Northeast Texas Community College &
Texas A&M University – Texarkana
2019-2020 Guided Pathways

Associate of Science in Engineering to
Bachelor of Science in Electrical Engineering

NTCC		A&M-TEXARKANA	
COURSES	HOURS	COURSES	HOURS
ENGL 1301	3	EE 319	3
SPCH 1315*	3	EE 320	1
MATH 2413	4	EE 321	3
PHYS 2425	4	EE 322	1
PHYS 2426	4	EE 325	3
PHIL 2306	3	EE 326	1
ARTS 1301*	3	EE 335	3
HIST 1301	3	EE 336	1
HIST 1302	3	EE 429	3
GOVT 2305	3	EE 345	3
GOVT 2306	3	EE 307	3
ECON 2301	3	EE 490	3
ENGL 2311	3	EE 491	3
CHEM 1411	4	CS 332	3
MATH 2414	4	EE 305	3
MATH 2415	4	EE 306	1
MATH 2320	3	EE 432	3
MATH 2318	3	EE 445	3
ENGR 2305	3	EE 446	1
ENGR 2105	1	EE 474	3
ENGR 1201	2	ENGR 312	3
ENGR 1304	3	Electives ** (see below)	9
TOTAL	69	TOTAL	129

*Other Courses may Apply. See NTCC Degree Plan for Options
LD= Lower Division
UD= Upper Division

** Select electives from: CS 360 or any upper division (300 or 400) level EE or ENGR courses

54 Upper Division (UD) Hours Required for the BS Degree
30 Hours of Residency Required

Effective September 1, 2019 – August 31, 2024.
This unofficial degree plan is for informational purposes only.
Please contact Jennifer.perez@tamut.edu for questions.

Texas A&M University – Texarkana
Course Descriptions

EE 2305. Electric Circuits I. 3 Hours. This course focuses on the fundamental concepts of engineering with special emphasis on electrical engineering. It includes the concepts of current, voltage, power and energy, Kirchhoff's current and voltage laws, resistance, capacitance, inductance, and series and parallel combinations of circuit elements. Basic techniques such as superposition, mesh current, and node voltage analysis are introduced. Time-domain analysis of first-order circuits RL, RC, and second-order RLC circuits are developed. Prerequisite: MATH 2413.

EE 289. Independent Study. 3 Hours. This course provides individual instruction. Students may repeat the course when topics vary.

EE 307. Probability and Random Processes. 3 Hours. This course introduces students to the fundamental principles of probability and random processes. While helping students to develop their problem-solving skills, the course strives to motivate students with practical applications from various engineering areas that demonstrate the relevance of probability theory to engineering practice. Topics covered in this course include probability theory, discrete and continuous random variables and statistical description, statistical characterization of sequence of random variables, and stationary random processes. Course is cross-listed with MATH 357. Prerequisite: MATH 2414. (It cannot be taken concurrently.).

EE 317. Information Theory. 3 Hours. This course focuses on the quantitative theory of information and its applications to compression as well as reliable communication systems. Topics include mathematical definition and properties of information, source coding theorem, lossless compression of data, optimal lossless coding, noisy communication channels, channel coding theorem, and Gaussian channel. Prerequisite: MATH 357 or EE 307, and MATH 2414.

EE 319. Electric Circuits II (EL). 3 Hours. This course covers the basics of circuit analysis using the Laplace transform, capacitors and inductors, transient response, RC, RL, and RCL circuits. AC steady-state analysis, sinusoids and phasors will be emphasized. This course integrates the principles of Experiential Learning through a semester-long project of practical electrical designs. Prerequisite: MATH 2414 and EE 2305, or instructor permission.

EE 320. Circuit Laboratory. 1 Hour. This course provides hands on experience with mainstream circuit technology. This shall be accomplished with a set of laboratory experiments that introduce increasingly more complex circuits and techniques. Successful completion of each lab assignment shall 1) require a written report detailing the design solution(s), 2) require the construction of one or more circuits, and 3) require a demonstration that the constructed circuits work properly. Prerequisite: must be concurrently enrolled in EE 319.

EE 321. Digital Logic. 3 Hours. This course provides a detailed knowledge of Boolean algebra and its application in digital design. It provides an in-depth coverage of combinational logic circuit analysis and minimalization and design techniques. It also covers the basic concepts of sequential circuits including the use of state diagrams and state tables to represent the behavior of sequential circuits. Prerequisite: MATH 2413.

EE 322. Digital Logic Laboratory. 1 Hour. This laboratory course consists of multiple projects that the students will complete based upon the concepts learned in EE 321. The overall aim of the course is to increase the students' depth of understanding of digital logic design and implementation. Prerequisite: EE 321.

EE 325. Signals and Systems. 3 Hours. This course is one of the fundamental courses of Electrical Engineering, providing theoretical concepts and mathematical tools used for the design and analysis of continuous-time linear systems, as well as analog signals. Topics covered in this course include linear convolution, impulse response, Fourier series, Fourier transforms, and Laplace transform. Prerequisite: MATH 2414.

EE 326. Signals and Systems I Lab. 1 Hour. This course provides practical concepts and software tools for the design and the analysis of both analog signals and continuous-time linear systems. It is based on exercises via computer simulation using MATLAB. The main aim is to get understanding of frequency and time domain analysis of basic signals and linear time-invariant systems employing linear convolution, impulse response, Fourier transforms, and Laplace transform. Prerequisite: MATH 2413 and EE 2305.

EE 335. Electronics I. 3 Hours. This course covers the basics of electronic circuit design techniques as well as the operation of bipolar junction and field-effect transistors. The knowledge acquired in this course will provide students with a sufficient depth of understanding to deal with circuit design problems and to be able to understand the operation of new devices as they become available. Prerequisite: EE 2305.

EE 336. Electronics Laboratory. 1 Hour. This laboratory course consists of multiple projects that the students will complete based upon the concepts learned in EE 335 (Electronics) class.

EE 340. Computer Architecture. 3 Hours. This course will focus on the interaction of hardware and software in digital computers. It will discuss basic computer structure, machine instructions, assembly language, CPU organization and design, memory addressing, pipelining, input/output organization and computer arithmetic. Prerequisite: COSC 1315 or ENGR 1201.

EE 345. Introduction to Electromagnetic Theory. 3 Hours. This is an introductory course in engineering electromagnetics. Emphasis is placed on time-varying topics, such as transmission lines, Maxwell's equations, and plane and guided waves. The basic concepts of electromagnetic fields, including field vectors, and potentials will be covered. Prerequisite: MATH 2320 and PHYS 2326/PHYS 2126.

EE 390. Ethics in Technology. 3 Hours. This course examines ethical issues and moral problems that engineers, computer scientists, and information technology professionals face. This course covers issues such as moral and ethical relevance, professional responsibilities, privacy, intellectual property, risks, and liabilities. Students review case studies of ethical conflicts in the work environment and resolve theoretical situations through application of ethical codes.

EE 425. Systems and Signals II. 3 Hours. This course lays the foundation of the knowledge needed to process information digitally using a variety of hardware platforms, and provides theoretical concepts and mathematical tools used for the design and analysis of discrete time linear systems as well as discrete time signals. Topics covered in this course include discrete convolution, discrete time impulse response, Discrete Fourier Transform (DFT), Discrete Time Fouriere Transform (DFTF), and Z-Transform. Prerequisite: EE 325.

EE 429. Basic Communication Theory. 3 Hours. This course introduces students to the fundamental principles of communication system analysis and design, providing theoretical concepts and mathematical tools used for special analysis, filtering, and transmission of analog signals. Topics covered in this course include modulation theory, effect of noise on analog communications, analog to digital conversion, and digital modulation in Additive White Gaussian Noise (AWGN) baseband channels. Prerequisite: EE 325. Prerequisite or Corequisite: ENGR 307.

EE 432. Control Systems. 3 Hours. This course is a review of the relations among transient responses, systems transfer functions, and methods of specifying system performance. It will include classical and modern feedback control system analysis and design methods, such as transfer functions, state variables, stability, root locus, Bode plot, and computer analysis. Prerequisite: EE 325.

EE 447. Electronics II. 3 Hours. This course covers the basic design and analysis of Electronic circuits for analog and digital applications, including oscillators, analog filters, power amplifiers, and CMOS design. Frequency response and Bode's rules are emphasized. Prerequisite: EE 335.

EE 455. Digital Circuit Testing and Testability. 3 Hours. The complexity of digital circuits placed on IC (Integrated Circuit) chips has significant impact on the cost of testing such chips. Testing is performed to ensure that function/performance have not been altered during fabrication. This course introduces current testing techniques for digital circuits and design strategies used to enhance their testability. Prerequisite: EE 321.

EE 465. Very-Large-Scale Integrated (VLSI) Design. 3 Hours. This course will cover basic theory and techniques of digital FLSA (Very-Large-Scale Integrated) circuit and system design in CMOS technology. It will discuss the bottom-up as well as the top-down design approach. It will prepare students to design and analyze digital circuits and show them how these circuits are implemented on a VLSI chip. Prerequisite: EE 321.

EE 469. Wireless Communications. 3 Hours. This course introduces students to the fundamental principles of wireless communication system analysis and design, providing theoretical concepts and mathematical tools used for transmission of analog signals. Prerequisite: EE 325.

EE 470. Digital Design Using Very High Speed Integrated Circuit Hardware Description Language (VHDL). 3 Hours. This course instructs the students in the use of VHDL (Very High Speed Integrated Circuit Hardware Description Language) for describing the behavior of digital systems. It will also teach students the use of the VHDL language for representation of digital signals, use of IEEE standard logic package/library, design of arithmetic, combinational, and synchronous sequential circuits. Prerequisite: EE 321.

EE 473. Power Systems. 3 Hours. This course introduces students to the fundamental principles of long-distance transmission of electric power with emphasis on admittance and impedance modeling of components and systems, and power flow studies and calculations. Prerequisite: EE 319 or concurrent enrollment.

EE 475. Capstone Design Project in Electrical Engineering. 4 Hours. The aim of the capstone project for seniors in Electrical Engineering is to familiarize them with the process of designing electronic circuits and systems as practiced in industry. This course requires students to develop a project based on the knowledge and skills acquired in earlier coursework and integrate their technical knowledge through practical design efforts. The work is performed as a team in accordance with ABET requirements. Each team is comprised of two to three students. Prerequisite: EE 319, EE 321, EE 322, EE 325, EE 326, EE 335, EE 340, EE 390, and EE 470.

EE 489. Independent Study. 1-3 Hours. This course provides individual instruction. Students may repeat the course when topics vary.

EE 490. EE Senior Design I. 3 Hours. This course is taken by seniors as the first part of the senior design experience in the semester before EE 491. Projects may involve the design of a device, circuit system, process, or algorithm and topics covered may include the design process, project planning and management, and project costs, and includes aspects of ethics in engineering design, safety, environmental considerations, economic constraints, liability, manufacturing, and marketing. Projects are carried out using a team-based approach and selection and analysis of a design project to be continued in EE 491 is carried out. Written progress reports, a proposal, a final report, and oral presentations are required. Taken in last 30 hours. Open only to Electrical Engineering majors.

EE 491. EE Senior Design II. 3 Hours. Projects involving the design of a device, circuit system, process, or algorithm that have started in the previous semester will be completed. Team solution to an engineering design problem as formulated and initiated in EE 490 will continue to take place. Written progress reports, a final report, design manuals, and oral presentations are required. Prerequisite: EE 490; open only to Electrical Engineering majors.

EE 497. Special Topics. 3 Hours. Instructors will provide an organized class designed to cover areas of specific interest. Students may repeat the course when topics vary.

EE 499. Independent Research. 1-6 Hours. Independent research in Electrical Engineering conducted by a student under the guidance of a faculty member of his or her choice. The student is required to maintain a research journal and submit a project report by the end of the semester and potentially make an oral presentation on the project. SCH and hours are by arrangement and, with a change in content, this course may be repeated for credit. Prerequisite: Consent of instructor.

ENGR 1201. Introduction to Engineering. 2 Hours. This course provides an introduction to the engineering profession. Information on the different disciplines of engineering will be presented. Professional and ethical aspects of engineering are covered. An introduction to problem solving and the engineering design process with the utilization of various computer applications are covered. Various forms of technical communication are emphasized. Prerequisite or Corequisite: MATH 1314 or MATH 2413.

ENGR 1204. Engineering Graphics I. 2 Hours. This course is an introduction to computer-aided drafting. Emphasis is placed on drawing setup, creating and modifying geometry, adding text and dimensions, using levels, coordinate systems, and plot/print scale. Technical drawing skills including freehand sketching, text, orthographic projection, dimensioning, sectional views, and other viewing conventions will be developed.

ENGR 2301. Engineering Mechanics I - Statics. 3 Hours. This course covers the principles of engineering mechanics in statics including force systems, moments of inertia, vector mechanics and analysis of structures. Prerequisite: PHYS 2325.

ENGR 2302. Engineering Mechanics II - Dynamics. 3 Hours. This course covers the principles of engineering mechanics in dynamics including Newton's laws, kinetic and potential energy, linear and angular momentum, work, impulse, and inertia properties. Prerequisite: ENGR 2301.

ENGR 2303. Principles of Engineering I: Statics and Dynamics. 3 Hours. This course examines the unified presentation of conservation principles applied to engineering mechanics and systems in statics and dynamics. Topics include force systems, moments of inertia, vector mechanics, Newton's laws, kinetic and potential energy, linear and angular momentum, work, impulse, and intertia properties. Prerequisite: MATH 2413, PHYS 2325, and PHYS 2125.

ENGR 2305. Electric Circuits I. 3 Hours. This course focuses on the fundamental concepts of engineering with special emphasis on electrical engineering. It includes the concepts of current, voltage, power and energy, Kirchhoff's current and voltage laws, resistance, capacitance, inductance, series, and parallel combinations of circuit elements. Basic techniques such as superposition and node voltage analysis are introduced. Prerequisite: MATH 2313, MATH 2413, or instructor permission. Prerequisite or Corequisite: PHYS 2326 or instructor permission.

ENGR 2308. Engineering Economics. 3 Hours. Methods used for determining the comparative financial desirability of engineering alternatives. Provides the student with the basic tools required to analyze engineering alternatives in terms of their worth and cost, an essential element of engineering practice. The student is introduced to the concept of the time value of money and the methodology of basic engineering economy techniques. The course will address some aspects of sustainability and will provide the student with the background to enable them to pass the Engineering Economy portion of the Fundamentals of Engineering exam.

ENGR 307. Probability and Random Processes. 3 Hours. This course introduces students to the fundamental principles of probability and random processes. While helping students to develop their problem-solving skills, the course strives to motivate students with practical applications from various engineering areas that demonstrate the relevance of probability theory to engineering practice. Topics covered in this course include probability theory, discrete and continuous random variables and statistical description, statistical characterization of sequence of random variables, and stationary random processes. Prerequisite: MATH 2415.

ENGR 310. Engineering and Business Technical Writing. 3 Hours. The course gives business and engineering students the ability to communicate effectively both in person and on paper. The course focuses on how to write effective letters, reports, memos, resumes, and other professional and technical documents.

ENGR 312. Engineering and Business Ethics. 3 Hours. This course will make science and engineering students aware of ethical issues they will face in the work environment. It will help them understand the responsibilities of scientists and engineers and prepare them to articulate and respond to ethical conflicts. Class will involve case studies, discussions, writing response papers and tests.

ENGR 315. Engineering Computations. 3 Hours. This course covers numerical methods and their use for solving computational problems in engineering. The course is devoted to mathematical essentials and software utilization of the following numerical methods: solving nonlinear equations, solving systems of linear algebraic equations, interpolation, curve fitting, numerical differentiation, numerical integration, and optimization. Engineering applications of the numerical techniques are also considered. Prerequisite: MATH 2413 and COSC 1315.

ENGR 333. Principles of Engineering II: Thermodynamics and Fluids. 3 Hours. This course examines theory and application of energy methods in engineering, conservation principles to investigate "traditional" thermodynamics, and internal flow fluids. Topics include the Laws of Thermodynamics, entropy, refrigeration, fluid properties, momentum, and heat transfer. Prerequisite: PHYS 2325 and PHYS 2125. Prerequisite or Corequisite: MATH 2413.

ENGR 389. Independent Study. 1-3 Hours. This course provides individual instruction. Students may repeat the course when topics vary.

ENGR 431. Engineering Internship I. 3 Hours. The course provides experience in an engineering service, industrial, or research setting. The program provides engineering experience during the last two years of an undergraduate academic career. During this period, students can complete at least one semester of work consisting of a 20 hour work week. Prerequisite: Junior standing and approval of STEM Dean.

ENGR 432. Engineering Internship II. 3 Hours. This course provides the second phase of the experience in engineering service, industrial, or research setting. The program provides engineering experience during the last two years of an undergraduate academic career. During this period students can complete at least one semester of work consisting of a 20 hour work week. Prerequisite: ENGR 431 and approval of STEM Dean.

ENGR 499. Independent Research. 1-6 Hours. Independent research in Engineering conducted by a student under the guidance of a faculty member of his or her choice. The student is required to maintain a research journal and submit a project report by the end of the semester and potentially make an oral presentation on the project. SCH and hours are by arrangement and, with a change in content, this course may be repeated for credit. Prerequisite: Consent of instructor.