TECHNOLOGY (TECH)

This course provides an introduction to the fundamentals of technical drawing and the related graphical tools used to communicate engineering design concepts. The topics include two dimensional graphics, orthographic projections, geometric dimensioning and tolerancing, computer-aided graphics, parametric solid modeling, and introduction to three dimensional graphics.
3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 1363. Manufacturing Processes I.
The course will provide an overview of the manufacturing processes. Major emphasis is placed on machining theory, setup and tooling. Metal forming and fabrication procedures are introduced. Joining and assembly includes welding, mechanical fastening, adhesive bonding and surface finishing concepts. Laboratory demonstrations and tutorials involve machining, joining and forming techniques.
3 Credit Hours. 2 Lecture Contact Hours. 3 Lab Contact Hours.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

TECH 1393. Manufacturing Processes II.
The course involves the fundamentals of casting and molding processes. Emphasis is placed on casting terminology, molding sand, molding processes, pattern making, coremaking and quality control. Ferrous and non-ferrous alloy composition and casting geometry are explored. Plastic and composite forming concepts are introduced. Microelectronic manufacturing principles and processes are introduced. Prerequisite: TECH 1363 with a grade of “D” or better.
3 Credit Hours. 2 Lecture Contact Hours. 3 Lab Contact Hours.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

TECH 2190. Industrial Internship.
This course is a supervised experiential learning course in various technical disciplines as appropriate to a student’s degree program. This work integrated learning course helps the student link theory with practice. Repeatable for credit. Prerequisites: 45 hours completed with at least 12 having been completed at Texas State and a minimum major GPA of 2.25.
1 Credit Hour. 0 Lecture Contact Hours. 4 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing
Grade Mode: Credit/No Credit

TECH 2310. Introduction to Computer-Aided Design (CAD).
Principles of 3D modeling are introduced in the preparation of drawings for manufacturing processes. Emphasis includes the parametric solid modeling of machine elements and geometric dimensioning and tolerancing. The laboratory component involves production of engineering drawings and simulations connecting this course to computer-aided engineering. Prerequisite: TECH 1311 or ENGR 1313, with a grade of "C" or better, or instructor's approval.
3 Credit Hours. 3 Lecture Contact Hours. 3 Lab Contact Hours.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

TECH 2340. Environmental Technology I.
This course emphasizes the fundamental chemical, biological, ecological and hydrological principles, and mass and energy balances involved in solving environmental problems. Specific environmental areas covered include water, water quality and wastewater treatment. Environmental regulations and testing as pertinent to water will be covered. Prerequisites: CHEM 1342 and PHYS 1430.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 2344. Power Technology.
This class deals with understanding the basic laws of thermo-dynamics. It probes efficiency and examines energy-converting devices from the inputs, processes, outputs model. Internal combustion engines, electric motors, hydraulic, pneumatic, and gearing systems, and fuel analysis are reviewed from a practical and theoretical perspective. Prerequisites: MATH 1315 and PHYS 1315 and 1115 or PHYS 1410 or PHYS 1430.
3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

Course covers principles of statics and strength of materials to include forces, equilibrium, friction, centroids, and stress/strain relationships, axial stress and deformation, thermal stress and deformation, stress concentrations, factor of safety, torsional stress, beam stresses and combined stress. Prerequisites: CSM 2342 or ENGR 2300 and PHYS 1315 and PHYS 1115 or PHYS 1410 or PHYS 1430, all with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 2370. Electricity/Electronics Fundamentals.
This course covers fundamentals of safety, Ohm’s Law, series, parallel, and series/parallel circuits, meters, relays, DC/AC circuit analysis and basic semiconductors.
3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.
Grade Mode: Standard Letter
TCCN: ENGR 2305

TECH 3322. Development of Technology.
The role of technology in the development of Western World culture is studied from a technical perspective. Social repercussions resulting from the introduction of foundational technical developments are reviewed. Examples of technical areas examined are agriculture, transportation, manufacturing, engineering, defense, and communications. Readings focus discussions and papers on specific topics and encourage synthesis level understanding. (WI).
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Writing Intensive
Grade Mode: Standard Letter

TECH 3340. Environmental Technology II.
This course covers air pollution, solid waste and hazardous waste management, sustainability and risk management. Environmental regulations and testing as pertinent to soils, sediments, residual and air will be covered. Prerequisite: TECH 2340.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter
TECH 3344. Applied Thermo Fluids.
Basic concepts, first and second laws of thermodynamics, thermodynamic properties, heat transfer by conduction, convection and radiation, fluid statics and fluid dynamics are studied. Prerequisites: TECH 2344 and PHYS 1430, all with a grade of "D" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

The course provides an in-depth understanding of the lean principles as they apply to manufacturing and service organizations with emphasis on lean tools and concepts such as Value Stream Mapping, 5S, kaizen, waste, takt/cycle time, visual control, six-sigma, mistake proofing, single piece flow, cell design and pull systems. Prerequisite: TECH 3364 with a grade of "D" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 3357. Facilities Planning and Design.
This project-based course provides students with a practical knowledge of designing efficient facility layout and material handling system. Systematic layout planning (SLP) based on a product and process information is studied in depth. Simulation tools are used for flow analysis. Prerequisites: TECH 2310 with a grade of "D" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 3364. Quality Assurance.
This course covers the principles of quality management to include basic probability and statistics concepts, control charts for attributes and variables, sampling plans, quality audits and costs. The laboratory component of this class includes exercises that provide exposure to basic metrology and data collection.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 3370. Electronics.
This course is a study of the characteristics of basic electronic circuits and their component parts. Course content includes the use of electronic test equipment, inductance, capacitance, reactance, impedance, rectification, switching, amplification, and electronic circuit fabrication. Prerequisite: TECH 2370 or EE 2400, with a grade of "C" or better.
3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

This course deals with basic principles of communication systems. Specific topics include analysis of signals and systems, modulation techniques (digital and analog), analysis of transmitters and receivers, networking, and wireless communication systems. Prerequisite: TECH 2370 or EE 2400.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 4330. Foundry & Heat Treatment.
The technical aspects of foundry and heat treatment of ferrous and non-ferrous metals are reviewed. Students gain proficiency with interpretation of binary phase diagrams, mathematical modeling of gate and runner systems, micro-structural analysis, process cost evaluation, sand casting, and investment casting. The course includes writing technical reports and conducting experiments. Prerequisites: TECH 1311 or ENGR 1313; TECH 1393 or MFGE 2332; and ENGR 2300.
3 Credit Hours. 3 Lecture Contact Hours. 3 Lab Contact Hours.
Course Attribute(s): Lab Required/ Writing Intensive
Grade Mode: Standard Letter

TECH 4340. Design for Environment.
This course covers the basic principles of design for environment. Topics covered include: industrial ecology, resource depletion, product design, process design, material selection, energy efficiency, product delivery, use, end of life and life cycle analysis. Prerequisite: TECH 3340.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

This course will provide students with fundamentals of manufacturing processes planning and engineering. Major emphasis will be placed on make-buy analysis, tolerance analysis and dimensional control, tool and fixture design, process and material selection, design for manufacturing, design for assembly, and process planning. Prerequisites: TECH 1393 and TECH 2310, all with a grade of "C" or better.
3 Credit Hours. 1 Lecture Contact Hour. 3 Lab Contact Hours.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

Principles of the design of mechanical components; theories of failure; material selection; design of shafts, gears, cams, fasteners, springs and brakes; dynamics; balancing of machinery and vibration control are studied. Prerequisites: TECH 2310 and TECH 2351, all with a grade of "D" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 4372. Electronic Devices and Circuits.
This course covers transistor configurations, field effect transistors and circuits, voltage regulation, amplifier feedback principles, operational amplifiers and circuitry, and unijunction transistors and applications. Prerequisites: TECH 2370 or EE 2400, with a grade of "C" or better.
3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

TECH 4373. Control Systems and Instrumentation.
This course is an introduction to modern control systems and instrumentation. Topics covered include transducers, sensors, actuators, instrumentation, open and closed loop control systems, PID controllers, programmable logic controllers and ladder logic, and computer interface software and hardware. Prerequisites: TECH 2370 or EE 2400, with a grade of "C" or better.
3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter
TECH 4374. Digital Systems.
Solid state digital electronics from basic concepts to current industrial needs in terms of logic gates (all types), number systems counters (all types), registers (all types), sequential control circuits, and shift register generator. Prerequisite: TECH 2370 or PHYS 2425, with a grade of "C" or better.
3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

TECH 4380. Industrial Safety.
Introduction to the field of industrial safety with emphasis on compliance with Federal and State regulations. Prerequisite: Junior standing. (WI).
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Topics
Grade Mode: Standard Letter

TECH 4389A. Advanced Residential Construction.
Advanced concepts in residential construction are covered including land acquisition, land development, infrastructure, deed restrictions, cash flow, financial forecasting, marketing, scheduling and sustainable building practices. Prerequisite: CSM 2360 with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Topics
Grade Mode: Standard Letter

TECH 4389B. Construction Industry Best Practices.
This course will cover current issues facing the construction industry today including the best practices used to resolve these issues. Several industry leaders will lecture on these contemporary problems facing the industry. Restricted to Junior level Construction Science and Management Majors.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Topics
Grade Mode: Standard Letter

TECH 4390. Internship.
Supervised on-the-job professional learning experience in construction, manufacturing, electronics, and other technical areas. This course provides practical work experience in their particular field of interest. Repeatable for credit. Prerequisites: Consult internship coordinator. (WI).
3 Credit Hours. 0 Lecture Contact Hours. 40 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Dual Enrollment Permitted|Time Conflicts Permitted|Writing Intensive
Grade Mode: Standard Letter

TECH 4392. Micro and Nano Manufacturing.
This course covers the basic principles of micro and nano manufacturing. Emphasis is placed on the process descriptions, terminology, equipment requirements, and processes for micro and nano systems. Basic physics and process chemistry is combined with control schemes to arrive at overall systems descriptions. Prerequisites: CHEM 1335 or CHEM 1341, and PHYS 1325 or PHYS 1420 or PHYS 2425, all with a grade of "D" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 4395. Automated Manufacturing Systems I.
This course primarily deals with automation in industrial systems. In particular, this course focuses on automation and control technologies in manufacturing systems at machine and device levels. Included in its structure are areas such as fundamentals of industrial automation, sensors and actuators, numerical control, robotics, and PLC. Prerequisites: TECH 2310 with a grade of "D" or better.
3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

TECH 4396. Automated Manufacturing Systems II.
This course primarily deals with automation, simulation, and digitization in industrial systems. Course topics include discrete-event simulation of manufacturing systems, automated quality control and inspection, automated identification, industrial Internet of Things, automated material handling, automated data acquisition systems, and applied finite element analysis. Prerequisites: TECH 4395 with a grade of "D" or better.
3 Credit Hours. 3 Lecture Contact Hours. 3 Lab Contact Hours.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

TECH 4397. Special Problems.
The investigation of a special topic by developing the problem, researching the topic, and presenting the findings as they apply to industry/technology. This course will be applicable to all areas of technology, and must be done only with the approval of the cooperating faculty member and Department Chair. Repeatable for credit with different emphasis.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing
Grade Mode: Standard Letter

TECH 4398. Senior Design.
This course deals with application of technical and non-technical skills and knowledge using a multidisciplinary team-based approach for solving real-world problems related to product and process development. The topics include systematic product design, requirements analysis, prototyping, fabrication and concurrent engineering. (WI) Prerequisites: TECH 4395, TECH 4372, TECH 3373, EE 3400, or TECH 3340.
3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.
Course Attribute(s): Lab Required|Writing Intensive
Grade Mode: Standard Letter

TECH 5100. Academic Instruction for Technology.
The course is seminar based and covers topics related to teaching and employment responsibilities. Completion of this course is required as a condition of employment for graduate assistants. This course does not earn graduate degree credit. Repeatable with different emphasis.
1 Credit Hour. 1 Lecture Contact Hour. 0 Lab Contact Hours.
Course Attribute(s): Graduate Assistantship|Exclude from Graduate GPA
Grade Mode: Leveling/Assistantships
TECH 5195. Industrial Internship.
This course is a supervised experiential learning course in Technology Management. This work integrated learning course helps the student link theory with practice. Repeatable for credit. Prerequisites: 9 hours completed toward the Master of Science in Technology Management degree and the approval of the graduate advisor.
1 Credit Hour. 0 Lecture Contact Hours. 4 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing
Grade Mode: Credit/No Credit

TECH 5199B. Thesis.
This course represents a student's continuing thesis enrollments. The student continues to enroll in this course until the thesis is submitted for binding.
1 Credit Hour. 1 Lecture Contact Hour. 0 Lab Contact Hours.
Grade Mode: Credit/No Credit

TECH 5307. Fundamentals of Manufacturing Processes.
Application of metal cutting principles. Includes steel rule dye layout, machine layout, tool life, tool wear, tool geometry and reconditioning, principles of feed rate and speed, material removal rates and power consumption. Machining of steel and castings using various cutting tools. This course does not count toward degree credit. Prerequisite TECH 2330 with a grade of "C" or better.
3 Credit Hours. 1 Lecture Contact Hour. 3 Lab Contact Hours.
Course Attribute(s): Exclude from Graduate GPA|Lab Required|Leveling
Grade Mode: Credit/No Credit

TECH 5310. Product Design and Development.
This course provides an overview of the new product realization process. The focus is on the steps of systematic product design including problem identification, product planning, conceptual design, and embodiment design. Standard CAD tools are employed for product modeling. Prerequisite: TECH 2310 with a grade of "C" or better, or instructor's approval.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

Application of computer hardware and software to the design of products and systems; geometric modeling; engineering computational methods; overview of engineering analysis software which may include finite element analysis, manufacturing simulation, solidification modeling, and rapid prototyping.
3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

TECH 5315. Engineering Economic Analysis.
This course deals with economic analytical techniques used in engineering decision making. Topics include time value of money, comparing alternatives, depreciation, replacement, and income tax considerations. Prerequisite: MATH 1315 or MATH 1319, with a grade of "C" or better, or consent of instructor.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 5344. Robust Product and Process Design.
Provides the student with in-depth knowledge of inferential statistics as applied to design of robust processes and products. Topics covered include probability distributions, ANOVA, fractional factorial design, response surface method, orthogonal arrays, and Taguchi method. Prior experience with introductory-level statistics is assumed. Prerequisite: TECH 5394 with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 5382. Industrial Ecology and Sustainability Engineering.
This course covers the basic principles of life cycle analysis (LCA) of engineered products and processes. Topics covered include: industrial ecology, resource depletion, product design, process design, material selection, energy efficiency, product delivery, use, and end of life considerations.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 5384. Problems in Technology.
Graduate students investigate a special topic by developing a technical problem, researching the topic, and presenting the findings. Plans will be developed on an individual basis with strict faculty supervision. May be repeated for additional credit with permission of the department chair.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 5385. Readings in Technology.
A study of the ethical and moral viewpoints typically associated with American society as related to the development and introduction of new technology and engineering. Past, present, and future issues will be studied with selected readings focusing on industrial related problems and issues.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 5387. Advanced Facilities Planning.
An in-depth study of technical problems encountered in designing, equipping, arranging, and specifying facility requirements for industrial and technical training facilities.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter
TECH 5390. Research in Technology.
Examination of scientific methods including theory formulation, deductive reasoning, hypothesis generation, observation, inductive reasoning, and theory revision. Categories of research are compared and contrasted as regards methodology. In-depth study of experimental research as it relates to significant industrial problems including considerations of design, internal and external validity, and appropriate analytical technique. Introduction to data analysis and its proper interpretation.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 5391. Advanced Manufacturing Systems.
This course introduces students to various advanced tools, technologies, and strategies in modern manufacturing. An emphasis is placed on the state-of-the-art in factory automation and global and smart manufacturing enterprises. Topics include process automation and control, advanced manufacturing processes, intelligent manufacturing control, and information and communication technology (ICT) in manufacturing. Prerequisites: TECH 5307 or instructor's approval.
3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.
Grade Mode: Standard Letter

An introduction to integrated circuit fabrication to include crystal growth, wafer preparation, epitaxial growth, oxidation, diffusion, ion implantation, thin film deposition, lithography, etching, device and circuit formation, packaging and testing. Significant project includes circuit design/simulation and/or process design. Laboratory component involves actual production/testing of a functional semiconductor device. I.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 5394. Design of Industrial Experiments.
This course deals with the study of the fundamentals and applications of industrial experiments. Prerequisite: TECH 5390 with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 5398. Directed Project.
This course is a formal investigation into a business or industry problem. The directed project is an applied research project that is more extensive than an independent study and less extensive than a thesis. The course culminates in a detailed project report and oral presentation. Prerequisites: TECH 5390 and TECH 5394, all with a grade of "C" or better, and the approval of the graduate advisor.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing
Grade Mode: Credit/No Credit

TECH 5399A. Thesis.
This course represents a student's initial thesis enrollment. No thesis credit is awarded until student has completed the thesis in Technology 5399B.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Credit/No Credit

TECH 5399B. Thesis.
This course represents a student's continuing thesis enrollments. The student continues to enroll in this course until the thesis is submitted for binding.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Credit/No Credit

TECH 5599B. Thesis.
This course represents a student's continuing thesis enrollments. The student continues to enroll in this course until the thesis is submitted for binding.
5 Credit Hours. 5 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Credit/No Credit

TECH 5999B. Thesis.
This course represents a student's continuing thesis enrollments. The student continues to enroll in this course until the thesis is submitted for binding.
9 Credit Hours. 9 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Credit/No Credit