

# DEPARTMENT OF ENGINEERING TECHNOLOGY

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## Degree Programs Available Through the Department of Engineering Technology:

Associate of Science program in: Engineering Technology, with concentrations in: advanced manufacturing, electronics, industrial

Bachelor of Science programs in: Electronics Engineering Technology, with concentrations in: biomedical and electronics; Industrial Engineering Technology

### Pre-professional Program:

Pre-engineering

### Post Baccalaureate Certificates Offered Through the Department of Engineering Technology:

Project Management Post Baccalaureate Certification

Quality Control Post Baccalaureate Certification

Northwestern State University has been authorized by the Louisiana Board of Regents to offer the above Post Baccalaureate Certificates (PBCs). Refer to the Engineering Technology web page at <https://engrtech.nsula.edu> for detailed information on the Project Management and Quality Control certification programs.

### Accreditation

The Bachelor of Science in Electronics Engineering Technology, and the Bachelor of Science in Industrial Engineering Technology are accredited by the Engineering Technology Accreditation Commission of ABET, <http://www.abet.org>.

## Electronics Engineering Technology

**Electronics Engineering Technology Major Requirements:** (63-66 semester hours) Students seeking a major in Electronics Engineering Technology must complete 63-66 semester hours, within the 120 semester hour Electronics Engineering Technology curriculum, which include the 43 semester hour Electronics Engineering Technology core and a 20-23 semester hour concentration.

**Core:** (43 semester hours) Electronics Engineering Technology 1300-1301, 1311, 1320-1321, 1330-1331, 2320-2321, 3310-3311, 3340-3341, 3360-3361, 4300-4301, 4390, 4940; Industrial Engineering Technology 1400, 1700.

### Available Concentrations:

**Electronics (141A):** (20 semester hours): Electronics Engineering Technology 4310-4311, 4350-4351, 4950; Industrial Engineering Technology 2790, 3740; and three additional hours of technical electives<sup>1</sup>.

**Biomedical (141B):** (23 semester hours): Biomedical Engineering Technology 3320-3321, 3370-3371, 4950 (4 hours); Industrial Engineering Technology 3740; Biology 2250-2251, 2260-2261.

**Electronics Engineering Technology Minor Requirements:** (22 semester hours) Electronics Engineering Technology 1300-1301, 1311, 1320-1321, 1330-1331, 2320-2321, 3310-3311 or 3340-3341 or 3360-3361, and Industrial Engineering Technology 1700.

### Curriculum for Electronics Engineering Technology (141)

FIRST YEAR	SEM. HRS.
Electronics Engineering Technology 1300-1301, 1311, 1320-1321, 1330-1331.....	13
English 1010, 1020.....	6
Industrial Engineering Technology 1700.....	1
Mathematics 1810, 2020.....	12
University Studies 1000.....	1
	<u>33</u>

SECOND YEAR	SEM. HRS.
Biological Science <sup>2</sup> .....	0-3
Electronics Engineering Technology 2320-2321, 3340-3341, 3360-3361.....	12
EET concentration area <sup>3</sup> .....	3-8
Industrial Engineering Technology 1400.....	3
Physics 2030-2031, 2040-2041.....	8
	<u>29-31</u>

THIRD YEAR	SEM. HRS.
Chemistry <sup>4</sup> .....	3
Computer Science 1060.....	3
Electronics Engineering Technology 3310-3311, 4300-4301, 4390.....	11
EET concentration area <sup>3</sup> .....	8
English 2110; 3230 or 3190.....	6
	<u>31</u>

FOURTH YEAR	SEM. HRS.
Communication 1010.....	3
Economics 2000.....	3
Electronics Engineering Technology 4940.....	3
EET concentration area <sup>3</sup> .....	7-9
Fine Arts 1040.....	3
History <sup>5</sup> .....	3
Behavioral Science <sup>1</sup> .....	3
	<u>25-27</u>

Total Semester Hours for Degree: ..... 120

#### Footnotes:

- Technical electives may be selected from any Biomedical Engineering Technology, Computer Science, Electronics Engineering Technology, or Industrial Engineering Technology courses, or Mathematics 2050. Electives may include a maximum of three hours of occupational field experience.
- Students in the Biomedical concentration must take the Biology courses specified within the concentration, students in the Electronics concentration area must meet the University core curriculum requirements for biological science.
- Chosen from concentration area.
- Students in the Electronics concentration take CHEM 1030, students in the Biomedical concentration take CHEM 1070.
- Must meet the University core curriculum requirements.

## Industrial Engineering Technology

**Industrial Engineering Technology Major Requirements:** (64 semester hours) Students seeking a major in Industrial Engineering Technology must complete 64 semester hours, within the 120 semester hour Industrial Engineering Technology curriculum, which include Electronics Engineering Technology 1300-1301, 1311, 1320-1321, 4940; Industrial Engineering Technology 1020, 1400, 1700, 1800, 2020, 2400, 2740, 2790, 3150, 3510, 3550, 3570, 3740, 4700, 4720, 4730, 4960 or Electronics Engineering Technology 4950; and three hours of electives from any Industrial Engineering Technology or Electronics Engineering Technology courses.

**Requirements for a Minor in Industrial Engineering Technology:** (23 semester hours) Industrial Engineering Technology 1020, 1311, 1400, 1700, 2020, 2400, 2740, 3740, and 4730.

### Curriculum for Industrial Engineering Technology (145)

FIRST YEAR	SEM. HRS.
Chemistry 1030 .....	3
Electronics Engineering Technology 1311 .....	1
Industrial Engineering Technology 1020, 1400, 1700, 1800, 2400.....	13
Mathematics 1810, 2020.....	12
University Studies 1000 .....	1
	30

SECOND YEAR	SEM. HRS.
Computer Science 1060.....	3
Economics 2000 .....	3
Electronics Engineering Technology 1300-1301, 1320-1321 .....	8
English 1010, 1020.....	6
Industrial Engineering Technology 2020, 2790.....	6
Mathematics 2050 .....	3
Physics 2030-2031 .....	4
	33

THIRD YEAR	SEM. HRS.
Communication 1010 .....	3
English 2110; 3230 or 3190.....	6
Industrial Engineering Technology 2740, 3150, 3510, 3550, 3570, 4720, 4730.....	21
	30

FOURTH YEAR	SEM. HRS.
Biological Science <sup>1</sup> .....	3
Electives <sup>2</sup> .....	3
Electronics Engineering Technology 4940 .....	2
Fine Arts 1040 .....	3
Humanities <sup>1</sup> .....	3
Industrial Engineering Technology 3740, 4700, 4960 or Electronics Engineering Technology 4950 .....	9
Behavioral Science <sup>1</sup> .....	3
	27

Total Semester Hours for Degree: ..... 120

Footnotes:

- <sup>1</sup> Must meet University core requirements.
- <sup>2</sup> Electives may be selected from any Industrial Engineering Technology, Biomedical Engineering Technology, or Electronics Engineering Technology courses. Electives may include a maximum of three hours of occupational field experience.

## Associate of Science Degree

### Engineering Technology

Students seeking an Associate of Science in Engineering Technology must complete 61-63 semester hours which include a 28-semester hour core and 33-35 semester hour

concentration.

#### Available Concentrations:

**Advanced Manufacturing (140C):** (33 semester hours): Electronics Engineering Technology 1300-1301, 1320-21, 1330-31, 2320-21, 3320; Industrial Engineering Technology 1020, 1400, 2020, 2400, 2920.

**Electronics (140A):** (35 semester hours): Electronics Engineering Technology 1300-1301, 1311, 1320-1321, 1330-1331, 2320-2321, 3340-3341, 3360-3361; Industrial Engineering Technology 1400, 1700; Mathematics 2020.

**Industrial (140B):** (34 semester hours): Electronics Engineering Technology 1300-1301, 1311, 1320-1321; Industrial Engineering Technology 1020, 1400, 1700, 1800, 2020, 2400, 2740; Mathematics 2020.

### Curriculum for Engineering Technology (140)

FIRST YEAR	SEM. HRS.
Engineering Technology concentration area.....	14-21
English 1010 .....	3
Fine Arts 1040 .....	3
Mathematics 1020, 1090 .....	6
Physical Science <sup>1</sup> .....	3
University Studies 1000 .....	1
	30-37

SECOND YEAR	SEM. HRS.
Communication 1010 .....	3
Engineering Technology concentration area .....	12-21
English 1020.....	3
Science 1020 .....	3
Social/behavioral science <sup>2</sup> .....	3
	24-33

Total Semester Hours for Degree: ..... 61-63

Footnotes:

- <sup>1</sup> Students can choose either CHEM 1030 or SCI 1010.
- <sup>2</sup> Students can choose either EPSY 2020 or PSYC 1010 or 2050 or SOC 1010.

## Pre-professional Program

### Pre-Engineering

### Curriculum for Pre-Engineering (141E)

FIRST YEAR	SEM. HRS.
Chemistry 1030, 1031, 1040, 1041.....	8
English 1010, 1020.....	6
Industrial Engineering Technology 1400, 1700.....	4
Mathematics 2100, 2110 <sup>1</sup> .....	10
University Studies 1000 .....	1
Social/behavioral science .....	3
	32

SECOND YEAR	SEM. HRS.
Computer Science 2010.....	3
Economics 2010 .....	3
English literature .....	3
Mathematics 3130, 3160.....	6
Physics 2510-2511, 2520-2521 .....	10
Social/behavioral science .....	3
Technical electives <sup>2</sup> .....	6
	34

Total Semester Hours: ..... 66

Footnotes:

- <sup>1</sup> Students who are deficient in algebra and trigonometry should take Mathematics 1100.
- <sup>2</sup> Electives determined by field of engineering to be pursued.

## **Articulation Agreement with Central Louisiana Technical Community College**

As part of NSU's commitment to the advancement of workforce initiatives, the University will award 7 (seven) hours credit toward the Bachelor of Science degrees in Industrial Engineering Technology and Electronics Engineering Technology to students who have successfully completed the C4M modules and been awarded the C4M certificate through CLTCC. Specifically, credit will be awarded for IET 1020, IET 1800, and EET 1311.

This agreement assumes that the student meets all other conditions required by NSU for granting transfer credit.

Note: C4M certifications will be honored as per the agreement for a period of two years from the completion date of the program.

## BIOMEDICAL ENGINEERING TECHNOLOGY (BMET)

For Undergraduates Only

- 3320. DIGITAL SIGNAL PROCESSING.** (3-3-0). Overview of medical equipment networking and telecommunications. Digital signal processing. Digital image processing systems. Prerequisites: Electronics Engineering Technology 3360-3361, credit for or registration in Electronics Engineering Technology 3310-3311.
- 3321. DIGITAL SIGNAL PROCESSING LABORATORY.** (1-0-2). Laboratory course to accompany BMET 3320. DSP software and programming, sinc function, digital filters and Z-transform, statistical analysis, convolution, image processing, Fourier and fast Fourier transforms, digital signal processors. Prerequisite: Credit for or registration in 3320.
- 3370. BIOMEDICAL INSTRUMENTATION.** (3-3-0). Introduction to electronic acquisition and analysis of biomedical signals and imaging; biomedical transducers and actuators; signal conditioning; instrumentation amplifiers; characteristics, practical design, testing, and applications of electronic biomedical measuring instruments. Prerequisites: 3320-3321, Electronics Engineering Technology 3310-3311 or consent of instructor.
- 3371. BIOMEDICAL INSTRUMENTATION LABORATORY.** (1-0-2). Laboratory course to accompany BMET 3370. Basic biomedical equipment, data acquisitions and analysis, practical aspects of measurement and instrumentation, biomedical transducers and actuators, amplifiers and instrumentation amplifiers, microcontrollers, computers and programming in medical instruments, patient monitoring systems, x-rays and radiations, temperature and pressure sensors, ECG/EKG testing, biomaterials properties and testing. Prerequisite: credit for or registration in 3370 or consent of instructor.
- 4950. BIOMEDICAL ENGINEERING TECHNOLOGY INTERNSHIP.** (3 to 6-0-0). This course, along with Electronics Engineering Technology 4940, is the capstone experience for students in the biomedical concentration within the Electronics Engineering Technology program. Students will complete no fewer than 180 hours of student internship. Students must complete periodic evaluations, special projects, and a final report. Prerequisites: 3370, 3371, Electronic Engineering Technology 4300, 4301, 4940, English 3230, and senior status.

## BUSINESS ADMINISTRATION (BUAD)

For Undergraduates Only

- 1010. BUSINESS DOCUMENT PREPARATION.** (3-3-0). Introduction to the use of productivity software in the creation of business related documents; the use of language arts skills in the production of business related documents and the development of appropriate keying skills. Students majoring in the four-year business degree (computer information systems, accounting or business administration) may not use this course as a business elective.
- 1020. ADVANCED BUSINESS DOCUMENT PREPARATION.** (3-3-0). Advanced use of productivity software in the preparation of more complex business documents, legal documents, medical documents, and foreign correspondence. This course is for undergraduates only. Students majoring in the four-year business degree (computer information systems, accounting or business administration) may not use this course as a business elective. Prerequisite: BUAD 1010.
- 1040. FUNDAMENTALS OF BUSINESS ENTERPRISE.**

(3-3-0). The American business system; business organization and management; finance; marketing; government regulation of business.

- 1800. INTRODUCTION TO INFORMATION TECHNOLOGY.** (3-3-0). An introductory course, focusing on the use of file management; word processing, presentation, and data base management; and social issues related to information technologies.
- 2120. BASIC BUSINESS STATISTICS.** (3-3-0). A basic statistical foundation is developed; emphasis is then placed upon practical business applications including hypothesis testing, ANOVA, contingency table analysis, and introductory regression analysis; material is related directly to business applications. Prerequisite: CIS 2000 and any of the following: Mathematics 1060, 1100, 1810 or SMAT 1820 and 1840, or 2810.
- 2140. APPLIED OFFICE PROCEDURES.** (3-3-0). An office practice course to integrate keyboarding, computer applications, office management and clerical skills through the use of actual business procedures; lecture and laboratory practice designed to develop good business judgment and initiative. Prerequisites: 1020, 2200, Business Administration 1800; or consent of instructor.
- 2180. OFFICE PRODUCTIVITY SOFTWARE I.** (3-3-0). Review of Windows Operating System file management tasks. Emphasizes applications of common office productivity software including Word, Excel, Access, PowerPoint, and Outlook. Course is designed to assist students in preparation for one or more of the MCAS (Microsoft Certified Application Specialist) tests for certification.
- 2190. OFFICE PRODUCTIVITY SOFTWARE II.** (3-3-0). Emphasizes advanced applications and data exchange between programs of office productivity software suites, including Word, Excel, Access, PowerPoint, and Outlook. Course is designed to assist students in preparation for one or more of the MCAS (Microsoft Certified Application Specialist) tests for certification. Prerequisite: BUAD 2180 or consent of instructor.
- 2200. BUSINESS REPORTS AND COMMUNICATION.** (3-3-0). Communication problems, business letters, employment application procedures. Problem areas investigated by research procedures; sources of data, compilation and arrangement of data, documentation, bibliography, and effective presentation. Prerequisite: Business Administration 1800 or equivalent, English 1010, 1020.
- 2250. LEGAL ESSENTIALS FOR SMALL BUSINESSES.** (3-3-0). Legal aspects of buying and owning a small business compensation, employer-employee relationships, bankruptcy, and property rights. Considers mainly Louisiana law.
- 3120. INTERMEDIATE BUSINESS STATISTICS.** (3-3-0). parametric tests applied to business and economic problems. Prerequisite: Successful completion of Business Administration 2120 or SSTA 2810 and junior standing.
- 3250. BUSINESS LAW I.** (3-3-0). The study of the legal development of law, an overview of the court system, legal concepts underlying business crimes and torts, contracts, employer-employee relationships, commercial paper, and property rights, ethics. Prerequisite: Junior standing.
- 3260. BUSINESS LAW II.** (3-3-0). Legal concepts underlying the areas of sales, creditors rights, secured transactions, bankruptcy, business organizations including sole proprietorships; review of the UCC, and ethics. Partnerships, and corporations, agencies, lenders and director's liability, and accountants' liability. Prerequisite: Junior standing.
- 3270. INTERNATIONAL BUSINESS.** (3-3-0). Pertinent dimensions of the global business environment. Focusing on the international aspects of management, marketing, finance, accounting and economics. Various theories related to global business will be presented and applied in the form of cases. Prerequisites: ECON 2000 and BUAD 2200.

- 6450. SEMINAR IN CURRENT RESEARCH IN TECHNOLOGY.** (3-3-0). Issues, research, and movements affecting contemporary practice in instructional technology.

## ELECTRONICS ENGINEERING TECHNOLOGY (EET)

For Undergraduates Only

- 1300. ELECTRICAL PRINCIPLES I.** (3-3-0). Principles governing current, voltage, resistance and power in DC circuits. Series parallel, and series-parallel circuits. Network theorems. Prerequisite: Credit for or registration in 1301 and Mathematics 1810 or Mathematics 1090 or equivalent.
- 1301. ELECTRICAL PRINCIPLES I LABORATORY.** (1-0-2). Prerequisites: Credit for or registration in 1300.
- 1311. ELECTRONIC FABRICATION LABORATORY.** (1-0-2). Fabrication techniques for analog and digital circuits. Device symbols and markings, soldering, antistatic techniques, measurement, testing and troubleshooting.
- 1320. ELECTRICAL PRINCIPLES II.** (3-3-0). Alternating current. Capacitors, inductors, and impedance. AC circuit analysis theorems and techniques. Prerequisite: 1300-1301, credit for or registration in 1321; Mathematics 1810 or Mathematics 1090.
- 1321. ELECTRICAL PRINCIPLES II LABORATORY.** (1-0-2). Electrical principles lab dealing primarily with AC circuits. Measurement of AC and DC voltages, pulse width and duty cycle using oscilloscope. Measurement and application of capacitors, inductors, and transformers. Series RC, RL and RLC circuits connection and characteristics. Parallel RC, RL and RLC circuits connection and characteristics. Series and parallel resonances. Prerequisite: Credit for or registration in 1320.
- 1330. DIGITAL ELECTRONICS I.** (3-3-0). Logic function, logic gates, number systems and conversions, Boolean algebra, logic simplification, combinational circuits, programmable logic devices, and flip-flops. Analysis and design of basic digital logic circuits. Prerequisites: 1300-1301, credit for or registration in 1331.
- 1331. DIGITAL ELECTRONICS I LABORATORY.** (1-0-2). Number systems, logical gates, Boolean algebra, implementation of Boolean function by logic gates, simplification of Boolean function, Karnaugh map, design and optimization of digital circuits. Prerequisite: Credit for or registration in 1330.
- 1380. ALTERNATIVE ENERGY SYSTEMS.** (3-3-0). A study of alternative energy ("green") sources and resources: the solar resource, solar photovoltaic technologies, solar thermal applications, wind energy systems, biomass energy systems, transportation energy technologies, and ocean wave energy. A comparative study of the United States and the developing world.
- 2200. POWER SYSTEMS AND PROTECTION.** (3-3-0). Single phase and three phase circuits, generation of three phase electric power, transmission and distribution of electric power, study of power system faults, and application of relays for power system protection.
- 2320. BASIC ELECTRONICS.** (3-3-0). Principles of semiconductor devices and circuits. Design and analysis of diode and bipolar junction transistor in switching and amplifier circuits. Prerequisite: 1320-1321, credit for or registration in 2321.
- 2321. BASIC ELECTRONICS LABORATORY.** (1-0-2). Characteristics of diodes and BJT transistors, rectification circuits, BJT bias circuits, BJT amplifiers and switching circuits, FET characteristics of FE, FET amplifiers, power amplifiers. Prerequisite: Credit for or registration in 2320.
- 2340. MICROCOMPUTERS.** (3-3-0). Computer overview with emphasis on hardware. The basic components of a microcomputer system, microprocessor basics, memory, secondary storage, input and output devices, operating systems, networks, and security. Prerequisite: Computer Information Systems 1020 or permission of the instructor.
- 2360. ELECTRIC GENERATORS, MOTORS, AND TRANSFORMERS.** (3-3-0). Principles of magnetism and electromagnetic circuits. Transformer principles. AC and DC generators and motors-single phase, three phase, and synchronous machines. Prerequisite: 1320-1321, credit for or registration in 2361.
- 2361. ELECTRIC GENERATORS, MOTORS, AND TRANSFORMERS LABORATORY.** (1-0-2). Safety issues of motors, generators and transformers. The characteristics of different types of DC motors. The characteristics of different types of single phase and three phase AC motors. Operation, synchronization, and phase sequence of three phase generators. Single and three phase transformers operations, connections, and applications. Prerequisite: Credit for or registration in 2360.
- 2920. SPECIAL PROBLEMS.** (1 to 3-0-0). Selection of special problems in engineering technology. Individual or small group work. Prerequisite: Credit for or registration in 2320-2321 and consent of instructor.
- 3310. DIGITAL ELECTRONICS II.** (3-3-0). Programming and applications of programmable logic devices, sequential networks, state machine analysis and design, memories, integrated circuit technologies. Introduction to microprocessors and interfacing. Prerequisite: 1330-1331, 2320-2321, credit for or registration in 3311.
- 3311. DIGITAL ELECTRONICS II LABORATORY.** (1-0-2). Characteristics, functions and operations of digital devices and logic circuits, such as flip-flops, counters, shift registers, memory, etc., and their applications in digital circuits and systems. Prerequisite: Credit for or registration in 3310.
- 3320. ELECTRIC MOTOR CONTROLS.** (3-3-0). Theory of operation of electric motors with emphasis placed on ac motors in terms of circuit diagrams and safety. Basics of industrial motor control, sensors and control devices, electronic control of direct-current (DC) motors, electronic control of alternating-current (AC) motors, manual contactors, magnetic motor starters, and installation of control devices and maintenance procedures. Prerequisite: EET 1320-1321.
- 3340. ADVANCED ELECTRONICS.** (3-3-0). Advanced semiconductor devices. Power amplifiers, Class A, B, and C amps, and the emitter follower. JFET and MOSFET devices and circuits, differential and operational amplifiers. Prerequisite: 2320-2321, credit for or registration in 3341.
- 3341. ADVANCED ELECTRONICS LABORATORY.** (1-0-2). Power amplifiers, FET characteristics, FET bias circuits, FET amplifiers, operational amplifiers characteristics and applications, integrator circuits, oscillator circuits. Prerequisite: Credit for or registration in 3340.
- 3360. INSTRUMENTATION AND CONTROL.** (3-3-0). Transducers, signal conditioning, open and closed loop control. Proportional, derivative, and integral control modes. Analog-to-digital and digital-to-analog conversion. Analysis and design of control systems. Prerequisite: 1320-1321, Math 2010 or credit for or registration in Math 2020, and credit for or registration in 3361.
- 3361. INSTRUMENTATION AND CONTROL LABORATORY.** (1-0-2). Laplace transform of signals, transfer functions, block diagrams, stability analysis, time specifications, and controller designs. Applications of MATLAB and Simulink. Prerequisite: Credit for or registration in 3360.
- 4300. MICROPROCESSOR FUNDAMENTALS.** (3-3-0).

Micro-processor architecture, programming, and interfacing. Topics include addressing modes, instruction set, I/O operations, interrupts, timing, memory, peripheral interface devices, microprocessor system design, and an overview of advanced microprocessors. Prerequisite: 3310-3311, credit for or registration in 4301.

- 4301. MICROPROCESSOR FUNDAMENTALS LABORATORY.** (1-0-2). Programming of microcontrollers in Assembly and C/C++ language. Program development tools and interfacing microcontrollers to PC and electronic circuits. Controlling electrical and mechanical systems with microcontrollers. Prerequisite: Credit for or registration in 4300.
- 4310. COMMUNICATION ELECTRONICS.** (3-3-0). Principles of filters and oscillation. Active and passive filters and oscillator circuits. Principles of AM, FM, and PM transmitters, and receivers. Phase Locked Loops. Prerequisite: 3340-3341, Physics 2040, credit for or registration in 4311.
- 4311. COMMUNICATION ELECTRONICS LABORATORY.** (1-0-2). Practical aspects of passive RC and LC filters, and active filters, oscillator circuits and their applications, operation and characteristics analysis of linear integrated circuit (LIC) function generator, voltage control oscillator, phase locked loop, and AM modulator, characteristics of class A and class C AM DSBFC transistor modulators and AM peak detector, FM modulator and demodulator. Prerequisite: Credit for or registration in 4310.
- 4350. AUTOMATION AND CONTROL.** (3-3-0). Programmable logic controllers, microcontrollers, and robots. Prerequisite: 3360-3361, credit for or registration in 4351.
- 4351. AUTOMATION AND CONTROL LABORATORY.** (1-0-2). Familiarization with industrial based Programmable Logic Controller (PLCs) systems trainer. Introduction to programmable controllers. PLC program operators and programming. Timer and counter instructions and program control instructions. Characteristics of industrial cell with PLCs and Robotics. Prerequisite: Credit for or registration in 4350.
- 4360. WIRELESS COMMUNICATIONS SYSTEMS.** (3-3-0). Overview of communications with emphasis on wireless communications. Cellular and PCS communication systems, microwave and satellite systems, LMDS, wireless LAN, antennas and advanced topics in fiber optic communication systems. Prerequisites: Credit for 4310-4311, 4390, credit for or registration in 4361.
- 4361. WIRELESS COMMUNICATIONS SYSTEMS LABORATORY.** (1-0-2). Characteristics of time domain reflectometry (TDR) and spectrum analyzer, fiber optic links, wireless LAN using ethernet modems, microwave and satellite communications, cellular communications with cell site, base station and frequency reuse plan. Prerequisite: Credit for or registration in 4360.
- 4390. DIGITAL COMMUNICATIONS.** (3-3-0). Digital and data communications and transmission, protocols and standards, local and wide-area networks, multiplexing, satellite and fiber optic communications, and digital signal processing. Prerequisites: 3310-3311, 4310-4311, or consent of instructor.
- 4920. ADVANCED SPECIAL PROBLEMS.** (1 to 3-0-0). Selection of advanced special problems in engineering technology. Individual or small group work. Prerequisite: Credit for or registration in 3340-3341 and consent of instructor.
- 4940. PROJECT DESIGN I.** (3-3-0). Principles of project management and engineering economics. Development of proposals for senior design project. Prerequisites: Credit for or registration in English 3230, 3190 or IET 3720 and senior status or consent of instructor.
- 4950. PROJECT DESIGN II.** (3-0-0). This is a capstone course.

Students will independently design (including specifications), construct, and test an approved electronics project within budget and on schedule. Students will prepare a written project report and give an oral presentation. Prerequisites: 4940.

## ENGINEERING TECHNOLOGY (ET)

For Graduates Only

- 5010. PROJECT ENGINEERING.** (3-3-0). Fundamental concepts of project engineering/management, project planning, resource management, tools and techniques in project management to assess budget, establish schedule and meet performance matrices.
- 5020. ENGINEERING STATISTICS.** (3-3-0). Basic probability, continuous and discrete probability distributions, hypothesis testing, regression analysis, Analysis of Variance, and non-parametric statistics.
- 5030. ENGINEERING ECONOMIC ANALYSIS.** (3-3-0). Economic worth of a business entity, constrained economic optimization, economic risk and uncertainty, foundations of utility functions. Time value of money, capital investment, risk analysis and investment decision.
- 5040. ENVIRONMENT OF MANUFACTURING ORGANIZATION.** (3-3-0). Provides necessary concepts and principles for technologist, engineers or other professionals to successfully transform into managers in technology driven industries or business environments.
- 5050. COST ENGINEERING.** (3-3-0). Principles of cost and budget estimation and techniques, identifying and measuring cost elements, managing cost over the life cycle of product and project.
- 5060. OPERATIONS MANAGEMENT.** (3-3-0). Operations strategy, process design and reengineering, forecasting, inventory management, scheduling and quality management.
- 5070. MANAGEMENT INFORMATION SYSTEMS.** (3-3-0). Design and implementation of Management Information Systems (MIS), organizational, managerial, and economic aspects of MIS. Use of information system in problem solving and decision making process.
- 5080. LAW AND SPECIFICATION FOR MANUFACTURING MANAGERS.** (3-3-0). Legal rules and ethical constraints in business decisions and commercial transactions, contract law, property and sales contracts, any commercial document, agency law, and ethics.
- 5090. LEADERSHIP AND TECHNICAL MANAGERS.** (3-3-0). Leadership theories and myths, qualities of an effective leader, developing leadership potential.
- 6000. PRODUCTION PLANNING AND SCHEDULING.** (3-3-0). Planning and control of production; operations analysis; routing, scheduling, dispatching; production charts; inventory control; accumulation of material requirements; use of critical path techniques.
- 6010. FINANCE AND ACCOUNTING FOR ENGINEERING MANAGERS.** (3-3-0). Development, analysis and use of accounting reports, financial report, knowledge of earning, assets, liability and equity, accounts receivables, inventory, etc.
- 6020. DECISION ANALYSIS.** (3-3-0). Decision models building, analysis, decision tree, decision under uncertainty, risk analysis, multi criteria decision making.
- 6030. SUPPLY CHAIN MANAGEMENT.** (3-3-0). Supply chain management principles, supply chain networks, relationship of supply chain in product life cycle, developing and implementing supply chains.
- 6040. ENGINEERING MANAGEMENT.** (3-3-0). Applying engineering processes to management and organizational issues. Provides knowledge, capabilities, and understanding

of engineering and technology management topics emphasizing language, principles, and environment of real business organization.

- 6050. ADVANCED CONCEPTS IN SAFETY, ERGONOMICS AND DESIGN.** (3-3-0). Principles and practices of accident prevention; safety and health program operations in industrial facilities; employee and management responsibilities; Occupational Safety and Health Act and Regulations. Overview of the human body, its systems and how it interacts with environmental stressors; designing to fit body movements; office (computer) workstation design considerations; designing for special populations; handling loads.
- 6060. INDUSTRIAL ROBOTICS.** (3-3-0). Concepts, principles, and relationships of automated assembly devices, computer-aided manufacturing, industrial robots and its working principles, programming of robots.
- 6070. ADVANCED QUALITY OPERATIONS.** (3-3-0). Methods and procedures employed in industrial quality management, theories of measurement, error, prediction, sampling, tests of significance and models. Prerequisite: ET 5020.

## ENGLISH (ENGL)

For Undergraduates Only

Placement in Freshman English is based on ACT scores.

The sophomore course(s) in English (ENGL 2110 or equivalent) required in any curriculum must be completed before entry into any advanced (3000- or 4000-level) English course.

Students must earn a C or better in ENGL 1010, 1020, and the sophomore literature course(s) in order to be eligible to enroll in advanced-level ENGL courses.

Students enrolled in ENGL 1011 must earn a C or better to complete the course.

- <sup>2</sup>1010. COMPOSITION AND RHETORIC I.** (3-3-0). The short paper; rhetoric, with emphasis on writing.
- <sup>3</sup>1011. COMPOSITION AND RHETORIC I ENRICHMENT.** (1-0-1). This course offers supplemental instruction in core writing concepts for students as appropriate per ACT, SAT, or placement test. It specifically addresses the following areas: standard language conventions, grammar and sentence structure, reading and writing basics, and it gives students additional practice in constructing essays using various strategies. This course may not be used to satisfy requirements for any degree. Prerequisite: Placement based on ACT, SAT, or results of English Placement Exam. Corequisite: 1010.
- <sup>2</sup>1020. COMPOSITION AND RHETORIC II.** (3-3-0). Writing the longer paper; diction, style, analysis and interpretation of collateral readings leading to the composition of the research paper. Prerequisite: ENGL 1010 with a grade of "C" or better or equivalent.
- <sup>2</sup>2070. MAJOR WRITERS IN WORLD LITERATURE.** (3-3-0). Including works by Homer, Cervantes, Moliere, Goethe, Flaubert, Dostoyevsky, Camus, and others, exclusive of English and American literature. Prerequisite: ENGL 1020 with a grade of "C" or better or equivalent.
- <sup>2</sup>2110. INTRODUCTION TO LITERATURE.** (3-3-0). This course introduces students to literature in its various forms and genres and has an extensive writing component. Prerequisite: C or better in both ENGL 1010 and 1020 or the equivalent.
- 2120. INTRODUCTION TO CREATIVE WRITING.** (3-3-0). A multi-genre introduction to the theory and practice of creative writing. Prerequisite: ENGL 1020.
- 2510. ARGUMENTATIVE WRITING.** (3-3-0). Study of classical and contemporary argumentative techniques and strategies. Practice in writing and researching different types of arguments. Prerequisite: 1020.
- 2610. ANALYTICAL WRITING.** (3-3-0). Study and practice in rhetorical analysis, causal analysis, and researched writing. Focused exercises in critical reading and writing. Prerequisite 1020.
- <sup>1</sup>3000. THE ORIGINS OF CHILDREN'S LITERATURE.** (3-3-0). Introductory literature course will present an overview of the history of children's literature and introduce students to children's literature as a field of critical literary study. Students will read a wide range of traditional children's literature and develop an understanding of the key developments in children's literature and the critical debates concerning the social roles and aesthetic forms of children's literature that will include historical, psychoanalytical, and folklore traditions.
- <sup>1</sup>3010. TEACHING YOUNG ADULT LITERATURE.** (3-3-0). This course introduces prospective teachers, librarians, and other educators to the use of contemporary adolescent literature across the curriculum. Multicultural and global selection, critical evaluation of the literature, issues of censorship, reader response theory, media connections, and reading/writing strategies for teaching young adult readers will receive major emphasis. Prerequisite: 2000 level literature.
- <sup>1</sup>3030. WORDS AND PICTURES: CREATING GRAPHIC LITERATURE.** (3-3-0). This course will create a cross-curriculum learning environment for students interested in both the visual and verbal elements of creating texts. Class discussions will introduce various traditions that combine writing and illustration, which will build toward the production of individual and collaborative creative work. Prerequisite: ENGL 2070 or 2110.
- <sup>1</sup>3050. INTERMEDIATE CREATIVE NONFICTION WRITING.** (3-3-0). Dedicated study of the forms and techniques of creative nonfiction writing with practice composing and revising work in multiple modes and forms. Prerequisite: ENGL 2120.
- <sup>1</sup>3060. THE POETRY COLLECTION: READING AND WRITING POEMS IN SEQUENCE.** (3-3-0). This is an elective course for students interested in exploring the formal, generic, and aesthetic considerations related to the writing and reading of poetry collections. The course combines literary study, creative writing, and discussions on publishing. Prerequisite: ENGL 3080.
- <sup>1</sup>3080. INTERMEDIATE POETRY WRITING.** (3-3-0). A dedicated study of the major forms and conventions of contemporary American poetry with practice in composing, revising, and workshopping original poems. (Cannot be substituted for core undergraduate English curriculum requirements.) Prerequisite: ENGL 2120.
- <sup>1</sup>3100. SURVEY OF AMERICAN LITERATURE I: BEGINNINGS TO 1865.** (3-3-0). A survey of American literature from its beginnings to 1865.
- <sup>1</sup>3150. SURVEY OF AMERICAN LITERATURE II: 1865 TO PRESENT.** (3-3-0). A survey of American literature from 1865 to present.
- <sup>1</sup>3160. SURVEY OF BRITISH LITERATURE I: BEGINNINGS TO 1800.** (3-3-0). Survey of British literature from its beginnings to the end of the 18th century.
- <sup>1</sup>3170. SURVEY OF BRITISH LITERATURE II: 1800 TO PRESENT.** (3-3-0). A survey of British literature from 1800 to the present.
- <sup>1</sup>3180. INTERMEDIATE FICTION WRITING.** (3-3-0). This course serves to acquaint students with a potential future in creative writing and to begin development of their talents as short story writers; to learn fundamentals of the theory and craft of fiction. Prerequisite: ENGL 2120.
- <sup>1</sup>3190. FOUNDATIONS OF ENGLISH GRAMMAR.** (3-3-0). The course covers the fundamental principles of the grammatical structure of formal written Standard American

Human Performance 5020.

**5980. THESIS.** (3 to 6-0-0).

**5990. INTERNSHIP IN SPORT ADMINISTRATION.** (3-0-40). Internship in a school or university, professional sports organization, sports marketing, sport medicine clinic or a similar setting approved by the department head and major professor. Prerequisite: 18 hours of graduate credit in Sport Administration including Human Performance 5020.

## HUMANITIES (HUM)

For Undergraduates Only

**4010. HEALTH AND HUMANITY.** (3-3-0). Interdisciplinary investigations of death and dying, the experience of illness, metaphors of health and disease, transcultural factors in health care, and stereotypes and health care. Prerequisite: Junior standing.

**4020. HUMAN VALUES AND HEALTH CARE.** (3-3-0). Interdisciplinary investigations of philosophical concepts of humanhood, bioethics, historical issues of health care in America, and the holistic health movement. Prerequisite: Junior standing.

For Graduates Only

**5010. GREAT IDEAS OF WESTERN CULTURE.** (3-3-0). Lectures and critical discussions of the foundational ideas of Western culture: God, nature, education, justice, freedom, science, democracy, truth; assignments from Plato, Machiavelli, James, Whitehead, and others. Prerequisite: 12 hours of social sciences.

**5020. CLASSICAL AGE OF GREECE.** (3-3-0). An interdisciplinary study of Athens in the Classical Age of Greece (5th-4th centuries BCE). Students will study the rise and fall of this great power by looking through the eyes of such citizens as Aeschylus, Sophocles, Aristophanes, Thucydides, Plato, and Aristotle along with examining significant monuments from the art and architectural tradition.

## INDUSTRIAL ENGINEERING TECHNOLOGY (IET)

For Undergraduates Only

**1020. ENGINEERING TOOLS AND DIMENSIONAL ANALYSIS.** (3-2-2). Principles and practices of measurement technology; use of tools; dimensional analysis; and the use of all the above in applications of technology.

**1400. TECHNICAL DRAFTING I.** (3-2-2). Introduction to drafting, with computer-aided drafting (CAD) applications. Orthographic projection, geometric construction, sectioning, dimensioning, auxiliary views, and text. Includes display and editing techniques as well as working with drawing files.

**1420. BLUEPRINT READING.** (3-2-2). Technical and symbolic communication used on blueprints and working drawings.

**1700. INTRODUCTION TO ENGINEERING TECHNOLOGY.** (1-1-0). Specific information for engineering technology students about degree requirements, scholastic resources, careers in engineering technology, job opportunities, academic skills for success in engineering technology, scholarship, and preparing for the future.

**1800. OCCUPATIONAL SAFETY AND HEALTH.** (3-3-0). Principles and practices of accident prevention and safety program operation in industrial facilities and school laboratories; effective safety organization, management and supervision; teacher, administrator and management liabilities; Occupational Safety and Health Act (OSHA).

**2020. METALS MACHINING I.** (3-2-2). Machine tool technology; operator control and computer numerical control (CNC) machining, computer-aided manufacturing (CAM), and production centers. Precision measurement and layout. Survey of nontraditional machining processes. Prerequisites: 1020, 2400.

**2400. TECHNICAL DRAFTING II.** (3-2-2). Continuation of 1400, with intermediate CAD applications. Working drawings, limit dimensioning, threads and fasteners, secondary auxiliary views, descriptive geometry, assembly drawings, and production illustrations. Prerequisite: 1400.

**2700. OCCUPATIONAL FIELD EXPERIENCE I.** (3-0-0). Work experience supervised by the student's departmental coordinator in related occupational areas. May be repeated. Prerequisite: Consent of instructor and placement in related job.

**2740. ENGINEERING MATERIALS.** (3-2-2). Methods of making basic engineering materials; phase diagrams; crystalline lattice structures; material properties; methods for changing material properties. Prerequisites: 1020, Chemistry 1030, Mathematics 1810 or Mathematics 1090.

**2790. STATICS.** (3-3-0). Principles of statics, vector algebra and vector quantities. Resultants in coplanar force systems, equilibrium in coplanar force systems, analysis of structures, trusses, beams, chains and cables, friction, centroids and centers of gravity, moments of inertia. Prerequisite: Mathematics 1810 or Mathematics 1090, Physics 2030 or consent of instructor.

**2830. ADVANCED INDUSTRIAL SAFETY ENGINEERING AND MANAGEMENT.** (3-3-0). Recognition and control of occupational safety and health hazards; human relations for safety; psychological considerations; human engineering; management and supervisory leadership. Prerequisite: 1800 or consent of instructor.

**2840. DEVELOPMENT OF OCCUPATIONAL SAFETY AND HEALTH PROGRAMS.** (3-3-0). Programs for plants and systems operations; systems analysis. Comprehensive occupational safety and health programs developed by students. Prerequisite: 1800.

**2920. SPECIAL PROBLEMS.** (1 to 3-0-0). Selection of special problems. Individual or group independent work. Prerequisite: Consent of instructor.

**3100. TECHNICAL PROJECT MANAGEMENT.** (3-3-0). Project evaluation and selection; project planning, organizing, managing and controlling. Software tools and techniques for work breakdown structure; project networks; scheduling; critical path method; program evaluation and review technique; project crashing for small/large project of commercial/academic or nonprofit organizations. Prerequisite: Junior or senior standing or consent from instructor.

**3150. FLUID POWER.** (3-2-2). Compressible and incompressible fluid statics and dynamics of industrial hydraulic and pneumatic circuits and controls. Software and functional components used to design, construct, and analyze piping circuits. Prerequisites: Physics 2030-2031 and Computer Science 1030 or 1060.

**3410. ADVANCED CAD APPLICATIONS.** (3-2-2). Detail and assembly drawing; cams, gears, graphs; pipe, welding, and structural drafting; 3D and surface modeling. Prerequisite: 2400.

**3460. ARCHITECTURAL DRAFTING AND CAD.** (3-2-2). Principles and practices of home planning; procedures in residential construction; preparation of plans and specifications for a modern home using CAD software. Prerequisite: 1400.

**3510. MOTION AND TIME STUDY.** (3-3-0). Analysis of motions necessary to perform industrial operations; motion economy; development of ratings, allowances, standard data,



formula construction, work sampling, wage payment and performance training. Prerequisite: Mathematics 1810 or Mathematics 1090.

- 3550. MATERIAL HANDLING.** (3-3-0). Material handling as related to manufacturing, warehousing and distribution centers. Topics include methods of movement, storage, inventory control, and retrieval. Prerequisites: 3510 and Mathematics 1810 or Mathematics 1090.
- 3570. ENGINEERING ECONOMICS.** (3-3-0). Principles and applications of economic analysis presented through engineering-oriented examples. Introduction and definitions of economic factors, analysis methods for evaluating alternative choices, and decision making tools for real-world situations. Prerequisites; Mathematics 1810 or Mathematics 1090.
- 3720. TECHNICAL WRITING.** (3-3-0). Fundamentals of technical report writing, industrial communications, preparation of materials for publication. Prerequisite: English 1020.
- 3730. INDUSTRIAL TRAINING PRACTICES.** (3-3-0). Employee educational and training methods, management, and evaluation. Task analysis, job safety analysis; development of training materials; delivery methods and media. Prerequisite: Junior standing or consent of instructor.
- 3740. ELEMENTS OF OCCUPATIONAL SUPERVISION.** (3-3-0). Preparation, training, and problems of the supervisor.
- 3820. ERGONOMIC DESIGN.** (3-3-0). Overview of the human body, its systems and how it interacts with environmental stressors; designing to fit body movements; office (computer) workstation design considerations; designing for special populations; handling loads. Prerequisite: 1800.
- 4020. ADVANCED METALS MACHINING.** (3-1-4). Special practices of metals processing; CNC machining and CAD-CAM interfacing; machining systems. Prerequisite: 2020, Math 1810 or Math 1090.
- 4420. TOOL DESIGN.** (3-1-4). Design and construction of jigs and fixtures applicable to industrial production. Prerequisite: 2020, 3410, Math 1810 or Math 1090.
- 4700. MANUFACTURING FACILITIES.** (3-3-0). Study of the planning processes for facilities location and design, material handling equipment, and manpower requirements. Analysis of production line requirements, assembly line balancing, and automation. Prerequisite: Math 2050, credit for or registration in Math 2020.
- 4720. QUALITY CONTROL.** (3-3-0). Methods and procedures employed in industrial quality control, theories of measurement, error, prediction, sampling, tests of significance and models. Prerequisite: Mathematics 1810 or Mathematics 1090; Math 2050 or consent of instructor.
- 4730. MANUFACTURING PROCESSES.** (3-2-2). Design, economics, and control of manufacturing processes. Methods engineering, job shop and automation practices; machining and fabrication processes. Prerequisite: 2740, Math 1810 or Math 1090.
- 4790. STRENGTH OF INDUSTRIAL MATERIALS.** (3-2-2). Internal stresses and deformation of bodies resulting from action of external forces; concepts and techniques of testing tensile, compression, shear, transverse, elasticity on various materials and fasteners. Prerequisite: IET 2790, credit for or registration in Math 2020.
- 4820. PRODUCTION AND INVENTORY CONTROL.** (3-3-0). Planning and control of production; operation analysis; routing, scheduling, dispatching; production charts and boards; inventory control; accumulation of material requirements; use of critical path techniques. Prerequisite: Junior standing or consent of instructor.
- 4900. RESEARCH METHODS.** (3-3-0). This course provides foundational preparation and understanding of scientific research methods, types of research, tools for research tools,

research ethics, acquisition of prior research knowledge and presentation of findings. Prerequisite: Credit for or registration in EET 4940.

- 4920. SPECIAL PROBLEMS.** (1 to 3-0-0). Selection of advanced special problems. Individual or group independent work. Prerequisite: At least twelve (12) semester hours credit in IET and/or EET courses and consent of instructor.
- 4950. RESEARCH PROBLEMS.** (1 to 3-0-0). The student selects a problem in his major field and through investigation formulates an acceptable solution. Prerequisite: Upper level status and consent of instructor.
- 4960. PROJECT DESIGN II.** (3-0-0). This is a capstone course for ET majors. Students will work with a professor to design a project that reflects several aspects of the student's curriculum. Independent or group work. Students will prepare a written project report and give an oral presentation. Prerequisite: EET 4940.

## INTERDISCIPLINARY STUDIES (IDS)

For Undergraduates Only

- 2000. SERVICE LEARNING.** (2-2-0). Service Learning experiences within and outside the University setting. Current issues, values, and opportunities essential for relating service, volunteerism and leadership to academic study.
- 3000. FOUNDATIONS IN PROFESSIONAL STUDIES.** (3-3-0). Exploration and development of a knowledge base in the philosophy, leadership, and trends of professional studies. Forum in which students explore a relationship between prior learning gained from collegiate and non-collegiate instruction and philosophy and theories in education. Career assessment, planning and evaluation. This course lays the foundation for development of an academic portfolio that will serve as an opportunity for the student to translate knowledge and skills obtained from prior instruction into academic credit.
- 4010. INTERNSHIP.** (3 to 6-0-6 to 12). Supervised work experience in the student's area of professional interest and/or background. Focus on professional development, application of skills, development of work habits, and transition from college to career. Prerequisite: Senior standing and consent of instructor.
- 4020. PERSPECTIVES/SENIOR SEMINAR.** (1-1-0). This course prepares seniors in the Bachelor of General Studies (BGS) program for making the transition from student to professional. The course will include sections on resume development, networking, interviewing and self-reflection. Prerequisite: BGS students only, with senior classification.

## LATIN (LATN)

For Undergraduates Only

- 1010. INTRODUCTION TO LATIN.** (3-3-0). The fundamentals of Latin grammar and basic reading skills, including basic vocabulary, pronunciation, and syntax. Aspects of Roman culture and its tradition in the Western world will also be discussed.
- 1020. ELEMENTARY LATIN.** (3-3-0). A continuation of LATN 1010. Latin grammar and basic reading skills, including basic vocabulary, pronunciation, and syntax and additional study of the Latin tradition. Prerequisite: C or better in LATN 1010 or the equivalent.

## LIBRARY (LIB)

For Undergraduates Only

- 1030. INFORMATION SOURCES AND SERVICES.** (3-3-0). The student will learn how to identify and evaluate