

Undergraduate Engineering Courses

ENGT 1100. Transitioning to University Studies in Engineering Technology. 1 Credit Hour (Lecture: 1 Hour, Lab: 1 Hour).

Practical study designed to prepare the student for university life, aid in the development of skills for academic success, promote personal growth and responsibility, and encourage active involvement in the learning process from an individual college perspective. These skill sets are presented in the context of Engineering Technology.

ENGT 1305. Principles of Drafting. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

An introduction to mechanical drafting involving geometrical constructions, orthographic projection, dimensioning techniques, sectional views, auxiliary views, isometric views, and other topics related to manufacturing and other areas of drafting. Lab fee \$10.

ENGT 1306. Applied Statics. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

This course will focus on understanding the resolution and composition of forces and moments; free-body diagrams; equilibrium of particles and rigid bodies; simple structures; friction; centroid; moments of inertia. Prerequisite: Concurrent with MATH 1316 or 2412.

ENGT 1317. Machining Technology. 3 Credit Hours (Lecture: 3 Hours, Lab: 2 Hours).

A study of metals and their machining characteristics and application. Emphasis is placed on layout, precision measurement, and heat treating. Laboratory experiences include work with sheet metal, metal casting, and metal lathe operation. Lab fee \$2.

ENGT 2303. Engineering Economy. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).

Principles of economics equivalence; time value of money, analysis of single and multiple investments; comparison of alternatives; capital recovery and tax implications; certainty; uncertainty; risk analysis; public sector analysis; and break-even concepts. Prerequisite: MATH 1316, MATH 2412, or MATH 2413.

ENGT 2309. Electrical Circuits. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

Principles of electricity, magnetism, and basic laws. Fundamentals of analog and digital electronic components and circuits, including applied areas. Laboratory involves experiments with basic circuits and test equipment. Lab fee: \$2.

ENGT 2310. Introduction to Manufacturing Processes. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

A study of metals and their machining characteristics and application. Emphasis is placed on layout, precision measurement, and heat treating. Laboratory experiences include work with sheet metal, metal casting, and metal lathe operation. Lab fee \$10.

ENGT 2335. Solid Modeling. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

A study of complex three-dimensional solid models used in the fields of mechanical engineering, sheet metal, welding, and other areas of manufacturing and engineering. Orthographic views projected from solid models and annotation techniques are used to produce engineering drawings. Prerequisite: ENGT 1305 or 3 semester hours of drafting or approval of the instructor. Lab fee \$10.

ENGT 3099. Cooperative Education. 1-3 Credit Hours (Lecture: 1-3 Hours, Lab: 3-9 Hours).

This course is designed to offer students the opportunity to integrate academic study with work experience that is germane to their major or minor. Enrollment requires a two-semester minimum commitment that may be accomplished by 1) alternating semesters of full-time study with semesters of curriculum-related employment, or 2) enrolling in courses at least half-time (6 semester hours) and working part-time in parallel positions of curriculum-related employment. The department Cooperative Education advisor will supervise the student's experience and assign the final grade based on the student's final report which is required to complete the course. Students may participate in the Cooperative Education program for an unlimited number of semesters but a maximum of 6 hours credit may be counted toward a degree. Prerequisites: Completion of 30 semester hours which includes 12 hours in the major or minor discipline in which the Cooperative Education course is desired, minimum overall GPA of 2.5 and a minimum GPA of 3.0 in the appropriate major or minor field, and department head approval. Field experiences fee \$50.

ENGT 3301. Applied Dynamics. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

This course will study the principal concepts and application of dynamics. The topics include kinematics and kinetics analysis of particle motion, kinematics and kinetics analysis of two-dimensional rigid body motion, and principal of work and energy and its application in particle and two-dimensional rigid body motion analysis. Prerequisites: MATH 2413 and ENGT 1306.

ENGT 3303. Industrial Materials. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours). [WI (<http://catalog.tarleton.edu/academicaffairs/>)]

A study of the structure, properties, processing, and application of metallic, polymeric, ceramic, and composite materials utilized in manufacturing. Laboratory exercises include processing methods, physical and mechanical testing, modification of properties, manufacturing applications, and material identification. Prerequisites: CHEM 1411 and ENGL 1302 Lab fee \$2.

ENGT 3304. Manufacturing Materials. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours). [WI (<http://catalog.tarleton.edu/academicaffairs/>)]

A study of the properties, processing, and application of metallic, polymeric, ceramic, and composite materials utilized in manufacturing. Emphasis is placed on broad characteristics and applications of industrial materials.

ENGT 3305. Machine Design. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

Application of mechanics and strength of materials to the analysis, synthesis and design of machine elements; theories of failure, stress concentrations, fatigue life and thermal stress, consideration of economics and safety; projects in creative mechanical design. Prerequisite: MATH 2413 and ENGT 3313.

ENGT 3309. Control Systems for Mechanical Application. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

Application of computers to control industrial processes. Study of continuous- and discrete-time control algorithms; digital signal processing; and system control concepts applied to process control. Prerequisite: ENGT 2303. Lab fee: \$2.

ENGT 3313. Mechanics of Materials. 3 Credit Hours (Lecture: 3 Hours, Lab: 3 Hours).

Stresses and strains in elastic members under tensile, compressive, shearing, torsional and bending loads; combined stresses; shear and moment diagrams; Mohr's circle; deflection of beams; thin-walled pressure vessels; stability of columns and buckling. Prerequisites: Concurrent with MATH 2413 and ENGT 1306.

ENGT 3314. Principles of Technology Education. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).

A study of the Texas Technology Education curriculum, to include the areas of communication, manufacturing, construction, energy, power, transportation, computer applications, bio-related technology, electricity, electronics, graphics, principles of technology, and other related technologies.

ENGT 3316. Manufacturing Systems. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

A study of organizational and production techniques used in manufacturing. A thematic team approach will be used to design and produce a product using principles of mass production. Concepts of manufacturing that will be studied will include: principles of tooling, quality, plant layout, resource planning and scheduling. Prerequisites: ENGT 1305, 1317.

ENGT 3317. Machine Tool Technology. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

Fundamentals and principles of metal removal processes. Emphasis is placed on metal lathes, milling machines, grinding machines, and electric discharge machines. Prerequisite: ENGT 1317. Lab fee \$10.

ENGT 3318. Research and Reporting For Technologists. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours). [WI (<http://catalog.tarleton.edu/academicaffairs/>)]

A study of research tools, methods, and data collection techniques used in the field of Engineering Technology. Emphasis will be placed on gathering, analyzing, and presenting technical information related to manufacturing topics in both oral and written form. Technical reports, product documentation, and correspondence will also be discussed.

ENGT 3319. Motor Control and Machine Automation. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

A study of power transformers, single and multiphase circuits. The study of DC machines, AC single and multiphase synchronous and induction machines, and an introduction to power electronics. Lab fee: \$2.

ENGT 3320. Industrial Safety. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).

A study of principles and practices used to establish a safe and healthful environment for industrial personnel. Includes a study of general industrial safety, safety and health regulation agencies, hazard recognition and correction, and first aid. Credit for both ENGT 3320 and MGMT 3320 will not be awarded.

ENGT 3323. Computer-Aided Design with AutoCAD. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

The application of the principles of computer-aided design as they relate to manufacturing and construction. Computerized generation of drafting and design data, using AutoCAD, to create two- and three-dimensional geometries.

ENGT 3324. Applied Polymer Processing. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

This course is a study of thermoplastic and thermosetting materials and processes used in plastics manufacturing. Emphasis will be placed on injection molding, thermoforming, extrusion, rotational casting, elastomeric mold fabrication, resin casting, and coatings. Also, the impact of material selection on processing parameters will be stressed. Prerequisite: ENGT 3303. Lab fee: \$2.

ENGT 3325. Composites Manufacturing. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

This course includes a study of basic organic-matrix composites manufacturing and assembly processes, especially as these relate to aerospace and construction composite products. Lab exercises will include composite hand layout procedures, composite tool design, pultrusion, and assembly processes for composite products. Prerequisite: ENGT 3303. Lab fee: \$2.

ENGT 3326. Ergonomics and Work Methods. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).

Introduction to the design of man-machine systems with particular emphasis on the application of ergonomics to the manufacturing workplace and environment. Use of anthropometric data in design; limitations of human performance; effects of environmental stress on work performance, safety, and health. Lab fee \$2.

ENGT 3327. Mechanical Analysis. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

The course works with the principal concepts and application of Finite Element Analysis (FEA). The topics include fundamental stress/strain analysis of linear static systems and comparing with FEM software on lab projects. The topics also include fundamental of mechanical fracture and fatigue analysis and if time permits performing FEM analysis of them using software on lab projects. Prerequisites: ENGT 3313.

ENGT 3336. Industrial Controls. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

The theory and application of electronic programmable devices such as programmable logic controllers, temperature controllers, counters, etc. Emphasis is also given to control devices using pneumatics and hydraulics. Ladder logic and input/output devices will be emphasized. Lab Fee: \$10.00.

ENGT 3345. Industrial Design. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

An application based course that exposes students to industrial design and provides experience in the varied aspects of the design process, culminating in a final, individual design project. Topics include, but are not limited to: Working drawings, tolerancing, dimensioning, material selection and pricing, sketching and proper design techniques. Prerequisite: ENGT 2335 or approval of the instructor. Lab fee \$2.

ENGT 3350. Numerical Control Systems. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

Principles, techniques, and applications of numerically controlled machine tools. Application of the APT system. Laboratory experiences in processing, writing, debugging, and processing the N/C part program. Prerequisite: ENGT 1317 or approval of the instructor. Lab fee \$10.

ENGT 3360. Safety Management. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).

Occupational safety engineering and management with emphasis on control of hazardous materials, fire prevention, safety considerations in production facility design and maintenance, and operation of effective safety programs.

ENGT 3375. Continuous Improvement. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).

The role of the manufacturing engineer in continuous improvement projects to improve design and production processes. The student will utilize modern tools and techniques for planning and managing continuous improvement projects, integrating and deploying change programs, data based decision making, and resource management.

ENGT 3385. Fluid Mechanics. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

This course is an introduction to fluid mechanics, and emphasizes fundamental concepts and problem-solving techniques. Topics to be covered include fluid properties, fluid statics, fluid kinematics, control volume analysis, internal flows (pipe flows), and external flows (lift and drag). Brief introductions to computational fluid dynamics (CFD), compressible flow, and fluid power systems such as turbomachinery (pumps and turbines) will also be provided. Prerequisites: MATH 2413.

ENGT 3386. Quality Management. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).

A study of the application of various methods used by manufacturing to quantify product quality. This will include a review of the ASTM, ANSI, and ISO tests as they apply to metallic, polymeric, ceramic, and composite materials. Statistical Quality Control, Statistical Process Control, Total Quality Management, and ISO 9000 will also be investigated. Laboratory assignments will acquaint the student with the variety of instrumentation that is used in quality control and their use. Lab fee \$2.

ENGT 3393. Modular Technology. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

This course will investigate various systems used in modular technology education. Modular technology studies will include broadcasting technology, applied physics, power energy, transportation, graphic communication, composites, and computer application. Prerequisite: junior standing. Lab fee \$15.

ENGT 3395. Fundamentals of Industrial Project Management. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours). [WI (<http://catalog.tarleton.edu/academicaffairs/>)]

As an introductory course for project management, the course covers essential elements to successfully initiate and complete a project in general. Topics will include five of the basic elements of project management; project initiation, planning, executing, controlling and closing a project. The course includes the use of Project Management software.

ENGT 395. Industrial Project Management. 5 Credit Hours (Lecture: 0 Hours, Lab: 0 Hours).**ENGT 4086. Problems. 1-3 Credit Hours (Lecture: 1-3 Hours, Lab: 0 Hours).**

This course is designed to meet the needs of Engineering Technology students who have above average academic ability and who need to pursue subject matter that is not normally included in the Engineering Technology curriculum. Approval for enrollment in this course shall be with the concurrence of the individual instructor and the department head. The student must be currently enrolled in one of the majors offered in the Engineering Technology Department. Prerequisite: completion of 30 or more hours in the Department of Engineering Technology.

ENGT 4303. Weld Design. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

This course presents the basics of weld design, welded structure manufacturing, and structural design as it applies to welded structures.

ENGT 4305. Architectural Drafting. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

A course in residential architectural drafting using computer-aided drafting. Emphasis is placed on residential design and home planning. Lab fee \$10.

ENGT 4320. Occupational Safety and Health. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).

A study of principles and practices used to establish a safety and health program within industrial and retail environments. The course includes a study of general safety regulations and occupational safety program strategies as they pertain to internal organizational efforts. Related topics such as safety and health regulation agencies, hazard recognition and correction, and first aid.

ENGT 4322. Applied Thermodynamics. 3 Credit Hours (Lecture: 3 Hours, Lab: 3 Hours).

The study of the basic concepts and laws of thermodynamics and the application of these laws or principles to simple engineering systems. Topics include the First Law of Thermodynamics, the Second Law of Thermodynamics, thermodynamic properties, and various cycles. Prerequisite: MATH 2414.

ENGT 4326. Applications of Linear Programming and Optimization. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

An introduction to applications of linear and nonlinear programming, single and multiple objective optimization, sensitivity, forecasting, queuing theory, and decision analysis. The student will be able to implement these concepts using a COTS software application as applied in industrial and public settings. Lab fee \$10.

ENGT 4336. Production Planning. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).

A study of the principles and theory used in the design and maintenance of production operations and inventory systems. These include forecasting techniques, inventory models, production control models and assembly line balancing. Particular emphasis is on MRP. Just-in-Time, and Synchronous Manufacturing.

ENGT 4339. Process Control Instrumentation. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

Introduction to process control principles and practices. Study of analog and digital signal conditioning; thermal, mechanical and optical transducers; electromechanical, pneumatic and hydraulic devices; and the application of computer-aided tools for process control instrumentation. Prerequisite: ENGT 3336, 3309. Lab fee: \$2.

ENGT 4346. Manufacturing Management. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).

Applications of modern manufacturing principles including: design for manufacturability, group technology, just-in-time, synchronous manufacturing, concurrent engineering, flexible manufacturing, and product management to effectively manage the manufacturing environment.

ENGT 4347. Metrics and Measurements. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).

This course covers topics in ergonomics, the man-machine interface, managing worker methods, and time studies. We will cover topics that lead to measuring and monitoring work both by human and machines. Prerequisite: ENGT 3375.

ENGT 4350. NUMERICAL CONTROL PROGRAMMING. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

A continuation of I T 350 in which more advanced programming techniques are studied. Included is a study of the various N/C part programming languages, and evaluation of N/C equipment and the further refinement of the APT/NC language. Prerequisite: ENGT 3350. Lab fee \$10.

ENGT 4356. Advanced Industrial Controls. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

Feedback control system analysis. Proportional, integral and derivative controls of automated systems. Control system design and compensation. Analog and digital simulation. Prerequisite: MATH 2413, ENGT 3336.

ENGT 4361. Computer Aided Manufacturing. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).

The principles of computer aided manufacturing and simulation as they relate to mechanical design and assemblies. Software tools will be used to analyze parametric parts and assemblies for strength, function, range of motion and interference. Prerequisite: Approval of the instructor.

ENGT 4375. Facility Planning. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).

This course covers topics in Facilities Planning and design for Operations. We will cover topics that lead to making good decisions for facility layout including product, process flow, material handling, and facility location techniques. Prerequisite: ENGT 3375.

ENGT 4376. Automated Manufacturing Systems. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).

An analysis of materials flows to design automated manufacturing systems in the manufacturing environment. This will include material handling systems, how computer-aided manufacturing software improves productivity, automated storage and retrieval systems, automated guided vehicles, bar-coding systems, automated warehousing, and the programming and application of robots.

ENGT 4384. Internship. 3 Credit Hours (Lecture: 0 Hours, Lab: 6 Hours).

An approved, supervised, comprehensive work experience consisting of a minimum of 240 hours (6 weeks) in an industrial or manufacturing enterprise. Prerequisite Course(s): Junior or senior classification and approval of academic advisor and department head. The internship may be repeated for a maximum of 6 hours of credit. Field experience fee \$75.

ENGT 4385. Seminar. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).

Topics will vary according to timeliness and special needs. May be taken more than once for credit.

ENGT 4395. Engineering Technology Projects. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

A capstone projects course emphasizing a team approach to the analysis and solutions of manufacturing problems. Projects will be supplied by industry whenever possible. Emphasizes scheduling, design, working in teams, final written report and presentation. Restricted to Engineering Technology majors. Prerequisite: Senior standing. Lab fee \$15.