COSC 1337 Object Oriented Programming
A continuation of COSC 1336. Emphasis is placed upon applying the object-oriented paradigms to develop the skills in data abstraction and object design where language features, essential programming techniques, and design guidelines are presented from a unified point of view.
Prerequisites: COSC 1336.
Corequisites: COSC 1137.

COSC 2301 Fundamentals of Comp Sci
Introduces fundamental concepts of programming from algorithmic and object-oriented perspectives. Topics include the range of introductory algorithmic concepts and constructs, simple data types, control structures, and introduction to array and string data structures, as well as debugging techniques and the social implications of computing. Emphasizes good software engineering principles and developing fundamental programming skills both in a language independent manner and in the context of a language that supports the object-oriented paradigm. High school BCIS is encouraged. Students should have sufficient abilities in high school mathematics.
Prerequisites: No programming or computer science experience is required.

COSC 2330 Digital Logic Design
Hardware implementation of arithmetic and logical functions, organization and design of digital systems.

COSC 3301 Algorithms & Data Structures
Builds on the foundation provided by COSC 1136/1336 and COSC 1137/1337 with an increased emphasis on algorithms, data structures, and software engineering. The treatment of programming concepts will be both in terms of the object-oriented paradigm as well as independent of any programming language.
Prerequisites: COSC 1137 and COSC 1337.

COSC 3310 Algorithm Design & Analysis
Introduces formal techniques to support the design and analysis of algorithms focusing on both the underlying mathematical theory and practical considerations of efficiency. Topics include asymptotic complexity bounds, techniques of analysis, algorithmic strategies, and an introduction to automata theory and its application to language translation.
Prerequisites: COSC 3301 and MATH 3365.

COSC 3320 Computer Architecture
Introduces the organization and architecture of computer systems, beginning with the standard von Neumann model and then moving forward to more recent architectural concepts.
Prerequisites: COSC 3301.

COSC 3326 Operating Systems & Networking
Introduces the fundamentals of operating systems together with those of networking and communications.
Prerequisites: COSC 3301 and MATH 3365.

COSC 3340 Microprocessor Systems
Basic computer structure, the instruction set, addressing modes, assembly language programming, assembly language subroutines, arithmetic operations, programming in C, implementation of C procedures, elementary data structures, input and output and a survey of microprocessor design.
Prerequisites: COSC 2330.
COSC 3350 Human Computer Interaction
Presents a comprehensive introduction to the principles and techniques of human-computer interaction.
Prerequisites: COSC 3301 and MATH 3365.

COSC 3370 Databases
Introduces the concepts and techniques and database systems. Topics include information models and systems; database systems; data modeling to include conceptual, object-oriented and relational data models; relational databases; database query languages to include SQL and OQL; relational database design; transaction processing; distributed databases; and physical database design.
Prerequisites: COSC 3301 and MATH 3365.

COSC 3390 Software Development
Provides an intensive implementation-oriented introduction to the software-development techniques used to create medium-scale interactive applications, focusing on the use of large object-oriented libraries to create well-designed graphical user interfaces. Topics include event-driven programming, computer graphics, human-computer interaction (HCI), and graphical user interfaces.
Prerequisites: COSC 3301 and MATH 3365.

COSC 4101 Soft Engr&Proj Develop I Lab
Laboratory course to accompany COSC 4301. Laboratory exercises help students to gather and document the requirements of the project that is defined in COSC 4301. Students will also develop and document a design solution for the project. This course places importance on scientific communication and collaboration methods.
Corequisites: COSC 4301.

COSC 4152 Internship in Computer Science
A directed internship in a public/private organization that is appropriate to the student's career objective or desire in a computer science setting. Students will apply analytical and technical knowledge acquired in the program in a real world setting and receive on-the-job training experience. Seminar and training will be held to discuss field experience from theoretical and applied perspective.
Prerequisites: Permission of the instructor and advisor.

COSC 4252 Internship in Computer Science
A directed internship in a public/private organization that is appropriate to the student's career objective or desire in a computer science setting. Students will apply analytical and technical knowledge acquired in the program in a real world setting and receive on-the-job training experience. Seminar and training will be held to discuss field experience from theoretical and applied perspective.
Prerequisites: Permission of the instructor and advisor.

COSC 4252 Internship in Computer Science
A directed internship in a public/private organization that is appropriate to the student's career objective or desire in a computer science setting. Students will apply analytical and technical knowledge acquired in the program in a real world setting and receive on-the-job training experience. Seminar and training will be held to discuss field experience from theoretical and applied perspective.
Prerequisites: Permission of the instructor and advisor.

COSC 4352 Internship in Computer Science
A directed internship in a public/private organization that is appropriate to the student's career objective or desire in a computer science setting. Students will apply analytical and technical knowledge acquired in the program in a real world setting and receive on-the-job training experience. Seminar and training will be held to discuss field experience from theoretical and applied perspective.
Prerequisites: Permission of the instructor and advisor.

COSC 4385 Special Topics in Comp Science
Topics may be from an area of computer science. May be repeated when topic changes.
COSC 4390 Comp Science Senior Dsgn Proj
This capstone course provides students the experience of implementing (including building, testing, and documenting) the approved project in COSC 4301, 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: COSC 4301.

COSC 4395 Undergraduate Research
Students work on a computer science research project. The topic is chosen by the student and approved by the instructor. Course may be repeated under different topic for credit.
Prerequisites: Permission of instructor and department.

COSC 4452 Internship in Computer Science
A directed internship in a public/private organization that is appropriate to the student's career objective or desire in a computer science setting. Students will apply analytical and technical knowledge acquired in the program in a real world setting and receive on-the-job training experience. Seminar and training will be held to discuss field experience from theoretical and applied perspective.
Prerequisites: Permission of the instructor and advisor.

CSCE 1136 Funds of Programming Lab
Laboratory course to accompany CSCE 1336. Laboratory exercises reinforce the particular paradigms that are stressed in CSCE 1336. Students will develop and run functional programs that solve elementary algorithmic problems. Students will also gain experience with compiling, finding, correcting syntax errors, and executing programs. This course places importance on scientific communication and collaboration methods.
Corequisites: CSCE 1336.

CSCE 1137 Object-Oriented Program Lab
Laboratory course to accompany CSCE 1337. Laboratory exercises reinforce the particular paradigms that are stressed in CSCE 1337. Students will develop programs in an object-oriented programming language by practicing the use of a variety of abstract data types and data structures. Students will also gain experience on using advanced design tools and the skills to analyze, debug and correct errors in programs. This course places importance on scientific communication and collaboration methods.
Prerequisites: CSCE 1336 and CSCE 1136.
Corequisites: CSCE 1337.

CSCE 1336 Fundamentals of Programming
Introduces the fundamental concepts of a high-level programming language and provides a comprehensive introduction to programming for STEM majors. Topics include data types, flow of control, functions, I/O streams, arrays, and the mechanics of running, testing, and debugging. This course assumes computer literacy.
Corequisites: CSCE 1136

CSCE 1337 Object Oriented Programming
A continuation of CSCE 1336. Emphasis is placed upon applying the object-oriented paradigms to develop the skills in data abstraction and object design where language features, essential programming techniques, and design guidelines are presented from a unified point of view.
Prerequisites: CSCE 1136 and CSCE 1336.
Corequisites: CSCE 1137.

CSCE 2330 Digital Logic Design
Hardware implementation of arithmetic and logical functions, organization and design of digital systems.

CSCE 3301 Algorithms & Data Structures
Builds on the foundation provided by CSCE 1336 and CSCE 1337 with an increased emphasis on algorithms, data structures, and software engineering. The treatment of programming concepts will be both in terms of the object-oriented paradigm as well as independent of any programming language.
Prerequisites: CSCE 1137 and CSCE 1337.

CSCE 3314 Electronic Devices & Apps
Theory and application of solid state electronic devices. Physical principles of carrier motion in semiconductors leading to operating principles and circuit models for diodes, bipolar transistors, and field effect transistors. Applying the skills in designing amplifiers and op-amp based circuits.
Prerequisites: ENGR 2305

CSCE 3326 Operating Systems & Networking
Introduces the fundamentals of operating systems together with those of networking and communications.
Prerequisites: MATH 3365.

CSCE 3340 Microprocessor Systems
Basic computer structure, the instruction set, addressing modes, assembly language programming, assembly language subroutines, arithmetic operations, programming in C, implementation of C procedures, elementary data structures, input and output and a survey of microprocessor based design.
Prerequisites: CSCE 2330

CSCE 3390 Software Development
Provides an intensive implementation-oriented introduction to the software-development techniques used to create medium-scale interactive applications, focusing on the use of large object-oriented libraries to create well-designed graphical user interfaces. Topics include event-driven programming, computer graphics, human-computer interaction (HCI), and graphical user interfaces.
Prerequisites: CSCE 1337, CSCE 1137, and MATH 3365

CSCE 4101 Soft Eng & Proj Develop Lab
Laboratory course to accompany CSCE 4301. Laboratory exercises help students to gather and document the requirements of the project that is defined in CSCE 4301. Students will also develop and document a design solution for the project. This course places importance on scientific communication and collaboration methods.
Prerequisites: CSCE 3301.
Corequisites: CSCE 4301.

CSCE 4203 Dig Electronic Circuit Design
Theory of digital and electronics circuits. Digital logic families TTL, IIL, ECL, NMOS, CMOS, and GaAs. Large signal models for transistors. The course includes the study of the MOS device, critical interconnect and gate characteristics that determine the performance of VLSI circuits, using CADENCE VLSI tools.
Prerequisites: CSCE 2330 and CSCE 3314
CSCE 4210 Computer Engineering Design
This course emphasizes hardware design and debugging. Topics include combinational and sequential logic design using VHDL based upon PLA/PLD.
Prerequisites: CSCE 2330 and CSCE 3320

CSCE 4214 Data Communication
Introduction to the fundamental concepts of computer communication networks. Topics include the OSI reference model, the physical, data link, network, and transport layers, TCP/IP, network topologies, routing and flow control.
Prerequisites: CSCE 2330

CSCE 4220 Programming Languages
The study of programming language design including syntax, semantics, behavior, and implementation issues in imperative, functional, logic, and object-oriented languages. Topics may include type theory, concurrency, data dependency, and nondeterminism.
Prerequisites: CSCE 1337 and CSCE 3301

CSCE 4240 Intro to Unmanned Aerial Vehic
Prerequisites: Senior Standing or approval of instructor.

CSCE 4301 Software Engr&Proj Develop I
Principles of software engineering, design, and their applications in the development of a two-semester software project. Students work in teams to gather projects’ requirements, design a solution, and implement their design. The students also practice good project management using state-of-the-art software engineering processes. At the beginning of the first semester, projects are defined by the instructor and their requirements are documented by the teams. The students then work on designing and implementing their solutions in the remaining period of the first semester and the proceeding semester, culminating in a formal presentation of the results at the end of CSCE 4302. This course should be taken the semester preceding CSCE 4302.
Prerequisites: CSCE 3301.
Corequisites: CSCE 4101.

CSCE 4302 Software Engr&Proj Develop II
Continuation of CSCE 4301 to work on the software project initiated in the prior semester.
Prerequisites: CSCE 4301

CSCE 4310 Computer Security
Fundamental concepts and principles of computer security, operating system and network security, private key and public key cryptographic algorithms, hash functions, authentication, firewalls and intrusion detection systems, IPSec and VPN, wireless and web security.
Prerequisites: Senior standing or approval of instructor

CSCE 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. Interchangeable with SENG 4315.
Prerequisites: ENGR 2305 and CSCE 1336 or COSC 1336.

CSCE 4320 Computer System Architecture
I/O organization, memory organization including virtual memory, cache memory mapping, pipelining, and multiprocessing, CISC and RISC microprocessors.
Prerequisites: CSCE 2330 and CSCE 3320

CSCE 4350 Comp Approach to Crim Justice
Statistical and algorithmic methods in criminal justice system, predictive policing, sentencing, applications of this approach to real-time risk assessments for bail decisions and tests for discrimination in traffic stops.
Prerequisites: Senior Standing or approval of instructor

CSCE 4390 Comp Eng Senior Design Project
This capstone course provides students the experience of implementing (including building, testing, and documenting) a project, within budget and on schedule. Course requirements include a written report and oral presentation. To be taken during the semester of graduation.
Prerequisites: Senior Standing

CSCE 4395 Undergraduate Research
Students work on a computer engineering research project. The topic is chosen by the student and approved by the instructor.
Prerequisites: Permission of instructor and department

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 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, PHYS 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 2380 Fluid Mechanics
Study of fluid at rest and in-motion. Topics covered in the course include fluid properties, pressures, hydrostatics, buoyance, open system, control volume approach to conservation of mass, moment and energy. Applications includes fluid flow through pipes, dimensionless analysis, boundary layers, and lift and drag acting on object.
Prerequisites: ENGR 2376.

ENGR 2390 Mechanics of Materials
Principle of material mechanics in engineering problems addressing strength and stiffness of different solid material. The course includes topics in continuum stress and strain, torsion of circular shaft, beam bending, and combined stresses applied to an object.
Prerequisites: ENGR 2303.

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.

ENGR 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. Interchangeable with SENG 3300.
Prerequisites: MATH 2414.

ENGR 3301 Engineering Ethics
Emphasis is placed on the developing techniques of moral/ethical analysis and their application to real and hypothetical ethical issues encountered by engineers, such as: professional employee rights and whistle blowing; environmental issues; ethical aspects of safety, risk and liability, and conflicts of interest.
Prerequisites: Junior Standing.

EPSC 1170 Survey of Earth Science Lab
Laboratory course to accompany EPSC 1370. Must be taken concurrently with EPSC 1370. Laboratory fee applicable.
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: GEOL 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. Laboratory fee applicable.
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.
TCCN: GEOL 1347

GEOL 1103 Intro to Physical Geology Lab
Laboratory course to accompany GEOL 1103. Must be taken concurrently with GEOL 1103. Laboratory fee applicable.
TCCN: GEOL 1105

GEOL 1105 Environmental Geology Lab
Laboratory course to accompany GEOL 1305. Must be taken concurrently with GEOL 1305. Laboratory fee applicable.
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. Laboratory fee applicable.
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. Laboratory fee applicable.
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. Laboratory fee applicable.

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. Laboratory fee applicable.
Prerequisites: Junior Standing.

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. Laboratory fee, 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. Laboratory fee, 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. Laboratory fee, if applicable. (Formerly EPSC 4173-3373)
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. Laboratory fee, if applicable. (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. Laboratory fee, 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. Laboratory fee, 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. Laboratory fee, if applicable.
Prerequisites: Twelve semester hours of Geology.

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.
Prerequisites: ENGR 2380, ENGR 2390, and PETE 3340

PETE 3307 Reservoir Engineering I
Fundamental properties of reservoir formations and fluids including reservoir volumetric, reservoir statics and dynamics. Analysis of Darcy's law and the mechanics of single and multiphase fluid flow through reservoir rock, capillary phenomena, material balance, and reservoir drive mechanisms.

PETE 3310 Reservoir Fluids
Thermodynamic behavior of naturally occurring hydrocarbon mixtures; evaluation and correlation of physical properties of petroleum reservoir fluids including laboratory and empirical methods.
Prerequisites: CHEM 1311 and ENGR 2376

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 saturation, capillary characteristics, and rock-fluid interaction; This course also covers an introduction to the electrical, nuclear, and acoustic properties of rocks including theory and interpretation of conventional well logs.
Prerequisites: ENGR 2390 and GEOL 3320

PETE 3320 Petroleum Production I
Introduction to production operations and oil field equipment; inflow performance analysis, effect of formation damage on well flow, nodal systems analysis; perforating techniques and their effect on inflow; and stimulation treatments to enhance well performance.
Prerequisites: PETE 3307

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.
Prerequisites: ENGR 2380 and GEOL 3320

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 4301 Petroleum Economics
Estimation of oil and gas reserves and their uncertainty is introduce including tangible and intangible investment costs, depreciation, economic analysis of producing wells, income tax consideration, risk and probability determination of different prospects.
Prerequisites: ENGR 2372 and ENGR 3300

PETE 4302 Drilling II
This course addresses the current advancement and technologies applied in modern drilling designs. The course focuses on building and designing directional well paths, wellbore surveying methods, predicting dog-leg severity, bottom hole assembly and operational techniques used in directional drilling, limiting factors and wellbore issues associated with directional drilling.
Prerequisites: PETE 3301

PETE 4312 Reservoir Engineering II
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 3307

PETE 4313 Integrated Reservoir Mngt
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 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 4322 Artificial Lift
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 4355 Drilling Optimization
Optimization of the drilling process for oil and gas well based on geometric and dynamic models. Topics to be covered include drilling hydraulics, drill bit selection, operating parameter selection, analysis of drilling time and cost, and rate of penetration predications.

PETE 4380 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.

PETE 4390 Capstone Senior Design
This capstone course provides students the experience of implementing (including building, testing, and documenting) an approved project within a budget and on schedule. This project requires integration of knowledge from student’s engineering courses. Course requirements include a written report and oral presentation. To be taken during the semester of graduation.
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. Interchangeable with ENGR 3300.
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 3370 Computer Int Manufacturing
Prerequisites: Junior or Senior standing.

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. Interchangeable with CSCE 4315.
Prerequisites: ENGR 2305 and COSC 1336 or CSCE 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.