

2023-2024

NWKTC Catalog and Student Handbook

MECHANICAL ENGINEERING TECHNOLOGY

Description: Mechanical Engineering Technology at Northwest Tech provides a well-balanced curriculum in drafting, design, and advanced manufacturing processes by covering three basic areas of mechanical computer-aided drafting, additive manufacturing (3D printing) and subtractive manufacturing (multi-axis CNC machining). Students will develop necessary job skills and related technical information in an on-the-job atmosphere similar to an actual engineering/manufacturing firm. Training will begin on the drafting boards and move to computers using the same software that industry uses, as well as multiple advanced manufacturing machines within the 1800 sq.ft. Advanced Manufacturing Lab. Design and mathematical applications are used throughout many diverse live projects that the program is involved with.

Degree/Certificates awarded:

AAS

Tech Cert A, Tech Cert B, Tech Cert C

Accreditation/Certification:
Program Learning Outcomes:

Upon successful completion of the program, the student will be able to:

- Apply the theory of engineering to specific jobs using critical thinking/reasoning.
- Draw multi-view projections.
- Apply geometry to geometric designs.
- Draw prints from sectional views.
- Develop and prepare drawings for intersecting and transitional pieces.
- Analyze and perform surveying procedures.
- Apply architectural commands for office design.
- Prepare drawings in mechanical, civil, and architectural areas.
- Demonstrate mathematical and reasoning skills.
- Demonstrate effective reading, writing, speaking, listening, and time management skills.

Program Schedule:

Students will attend class from 7:00 a.m. – 2:30 p.m., Monday through Friday

First Semester:

Course #	Course Name	
CF 101	Computer Fundamentals	3
EN 105	Applications of Engineering Technology	3
EN 105A	Fundamentals of Drafting	2
EN 110	Drafting 2D Views and Dimensioning	2
EN 115	Engineering Technology Projects I	2
EN 120A	Civil Drafting Fundamentals	2
EN 130	CAD Fundamentals	2
ENGL 110 (or 112)	English Composition I (or English Comp I with Review)	3

Second Semester:

Course #	Course Name	
EN 101	OSHA 10	1
EN 107	Intro to UAS Flight	1
EN 150	Topographic Triangulation	2
EN 160A	Applications of Spatial Reasoning in Engineering	2
EN 182	CAD Drafting Models	1
EN 177	Mechanical CAD/CAM Drafting	2
EN 185	Civil CAD Fundamentals	2
EN 190	Basic Surveying with Mathematics	3
MATH 110 (or 112)	Intermediate Algebra (or Intermediate Algebra with Review)	3

Third Semester:

Course #	Course Name	
BA 215	Personal Finance (Required)	3
MEC 200	Advanced Mechanical Drafting	2
MEC 205	Manual Machining Operations	3
MEC 210	Mechanical Engineering Technology	3
MEC 215	Additive Manufacturing Design & Operations	3
BEH 105	Human Relations (Required, or Ethics, PSY, SOC)	3

Fourth Semester:

Course #	Course Name	
MEC 250	Mechanical Design Capstone	7
MEC 260	Advanced Manufacturing Processes	3
MEC 280 OR	MEC Occupational Work Experience	5
MEC 281	Special Projects	5

COURSE DESCRIPTIONS

First Year Core Courses

EN 101 OSHA 10

1 CR

The student will learn the basic safety and health information needed for entry-level positions in the general industry. Industry safety practices, workplace hazards, workers' rights, and employers' responsibilities will be covered in this course.

EN105 APPLICATION OF ENGINEERING TECHNOLOGY

3 CR

This course provides student orientation for the Engineering Technology program, a short history of Engineering drawing and drafting technology, and an introduction to modern technology used in the various fields and professions that are within engineering technology. This course also includes fundamental operations and applications of fractions, decimals, ratios, proportions, percentages, and basic algebra as applied in the engineering technology field.

EN 105A FUNDAMENTALS OF DRAFTING

2 CR

The student will identify and display the basic use of drafting instruments. Emphasis will be placed on reading the various scales, engineering lettering, and manipulation of compasses, dividers, and other tools

EN 107 INTRODUCTION TO UAS FLIGHT

1 CR

Students will be introduced to the world of Unmanned Aerial Systems (UAS). This course exposes students to basic aviation flight principles, safety considerations, FAA regulations, and current UAS applications. The student will safely pilot an entry-level UAS within a controlled environment.

EN 110 DRAFTING 2D VIEWS AND DIMENSIONING

2 CR

Technical drawing exercises are produced using the methods of projection and the fundamentals of drafting. Emphasis in accuracy, completeness and time management.

Multi-view drawings are produced through the application of the principles of orthographic projection. Problems and projects cover the relationship of views to each other, methods of developing views, alternate positions, and revolution.

EN 115 ENGINEERING TECHNOLOGY PROJECTS I

2CR

The student will be assigned projects, which will require application of basic design to develop all drawings from sketches and layouts to complete details of the assigned projects. Some projects will be developed using the team concept with a need for working with others. Emphasis is placed on the followership role.

EN 120A CIVIL DRAFTING FUNDAMENTALS

2CR

Methods of construction geometric figures, tangency's, ellipses, parabolas, and hyperbolas are used to complete the exercise and projects in this course.

EN 130 CAD FUNDAMENTALS

2 CR

This includes constructing various pictorial drawings using the various methods of projection. Methods applied are axonometric, oblique and perspective projection. Sectional views include full, half, broken, revolved, thin and removed sections. Dimensions involve complete size description. It includes aligned and unidirectional dimensions systems, decimal, metric and fractional dimensions, and notes and standard classification of cylindrical fits.

EN 150 TOPOGRAPHIC TRIANGULATION

2CR

This course consists of applications of triangles used in drafting and engineering with an emphasis placed on finding solutions to right and oblique triangles as related in the engineering field.

EN 160A APPLICATIONS OF SPATIAL REASONING IN ENGINEERING

3 CR

This course consists of a demonstration of the uses of fundamental geometric theorems applied to various drafting principles. Emphasis is placed on proper construction methods of all geometric figures and use of geometric formulas used in the field to assist the student in their CAD training. This course is essential and a prerequisite to Topographic Triangulation for the recognition of triangles contained in complex drawings.

EN 177 MECHANICAL CAD/CAM DRAFTING

2 CR

The student will learn the basics of production drawing by means of 3-dimensional modeling CAD program provided. The student will create parts, assemblies, and properly annotated production drawing sets in ways that align with industry practices.

EN 182 CAD DRAFTING MODELS

1 CR

The student will learn different methods for creating 3-dimensional design models using the CAD program provided. Emphasis is placed on scales, coordinates, proper projections and referencing multiple design models together.

EN 185 CIVIL CAD FUNDAMENTALS

2 CR

The student will learn the basics of infrastructure design through the use of civil CAD program provided. The student will use template 3-dimensional infrastructure designs to perform the civil drafting techniques and mathematical concepts previously learned during the manual drafting courses.

EN 190 BASIC SURVEYING WITH MATHEMATICS

3 CR

The manipulations involved in setting up the engineering transit and level are covered in this course. Basics of note-taking and transfer of data to a drawing are stressed. Mathematics includes latitude, departure, azimuth, bearing and length calculations making sure a traversed area will close.

Second Year – Mechanical Engineering Technology specialization

MEC 200 ADVANCED MECHANICAL DRAFTING

2 CR

Application of all basics of drafting is applied in this segment of technical drafting and expands to include complex assembly drawings, weldment drawings, flat patterns, and more design techniques related to the mechanical and manufacturing profession. Projects are assigned to include research, use of multiple CAD/CAM software, and solving basic design problems.

MEC 205 MANUAL MACHINING OPERATIONS

3 CR

The student will identify and display the basic use of manual machining equipment to complete the exercises in this course. Emphasis will be placed on correctly following standard operating procedures, lab safety, tool identification, precision and the desired outcome of a final product.

MEC 210 ENGINEERING TECHNOLOGY PROJECTS II

3 CR

Students will lead and/or work with others in preparing working design models and drawings for all projects assigned. The student's responsibility in this phase of study will direct others in preparing working drawings, all research, design sketches, checking, cost analysis, and feasibility of marketing. Emphasis is on the leadership role and project management.

MEC 215 ADDITIVE MANUFACTURING DESIGN & OPERATIONS

3 CR

This course explores how to conceptualize and create a part design for an additive manufacturing Process. The student will learn and demonstrate the procedures for mechanical designs using modern software and equipment for manufacturing that require material to be added to create a product. Additive manufacturing equipment is available on-site to instruct hands-on applications that utilize various design planes, axis, and material types.

MEC 250 MECHANICAL DESIGN CAPSTONE

7 CR

Application of all material covered through the student's education will be demonstrated through a comprehensive and robust design project. The design/build project will require the student to apply mechanical design practices along with advanced manufacturing technology and techniques in order to create a functional prototype of the design following all regulations of the project scope.

MEC 260 ADVANCED MANUFACTURING PROCESS

3 CR

This course covers the modern manufacturing processes and systems, and will emphasize hands on training with industry current machines and technology, such as robotics, 3, 4, 5-axis CNC milling, and 4 & 5 axis 3D printing.

MEC 280 OCCUPATIONAL WORK EXPERIENCE

5 CR

Students who complete the Capstone project and obtain a job with a company in the field of expertise of the Mechanical Engineering Technology program are eligible for Occupational Work Experience (OWE). Students on OWE shall begin working full-time and coordinate with their supervisor to submit weekly reports of the tasks they were active on with performance scores.

MEC 281 SPECIAL PROJECTS

5 CR

Students who complete the capstone project and are awaiting employment or graduation shall complete the special projects course. These special projects will be assigned from faculty to better prepare students for their jobs, post-graduation. Project discipline and deliverables will be considered when assigning to a student to ensure the student has the right skills to complete the project and/or the project aligns with the concentration of the student.