ENGINEERING

Degrees

Major

• Bachelor of Science with a Major in Systems Engineering (BS)
  (http://catalog.tamiu.edu/catalog/2017-2018/undergraduate-information/arts-sciences/engineering/bachelor-science-major-systems-engineering-bs)

Minor

• Minor in Petroleum Engineering (http://catalog.tamiu.edu/catalog/2017-2018/undergraduate-information/arts-sciences/engineering/petro-minor)

Courses

ENGR 1201 Foundations of Engineering I
Introduction to the engineering profession and disciplines; development of skills in problem solving including numbers, units, graphs and error calculation; drawing and design using CAD tools; students work in teams on an engineering design project, including construction, testing and reporting.
Corequisites: MATH 2413.
TCCN: ENGR 1201

ENGR 1202 Foundations of Engineering II
Introduction to engineering ethics and professional responsibilities; development of skills in problem solving, analysis, estimation, design, and teamwork; introduction to systems engineering; computational analysis, computer programming applications. Students work in teams on an engineering design project, including construction, testing, and reporting.
Prerequisites: ENGR 1201 and MATH 2413.

ENGR 1204 Engineering Graphics
Orthographical and isometric drawings. Tolerance, working drawings, three dimensional pictorials, primary and successive auxiliary view and vector graphics. Computer aided design software is used for drawing and development of systems in mechanical, electrical and welding applications.
Prerequisites: ENGR 1201.
TCCN: ENGR 1204

ENGR 1211 Foundations of Engineering I
Introduction to the engineering profession, ethics and disciplines, development of skills in teamwork, problem solving, logic processing, design and drawing; emphasis on computing applications and CAD tools.
Corequisites: MATH 2413.

ENGR 1230 Principles of Innov & Creativ
Introduction to creativity and creative problem solving techniques, innovation strategies, collective thinking in engineering. Students will be able to use a "whole-brain" approach to the study of engineering.

ENGR 2103 Eng Mech Statics & Dynamic Lab
Laboratory course to accompany ENGR 2303. Laboratory exercises reinforce ENGR2303 lecture material and place importance on scientific communication and collaboration.
Corequisites: ENGR 2303.

ENGR 2105 Principles of Elec Engr Lab
Laboratory course to accompany ENGR 2305. Laboratory exercises reinforce ENGR2305 lecture material and place importance on scientific collaboration.
Corequisites: ENGR 2305.
TCCN: ENGR 2105

ENGR 2303 Eng Mech Statics & Dynamics
Application of the fundamental principles of Newtonian mechanics to the statics and dynamics of particles and the equilibrium of trusses, frames, beams and other rigid bodies. Dynamics of moving particles, including friction, torque, impulse, and momentum.
Prerequisites: PHYS 2325/2125 and MATH 2414.
Corequisites: ENGR 2103.
TCCN: ENGR 2303

ENGR 2305 Principles of Elec Engineering
Fundamentals of electrical circuit analysis, AC power and electronics, intended as a terminal course in these areas for most engineering disciplines.
Prerequisites: PHYS 2326 and ENGR 1202.
Corequisites: ENGR 2105.
TCCN: ENGR 2305

ENGR 2312 Cons Prin in Thermal Sci
Theory and applications of energy methods in engineering; conservation principles to investigate "traditional" thermodynamics and internal flow fluids.
Prerequisites: ENGR 2321, MATH 2415 or registration therein.

ENGR 2315 Principles of Elec Engineering
Fundamentals of electrical circuit analysis, AC power and electronics, intended as a terminal course in these areas for most engineering disciplines.
Prerequisites: ENGR 2321, PHYS 2326/2126.

ENGR 2321 Statics and Particle Dynamics
Application of the fundamental principles of Newtonian mechanics to the statics and dynamics of particles and the equilibrium of trusses, frames, beams and other rigid bodies.
Prerequisites: PHYS 2326/2126.
Corequisites: MATH 2415.

ENGR 2372 Engineering Statistics
This course will cover a variety of important topics in probability and statistics such as pictorial and tabular methods in descriptive statistics, measures of location, measures of variability, samples spaces and events, axioms and properties of probability, counting techniques, conditional probability, independence, discrete random variables and probability distributions, continuous random variables and probability distributions, joint probability distributions and random samples. The course will also demonstrate how Microsoft Excel can be used to conduct statistical analysis such as basic simple and multiple regression.
Prerequisites: MATH 2414.

ENGR 2376 Cons Prin in Thermal Engr
Theory and applications of energy methods in engineering; conservation principles to investigate "traditional" thermodynamics and internal flow fluids; material properties.
Prerequisites: ENGR 2303, MATH 2415 or registration therein.
ENGR 3231 The Engineer as an Innovator
Mentally and physically develop creative thinking skills, use creativity to generate ideas and solve problems, learn how to organize teams, avoid roadblocks to team creativity, and use the creative problem-solving process.
Prerequisites: ENGR 1230.

EPSC 1170 Survey of Earth Science Lab
Laboratory course to accompany EPSC 1370. Must be taken concurrently with EPSC 1370. Lab fee: $27.25.
TCCN: GEOL 1101

EPSC 1370 Survey of Earth Science
A survey of the natural processes at work in the atmosphere, lithosphere, hydrosphere, and biosphere of the Earth, as well as Earth's place in the universe. Includes an introduction to astronomy, geology, oceanography, and meteorology. Designed to fulfill laboratory science core curriculum requirements. Must be taken concurrently with EPSC 1170.
TCCN: GEOG 1301

EPSC 2101 Atmospheric Science-Lab
Laboratory course to accompany EPSC 2301. Practical exercises reinforce EPSC 2301 lecture material. Topics will include structure, energy, and motions of the atmosphere; climate; fronts and cyclones; atmospheric stability; clouds and precipitation; severe storms. Must be taken concurrently with EPSC 2301. Lab fee: $27.25.
TCCN: GEOL 1147

EPSC 2301 Atmospheric Science
Structure, energy, and motions of the atmosphere; climate; fronts and cyclones; atmospheric stability; clouds and precipitation; severe storms.

EPSC 2401 Atmospheric Science
Structure, energy, and motions of the atmosphere; climate; fronts and cyclones; atmospheric stability; clouds and precipitation; severe storms. Includes three hours of laboratory per week. Lab fee: $27.25.
TCCN: GEOL 1447

GEOL 1103 Intro to Physical Geology Lab
Laboratory course to accompany GEOL 1303. Must be taken concurrently with GEOL 1303. Lab fee: $27.25.
TCCN: GEOL 1103

GEOL 1105 Environmental Geology Lab
Laboratory course to accompany GEOL 1305. Must be taken concurrently with GEOL 1305. Lab fee: $27.25.
TCCN: GEOL 1105

GEOL 1303 Intro to Physical Geology
An introductory study of Earth's composition, structure, and internal and external physical processes. Designed to fulfill laboratory science core curriculum requirements. Must be taken concurrently with GEOL 1103.
TCCN: GEOL 1303

GEOL 1305 Environmental Geology
An introductory study of Earth's major resources, including the atmosphere, water, minerals, energy, and biological systems as they relate to the impact of urban development and environmental control. Designed to fulfill laboratory science core curriculum requirements. Must be taken concurrently with GEOL 1105.
TCCN: GEOL 1305

GEOL 3320 Petroleum Geology
Origin, migration and accumulation of petroleum; typical U.S. oil and gas fluids and studies in subsurface geology.
Prerequisites: GEOL 1303/1103.

GEOL 3401 Earth Mats: Minerals & Rocks
An examination of minerals, and rocks; their formation and economic significance. Includes three hours of lab per week. Lab fee: $27.25.
Prerequisites: GEOL 1303/1103 or EPSC 1370/1170.

GEOL 3405 Geohydrology
A study of surface and subsurface hydrology emphasizing geological controls on groundwater flow; quantitative methods of analyzing aquifer systems; regional hydrology; water quality and pollution. Includes three hours of laboratory per week. Lab fee: $27.25.
Prerequisites: Eight hours of Geology.

GEOL 3415 Sedimentology & Stratigraphy
Origin of sediments and sedimentary rocks; transport, deposition, and depositional environments for sediments; field and laboratory studies in description and interpretation of sedimentary rocks; principles of stratigraphy; geologic time and correlation; and sequence stratigraphy. Includes three hours of laboratory per week. Lab fee: $27.25.

GEOL 3425 Paleontology and Earth History
An examination of the geologic history of the Earth focusing on the fossil and rock record. Specifically, this course will consider the development and history of life as documented by the fossil record and earth's history from a stratigraphic perspective. Includes three hours of laboratory per week. Lab fee: $27.25.
Prerequisites: GEOL 1303/1103 or EPSC 1370/1170.

GEOL 4170 Geology Seminar
A discussion of research and current topics in the geological sciences.
Prerequisites: Twelve semester hours of Geology.

GEOL 4173 UG Res in Geosciences
A course adapted to the study of special topics in the geosciences. For advanced students capable of developing a problem independently through conference and research (field and/or laboratory based) directed by the instructor. Problem chosen by the student with approval of the instructor prior to registration. May be repeated not to exceed four semester credit hours total. Lab fee: $27.25, if applicable. (Formerly EPSC 4173-3373)
Prerequisites: Twelve semester hours of Geology.

GEOL 4199 Special Topics in Geosciences
A course involving instruction in geology depending on student interest and specialty of instructor. May be repeated for credit when topic changes. Lab fee: $27.25, if applicable.
Prerequisites: Twelve semester hours of Geology.

GEOL 4273 UG Res in Geosciences
A course adapted to the study of special topics in the geosciences. For advanced students capable of developing a problem independently through conference and research (field and/or laboratory based) directed by the instructor. Problem chosen by the student with approval of the instructor prior to registration. May be repeated not to exceed four semester credit hours total. Lab fee: $27.25, if applicable. (Formerly EPSC 4173-3373)
Prerequisites: Twelve semester hours of Geology.
GEOL 4299 Special Topics in Geosciences
A course involving instruction in geology depending on student interest and specialty of instructor. May be repeated for credit when topic changes. Lab fee: $27.25, if applicable.
Prerequisites: Twelve semester hours of Geology.

GEOL 4373 UG Res in Geosciences
A course adapted to the study of special topics in the geosciences. For advanced students capable of developing a problem independently through conference and research (field and/or laboratory based) directed by the instructor. Problem chosen by the student with approval of the instructor prior to registration. May be repeated not to exceed four semester credit hours total. (Formerly EPSC 4173-4473)
Prerequisites: Twelve semester hours of Geology.

GEOL 4399 Special Topics in Geosciences
A course involving instruction in geology depending on student interest and specialty of instructor. May be repeated for credit when topic changes. Lab fee: $27.25, if applicable.
Prerequisites: Twelve semester hours of Geology.

GEOL 4460 Intro to Geographic Info Sys
This course will explore fundamental concepts of geographic information technologies with a focus on applications within the geosciences and natural sciences in general. Students will be exposed to the power of geographic information systems to elucidate complex problems. (Cross-listed with BIOL 4460 and BIOL 5460)
Prerequisites: Senior standing.

GEOL 4473 UG Res in Geosciences
A course adapted to the study of special topics in the geosciences. For advanced students capable of developing a problem independently through conference and research (field and/or laboratory based) directed by the instructor. Problem chosen by the student with approval of the instructor prior to registration. May be repeated not to exceed four semester credit hours total. Lab fee: $27.25, if applicable. (Formerly EPSC 4173-3373)
Prerequisites: Twelve semester hours of Geology.

GEOL 4499 Special Topics in Geosciences
A course involving instruction in geology depending on student interest and specialty of instructor. May be repeated for credit when topic changes. Lab fee: $27.25, if applicable.
Prerequisites: Twelve semester hours of Geology.

PETE 3210 Reservoir Fluids
Thermodynamic behavior of naturally occurring hydrocarbon mixtures; evaluation and correlation of physical properties of petroleum reservoir fluids including laboratory and empirical methods.

PETE 3301 Drilling I
Introduction to petroleum drilling systems, including fundamental petroleum engineering concepts, quantities and unit systems, drilling rig components, drilling fluids, pressure loss calculations, casing, well cementing, and directional drilling.

PETE 3311 Reservoir Petrophysics
Systematic theoretical and laboratory study of physical properties of petroleum reservoir rocks; lithology, porosity, elastic properties, strength, acoustic properties, electrical properties, relative and effective permeability, fluid saturations, capillary characteristics, and rock-fluid interaction.

PETE 3320 Petroleum Production I
Introduction to production operations and oil field equipment.

PETE 3340 Geophysics for Petro Engineers
The fundamentals of geophysics are given to petroleum engineering students, with special emphasis on 2-D and 3-D seismic. Application of seismic to oil and gas exploration problems.

PETE 4213 Integrated Reservoir Mgmt
Principles of reservoir management and applications to specific reservoirs. Examine case studies that include new fields, mature fields, water floods and enhanced recovery projects. Requirements for successful operation of a reservoir through integration of people, technology, tools and data, synergy, fostering teamwork and integration.
Prerequisites: PETE 4312

PETE 4280 Shale Oil & Gas
Introduction to reservoir and production operations in oil and gas shale. Review of the technology applied to oil and gas producing fields from shale. Hydraulic fracturing operations. Produced fluids and fluid separation.

PETE 4302 Drilling II
Design and evaluation of well drilling systems; identification and solution of drilling problems; wellbore hydraulics, well control, casing design; well cementing directional drilling, offshore drilling.
Prerequisites: PETE 3301

PETE 4312 Reservoir Engineering
Determination of reserves; material balance methods; aquifer models; fractional flow and frontal advance; displacement, pattern, and vertical sweep efficiencies in water floods; enhanced oil recovery processes; design of optimal recovery processes.
Prerequisites: PETE 3210 and PETE 3311.

PETE 4321 Petroleum Production II
Fundamental production engineering design, evaluation and optimization for oil and gas wells, including well deliverability, formation damage and skin analysis, completion performance, and technologies that improve oil and gas well performance (artificial lift and well stimulation).
Prerequisites: PETE 3320.

PETE 4332 Env Hlth & Saf in Oil Indus
This course analyzes U.S. laws, and how regulatory agencies address compliance concerns in the oil and gas industry. Attention will be paid to health, safety, and environmental concerns.

PETE 4333 Engineering Ethics
This course introduces the theory and the practice of engineering ethics using a multi-disciplinary and cross-cultural approach.

PETE 4390 Petro Proj Mngmt & Design
Introduction to reservoir and production operations in oil and gas shale. Review of the technology applied to oil and gas producing fields from shale. Hydraulic fracturing operations. Produced fluids and fluid separation.
Prerequisites: Semester prior to graduation.
SENG 3300 Engineering Economics
Principles of engineering economics including economic equivalence, time value of money, analysis of single and multiple investments, comparison of alternatives; capital recovery and tax implications; certainty; uncertainty; risk analysis; public sector analysis and break-even concepts.
Prerequisites: Math 2414.

SENG 3301 Engr Proj Mgt & Proposals
Principles of project management; planning, scheduling, and control. Engineering proposals; technical reports. Students prepare proposals, including specifications, timelines, schedule, and budget, for projects to be implemented in SENG 4390. This course should be taken the semester preceding SENG 4390. Prerequisites: ENGL 2311 and senior standing.

SENG 3310 Intro to Control Systems
Analysis and synthesis of controlled, dynamic, linear mechanical, electrical, fluid and/or thermal systems; introduction to concepts of stability, controllability, and observability. Optimal control systems and nonlinear control theory.
Prerequisites: ENGR 2305, MATH 3310, MATH 3330, COSC 1336 and COSC 1136.

SENG 3320 Engineering Modeling & Design
This course will cover the fundamentals of modeling and design, introduce students to engineering design criteria such as human factors and ergonomics, maintainability, and reliability. The course will also introduce students to project management topics such as project scheduling, schedule reduction, design and project selection models, and multi-criteria decision making. Contemporary case studies of failures in modeling and design will be analyzed to identify lessons learned.
Prerequisites: Junior Standing.

SENG 3330 Operations Research I
Introduction to the fundamental deterministic analytical methods and their applications to the industrial and systems engineering. Modeling and decision making. Methods include linear programming, the simplex method, integer programming, distribution and network models (transportation, transshipment, and assignment problems), nonlinear programming, queuing analysis, simulation, and forecasting.
Prerequisites: MATH 3310 and SENG 3320.

SENG 3337 Software Development
This course will cover advanced software development techniques including object-oriented programming, inheritance, polymorphism, formatted file access, recursion, functional and operator overloading, parsing using a FSM, stacks and queues using linked list, search algorithms using binary search trees, and shortest path algorithms.
Prerequisites: COSC 1336 and COSC 1136.

SENG 3340 Robotics and Automation
Study of the use, design, and deployment of industrial automation and robotics technologies in high-precision, multi-product manufacturing environments. Robot manipulators, kinematics and dynamics, robot automation and control, integrated robotic systems for manufacturing, automation in manufacturing, programmable logic controllers, applications to industrial systems.
Prerequisites: SENG 3310.

SENG 3350 Prod Planning and Control
Coordination of activities of manufacturing and services systems. System design, inputs and outputs, planning and scheduling. Inventory controls and supply chains management with the employment of linear programming. Job scheduling on flexible manufacturing lines.
Prerequisites: MATH 3310, SENG 3300.

SENG 3370 Computer Int Manufacturing
Prerequisites: SENG 3310.

SENG 3380 Measurements and Devices
Basic concepts and principles of measurement methods; characteristics of signals; signal conditioning; data acquisition and processing; transducers and sensors, analog and digital devices, voltage regulators; power supplies; measurements of temperature, pressure, velocity, flow, and strain.
Prerequisites: ENGR 2305/2105.

SENG 4152 Internship in Systems Engr
A directed internship in an organization appropriate to the student's career objectives. May be repeated. Evaluation of performance is on a CR/NC basis.
Prerequisites: Permission of instructor.

SENG 4195 Undergraduate Research
Permits work on a research engineering project. May be repeated.
Prerequisites: Permission of instructor.

SENG 4199 Independent Study in SENG
A directed study course. Topics selected from contemporary developments in the field of systems engineering.
Prerequisites: Permission of instructor.

SENG 4252 Internship in Systems Engr
A directed internship in an organization appropriate to the student’s career objectives. May be repeated. Evaluation of performance is on a CR/NC basis.
Prerequisites: Permission of instructor.

SENG 4295 Undergraduate Research
Permits work on a research engineering project. May be repeated.
Prerequisites: Permission of instructor.

SENG 4299 Independent Study in SENG
A directed study course. Topics selected from contemporary developments in the field of systems engineering.
Prerequisites: Permission of instructor.

SENG 4301 Engr Project Mgt and Proposals
Principles of project management; planning, scheduling, and control. Engineering proposals; technical reports. Students prepare proposals, including specifications, timelines, schedule, and budget, for projects to be implemented in SENG 4390. This course should be taken the semester preceding SENG 4390. (Formerly SENG 3301)
Prerequisites: ENGL 2311 and senior standing.
SENG 4315 Embedded Systems
Characteristics of embedded systems, microprocessors and microcontrollers, system design, modular programming, interface devices, memory management, interrupts, input/output applications, multitasking, and simulation.
Prerequisites: ENGR 2305 and COSC 1336.

SENG 4330 Operations Research II
This course will present mathematical models for inventory management. It also covers a variety of statistics topics such as analysis of variance (One Factor and Two Factors), simple and advanced multiple linear regression. Techniques to deal with collinearity in datasets such as stepwise regression and best subsets are presented. Other topics include game theory, Markov chains, and multi-criteria decision-making through goal programming.
Prerequisites: ENGR 2372 and SENG 3330.

SENG 4340 Intelligent Systems
Introduction to methods for the analysis and design of intelligent engineering systems. Topics include reinforcement learning, optimal estimation, Bayesian networks, expert systems, neural networks, and genetic algorithms. Applications emphasize control and decision making in engineering, finance, and computer science.
Prerequisites: SENG 3340.

SENG 4350 Facilities Design & Logistics
Design and analysis of models and algorithms for facility location, vehicle routing, and facility layout problems. Emphasis will be placed on both the use of computers and the theoretical analysis of models and algorithms in the design of production/service facilities, sequencing, and scheduling. Fundamental concepts applied through a sequence of design projects.
Prerequisites: SENG 3330.

SENG 4352 Internship in Systems Engr
A directed internship in an organization appropriate to the student's career objectives. May be repeated. Evaluation of performance is on a CR/NC basis.
Prerequisites: Permission of instructor.

SENG 4360 Systems Simulation
Study the structure, logic, methodologies, and computer techniques for simulating systems. Topics include fundamentals of discrete simulation, design-modeling and subsequent analysis, model verification and validation, and understanding and predicting the behavior of systems.
Prerequisites: SENG 3330.

SENG 4370 Intro to Virtual Manufacturing
Introduction to virtual manufacturing, virtual reality applications in manufacturing systems design, networked manufacturing applications, and modeling of occupational safety engineering.
Prerequisites: SENG 3370.

SENG 4380 Syst Eng in Oil and Gas Ind
Introduction to the interdisciplinary approach between two different engineering disciplines: Petroleum Engineering and Systems Engineering.
Prerequisites: Senior standing.

SENG 4385 Special Topics in Systems Engr
Topics may be from any area of systems engineering. May be repeated when topic changes.
Prerequisites: Senior standing or permission of instructor.

SENG 4390 Sys Eng Senior Design Project
This capstone course provides students the experience of implementing (including building, testing, and documenting) the approved project in SENG 3301, within budget and on schedule. Requires integration of knowledge from required systems engineering courses. Course requirements include a written report and oral presentation. To be taken during the semester of graduation.
Prerequisites: SENG 4301.

SENG 4395 Undergraduate Research
Permits work on research engineering project. May be repeated.
Prerequisites: Permission of instructor.

SENG 4399 Independent Study in SENG
A directed study course. Topics selected from contemporary developments in the field of systems engineering.
Prerequisites: Permission of instructor.