENG 1010** *Composing Arguments*
- **MET 1200** *Technical Drawing I*
- **MET 1000** *Intro to Mechanical Engineering Technology*
- **MET 1010** *Manufacturing Processes*
- **MTH 1400*** *Precalculus*

2nd Semester (Spring)

18 hours

- **CAS 1010** *Public Speaking*
- **MET 1210** *3D Modeling*
- **CHE 1100** *Principles of Chemistry*
- **CHE 1150** *Principles of Chemistry Lab*
- **MET 1310** *Principles of Quality Assurance*
- **MTH 1410** *Calculus I*

Sophomore Year

3rd Semester (Fall)

18 hours

- **ENG 1020** *Freshman Composition*
- **MET 2200** *Materials of Engineering*
- **EET 2350** *Adv. Technical Programming*
- **MTH 2410** *Calculus II*
- **PHY 2311** *General Physics I*
- **PHY 2321** *General Physics I-Lab*

4th Semester (Spring)

17 hours

- **JMP 2610** *Intro to Technical Writing*
- **ECO 2020** *Principles of Microeconomics*
- **PHI 1030** *Intro to Ethics* **OR** **PHI 3360** *Business Ethics*
- **PHY 2331** *General Physics II*
- **PHY 2341** *General Physics II-Lab*
- **CET 2150** *Mechanics I: Statics*

* Students placing directly in to MTH 1410 in the first semester may replace these credits with MTH 2420 in the third semester.

Metropolitan State University of Denver, Department of Engineering And Engineering Technology
MECHANICAL ENGINEERING TECHNOLOGY
Campus Box 29, Aerospace and Engineering Sciences Suite 300, P.O. Box 173362, Denver, CO 80217-3362
Phone: (303) 615-0499, http://www.msudenver.edu/met

Manufacturing Concentration

Junior Year

5th Semester (Fall)

16 hours

- **CET 3135** *Mechanics of Materials w/ Lab*
- **MET 3110** *Thermodynamics*
- **MET 3160** *Mechanics II: Dynamics*
- **EET 2000** *Electric Circuits & Machines*
- **General Studies** *History*

6th Semester (Spring)

13 hours

- **MET 3100** *N/C Computer Programming*
- **MET 3185** *Fluid Mechanics*
- **MET 3410** *Geometric Dimensioning & Tolerance*
- **EET 3010** *Industrial Electronics*
  OR
  EET 3730 *Process Control Systems*
  AND
  EET 3740 *Programmable Logic Controllers*

Senior Year

7th Semester (Fall)

17 hours

- **MET 3000** *Manufacturing Analysis*
- **MET 3250** *Tool Design & Production Tooling*
- **MET 3330** *Robotics for Manufacturing*
- **MET 4000** *Project Engineering*
- **MET 4100** *Senior Project I*
- **General Studies** *Arts & Humanities*

8th Semester (Spring)

14 hours

- **MET 3300** *Statistical Process Controls*
- **MET 4080** *Computer Aided Manufacturing*
- **MET 4110** *Senior Project II*
- **Approved technical elective**
- **General Studies** *Social & Behavioral Science*

Mechanical Concentration

Junior Year

5th Semester (Fall)

16 hours

- **CET 3135** *Mechanics of Materials w/ Lab*
- **MET 3110** *Thermodynamics*
- **MET 3160** *Mechanics II: Dynamics*
- **EET 2000** *Electric Circuits & Machines*
- **General Studies** *History*

6th Semester (Spring)

13 hours

- **MET 3410** *Geometric Dimensioning & Tolerance*
- **MET 3185** *Fluid Mechanics*
- **EET 3010** *Industrial Electronics*
  OR
  EET 3730 *Process Control Systems*
  AND
  EET 3740 *Programmable Logic Controllers*
- **Approved technical elective**

Senior Year

7th Semester (Fall)

17 hours

- **MET 3070** *Machine Design*
- **MET 3125** *Heat Transfer w/ Lab*
- **MET 4000** *Project Engineering*
- **MET 4100** *Senior Project I*
- **General Studies** *Arts & Humanities*
- **Approved technical elective**

8th Semester (Spring)

13 hours

- **MET 3320** *Instrumentation Lab*
- **MET 4070** *Computer Aided Design*
- **MET 4280** *Adv. Energy Technology*
- **MET 4110** *Senior Project II*
- **General Studies** *Social & Behavioral Science*

Metropolitan State University of Denver, Department of Engineering And Engineering Technology
MECHANICAL ENGINEERING TECHNOLOGY
Campus Box 29, Aerospace and Engineering Sciences Suite 300, P.O. Box 173362, Denver, CO 80217-3362
Phone: (303) 615-0499, http://www.msudenver.edu/met