

# ENGINEERING TECHNOLOGY (ENGTE)

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## **ENGTE-105 DRAFTING PRINCIPLES 9 Credits**

Includes line work, lettering, applied geometry, dimensioning, orthographic projection, and the use of drafting tools. Emphasis on various methods of drafting views of objects including auxiliary views, revolutions, intersections, developments, technical illustration, precision dimensioning, working drawings and reproductions of drawings. Traditional and CAD drafting tools used.

## **ENGTE-106 DRAFTING FUNDAMENTALS 6 Credits**

Includes geometric construction, measuring and scaling techniques, conventional drafting practices, dimensions and annotations, hand sketching techniques, and the use of drafting tools. Emphasis on various methods of drafting views of objects including multi-view drawings using orthographic projection, section views, auxiliary views, pictorials, pattern development, working drawings and prints. Traditional drafting tools and computer-aided drafting software used. Co-requisite: ENGTE-154.

## **ENGTE-107 ENGINEERING TECHNOLOGY DISCIPLINES 2 Credits**

Explores Engineering Technology careers, job opportunities and educational requirements for specific careers. Emphasis on disciplines related to mechanical, electrical, architectural, structural, geographic information systems, civil and surveying.

## **ENGTE-125 3D CAD MODELING I 3 Credits**

This is a study in Basic 3D CAD modeling concepts and procedures to develop and design three dimensional parts, assemblies, and drawings from sketches and real parts. Emphasis will be on the creation and use of 3-D primitives, surface modeling, basic solids modeling, shading techniques, and the use of rendering and animation software. Exercises will include rendered output to ink jet type printers and plastic 3D Printers. Pre-requisite: ENGTE-106 and ENGTE-154.

## **ENGTE-130 COMPUTER AIDED MACHINE DRAFTING 9 Credits**

Application of computer aided drafting skills using AutoCAD software on increasingly complex drawings. Emphasis is on drafting technician's position as a designer and detailer for support of engineered and manufactured products. Techniques of dimensioning and tolerancing detail drawings for manufacturing covered. Current manufacturing techniques and engineering product design processes also covered. Pre-requisite: ENGTE-105.

## **ENGTE-131 MECHANICAL DRAFTING 4 Credits**

Application of computer aided drafting skills using AutoCAD software for the creation of detailed working drawings using dimensions, tolerancing, and other specifications for machine tool, fabrication and/or welding processes. Introduction to three-dimensional modeling using AutoCAD and assembly drawings with bill of materials. Pre-requisites: MTHPT-137, ENGTE-106, and ENGTE-154.

## **ENGTE-135 APPLIED PHYSICS 4 Credits**

Combines lectures, classroom discussion and problem solving to teach fundamentals of physics. Topics include uniform linear and circular motion, uniform acceleration, projectiles, Newton's First, Second, and Third Laws of Motion, curvilinear motion, forces in rotation, elasticity, friction, work, momentum, rotational motion, mechanical properties of materials, vibrations and waves, sound and fluid mechanics, energy, and properties of materials. Pre-requisite: MTHPT-137.

## **ENGTE-154 INTRODUCTION TO COMPUTER DRAFTING 4 Credits**

Teaches basic computer skills using various CAD software. Learning centers around these components and how they send and receive information. Basic understanding of computer hardware, software, and disk operating systems. Uses basic drafting skills learned from traditional drafting courses to create simple dimensioned drawings.

## **ENGTE-171 INTRODUCTION TO GEOSPATIAL TECHNOLOGIES 2 Credits**

Introduction to geospatial technologies and underlying science. Develops concepts for understanding geographic information systems, global positioning systems, coordinate systems, satellite and unmanned aerial systems imagery, cartography, and ways to communicate results.

## **ENGTE-190 DIRECTED STUDY IN ENGINEERING TECHNOLOGY 1-10 Credits**

Opportunity to learn advanced skills in areas agreed upon by student and instructor. Objectives developed to complete a specialized project or course of study and a plan to achieve these objectives.

## **ENGTE-194 INTERNSHIP IN ENGINEERING TECHNOLOGY 12 Credits**

Work experience in business related to the student's career goal. Student is a paid, part-time employee working under supervision of employer and program coordinator. Registration only with the approval of program coordinator.

## **ENGTE-201 CIVIL DRAFTING 3 Credits**

Combines lectures, assignments and lab work to give the student a basic understanding of civil technology including civil drafting and design and mapping procedures. The student will develop skills in the use of AutoCAD and Civil 3D for civil design and drafting applications. Covers basics of mapping including contours, symbols, topography, curve geometry, and curve data. Practical problems given in cross-sections and profiles, cuts and fills, grades, earthwork, horizontal alignment layout and site plans. Pre-requisites ENGTE-105 or ENGTE-106, ENGTE-154, and MTHPT-137.

## **ENGTE-202 INTRODUCTION TO SURVEY 3 Credits**

This course provides students with a basic understanding of survey fundamentals. Students develop skills in the use and maintenance of survey equipment, surveying techniques, historical mapping practices, determinations for precision and accuracy as well as methods for error adjustments. Students use surveying equipment for measuring horizontal and vertical distances, angles, and develop mathematics skills specific to surveying. Pre-requisite: MTHPT-137 or MATH-147 or MATH-170 with a grade of 'C' or higher; ENGTE-154 with a grade of 'C' or better. Co-requisite: ENGTE-201.

**ENGTE-203 UNMANNED AERIAL SYSTEMS AND IMAGERY FUNDAMENTALS 3 Credits**

Introduction to unmanned aerial systems including unmanned aerial vehicle operation, limitations, best practices, maintenance and care, applicable regulations, aerial imagery fundamentals including settings, best practices, and photography basics.

**ENGTE-204 CIVIL TECHNOLOGY 9 Credits**

Combines lectures, assignments and lab work to give the student a basic understanding of civil technology including civil drafting, basic surveying, and mapping procedures. The student will develop skills in the use of AutoCAD Civil 3D for civil design and drafting applications as well as the use and maintenance of survey equipment. Covers basics of mapping including contours, symbols, topography, curve geometry, and curve data. Methods of calculating angles, bearings, distances, areas, quantities, and slope. Practical problems given in cross-sections and profiles, cuts and fills, grades, earthwork, and horizontal alignment layout and simple curve layout. Concepts of survey, leveling procedures, traverse closures and areas, triangulation, construction surveys, and computations by various methods. Mastery of correct methods of note-taking and electronic data collection. Pre-requisites: ENGTE-105, ENGTE-154, and MTHPT-137.

**ENGTE-205 ADVANCED CIVIL DRAFTING AND DESIGN 4 Credits**

The student will be prepared to perform basic civil design functions, such as surface and contour creation, grading and drainage plans, alignment layout, plan and profiles, detail drawings and survey data management. Upon completion of this course, the student will prepare a complete set of civil engineering drawings. Pre-requisite: ENGTE-201, MTHPT-137 or equivalent.

**ENGTE-206 RESIDENTIAL ARCHITECTURAL DRAFTING 4 Credits**

This course is designed to introduce the student to the concepts, practices, standards, and drafting techniques needed for architectural design. The student will learn fundamental architectural drafting methods and organization. Coursework covers foundation plans, floor plans, elevations, stair details, floor and roof framing plans, interior elevations, and window and door schedules developed. Includes residential architectural drawings. Pre-requisites: ENGTE-106 and ENGTE-154.

**ENGTE-207 STRUCTURAL DRAFTING 4 Credits**

The student will learn entry-level drafting and job skills in the four basic types of structural drafting. Coursework is organized to cover and prepare students for drafting experience in structural steel, poured-in-place concrete, precast and wood. Includes engineering drawings, and shop drawings. Pre-requisites: ENGTE-105 or ENGTE-106 and ENGTE-154.

**ENGTE-208 ARCHITECTURAL AND STRUCTURAL DRAFTING 9 Credits**

Fundamental architectural drafting methods taught. Site plans, foundation plans, floor plans, elevations, construction details, lighting and wiring, stair details, floor and roof framing plans, interior elevations drafted, and window and door schedules developed. Prepares students to draft structural steel, precast and poured-in-place concrete, and structural wood projects. Includes engineering drawings and shop drawings. Pre-requisite: ENGTE-154 or instructor's permission.

**ENGTE-209 ADVANCED SURVEYING 4 Credits**

This course is the second of a two-part introductory sequence in plane surveying, including the measurement of distances, elevations, angles and directions. Principles and field use of modern surveying instruments are covered in lecture and practiced in lab. Course covers fundamental surveying concepts and application practice using GPS and total stations, closure, error and accuracy computations, property, construction, and topographic surveys, highway curves and volume computations. Pre-requisite: ENGTE-202 or ENGTE-204 with grade of 'C' or better.

**ENGTE-211 UNMANNED AERIAL SYSTEM SURVEYING 2 Credits**

Survey applications with unmanned aerial systems specific to surveying including unmanned aerial vehicle operations, care and maintenance, licensing requirements, fundamental operations, flight requirements, photogrammetry, image processing using GIS, and CAD mapping. Pre-requisite MATH-137 or equivalent, ENGTE-154, ENGTE-171 all with a 'C' or higher.

**ENGTE-221 GLOBAL POSITIONING CONCEPTS AND APPLICATIONS 3 Credits**

Course covers GPS concepts including GPS signals, biases and solutions, framework, receivers, geodetic datums, coordinate systems and heights, and real-time GPS for land surveys. Pre-requisite: MATH-137 or MATH-170 with a grade of 'C' or better.

**ENGTE-225 3-D CAD MODELING II 4 Credits**

This is a study in intermediate 3D CAD modeling concepts and procedures to expand on solids, surfaces, multibodies, configurations, drawings, sheet metal and assemblies. Pre-requisite: ENGTE-125 or instructor's permission.

**ENGTE-227 CAD/CAM 3 Credits**

Students will be trained in the use of SolidWorks integrated cam software. This will integrate parametric feature based machining into projects students will carry over to other areas of study. SolidWorks will be used to design projects based on solving "real world" problems. These projects may originate with the student, or from local area businesses that require assistance implementing solutions to their production problems. Prerequisite ENGTE-225.

**ENGTE-231 GD&T APPLICATION & INTERPRETATION 3 Credits**

This is a study in Geometric Dimensioning and Tolerancing as related to design, manufacturing, and inspection. This study will adhere to ASME Y14.5-2018 standard. This course will explore and emphasize symbology, size tolerances, form controls, datums, datum references, orientation, positioning, runout and profile tolerancing, as well as practical and project based applications. These skills will be used in application on both 2D drawings and 3D cad models as well as manufacturing documentation.

**ENGTE-237 APPLIED PHYSICS II 3 Credits**

Covers basic engineering principles necessary for a draftsman to communicate on a technical level with designers. Covers temperature and heat, thermal properties of materials, fundamentals of thermodynamics, electrostatics, capacitance and dielectrics, current resistance, power, basic DC circuits, magnetism, electromagnetic induction, basic AC circuits, electrons and solid state physics, light and illumination, mirrors and lenses, and vision and optical instruments. Pre-requisite: ENGTE-135 or GENTC-133.

**ENGTE-241 INTRODUCTION TO MACHINING 3 Credits**

Intro to the designing, programming, editing, setup, and operation of CNC lathes and milling machines. Students will produce parts from 2-D CAD files. Topics studied will include: G and M control codes, importing and exporting CAD files, using CAM software to manipulate geometry, using CAM software to produce various toolpaths such as engraving, contouring, and pocketing paths, island avoidance, proper setup and sequence of operations while machining, and setting tool radius and height offsets. Pre-requisite: ENGTE-154.

**ENGTE-243 ADVANCED MACHINING 3 Credits**

This course provides the engineering students with the knowledge for lab operation of machining, special attachments, bench work, layout, heat-treating, hardness testing, layout inspection, jig and fixture setup, tool design. This course is designed to provide the students with the development of manufacturing plans for the efficient manufacturing of moderately complex products. Individualized laboratory practice will integrate the textbook, reference manuals and technical tools placing emphasis on the production of moderately complex products using production machines, setups, and fixtures. A continuation in the study of G and M codes from ENGTE 241. The emphasis will be in transforming 3-D models (including wire frame, surface, and solid models) into 3-D tool path definitions. Pre-requisite: ENGTE-241.

**ENGTE-246 CONSTRUCTION AND MANUFACTURING TECHNOLOGY 2 Credits**

This course is designed to develop a basic understanding of manufacturing and construction aspects including history, types, materials and materials production, management, quality, and safety.

**ENGTE-261 3-D ASSEMBLIES & AUTOMATION 3 Credits**

This is a study in advanced Solidworks tools and techniques. Will include preparation for the Certified Solidworks Professional Exam. Emphasis will be on the comprehensive coverage and integration of parts, surfaces, simulationXpress, sheet metal, top-down assemblies, core and cavity molds, and their application in a design and manufacturing environment. A portfolio of large assemblies with exploded drawings and manufacturing documentation will prepare students to excel in the mechanical drafting and design environment. Pre-requisite: ENGTE-225.

**ENGTE-272 ADVANCED GIS AND APPLICATIONS 3 Credits**

This course is designed to develop advanced GIS skills (spatial, suitability, surface, and point pattern analysis), web mapping, data collection, app development, and advanced cartography. Pre-requisite: GIS-271 with a grade of 'C' or better.

**ENGTE-273 REMOTE SENSING AND APPLICATIONS 3 Credits**

Course covers remote sensing physics, geodesy, photogrammetry, logistics for accessing imagery, preparing and rendering imagery, understanding variation and change through image analysis. Types of remotely sensed data include multispectral, digital elevation models, thermal, and Lidar. Pre-requisite GIS-271 with a 'C' or better.

**ENGTE-290 DIRECTED STUDY IN ENGINEERING TECHNOLOGY 1-10 Credits**

Opportunity to learn advanced skills in areas agreed upon by student and instructor. Objectives developed to complete a specialized project or course of study and a plan to achieve these objectives.

**ENGTE-292 SPECIAL TOPICS IN ENGINEERING TECHNOLOGY 1-10 Credits**

Offers opportunity to learn advanced skills for students who are progressing at faster than normal pace.

**ENGTE-294 INTERNSHIP IN ENGINEERING TECHNOLOGY 1-10 Credits**

Work experience in business related to the student's career goal. Student is a paid, part-time employee working under supervision of employer and program coordinator. Registration only with the approval of program coordinator.

**ENGTE-394 INTERNSHIP IN ENGINEERING 1-12 Credits**

Work experience in business related to the student's career goal. Student is a paid, part-time employee working under supervision of employer and program coordinator. Registration only with the approval of program coordinator.

**ENGTE-490 DIRECTED STUDY IN ENGINEERING TECHNOLOGY 1-12 Credits**

Opportunity to learn advanced skills in area agreed upon by student and instructor. Objectives developed to complete a specialized project or course of study and a plan to achieve these objectives.

**ENGTE-494 IN:ENGINEERING TECHNOLOGY 1-12 Credits**

Work experience in business related to the student's career goal. Student is a paid, part-time employee working under supervision of employer and program coordinator. Registration only with the approval of program coordinator.