

# Department of Engineering Technology

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The mission of the Department of Engineering Technology is to provide students an academically challenging program of study in technical fields that prepares graduates to establish successful careers and assume leadership roles in engineering, manufacturing, construction, and education. Engineering Technology is part of the engineering field which requires the application of scientific and engineering knowledge and methods combined with technical skills in support of engineering activities. The Department offers programs of study leading to a Bachelor of Science degree in Manufacturing Engineering Technology, Mechanical Engineering Technology, Industrial Technology, and Construction Science and Management. For the adult student seeking to advance career opportunities, the department offers two degrees online, a Bachelor of Applied Arts and Sciences degree in Manufacturing and Industrial Management and a Master of Science degree in Engineering and Quality Management, to allow our students to maintain professional and personal commitments while continuing an education.

## Bachelor of Science in Construction Science and Management

The mission of the Bachelor of Science in Construction Science and Management (CSM) is to provide graduates with knowledge and skills that are valued by commercial, residential, industrial and heavy civil sectors of the construction industry. Construction science and management graduates will gain knowledge of construction materials and methods, structural systems, soils, site development, surveying, contract administration, codes, plans and specifications, planning, estimating, scheduling, and evaluating project performance. Students graduating with this degree will find themselves with the skills and knowledge to compete in a regional, national and international job market.

### Program Course Prerequisite Policy

It is important for students to stay academically prepared as they progress through their curriculum. Prerequisite (taken previously) and corequisite (taken previously or concurrently) courses are in place to establish the foundational knowledge and skills needed to be successful in any given course. For all major courses in CSM, students must earn a grade of "C" or better to proceed to follow-up courses as well as to graduate. The following summarizes the policy for allowing/disallowing forward progress when prerequisite (prereq) and/or corequisite (coreq) conditions are not fully met:

- If a student earns an F in a prereq course or has not taken that prereq, then the student may NOT enroll in the follow-up course.
- If a student earns a D in a prereq for a course, the student IS allowed a prereq waiver to enroll in the follow-up course only if ALL THREE of the following conditions are met:
  - The student has an overall GPA of 2.4 or higher, AND
  - If by not enrolling in the follow-up course, the student's graduation date is adversely impacted (advisor must check the cascading effect of not enrolling in a course), AND
  - The student has not exceeded the maximum of FOUR prereq waivers.

If a student qualifies for a prereq waiver, the student must re-enroll in the prereq course concurrently; if the prereq course is not offered concurrently, the student must re-enroll on its immediate next offering. A student may utilize a maximum of FOUR prerequisite waivers over the duration of their pursuit of a degree within the CSM program.

## The Bachelor of Science in Construction Science and Management

### Required Courses

General Education Requirements ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )	42	
Choose one of the following options [shared]:		
CHEM 1311 & CHEM 1111	College Chemistry I (Lecture) and College Chemistry I (Laboratory)	
GEOL 1403	Physical Geology	
Choose one of the following options [shared]:		
PHYS 2425	University Physics I	
PHYS 1401	College Physics I	
MATH 2412 or MATH 1314 & MATH 1316	Precalculus Math College Algebra and Plane Trigonometry	4-6
ENGT 2303 [shared]	Engineering Economy	
MATH 1342 [shared]	Elementary Statistical Methods	
CNST 1305	Construction Graphics	3
CNST 1306	Construction Materials and Methods	3
CNST 1307	Construction Methods-Concrete and Masonry	3
CNST 2323	Construction Estimating	3
CNST 3301	Building Mechanical and Electrical Systems	3
CNST 3302	Construction Cost Estimating and Analysis	3
CNST 3308	Residential and Commercial Building Codes	3
CNST 3309	Commercial Construction and Industrial Subsystems	3
CNST 3311 [WI ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )]	Construction Materials Testing and Inspection	3
ENGT 3318 [WI ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )]	Research and Reporting For Technologists	3
CNST 3320	Construction Safety Management	3
CNST 3321	Construction Management	3
CNST 3335	Construction Layout and Site Development	3
CNST 3385 [WI ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )]	Construction Project Scheduling	3

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CNST 4310	Site & Building Foundations	3
CNST 4313	Construction Law and Ethics	3
CNST 4322	Building Information Modeling	3
CNST 4325	Contract Administration	3
CNST 4395	Construction Capstone	3
ACCT 3300	Accounting Concepts	3
BUSI 1301	Business Principles	3
MGMT 3300	Principles of Management	3
Electives		8
<b>Total Hours</b>		<b>120-122</b>

### The Bachelor of Science in Manufacturing Engineering Technology

The Bachelor of Science degree in Manufacturing Engineering Technology educates students in a wide range of manufacturing related areas: quality, ergonomics, production planning, management, control systems, productivity, automated systems, and computer modeling. The Manufacturing Engineering Technology courses are supplemented with a foundation of industrial technology courses and emphases in mathematics, statistics, and the sciences. A wide choice of electives complements the degree, allowing the student maximum flexibility in the areas of business, science, mathematics, computer information systems, and engineering.

### Bachelor of Science in Manufacturing Engineering Technology

#### Required Courses

General Education Requirements ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> ) <sup>1</sup>		42
ENGT 1305	Principles of Drafting	3
ENGT 1306	Applied Statics	3
ENGT 1317	Machining Technology	3
ENGT 2303 [shared]	Engineering Economy	3
ENGT 2335	Solid Modeling	3
ENGT 3303 [WI ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )]	Industrial Materials	3
ENGT 3318 [WI ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )]	Research and Reporting For Technologists	3
ENGT 3316	Manufacturing Systems	3
ENGT 3324	Applied Polymer Processing	3
or ENGT 3325	Composites Manufacturing	
ENGT 3336	Industrial Controls	3
ENGT 3375	Continuous Improvement	3
ENGT 3386	Quality Management	3
ENGT 3395 [WI ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )]	Fundamentals of Industrial Project Management	3
ENGT 4326	Applications of Linear Programming and Optimization	3
ENGT 4336	Production Planning	3
ENGT 4346	Manufacturing Management	3
ENGT 4347	Metrics and Measurements	3
ENGT 4375	Facility Planning	3
ENGT 4395	Engineering Technology Projects	3
MATH 1316	Plane Trigonometry (or above)	3
or MATH 2412	Precalculus Math	
MATH 2413 [shared]	Calculus I	
MATH 2414	Calculus II	4
COSC 1310	Procedural Programming	3
CHEM 1311 & CHEM 1111 [shared]	College Chemistry I (Lecture) and College Chemistry I (Laboratory)	
PHYS 2425 [shared]	University Physics I	
Advanced Electives		3
Electives		11
<b>Total Hours</b>		<b>120</b>

<sup>1</sup> Please see Academic Information section.

### The Bachelor of Science in Mechanical Engineering Technology

The mission of the Mechanical Engineering Technology program is to prepare students for the challenges in manufacturing and manufacturing support. Students develop the technical skills needed to solve problems through design, process, and personnel improvements and practices that are common in an industrial setting. Coursework focuses on mechanical engineering but includes the use of laboratories to reinforce student learning by designing, manufacturing, and/or troubleshooting physical systems.

### The Bachelor of Science Degree in Mechanical Engineering Technology

#### Required Courses

General Education Requirements ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )		42
ENGT 1305	Principles of Drafting	3
ENGT 1306	Applied Statics	3

ENGT 1317	Machining Technology	3
ENGT 2303 [shared]	Engineering Economy	
ENGT 2335	Solid Modeling	3
ENGT 3301	Applied Dynamics	3
ENGT 3303 [WI ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )]	Industrial Materials	3
ENGT 3305	Machine Design	3
ENGT 3313	Mechanics of Materials	3
ENGT 3318 [WI ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )]	Research and Reporting For Technologists	3
ENGT 3327	Mechanical Analysis	3
ENGT 3336	Industrial Controls	3
ENGT 3375	Continuous Improvement	3
ENGT 3385	Fluid Mechanics	3
ENGT 4322	Applied Thermodynamics	3
ENGT 4326	Applications of Linear Programming and Optimization	3
ENGT 4356	Advanced Industrial Controls	3
ENGT 4375	Facility Planning	3
ENGT 4395	Engineering Technology Projects	3
MATH 1316	Plane Trigonometry	3
or MATH 2412	Precalculus Math	
MATH 2413 [shared]	Calculus I	
MATH 2414	Calculus II	4
CHEM 1311 [shared]	College Chemistry I (Lecture)	
CHEM 1111 [shared]	College Chemistry I (Laboratory)	
PHYS 2425 [shared]	University Physics I	
Advanced Elective or Minor Course		6
General Elective		11
<b>Total Hours</b>		<b>120</b>

## The Bachelor of Science in Industrial Technology

The Bachelor of Science degree in Industrial Technology prepares students for roles in a technical career. Areas of study include drafting and design, manual and CNC machining, and automation. Students have room in their program of study to pursue a minor in business, computer science, or other content areas. Industrial Technology graduates often work in manufacturing in such areas as technical support, front line supervision, or machine operators. Industrial Technology students can also pursue a teaching certification to teach in a secondary school.

## The Bachelor of Science Degree in Industrial Technology

### Required Courses

General Education Requirements ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> ) <sup>1</sup>		42
ENGT 1305	Principles of Drafting	3
ENGT 1317	Machining Technology	3
ENGT 2335	Solid Modeling	3
ENGT 3303 [WI ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )]	Industrial Materials	3
or ENGT 3304	Manufacturing Materials	
ENGT 3317	Machine Tool Technology	3
ENGT 3324	Applied Polymer Processing	3
or ENGT 3325	Composites Manufacturing	
ENGT 3345	Industrial Design	3
ENGT 3350	Numerical Control Systems	3
MATH 1316	Plane Trigonometry	3
or MATH 2412	Precalculus Math	
<b>Total Hours</b>		<b>69</b>

### Additional Required Courses for Concentrations

#### General Without Certification

ENGT 1306	Applied Statics	3
ENGT 3316	Manufacturing Systems	3
ENGT 3318 [WI ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )]	Research and Reporting For Technologists	3
ENGT 3320	Industrial Safety	3
ENGT 3336	Industrial Controls	3
ENGT 3375	Continuous Improvement	3
ENGT 4395	Engineering Technology Projects	3
Advanced ENGT Electives		9
Electives from any field (6 Hours Advanced) <sup>2</sup>		21
<b>Total Hours</b>		<b>51</b>

**Technology Education (Secondary Teacher Certification)**

ENGT 1306	Applied Statics	3
ENGT 3314	Principles of Technology Education	3
ENGT 3393	Modular Technology	3
ENGT 4305	Architectural Drafting	3
ENGT 3336	Industrial Controls	3
ENGT 3316	Manufacturing Systems	3
BCIS 1305	Business Computer Applications	3
COMM 1316	News Photography I	3
ENGL 3309 [WI ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )]	Professional Writing	3
EDUC 3320 [WI ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )]	Foundations of Teaching: Elementary (EC-6) Classrooms	3
EDUC 3330	Effective Instruction for Middle and Secondary Educators	3
EDUC 4330	Application of Effective Teaching Practices	3
EDUC 4335	Issues of Professionalism	3
EDUC 4690	Clinical Teaching	6
Select one of the following:		3
PSYC 2308	Child Psychology	
PSYC 3303	Educational Psychology	
CHFS 3300	Child Development: Theory, Research, and Practice	
READ 3351 [WI ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )]	Content Area Literacy	3
ENGL 1301 [shared] [WI ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )]	Composition I	
ENGL 1302 [shared] [WI ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )]	Composition II	
<b>Total Hours</b>		<b>51</b>

<sup>1</sup> Please see Academic Information section.<sup>2</sup> Some students may choose to use 18 hours of electives for a minor in any field other than ENGT.**The Bachelor of Applied Arts and Sciences in Manufacturing and Industrial Management**

The Bachelor of Applied Arts and Sciences (BAAS) degree is designed as an online degree completion program. The BAAS is designed for students who have training in a technical area and some or all of their core classes completed. Technology courses from community colleges, technical schools, military experience, or employer-sponsored training may be used to meet some of the degree requirements. The major classes are offered online, giving working professionals the flexibility of taking classes while continuing to work. The degree offers two emphasis areas: Industrial Management or Safety Management.

**The Bachelor of Applied Arts and Sciences Degree in Manufacturing and Industrial Management****Required Courses**

General Education Requirements ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )		42
<b>Prior Learning Credit</b>		<b>12-36</b>
MATH 1316	Plane Trigonometry	3
or MATH 1342	Elementary Statistical Methods	
ENGT 3318 [WI ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )]	Research and Reporting For Technologists	3
ENGT 3375	Continuous Improvement	3
ENGT 3395 [WI ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )]	Fundamentals of Industrial Project Management	3
Advanced Electives		12
Advanced ENGT		6
Electives		0-24
<b>Total Hours</b>		<b>108</b>

**Additional Required Courses for Concentrations****Industrial Management**

ENGT 3386	Quality Management	3
ENGT 4336	Production Planning	3
ENGT 4346	Manufacturing Management	3
ENGT 4347	Metrics and Measurements	3
<b>Total Hours</b>		<b>12</b>

**Safety Management**

ENGT 3326	Ergonomics and Work Methods	3
ENGT 3320	Industrial Safety	3
ENGT 4320	Occupational Safety and Health	3
ENGT 3360	Safety Management	3
<b>Total Hours</b>		<b>12</b>

**General**

Advanced ENGT	12
<b>Total Hours</b>	<b>12</b>

**The Bachelor of Applied Science Degree in Construction Science and Management**

The mission of the Bachelor of Applied Science in Construction Science and Management is to provide graduates with knowledge and skills that are valued by commercial, residential, industrial and heavy civil sectors of the construction industry. Construction Science and Management graduates will gain knowledge of construction materials and methods, structural systems, soils, site development, surveying, contract administration, codes, plans and specifications, planning, estimating, scheduling, and evaluating project performance. Students graduating with this degree will find themselves with the skills and knowledge to compete in a regional, national and international job market. The BAS in Construction Science and Management is geared towards students who have an Associate's degree in a technical field and are interested in earning their Bachelor's.

**The Bachelor of Applied Science in Construction Science and Management****Required Courses**

General Education Requirements ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )	42
<b>Prior Learning Credit</b>	<b>12-24</b>
BUSI 1301 Business Principles	3
MATH 1316 Plane Trigonometry	3-4
or MATH 2412 Precalculus Math	
GEOL 1403 [shared] Physical Geology	
PHYS 1401 [shared] College Physics I	
ENGT 2303 [shared] Engineering Economy	
ENGT 3318 [WI] ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> ) Research and Reporting For Technologists	3
CNST 2323 Construction Estimating	3
CNST 3302 Construction Cost Estimating and Analysis	3
CNST 3308 Residential and Commercial Building Codes	3
CNST 3309 Commercial Construction and Industrial Subsystems	3
CNST 3320 Construction Safety Management	3
CNST 3321 Construction Management	3
CNST 3335 Construction Layout and Site Development	3
CNST 3385 [WI] ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> ) Construction Project Scheduling	3
CNST 4313 Construction Law and Ethics	3
CNST 4322 Building Information Modeling	3
CNST 4325 Contract Administration	3
ACCT 3300 Accounting Concepts	3
MGMT 3300 Principles of Management	3
Electives	6-18
<b>Total Hours</b>	<b>120</b>

**The Bachelor of Applied Science in Manufacturing Engineering Technology**

The Bachelor of Applied Science degree in Manufacturing Engineering Technology educates students in a wide range of manufacturing related areas: quality, ergonomics, production planning, management, control systems, productivity, automated systems, and computer modeling. The Manufacturing Engineering Technology courses are supplemented with a foundation of industrial technology courses and emphases in mathematics, statistics, and the sciences. A wide choice of electives complements the degree, allowing the student maximum flexibility in the areas of business, science, mathematics, computer information systems, and engineering. The BAS in Manufacturing Engineering Technology is geared towards students who have an Associate's degree in a technical field and are interested in earning their Bachelor's.

**The Bachelor of Applied Science Degree in Manufacturing Engineering Technology****Required Courses**

General Education Requirements ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )	43
<b>Prior Learning Credit</b>	<b>12-24</b>
MATH 1316 Plane Trigonometry	3-4
or MATH 2412 Precalculus Math	
MATH 2413 [shared] Calculus I	
MATH 2414 Calculus II	4
PHYS 2425 [shared] University Physics I	
ENGT 2303 [shared] Engineering Economy	
ENGT 2335 Solid Modeling	3
ENGT 3303 [WI] ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> ) Industrial Materials	3
ENGT 3318 [WI] ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> ) Research and Reporting For Technologists	3
ENGT 3324 Applied Polymer Processing	3
or ENGT 3325 Composites Manufacturing	
ENGT 3336 Industrial Controls	3
ENGT 3350 Numerical Control Systems	3
ENGT 3375 Continuous Improvement	3
ENGT 3386 Quality Management	3

ENGT 3395 [WI ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )]	Fundamentals of Industrial Project Management	3
ENGT 4326	Applications of Linear Programming and Optimization	3
ENGT 4336	Production Planning	3
ENGT 4347	Metrics and Measurements	3
ENGT 4395	Engineering Technology Projects	3
Electives		7-19
<b>Total Hours</b>		<b>120</b>

## The Bachelor of Applied Science in Mechanical Engineering Technology

The mission of the Mechanical Engineering Technology program is to prepare students for the challenges in manufacturing and manufacturing support. Students develop the technical skills needed to solve problems through design, process, and personnel improvements and practices that are common in an industrial setting. Coursework focuses on mechanical engineering but includes the use of laboratories to reinforce student learning by designing, manufacturing, and/or troubleshooting physical systems. The BAS in Mechanical Engineering Technology is geared towards students who have an Associate's degree in a technical field and are interested in earning their Bachelor's.

## The Bachelor of Applied Science Degree in Mechanical Engineering Technology

### Required Courses

General Education Requirements ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )		43
<b>Prior Learning Credit</b>		<b>12-24</b>
MATH 1316 or MATH 2412	Plane Trigonometry Precalculus Math	3
MATH 2413 [shared]	Calculus I	
MATH 2414	Calculus II	4
PHYS 2425 [shared]	University Physics I	
ENGT 2335	Solid Modeling	3
ENGT 3301	Applied Dynamics	3
ENGT 3303 [WI ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )]	Industrial Materials	3
ENGT 3305	Machine Design	3
ENGT 3313	Mechanics of Materials	3
ENGT 3318 [WI ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )]	Research and Reporting For Technologists	3
ENGT 3327	Mechanical Analysis	3
ENGT 3336	Industrial Controls	3
ENGT 3375	Continuous Improvement	3
ENGT 3385	Fluid Mechanics	3
ENGT 3395 [WI ( <a href="http://catalog.tarleton.edu/academicaffairs/">http://catalog.tarleton.edu/academicaffairs/</a> )]	Fundamentals of Industrial Project Management	3
ENGT 4322	Applied Thermodynamics	3
ENGT 4395	Engineering Technology Projects	3
Electives		7-19
<b>Total Hours</b>		<b>120</b>

## Academic Advising Guides

Academic Advising Guides area available at the following website:

<https://web.tarleton.edu/majorinfo/>

## Construction Courses

### CNST 1305. Construction Graphics. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

Computer based 2D & 3D graphics used in the construction industry including CAD/REVIT based drawing development, construction drawing interpretation, site/plan/elevation/section/detail drawings, structural and MEP drawings. Residential and commercial construction based. Lab fee: \$2.

### CNST 1306. Construction Materials and Methods. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

This course introduces students to the basic building materials and systems used in constructing buildings, bridges, and infrastructure projects. It offers the basic Understanding of the use of common systems such as foundations, structural framing/skeleton, building envelopes, and finishes. Namely, it introduces students to proper terminology and usage of wood, steel, and concrete materials and selected manufactured components. Lab fee: \$2.

### CNST 1307. Construction Methods-Concrete and Masonry. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

This course is an investigation into concrete and masonry construction methods, testing, and design used in residential and commercial construction is made. Topics include: concrete slab, wall, footing, and pier construction; brick and concrete masonry unit (CMU) wall construction; and decorative concrete /masonry design techniques. Lab fee: \$2.

### CNST 2323. Construction Estimating. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

This course introduces students to the skills and tools necessary to prepare formal cost estimations for residential construction projects. It focuses on pricing, indirect costs, bid analysis and use of computer aided software. The goal of this course is to expand the student's skills in new topics of estimating and to assist in developing high confidence in the application of construction estimating skills. This course addresses the typical procedures from familiarization with the CSI Divisions, building plans, material quantification, work breakdown, work quantification, pricing and bid submittals while creating detailed cost estimates. Prerequisite: CNST 1306, CNST 1307 Lab fee: \$2.

### CNST 3301. Building Mechanical and Electrical Systems. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).

This course introduces students to the planning and construction of mechanical and electrical systems common to construction projects. It involves basic calculations of cooling/heating loads, determination of temporary power demands, and sizing of pipes, HVAC equipment, and ducts. Lab fee: \$2.

**CNST 3302. Construction Cost Estimating and Analysis. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).**

This course covers quantification and pricing of direct field costs and general condition costs for light commercial and industrial construction projects from contract documents as well as preparation of complete lump sum bid package ready for project execution with emphasis on the use of software in the estimating process. Prior knowledge or experience in construction, mechanical, and electrical systems is recommended. Prerequisite: CNST 2323, CNST 3301, or appropriate Occupational Specialization credit Lab fee: \$2.

**CNST 3308. Structural Steel and Timber Construction. 3 Credit Hours (Lecture: 2 Hours, Lab: 2 Hours).**

Design and analysis of temporary structures used in construction, including scaffolding, shoring, ground support systems, concrete falsework, and formwork, bracing, soldier beam and lagging, trenching, equipment bridges, and temporary support of permanent structures. Besides, this course introduces construction safety associated with temporary structures. Prerequisites: CNST 1306 or appropriate Occupational Specialization credit, and either PHYS 1401 or PHYS 2425. Lab fee: \$2.

**CNST 3309. Commercial Construction and Industrial Subsystems. 3 Credit Hours (Lecture: 2 Hours, Lab: 2 Hours).**

This course introduces students to the terminology and functions of details of mechanical and electrical systems common to process and industrial plant projects. It involves basic calculations of systems, determination of power requirements, and selection of systems. Lab fee: \$2.

**CNST 3311. Construction Materials Testing and Inspection. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours). [WI (<http://catalog.tarleton.edu/academicaffairs/>)]**

Construction materials testing and inspection procedures in laboratory and field situations using standard testing equipment, methods, and field inspection techniques per ASTM and ACI standards. Laboratory reports, computer analysis, data collection and simulated field inspections are included. Focus is placed on acceptance testing for construction materials. Prerequisites: CNST 1306 Lab fee: \$2.

**CNST 3320. Construction Safety Management. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).**

This course introduces students to OSHA regulations and industry practices related to creating and maintaining safe construction sites. Students will be eligible to sit for the 10-hour OSHA safety certification exam. Prerequisites: CNST 1306 or concurrent enrollment or appropriate Occupational Specialization credit.

**CNST 3321. Construction Management. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).**

Construction Management courses including construction operations and key project management skills. Critical path scheduling, duration, logic, resource leveling, and the calculation of costs. Typical contract formats: project planning with emphasis on legal aspects of various types of corporations and structure.

**CNST 3335. Construction Layout and Site Development. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).**

Basic surveying techniques for construction layouts, fundamentals and regulations related to land development. Prerequisites: MATH 1316 or MATH 2412 or appropriate Occupational Specialization credit Lab fee: \$2.

**CNST 3385. Construction Project Scheduling. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours). [WI (<http://catalog.tarleton.edu/academicaffairs/>)]**

This course explores major problems, tasks and techniques required to manage the technical program in each phase of the product life cycle. Organizational planning, decision-making, and internal external interface techniques for each phase of the project life cycle are addressed. Additional concepts such as: Earned Value Analysis (EVA), Critical Path Management (CPM), Project Requirements Analysis, and Schedule Task Analysis will be explored in depth. Lab fee: \$2.

**CNST 4084. Seminar. 1-3 Credit Hours (Lecture: 1-3 Hours, Lab: 0 Hours).**

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

**CNST 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.

**CNST 4310. Site & Building Foundations. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).**

The course gives an overview of the difference and correlation between soil mechanics and foundations engineering. Soil mechanics is the branch of engineering that involves the study of the properties of soils and their behaviors under stress and strain in idealized conditions. Foundation engineering is the application of the principles of soil mechanics in the planning, design and construction of foundations for buildings, highways, dams and so forth. This course presents a detailed look into soil properties and foundations design. Prerequisites: PHYS 1401 or PHYS 2425. Lab fee: \$2.

**CNST 4313. Construction Law and Ethics. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).**

This course introduces students to basic understanding of contractual issues that are significant to construction managers. The course is designed to teach basic concepts of contract law and to recognize legal issues making decisions based on current industrial standards. The course also focuses on addressing ethics in the construction industry.

**CNST 4322. Building Information Modeling. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).**

This course is designed specifically to both introduce specific BIM (Building Information Modeling) techniques and software as well as further develop VDC (Virtual Design and Construction) software as they align with current managerial methods and project delivery platforms. The course is also designed and developed to promote discussion with respect to the roles played by owners, designers, builders, and suppliers. Specific attention is paid to BIM's role in various project platform delivery systems including DESIGN-BID-BUILD, DESIGN BUILD, CM AT RISK, and IPD. Prerequisite: CNST 4325, CNST 3385, CNST 3321, Minimum of 90 hours coursework complete Lab fee: \$2.

**CNST 4323. Construction Estimating. 3 Credit Hours (Lecture: 2 Hours, Lab: 4 Hours).**

This course introduces students to the skills and tools necessary to prepare formal bids for construction projects. It focuses on pricing, indirect costs, bid analysis and use of computer aided software. The goal of this course is to expand your skills in new topics of estimating and to assist you in developing high confidence in the application of the estimating skills you learned previously. The course addresses the bidding procedure from receipt of bid documents through work breakdown, work quantification, pricing and bid submittal for lump sum and unit price bids, and preparation of design/build proposals. Prerequisites: CNST 1306, 1307, and 3301 Lab fee: \$2.

**CNST 4325. Contract Administration. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).**

This course introduces students to issues regarding administering construction contracts. It focuses on understanding of the purpose of contract documents, legal hierarchy of the documents, the interrelationships among the documents, liabilities accepted with each document, and typical challenges related to communications among the parties involved, establishing chain of commands, warranties, and progress/final payments. Prerequisites: CNST 3321.

**CNST 4395. Construction Capstone. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).**

Capstone projects course emphasizing a team approach to the analysis and solutions of Construction problems. Projects will be supplied by industry whenever possible. Emphasizes scheduling, design, working in teams. A final written report drawings and presentations will be provided to the customer. Prerequisite: Minimum of 90 hours coursework complete and department head approval.

## Engineering Technology 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: \$2.

**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 the 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: \$2.

**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: \$2.

**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. 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 1311 and 1111 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 layup 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. Prerequisite: ENGT 3313.

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

The theory and application of Programmable Logic Controllers (PLCs) to the control of pneumatic systems. Ladder logic and input/output devices will be emphasized. Additional topics include number systems, networking, SCADA, and IIoT. Lab fee: \$2.

**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. Prerequisites: 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: \$2.

**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 4360. Hazardous Waste Management. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).**

An introduction to defining, identifying, and managing solid and hazardous waste materials. Examination of policy issues associated with solid waste and hazardous materials to meet RCRA and CERCLA regulations. Prerequisites: Junior standing.

**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. 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.

## Industrial Distribution Courses

**IDIS 2302. Fluid Power. 3 Credit Hours (Lecture: 2 Hours, Lab: 2 Hours).**

The study of the theory and application of pneumatic and hydraulic systems in industrial manufacturing processes. Specific topics include interpreting and drawing fluid circuits based on a standard symbol set; theory, namely the energy equation; components and component sizing; pros and cons of hydraulics and pneumatics, and in comparison to electrical systems; how such systems may be controlled at the subsystem level; and how such systems may be integrated into a larger or overall manufacturing process. Lab fee: \$2.

**IDIS 2304. Mechanical Power. 3 Credit Hours (Lecture: 2 Hours, Lab: 2 Hours).**

Covers principles of power transmission and motion control. The course includes current design innovations in components, systems, and manufacturing along with industry news and events. Lab fee: \$2.

**IDIS 2305. Engineering Drawings and Documentation. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).**

Students learn to interpret paper and electronic engineering drawings and datasets. Drawings and solid models are analyzed via computer aided design system(s). Students inspect parts to specified tolerances. Product data management systems, specifications and standards, and production planning documents are explored. Students learn to compile bid packages.

**IDIS 2306. Basic Electronics. 3 Credit Hours (Lecture: 2 Hours, Lab: 2 Hours).**

An introduction to basic electronics with an overview of computer components, digital systems using counters, registers, code converters, multiplexers, analog-to-digital-to-analog circuits, and large-scale integrated circuits. Lab fee: \$2.

**IDIS 3300. Basic Electricity. 3 Credit Hours (Lecture: 2 Hours, Lab: 2 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.

**IDIS 3302. Introduction to Industrial Distribution. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).**

As an introductory course to industrial distribution, this 2 credit hour course provides definitions and a history of industrial distribution, the types and range of products, lines of distribution, the function of manufacturers, distributors, and operations managers along with measures of effectiveness, and opportunities for employment and advancement.

**IDIS 3330. Technical Sales. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).**

Sales and sales management techniques for analyzing distribution challenges and providing solutions through effective communication; establishing credibility, effective questioning techniques, developing solutions, presenting solutions, anticipating objections and gaining a commitment, plus techniques for building, developing and compensating an effective sales organization.

**IDIS 3343. Logistics, Transportation, and Distribution. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).**

This course logistics network design, capacity planning and demand management, inventory and warehouse management, transportation systems. global logistics considerations, reverse logistics and sustainability. Upon completion of the course students will be prepared to pass the APICS CLTD exam.

**IDIS 3344. Supply Chain Management. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).**

Four credit course. A study of purchasing fundamentals performed by personnel who have the responsibility for procurement of materials, equipment, and/or services in a wholesale distribution environment. Upon completion of this course, students will be prepared to pass the APICS CPIM Part 1 and 2 exams.

**IDIS 4334. Quality for Industrial Distribution. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).**

Introduction to decision making for industrial distribution using quantitative methods. The emphasis will be on identifying opportunities for process/product improvement in manufacturing using statistical applications. Besides exploratory data analysis, basic probability, distribution theory and statistical inference will be covered. Special topics will include experimental design, regression, control charts and acceptance sampling. Prerequisite: MATH 1342 or BUSI 2311.

**IDIS 4350. Strategic Planning and Data Analysis. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).**

This course provides an overview of strategic planning and data analysis techniques and applies tools learned to industrial distribution scenarios. Prerequisites: BUSI 2311 or MATH 1342 and IDIS 4334.