



Course Number and Title: MET 123 Modern Manufacturing Techniques

Campus Location:
Georgetown, Stanton

Effective Date:
2018-51

Prerequisite:
MAT 010, ENG 090 or ENG 091, SSC 100 or concurrent

Co-Requisites:
None

Course Credits and Hours:
3.00 credits
2.00 lecture hours/week
4.00 lab hours/week

Course Description:

This course covers modern manufacturing techniques. Topics include the care and use of hand tools, precision measuring tools, the selection of materials, computerized numerical control, arc welding processes and proper use of machine tools including the lathe, drill press, and milling machines.

Required Text(s):

Obtain current textbook information by viewing the [campus bookstore - https://www.dtcc.edu/bookstores](https://www.dtcc.edu/bookstores) online or visit a campus bookstore. Check your course schedule for the course number and section.

Additional Materials:
None

Schedule Type:
Classroom Course

Disclaimer:
None

Core Course Performance Objectives (CCPOs):

1. Describe typical manufacturing processes. (CCC 1, 2, 5; PGC MET 1, 4, 5; DEM 6)
2. Describe the classification, properties, and uses of common metals. (CCC 1, 2, 6; PGC MET 8; DEM 6)
3. Identify and use hand tools and equipment to obtain measurements. (CCC 2; PGC MET 4; DEM 1, 4, 6, 8, 9, 10, 11)
4. Demonstrate machine, hand tool, and general shop safety. (CCC 2, 3; PGC MET 1, 4, 5; DEM 4, 6, 8)
5. Accurately lay out and set up experimental jobs. (CCC 1, 2; PGC MET 1, 4, 5; DEM 1, 2, 4, 6, 8, 9, 10, 11)
6. Write computer numerical control (CNC) programs. (CCC 1, 2, 6; PGC MET 1, 3, 4, 5; DEM 1, 2, 4, 5, 6, 9, 10, 11)
7. Apply current standards of geometric dimension and tolerancing (GD&T) to manufacture accurate and/or interchangeable parts. (CCC 2, 3, 6; PGC MET 1, 2, 4, 5; DEM 1, 2, 4, 5, 6, 8, 9, 10, 11)

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

Measurable Performance Objectives (MPOs):

Upon completion of this course, the student will:

1. Describe typical manufacturing processes.
 1. Explain basic manufacturing processes, such as machining, finishing, casting, welding, and grinding.
 2. Identify the processes involved in the manufacturing of selected raw materials.
 3. Examine types of casting processes.
 1. Identify a typical cast part.
 2. List tools used in making molds.
 3. Identify a typical one piece mold.
 4. Describe a typical two piece mold.
2. Describe the classification, properties, and uses of common metals.
 1. List the engineering properties of common engineering metals.
 2. Describe the steel identification system.
 3. List the applications of common ferrous and non-ferrous metals.
3. Identify and use hand tools and equipment to obtain measurements.
 1. Identify and use non-precision measuring tools such as squares, scales, and gages.
 2. Use common hand tools such as hack saws, files, punches, taps, and dies.
 3. Use precision measuring equipment such as micrometers, digital calipers, height gages, optical comparator, and digital readouts.
4. Demonstrate machine, hand tool, and general shop safety.
 1. Demonstrate safe work habits relative to a machine shop.
 2. List specific machinery safety rules.
 3. Apply safety principles for hand tools and equipment.
 4. Safely operate general machine shop equipment:
 1. Pedestal grinder band saw
 2. Cut off saw indexing head
 3. Drill press lathe
 4. Milling machine arc welder
5. Accurately lay out and set up experimental jobs.
 1. Calculate proper speeds and feeds for machines.
 2. Describe common types of machine tooling.
 3. Produce threads and threaded parts.
 4. Machine selected projects.
6. Write computer numerical control (CNC) programs.
 1. Develop and write a CNC program.
 2. Operate CNC equipment.
 3. Identify specialized tooling used on CNC equipment.
 4. Compare CNC to manual machines.
 5. Describe the equipment used for a flexible manufacturing system.
7. Apply current standards of geometric dimension and tolerancing (GD&T) to manufacture accurate and/or interchangeable parts.
 1. Identify current GD&T standard symbols.
 2. Make simple machined parts to size.
 3. Inspect manufactured parts.

Evaluation Criteria/Policies:

Students must demonstrate proficiency on all CCPOs at a minimal 75 percent level to successfully complete the course. The grade will be determined using the Delaware Tech grading system:

92	-	100	=	A
83	-	91	=	B
75	-	82	=	C
0	-	74	=	F

Students should refer to the [Student Handbook - https://www.dtcc.edu/handbook](https://www.dtcc.edu/handbook) for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

Core Curriculum Competencies (CCCs are the competencies every graduate will develop):

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):
METAASMET

1. Use effective problem-solving skills and make appropriate decisions relative to the technical field.
2. Design basic mechanical systems with the use of computer-aided drafting equipment.
3. Demonstrate basic computer literacy and knowledge of computer software applications in both the business and technical fields.
4. Use hand and power tools for standard manufacturing operations.
5. Conduct basic machining and welding operations; and perform basic programming of computer/numerically-controlled machines.
6. Calculate forces, properly size structures and mechanical components, and perform standard materials testing procedures.
7. Demonstrate an understanding of basic AC and DC electrical control circuits.
8. Select appropriate materials for basic mechanical applications.
9. Review and/or design basic hydraulic/pneumatic power systems.
10. Select basic machine components for mechanical systems.
11. Exhibit professional traits, including the ability to work with minimal supervision, willingness to learn new skills, and contributing to team project efforts.

CADAASCAD

1. Prepare detailed mechanical, machine, architectural, structural, HVAC, industrial piping electrical/electronics drawings for light commercial, manufacturing and industrial companies.
2. Perform routine structural design calculations required to size steel beams, columns and decking materials in accordance with AISC standards, and reinforced concrete slabs, foundation footings in accordance ACI standards.
3. Support manufacturing office administration activities with ability to read and interpret drawings and specifications, prepare technically accurate drawings using both manual and CAD techniques, perform quantity surveys and organize cost data for cost estimating functions, prepare or check shop drawings, assist in the planning or coordinating of manufacturing activities, assist designers and coordinate the preparation and review of bid packages.
4. Communicate in a clear and concise manner with peers and management, verbally and in writing, through the preparation of technical reports, effective inner-office and business correspondence and contribute to the development of manufacturing specifications and other written contract documents.
5. Provide meaningful and innovative assistance to supervising engineers or designers by developing layout design solutions to manufacturing problems, recommending alternate material substitutions or methods of production, and applying reference resources to collect, organize and analyze required research data.
6. Collect, organize, and analyze data for manufacturing machine parts, prepare plans for department/client approval.
7. Demonstrate a professional attitude by working efficiently in close cooperation with others, being adaptable to changes in plans and giving proper credit for assistance received through outside resources.

DETAASDEM

1. Apply the knowledge, techniques, skills, and modern tools of the discipline to narrowly defined engineering technology activities.
2. Apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require limited application of principles but extensive practical knowledge.
3. Conduct standard tests and measurements, and to conduct, analyze, and interpret experiments.
4. Function effectively as a member of a technical team.
5. Identify, analyze, and solve narrowly defined engineering technology problems.
6. Apply written, oral, and graphical communication in both technical and nontechnical environments; and identify and use appropriate technical literature.
7. Recognize the need for and an ability to engage in self-directed continuing professional development.
8. Integrate a commitment to address professional and ethical responsibilities, including a respect for diversity.
9. Demonstrate a commitment to quality, timeliness, and continuous improvement.
10. Demonstrate knowledge and technical competency in engineering materials, applied mechanics, and manufacturing methods.
11. Demonstrate knowledge and in-depth technical competency in applied drafting practice emphasizing mechanical components and systems, as well as fundamentals of descriptive geometry, orthographic projection, sectioning, tolerancing and dimensioning, and computer aided drafting and design.
12. Demonstrate knowledge and technical competency in the in-depth application of physics having emphasis in mechanical components and design.

Disabilities Support Statement:

The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the [disabilities services - https://www.dtcc.edu/disabilitysupport](https://www.dtcc.edu/disabilitysupport) web page or visit the campus Advising Center.