Chemical Engineering (CHEG)

Courses

CHEG 1011 Intro Engr, Comp Sci & Tech: 1 semester hour.
Introduction to basic engineering, computer science and technology concepts. Students will become aware of the various disciplines of engineering, computer science and technology, ethical and professional responsibilities in these fields, creativity and design.
Co-requisite: CHEG 1021 (http://catalog.pvamu.edu/search/?P=CHEG%201021).

CHEG 1021 Intro CHEG Lab: 1 semester hour.
Introduction to the field of engineering, industries, careers, and the curriculum. Basic engineering terms, concepts, calculations problem solving skills, ethics, and computer applications.
Co-requisite: CHEG 1011 (http://catalog.pvamu.edu/search/?P=CHEG%201011).

CHEG 2003 Eco Anal Technical Application: 3 semester hours.
Fundamental concepts of economic principles. Evaluation of technical alternatives, economic significance of technical proposals; interest, description, analysis, and forecasting.
Prerequisites: MATH 1124 (http://catalog.pvamu.edu/search/?P=MATH%201124).

CHEG 2013 Materials Science: 3 semester hours.
Chemical bonding, atomic order and disorder, transport properties, single phase and multiphase materials, heat treatment, corrosion, and composites.
Prerequisites: CHEM 1043 (http://catalog.pvamu.edu/search/?P=CHEM%201043) (may be taken concurrently) or CHEM 1034 (http://catalog.pvamu.edu/search/?P=CHEM%201034) (may be taken concurrently).

CHEG 2043 Chemical Engineering Thermodynamics I: 3 semester hours.
Introduction to chemical engineering calculations. PVT properties of fluids, equations of state. First and second laws of thermodynamics. Applications to heat effects and flow processes.
Prerequisites: CHEM 1043 (http://catalog.pvamu.edu/search/?P=CHEM%201043) or CHEM 1034 (http://catalog.pvamu.edu/search/?P=CHEM%201034) and PHYS 2513 (http://catalog.pvamu.edu/search/?P=PHYS%202513).

CHEG 2053 Material and Energy Balances: 3 semester hours.
Application of the laws of conservation of mass and energy to reacting and non-reacting, simple and complex chemical systems. Application of both element and species balances to multiple reaction systems. Application of the degrees-of-freedom analysis to single process units and multi-unit process flow-sheets. Numerical solution techniques for the solution of balance equations.
Prerequisites: CHEG 2043 (http://catalog.pvamu.edu/search/?P=CHEG%202043) (may be taken concurrently).

CHEG 2153 Biochemical Engineering Fundamentals: 3 semester hours.
This course introduces biology fundamentals and associated subjects required for engineers to understand and design multidisciplinary technology in the complementary areas of biological sciences and engineering. To accommodate those who do not have the biological background, the course covers basic biological principles and engineering applications of general biology including: biochemistry, genetics, and physiology. Subsequently, special emphasis is placed on applying engineering concepts to biological problems.
Prerequisites: CHEM 1043 (http://catalog.pvamu.edu/search/?P=CHEM%201043) or CHEM 1034 (http://catalog.pvamu.edu/search/?P=CHEM%201034) and CHEM 2033 (http://catalog.pvamu.edu/search/?P=CHEM%202033).

CHEG 2156 Chemical Engineering Internship I: 6 semester hours.
This course is an internship program of work experience with an approved engineering firm.

CHEG 3011 Chemical Engineering Laboratory I: 1 semester hour.
Quantitative experimental study of properties of fluids, fluid mechanics, metering, and heat transfer. Operation and evaluation of equipment, techniques of graphical and statistical data analysis. Strong emphasis is placed on safety, report writing and oral communication.
Prerequisites: CHEG 3013 (http://catalog.pvamu.edu/search/?P=CHEG%203013) (may be taken concurrently) and PHYS 2511 (http://catalog.pvamu.edu/search/?P=PHYS%202511) (may be taken concurrently) and PHYS 2521 (http://catalog.pvamu.edu/search/?P=PHYS%202521) (may be taken concurrently) and CHEM 1021 (http://catalog.pvamu.edu/search/?P=CHEM%201021) (may be taken concurrently) and (COMM 1003 (http://catalog.pvamu.edu/search/?P=COMM%201003) (may be taken concurrently) or SPCH 1003 (may be taken concurrently)) and (ENGL 1133 (http://catalog.pvamu.edu/search/?P=ENGL%201133) (may be taken concurrently) or ENGL 1143 (http://catalog.pvamu.edu/search/?P=ENGL%201143) (may be taken concurrently).

CHEG 3013 Heat, Mass, and Momentum Transport: 3 semester hours.
Prerequisites: CHEG 2053 (http://catalog.pvamu.edu/search/?P=CHEG%202053) and MATH 2043 (http://catalog.pvamu.edu/search/?P=MATH%202043).

CHEG 3023 Unit Operations: 3 semester hours.
Application of transport theory to the design of equipment for the pumping and transfer of fluids through pipes, heat exchange, interphase transfer of heat and mass for the separation and purification of process streams.
Prerequisites: CHEG 2053 (http://catalog.pvamu.edu/search/?P=CHEG%202053).
CHEG 3043 Equilibrium Stage Separation Processes: 3 semester hours.
Applications of heat and mass balances and phase equilibria to the design of staged separation processes. Use of graphical methods such as McCabe Thiele and Ponchon Savart for the treatment of binary systems. Application to distillation, absorption, stripping, and extraction. Prerequisites: CHEG 2053 (http://catalog.pvamu.edu/search/?P=CHEG%202053) and CHEG 3053 (http://catalog.pvamu.edu/search/?P=CHEG%203053).

CHEG 3053 Chemical Engineering Thermodynamics II: 3 semester hours.
Properties of ideal and non-ideal binary and multi-component mixtures. Study of phase equilibria for single- and multi-component systems based on methods of corresponding states, equation of states and activity coefficient. Chemical equilibria applied to both homogeneous and heterogeneous systems. Prerequisites: CHEG 2043 (http://catalog.pvamu.edu/search/?P=CHEG%202043) and CHEG 2053 (http://catalog.pvamu.edu/search/?P=CHEG%202053) (may be taken concurrently).

CHEG 3063 Chemical Reaction Kinetics and Reactor Design: 3 semester hours.
Application of fundamental concepts of reaction stoichiometry, chemical and biochemical kinetics, and equilibria to the interpretation of reaction rate data. Application of reaction rate and heat and mass transfer correlations to the design of batch reactors, continuous staged reactors, and tubular reactors. Prerequisites: MATH 2043 (http://catalog.pvamu.edu/search/?P=MATH%202043) and CHEG 3053 (http://catalog.pvamu.edu/search/?P=CHEG%203053) and CHEG 2013 (http://catalog.pvamu.edu/search/?P=CHEG%202013).

CHEG 3113 Introduction to Energy Systems: 3 semester hours.
This course introduces fundamental physical and engineering principles associated with various energy systems. Basic energy concepts will be introduced describing the magnitudes and patterns of human energy needs. Historical evolution and present status of the conventional fossil and nuclear-fuelled energy will be investigated along with others such as hydropower, biofuels, and the developing renewable energy systems. Prerequisites: MATH 2024 (http://catalog.pvamu.edu/search/?P=MATH%202024) and CHEG 2023 (http://catalog.pvamu.edu/search/?P=CHEG%202023) and (CHEM 1034 (http://catalog.pvamu.edu/search/?P=CHEM%201034) or CHEM 1043 (http://catalog.pvamu.edu/search/?P=CHEM%201043)).

CHEG 3153 Introduction to Biotechnology: 3 semester hours.
This course introduces students of chemical engineering, biological sciences, and chemistry to biological concepts and Nano scale considerations in engineering applications. It provides training for effective communication, hands-on skills, and analytical tools needed to pursue careers in biological/ biochemical, and biopharmaceutical process industries. Ties to relevant current research will be explored. Prerequisites: CHEG 2153 (http://catalog.pvamu.edu/search/?P=CHEG%202153) (may be taken concurrently).

CHEG 3156 Chemical Engineering Internship II: 6 semester hours.
This course is an internship program of work experience with an approved engineering firm.

CHEG 4011 Chemical Engineering Laboratory II: 1 semester hour.
Chemical engineering laboratory directed to separation processes such as gas absorption, fractional distillation, extraction, and drying. Study of reaction rates and equilibria in simple chemical systems. Emphasis is placed upon experimental data required for the scale-up to commercial scale equipment. Prerequisites: CHEG 3023 (http://catalog.pvamu.edu/search/?P=CHEG%203023) (may be taken concurrently) and CHEG 3043 (http://catalog.pvamu.edu/search/?P=CHEG%203043) (may be taken concurrently) and (SPCH 1003 (may be taken concurrently) or COMM 1003 (http://catalog.pvamu.edu/search/?P=COMM%201003) (may be taken concurrently)) and (ENGL 1133 (http://catalog.pvamu.edu/search/?P=ENGL%201133) (may be taken concurrently) or ENGL 1143 (http://catalog.pvamu.edu/search/?P=ENGL%201143) (may be taken concurrently)) and PHYS 2511 (http://catalog.pvamu.edu/search/?P=PHYS%202511) (may be taken concurrently) and PHYH 2521 (http://catalog.pvamu.edu/search/?P=PHYH%202521) (may be taken concurrently) and CHEM 1021 (http://catalog.pvamu.edu/search/?P=CHEM%201021) (may be taken concurrently).

CHEG 4031 Chemical Engineering Laboratory III: 1 semester hour.
Chemical engineering laboratory with emphasis on reactive and control systems. Measurement of reaction conversion, determination of reaction order and rate in a tubular reactor. Analysis of the dynamic responses of stirred tanks in series. Experimental study of the use of analog and digital controller for heat exchanger and flow and level control systems. Prerequisites: CHEG 4033 (http://catalog.pvamu.edu/search/?P=CHEG%204033) (may be taken concurrently) and (SPCH 1003 or COMM 1003 (http://catalog.pvamu.edu/search/?P=COMM%201003)) and (ENGL 1133 (http://catalog.pvamu.edu/search/?P=ENGL%201133) or ENGL 1143 (http://catalog.pvamu.edu/search/?P=ENGL%201143)) and PHYS 2511 (http://catalog.pvamu.edu/search/?P=PHYH%202511) and PHYH 2521 (http://catalog.pvamu.edu/search/?P=PHYH%202521) and CHEM 1021 (http://catalog.pvamu.edu/search/?P=CHEM%201021).

CHEG 4033 Process Dynamics and Control: 3 semester hours.
Dynamic response and control of chemical process such as reactors, heat exchangers, distillation columns. Use is made of fundamental techniques of servomechanism theory such as block diagrams, transfer functions, and frequency response; stability analysis and control loop design. Unsteady state modeling and computer simulation of simple control systems. Prerequisites: CHEG 3063 (http://catalog.pvamu.edu/search/?P=CHEG%203063) (may be taken concurrently) and (MATH 4173 (http://catalog.pvamu.edu/search/?P=MATH%204173) (may be taken concurrently) or MATH 3685 (http://catalog.pvamu.edu/search/?P=MATH%203685) (may be taken concurrently)).
CHEG 4043 Chemical Process Design and Analysis: 3 semester hours.
Use of material and energy balance calculations, thermodynamics, transfer operations, reaction kinetics and process economics for the synthesis and analysis of chemical processing systems. Design alternatives are analyzed by the use of case studies, computerized flow sheet modeling and simulation, and optimization methods. Safety and design codes are emphasized.
Prerequisites: CHEG 3013 (http://catalog.pvamu.edu/search/?P=CHEG%203013) and CHEG 3023 (http://catalog.pvamu.edu/search/?P=CHEG%203023) and CHEG 3043 (http://catalog.pvamu.edu/search/?P=CHEG%203043) and CHEG 3063 (http://catalog.pvamu.edu/search/?P=CHEG%203063).

CHEG 4103 Special Topics in Chemical Engineering: 3 semester hours.
This course presents selected current and emerging topics in chemical engineering depending on need as determined by the department faculty.

CHEG 4133 Process Modeling and Simulation: 3 semester hours.
Construction and solution of mathematical models of process units and integrated systems for computer simulation. Both steady and dynamic models will be developed. Students will make use of one or more of the commercial flow sheet simulation programs for the analysis of specific systems.

CHEG 4153 Bioengineering: 3 semester hours.
Design and analysis of biochemical systems with applications in biomedical engineering and metabolic processes, enzyme catalyzed reactions and product separation, biomass production, and wastewater treatment. Emphasis is placed upon the application of biochemical systems structure, reaction kinetics, transport processes, and control in the design and use of biochemical reactors and separation units.

CHEG 4163 Engineering Optimization: 3 semester hours.
Optimization methodology, with a major focus on the techniques and stratagems relevant to engineering applications arising in design, operations and analysis, is emphasized. This includes linear, dynamic and nonlinear optimization techniques applied to engineering examples drawn from the chemical, industrial and mechanical engineering fields.

CHEG 4183 Design of Process Engineering Systems: 3 semester hours.
The course will stress the interdisciplinary nature of systems design and will include structural, hydraulic, process, utilities and control concepts. Development of one or more selected applications in optimal design of continuous and batch systems. Studies will involve the use of computer-aided design, cost estimation, engineering data bases, and project scheduling.
Prerequisites: CHEG 3013 (http://catalog.pvamu.edu/search/?P=CHEG%203013) and CHEG 3023 (http://catalog.pvamu.edu/search/?P=CHEG%203023) and CHEG 3043 (http://catalog.pvamu.edu/search/?P=CHEG%203043) and CHEG 3063 (http://catalog.pvamu.edu/search/?P=CHEG%203063).

CHEG 4472 Senior Design and Professionalism - I: 2 semester hours.
This is the first course of a two-semester capstone experience (CHEG 4482 (http://catalog.pvamu.edu/search/?P=CHEG%204482) must immediately follow 4472 or sequence must restart with 4472) involving engineering design of an industrial or advanced team project. Elements of ethics and professionalism in engineering practice are integrated into the project experience. The project will include application of relevant engineering codes and standards, as well as realistic constraints. Design achievements are demonstrated with written reports, and oral presentation, and professional standards and ethics examinations.
Prerequisites: CHEG 3013 (http://catalog.pvamu.edu/search/?P=CHEG%203013) and CHEG 3023 (http://catalog.pvamu.edu/search/?P=CHEG%203023) and CHEG 3043 (http://catalog.pvamu.edu/search/?P=CHEG%203043) and CHEG 3063 (http://catalog.pvamu.edu/search/?P=CHEG%203063).

CHEG 4482 Senior Design and Professionalism - II: 2 semester hours.
A continuation of CHEG 4472 (http://catalog.pvamu.edu/search/?P=CHEG%204472) with required design modifications of the team projects necessary to produce a working prototype of the designs initiated in Senior Design and Professionalism I. Design project deliverables include an oral presentation, as well as a final written report. Professionalism education will, and a formal demonstration of prototype, or model, of the design. Elements of professionalism reinforce the importance of professional engineering ethics, corporate culture, life-long learning, and globalization.
Prerequisites: CHEG 4472 (http://catalog.pvamu.edu/search/?P=CHEG%204472).

CHEG 4993 Independent Study: 1-3 semester hour.
Readings, research and/or field work on selected topics. This course is intended as a curriculum supplement for highly motivated students with special areas of interest. An individualized course of study, planned by student and advisor, is executed under the direction of the advisor.

CHEG 5013 Advanced Reaction Engineering: 3 semester hours.
Rates and mechanisms of chemical reactions. Thermo and catalytic reactions both homogeneous and heterogeneous with applications. Applications to design of new materials.

CHEG 5023 Microelectronics Materials: 3 semester hours.

CHEG 5033 Environmental Processes: 3 semester hours.

CHEG 5043 Remediation Technologies: 3 semester hours.