Department of Engineering Technology

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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 mission of the Department of Engineering Technology is to provide students an academically challenging program of study in technical fields that prepares graduates to make immediate contributions, to establish successful careers, and to assume leadership roles in engineering, manufacturing, and construction. By leveraging the substantial experience of its faculty, the department offers programs focused on application and experiential learning that support the combination of conceptual and practical skills. This approach allows our students to see technology in terms of theory, implementation, and innovation.

The Department offers programs of study leading to a Bachelor of Science degree in Construction Science and Management, Industrial Technology, Manufacturing Engineering Technology, and Mechanical Engineering Technology. The department also offers several opportunities for the adult student seeking to advance career opportunities. The department offers three degrees online: a Bachelor of Applied Arts and Sciences degree in Manufacturing and Industrial Management, a Master of Science degree in Quality and Engineering Management, and a Master of Science degree in Construction Science and Management. These allow our students to maintain professional and personal commitments while furthering their education. Face-to-face options are the Bachelor of Applied Sciences in Construction Science and Management, Manufacturing Engineering Technology, and Mechanical Engineering Technology.

Bachelor of Science in Construction Science and Management

The mission of the Construction Science and Management (CSM) program is to provide graduates with knowledge and skills valued by commercial, residential, industrial and heavy civil sectors of the construction industry. The curriculum integrates the study of materials, methods, and quality with technologies and management systems required to successfully plan, execute, and closeout construction projects of varying sizes and complexities. The program is structured with an emphasis on hands on lab work and instruction along with development of supervision and communication skills necessary to manage and oversee construction projects. Courses include construction materials and methods, site safety, estimating, scheduling, plan and specification reading, utilization of computer technologies, fundamentals of project and site management, and contract administration. Graduates from the program enter the workplace as construction managers, project managers, superintendents, project coordinators, project engineers, estimators, and schedulers. The program is supported by the Construction Industry Advisory Council (CIAC) which provides students with access to internships, construction industry guest lecturers, and project site visits. These industry experts provide real-world opportunities to students, forming an invaluable part of their learning process.

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, otherwise the course must be repeated. If a student makes a D or an F in a CSM major course and the course is not a prerequisite or corequisite to a future course, then the course should be repeated in the next semester the course is offered.

If the student makes a D or an F in a course and that course is a prerequisite (prereq) and/or corequisite (coreq) to future courses, then the following shall apply:

- If a student earns an F in a prereq course or has not taken the necessary prereq(s), 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:
    1. The student has an overall GPA of 2.4 or higher, AND
    2. 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
    3. 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.

General Education Requirements (http://catalog.tarleton.edu/academicaffairs/)		42
Choose 2 of the following:		
GEOL 1403 [shared]	Physical Geology	
GEOL 1407 [shared]	Introduction to Environmental Science	
PHYS 1401 [shared]	College Physics I (Prerequisite: MATH 1316, MATH 2412, MATH 2413 or concurrent enrollment.)	
ENGT 2303 [shared]	Engineering Economy	
MATH 1342 [shared]	Elementary Statistical Methods	
MATH 1352	Math Applications for Construction Sci	3
CNST 1301	Introduction to Construction	3
CNST 1305	Construction Document Analysis	3
CNST 1306	Construction Materials and Methods I	3
CNST 1307	Construction Materials and Methods II	3
CNST 2301	Mechanical, Electrical & Plumbing Systems (MEP)	3
CNST 2311	Construction Quality Assurance & Quality Control (QA/QC)	3
ENGT 3318	Research and Reporting For Technologists	3
CNST 3320	Construction Safety Management	3
CNST 3321	Construction Management	3

CNST 3323	Construction Estimating I	3
CNST 3335	Construction Layout and Site Development	3
CNST 3350	Horizontal Construction	3
CNST 3360	Vertical Construction	3
ENGT 3395	Fundamentals of Industrial Project Management	3
CNST 4313	Construction Law and Ethics	3
CNST 4322	Building Information Modeling	3
CNST 4323	Construction Estimating II	3
CNST 4325	Contract Administration	3
CNST 4358	Construction Project Scheduling	3
Chose between 6 hrs of Internship(s) or Elective(s)		6
CNST 4387	Internship (must be taken in 2 different semesters for a total of 3 hrs each semester)	
or Elective(s)		
CNST 4395	Construction Capstone	3
BUSI 1301	Business Principles	3
MGMT 3300	Principles of Management	3
ACCT 4352	Construction Cost Control	3
Total Hours		**120**

The Bachelor of Science in Manufacturing Engineering Technology

The Bachelor of Science in Manufacturing Engineering Technology is designed to provide graduates with knowledge and skills in materials and manufacturing processes; product, tooling, and assembly engineering; manufacturing systems and operations; and manufacturing competitiveness. The mission of the Manufacturing Engineering Technology program is to prepare students for the challenges in manufacturing and manufacturing support and the back-office functions in an operation. 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 manufacturing and process engineering but includes the use of laboratories to reinforce student learning by designing, manufacturing, and/or troubleshooting physical systems.

General Education Requirements (http://catalog.tarleton.edu/academicaffairs/)		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 3303	Industrial Materials	3
ENGT 3318	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	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
Placement is required for MATH 1316 or MATH 2412.		
MATH 1316	Plane Trigonometry (or above)	3
or MATH 2412	Precalculus Math	
MATH 2413 [shared]	Calculus I	
MATH 2414	Calculus II	4
MATH 3311	Probability and Statistics I	3
COSC 1310	Procedural Programming	3
CHEM 1311 [shared]	College Chemistry I (Lecture)	
CHEM 1111 [shared]	College Chemistry I (Laboratory)	
PHYS 2425 [shared]	University Physics I	
Electives		11
Total Hours		**120**

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 system improvements and practices common in an industrial setting. Coursework focuses on mechanical components and design, automation, and system integration. Laboratories reinforce student learning through testing, designing, manufacturing, and/or troubleshooting physical systems. Graduates from this program will be uniquely qualified to address the support and process needs of manufacturing and related businesses. This program is offered in both Stephenville and RELLIS (https://www.tarleton.edu/rellis/).

General Education Requirements (http://catalog.tarleton.edu/academicaffairs/)		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	Industrial Materials	3
ENGT 3305	Machine Design	3
ENGT 3313	Mechanics of Materials	3
ENGT 3318	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		6
General Elective		11
Total Hours		**120**

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. The Industrial Technology program provides flexibility so students can focus on or pursue a minor in business, computer science, or other content areas. Industrial Technology graduates often work in manufacturing in areas such as technical sales and support, front-line supervision, or as machine operators. Industrial Technology students can also pursue a teaching certification to teach in a secondary school.

General Education Requirements (http://catalog.tarleton.edu/academicaffairs/) [1]		42
MATH 1314 [shared]	College Algebra	
CHEM 1311 [shared]	College Chemistry I (Lecture)	
CHEM 1111 [shared]	College Chemistry I (Laboratory)	
ENGT 1305	Principles of Drafting	3
ENGT 1317	Machining Technology	3
ENGT 2335	Solid Modeling	3
ENGT 3303	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	
ENGT 3316	Manufacturing Systems	3
ENGT 3318	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		12
Electives from any field (6 Hours Advanced)		21
Total Hours		**120**

The Bachelor of Applied Arts and Sciences in Manufacturing and Industrial Management

Designed with the worker in mind, the Bachelor of Applied Arts and Sciences (BAAS) degree in Manufacturing and Industrial Management is a 100% online degree-completion program. The BAAS is designed for students who have training in a technical area and some or all of their general education classes completed. Technology courses and/or workforce training from community colleges, technical schools, the military, or employer-sponsored training may count for up to 36 credit hours of the degree requirements. The major classes are offered online, giving working professionals the flexibility to upskill while continuing to work.

General Education Requirements (http://catalog.tarleton.edu/academicaffairs/)		42
MATH 1342 [shared]	Elementary Statistical Methods	
Select one of the following:		3
MATH 1314	College Algebra	

MATH 1316	Plane Trigonometry	
MATH 1324	Math for Business & Social Sciences I (Finite Mathematics)	
MATH 2412	Precalculus Math	
MATH 2413	Calculus I	
ENGT 3318	Research and Reporting For Technologists	3
ENGT 3375	Continuous Improvement	3
ENGT 3395	Fundamentals of Industrial Project Management	3
Electives and/or Prior Learning Credit [1]		
Prior Learning Credit		12-36
Electives		0-24
Three of ENGT or CNST 3000/4000 Elective		9
Two of 3000/4000 course elective any discipline		6
Elective		3
Total Hours		**108**

Construction

CNST 3320	Construction Safety Management	3
CNST 3321	Construction Management	3
CNST 4325	Contract Administration	3
ENGT 4360	Hazardous Waste Management	3
Total Hours		**12**

Industrial Management

ENGT 3386	Quality Management	3
ENGT 4336	Production Planning	3
ENGT 4346	Manufacturing Management	3
ENGT 4347	Metrics and Measurements	3
Total Hours		**12**

Industrial Safety

ENGT 3320	Industrial Safety	3
ENGT 3360	Safety Management	3
ENGT 4320	Occupational Safety and Health	3
ENGT 4360	Hazardous Waste Management	3
Total Hours		**12**

Quality Management

ENGT 3386	Quality Management	3
ENGT 4347	Metrics and Measurements	3
ENGT 4360	Hazardous Waste Management	3
ENGT 4375	Facility Planning	3
Total Hours		**12**

The Bachelor of Applied Science Degree in Construction Science and Management

The mission of the Bachelor of Applied Science (BAS) in Construction Science and Management program is to provide graduates with knowledge and skills that are valued by commercial, residential, industrial and heavy civil sectors of the construction industry. The program is structured with an emphasis on development of supervision and communication skills necessary to manage and oversee construction projects, including contract administration, codes, plans and specifications, planning, estimating, scheduling, and evaluating project performance. Students graduating with this degree possess the skills and knowledge to compete in regional, national, and international job markets. 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. This program is offered in both Stephenville and Fort Worth (https://www.tarleton.edu/fortworth/).

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, otherwise the course must be repeated. If a student makes a D or an F in a CSM major course and the course is not a prerequisite or corequisite to a future course, then the course should be repeated in the next semester the course is offered.

If the student makes a D or an F in a course and that course is a prerequisite (prereq) and/or corequisite (coreq) to future courses, then the following shall apply:

- If a student earns an F in a prereq course or has not taken the necessary prereq(s), 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.

General Education Requirements (http://catalog.tarleton.edu/academicaffairs/)		42
MATH 1342 [shared]	Elementary Statistical Methods	
ENGT 3318	Research and Reporting For Technologists	3
CNST 3320	Construction Safety Management	3
CNST 3321	Construction Management	3
CNST 3323	Construction Estimating I	3
CNST 3350	Horizontal Construction	3
CNST 3360	Vertical Construction	3
ENGT 3395	Fundamentals of Industrial Project Management	3
CNST 4313	Construction Law and Ethics	3
CNST 4322	Building Information Modeling	3
CNST 4323	Construction Estimating II	3
CNST 4325	Contract Administration	3
CNST 4358	Construction Project Scheduling	3
CNST 4395	Construction Capstone	3
General Elective		3
Credit for Prior Learning Component:		
Prior Learning Credit		12-36
Electives		0-24
Total Hours		**120**

The Bachelor of Applied Science in Manufacturing Engineering Technology

The Bachelor of Applied Science (BAS) degree in Manufacturing Engineering Technology educates students in a wide range of manufacturing related areas: quality, ergonomics, production planning, management, 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. 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.

General Education Requirements (http://catalog.tarleton.edu/academicaffairs/)		42
Placement is required for Trig or Precal (Math 1316 or 2412)		
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	Industrial Materials	3
ENGT 3318	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	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
General Electives		7-8
Credit for Prior Learning Component:		
Credit for Prior Learning		12-24
Electives		0-12
Total Hours		**120**

The Bachelor of Applied Science in Mechanical Engineering Technology

The mission of the Bachelor of Applied Science (BAS) in 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 system improvements and practices that are common in an industrial setting. Coursework focuses on mechanical components and design, automation, and system integration. Laboratories reinforce student learning through testing, 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. This program is offered in both Stephenville and RELLIS (https://www.tarleton.edu/rellis/).

General Education Requirements (http://catalog.tarleton.edu/academicaffairs/)		42
Placement is required for Trig or Precal (MATH 1316 or 2412)		
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 2335	Solid Modeling	3
ENGT 3301	Applied Dynamics	3
ENGT 3303	Industrial Materials	3
ENGT 3305	Machine Design	3
ENGT 3313	Mechanics of Materials	3
ENGT 3318	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	Fundamentals of Industrial Project Management	3
ENGT 4322	Applied Thermodynamics	3
ENGT 4395	Engineering Technology Projects	3
General Electives		7-8
Credit Prior Learning Component		
Credit for Prior Learning		12-24
Electives		0-12
Total Hours		**120**

Construction Courses

CNST 1301. Introduction to Construction. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
This course introduces the student to the characteristics of the construction industry; construction terminology; types of construction companies; parties involved in a project, their responsibilities, and relationships; evolution of a project; introduction to working drawings and construction documents; construction math; construction software.

CNST 1305. Construction Document Analysis. 3 Credit Hours (Lecture: 2 Hours, Lab: 2 Hours).
This course is an introductory college level class that will provide student with fundamental 2 & 3-dimensional drawings and contract specifications knowledge to technically interpret, extract, and communicate relevant information within the construction team. The course will utilize software tools appropriate for the course to guide and aid student understanding. Lab fee: $2.

CNST 1306. Construction Materials and Methods I. 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 envelops, 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 Materials and Methods II. 3 Credit Hours (Lecture: 2 Hours, Lab: 2 Hours).
This course is an investigation into concrete and masonry construction methods, testing, and design used an 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 2301. Mechanical, Electrical & Plumbing Systems (MEP). 3 Credit Hours (Lecture: 2 Hours, Lab: 2 Hours).
This course introduces students to the basic drawings, specifications, materials, installation procedures and commissioning methods common to mechanical, electrical and plumbing systems on residential and commercial construction projects.

CNST 2311. Construction Quality Assurance & Quality Control (QA/QC). 3 Credit Hours (Lecture: 2 Hours, Lab: 2 Hours).
This course introduces students to the principles of construction quality assurance and quality control. This includes understanding the submittal, substitution and request for information (RFI) process found in typical commercial construction specifications. It will also discuss project closeout requirements including punch list management and warranty work. Field based quality control and testing will comprise the lab-based portion of the course.

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, or CNST 3301 Lab fee: $2.

CNST 3308. Residential and Commercial Building Codes. 3 Credit Hours (Lecture: 2 Hours, Lab: 2 Hours).
Course introduces students to understand the basic principles of structural behavior emphasis on the the steel and wood members in residential and commercial building. This involves the application of the IRC (International Residential Code), IBC (International Building Code), AISC (American Institute of Steel Construction), and NDS (National Design Specification for Wood Construction). 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.

CNST 3321. Construction Management. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
This course provides an overview of construction operations and key management skills. This course is intended to emphasize field-based management while also providing an understanding of overall project management concepts including project delivery systems and project team organization. Field based construction practices include contractual documentation preparation, administration and record keeping, jobsite layout and control, facilitation of jobsite meetings, jobsite labor relations, personnel and site safety, subcontractor management, project quality control principles, sustainable practices at the jobsite, project changes and claims, schedule of values and progress payments and field-based project closeout.

CNST 3323. Construction Estimating I. 3 Credit Hours (Lecture: 2 Hours, Lab: 2 Hours).
This course introduces the student to the process of quantifying the materials, labor and equipment required to develop detailed cost estimates for construction projects of various size and scope. Course work is designed to develop the student's ability to break down a project into individual work tasks, from the plans and specifications, which can then be quantified and priced. Topics addressed in this course include CSI divisions, plan and specification analysis, material and work break down for quantification and pricing, bid submittals, RFI's, RFP's, and RFQ's. This course is CSI Master-Format driven and will be addressing the full scope of divisions throughout the semester. Lab fee: $2.

CNST 3325. Construction Specification Management. 3 Credit Hours (Lecture: 2 Hours, Lab: 2 Hours).
This course further expands on the students understanding of construction documents including specifications and drawings. The emphasis of the course is on the CSI (Construction Specification Institute) divisions . The course highlights technical aspects of these divisions of work including installation and commissioning. The course also describes the submittal and quality control processes associated with these specification sections. The lab component of this course will investigate the installation, quality and commissioning of these systems using models, videos or sample material. Lab fee: $2.

CNST 3335. Construction Layout and Site Development. 3 Credit Hours (Lecture: 2 Hours, Lab: 2 Hours).
Introduction to construction site surveying and layout including the ability to understand specifications and drawings typically found in civil drawing sets related to commercial construction or heavy/highway projects. Introduction to and utilization of surveying equipment and its application in construction layout and control including site layout, building layout and utility layout. Includes measurement and recording of distances, angles and elevations. Lab fee: $2.

CNST 3350. Horizontal Construction. 3 Credit Hours (Lecture: 2 Hours, Lab: 2 Hours).
Horizontal Construction will explore construction procedures and equipment options, capabilities, costs, and productivity involved with the construction of roads, bridges, infrastructure and utilities. General estimating and costing will be discussed, as well as characteristics, quality analysis, logistics and procedures required on horizontal construction sites. This course will be structured around CSI divisions as they relate to specific forms of horizontal construction processes.

CNST 3360. Vertical Construction. 3 Credit Hours (Lecture: 2 Hours, Lab: 2 Hours).
Vertical Construction will explore construction procedures and equipment options, capabilities, costs, and productivity involved with the construction of single-family homes, multifamily homes, commercial construction, industrial construction and hybrid construction. General estimating and costing will be discussed, as well as characteristics, quality analysis, logistics and procedures required on vertical construction sites. This course will be structured around CSI divisions as they relate to specific forms of vertical construction processes.

CNST 3385. Construction Project Scheduling. 3 Credit Hours (Lecture: 2 Hours, Lab: 2 Hours).
This course will provide student with an understanding of planning, scheduling, and monitoring construction projects, including development of schedules using critical path method, program evaluation and review techniques (PERT), Gantt charts, linear scheduling as well as resource allocation, cost control and software applications used to schedule construction projects. The student will learn these techniques using hard skills and software tools to accurately prepare, analyze, and communicate the schedule to all team members. 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: 2 Hours).
This course will provide student with skills and information needed to effectively utilize existing BIM technologies for planning and executing construction projects. This course will help students gain project-based knowledge on executing and managing concept using BIM and VDC (virtual design and construction) technologies for planning, monitoring, and controlling construction project from inception to operation and maintenance. Prerequisites: CNST 3321 Lab fee: $2.

CNST 4323. Construction Estimating II. 3 Credit Hours (Lecture: 2 Hours, Lab: 2 Hours).
This course applies and expands the student's ability to quantify materials, labor and equipment and develop pricing and estimates according to CSI division standards. Course work is structured to increase the level of complexity in detailed takeoffs, estimates, reporting and presentation. Topics addressed in this course include spreadsheet development, plan and specification analysis, material assembly development and detailed estimate (cost) reporting using computer software. This course is CSI Master-Format driven and will be addressing the full scope of divisions throughout the semester. Prerequisite: CNST 3323 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 the purpose of contract documents, legal hierarchy of the documents, the interrelationships among the documents, common construction risks and liabilities and means and methods to mitigate such risks, along with the typical challenges related to communications among the parties involved. The course will primarily use the suite of American Institute of Architect (AIA) contract documents as a model contract. Prerequisites: CNST 3321.

CNST 4358. Construction Project Scheduling. 3 Credit Hours (Lecture: 2 Hours, Lab: 2 Hours).
This course will provide student with an understanding of planning, scheduling, and monitoring construction projects, including development of schedules using critical path method, program evaluation and review techniques, Gantt charts, linear scheduling as well as resource allocation, cost control and software applications to scheduling. The student will learn these techniques using hard skills and software tools to accurately prepare, analyze, and communicate the schedule to all team members.

CNST 4387. Internship. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
An approved, supervised, comprehensive work experience consisting of a minimum of 320 hours (8 weeks) in a construction environment Prerequisite: at least 9 hours of CNST coursework.

CNST 4395. Construction Capstone. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
Capstone projects will be administered in one of two formats. Students will either intern with a construction company and conclude their capstone project with a final presentation describing the learning outcomes from their internship or students will perform a desktop project where students will execute a project on paper which shall include a project bid, project schedule and a project plan. Alternatively, the student may be asked to develop research reports on current topical trends facing the construction industry. Prerequisite: Minimum of 90 hours of coursework complete.

Engineering Technology Courses

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

ENGT 1317. Machining Technology. 3 Credit Hours (Lecture: 2 Hours, Lab: 2 Hours).
A study of metals and their machining characteristics and applications. Emphasis is placed on layout, precision measurement, and heat treatment. Laboratory experiences include working 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, MATH 2413, or MATH 1352.

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. Lab Fee: $50.

ENGT 3301. Applied Dynamics. 3 Credit Hours (Lecture: 2 Hours, Lab: 2 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: 2 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 1311,1111 or CHEM 1407 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. 1-3 Credit Hours (Lecture: 1-3 Hours, Lab: 0 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.

ENGT 3313. Mechanics of Materials. 3 Credit Hours (Lecture: 2 Hours, Lab: 2 Hours).
A study of the principles of analysis of materials and structures under loads: stresses and strains in elastic members under tensile, compressive, shear, torsion and bending loads; combined stresses; shear and moment diagrams; deflection of beams; thin-walled pressure vessels; column buckling. Prerequisites: 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: 2 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: 2 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 $2.

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.

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: 2 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: 2 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 $2.

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: 3 Hours).
Introduction to fluid mechanics, and topics include 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). Introductions to computational fluid dynamics (CFD), compressible flow, and fluid power systems such as turbomachinery (pumps and turbines) will also be provided. Prerequisites: ENGT 1306.

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 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: 2 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 3301, and ENGT 3385.

ENGT 4324. Statistics for Engineering Management. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
Introduction to decision making using quantitative methods. In addition to 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 3311.

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

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: 2 Hours).
A continuation of ENGT 3350 in which more advanced programming techniques are studied. Included is a study of the various N/C part programming languages, an evaluation of N/C equipment, and the further refinement of the NC language. Prerequisite: ENGT 3350. Lab fee $2.

ENGT 4356. Advanced Industrial Controls. 3 Credit Hours (Lecture: 2 Hours, Lab: 3 Hours).
The application of circuits, sensors, and programming to autonomous systems controlled via an on-board microprocessor. 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 4362. Supply Chain Management. 3 Credit Hours (Lecture: 3 Hours, Lab: 0 Hours).
Exploration of the key drivers associated with the design and management of industrial supply chains. The course will focus in covering high level supply chain strategy and concepts, and the use of analytical tools to solve supply chain problem. Specific content will include strategy, supply chain metrics and drivers, network design, forecasting, sales and operations planning, supply chain uncertainty, inventory, sourcing and sustainability and technology. Course helps prepare students for the APICS Certified Supply Chain Professional certification exam.

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: 3 Hours, Lab: 0 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.

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. Lab fee $2.

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 2305.

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 2305 or MATH 1342 and IDIS 4334.