CHEMICAL ENGINEERING (CHE)

Subject-area course lists indicate courses currently active for offering at the University of Louisville. Not all courses are scheduled in any given academic term. For class offerings in a specific semester, refer to the Schedule of Classes (https://csprd.louisville.edu/psp/ps_class/EMPLOYEE/PSFT_CS/c/COMMUNITY_ACCESS.CLASS_SEARCH./x/?state=62dab551a0d600a5e8237359c50704e59007&duo_code=sjUx2OSTj21bJWVEuO3Z1YRiHmfxpqoV).

500-level courses generally are included in both the undergraduate- and graduate-level course listings; however, specific course/section offerings may vary between semesters. Students are responsible for ensuring that they enroll in courses that are applicable to their particular academic programs.

Course Fees

Some courses may carry fees beyond the standard tuition costs to cover additional support or materials. Program-, subject- and course-specific fee information can be found on the Office of the Bursar website (https://louisville.edu/bursar/tuitionfee/university-fees/).

CHE 205. Introduction to Chemical Engineering **3 Units**
Term Typically Offered: Summer Only
Prerequisite(s): ENGR 101, CHEM 201.
Corequisite(s): CHE 230.
Description: Overview of chemical engineering practice and basic principles; problem-solving techniques; open-ended problems and hands-on projects to introduce design concepts.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 211. Chemical Engineering Thermodynamics I **3 Units**
Term Typically Offered: Fall Only
Prerequisite(s): ENGR 102 and CHEM 202.
Description: Development of first law, PVT behavior of pure fluids and heat effects, development of second law, thermodynamic properties of pure fluids, applications of first and second laws to realistic chemical engineering problems, conversion of heat and work-basic cycles.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 230. Computer Applications in Chemical Engineering **2 Units**
Term Typically Offered: Summer Only
Prerequisite(s): ENGR 101, CHEM 201.
Corequisite(s): CHE 205.
Description: Introduction to computer software relevant to solving ChE problems, development of computer solutions to selected problems involving thermodynamics, fluid dynamics, heat and mass transfer, and reactor design.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 253. Materials Science **3 Units**
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): CHEM 201.
Description: The properties of materials as reflected by the atomic and electronic structure of their constituent elements. Mechanical, thermal, electrical, magnetic, optical, and chemical characteristics of metallic, ceramic, polymeric, and composite solids.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 288. Chemical Engineering Cooperative Education Seminar **0 Units**
Grading Basis: Pass/Fail
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): ENGL 101, ENGR 110, student must be in Good Standing with GPA of 2.25 or higher; CHE 211, CHE 305, ENGR 201.
Corequisite(s): CHE 211, CHE 305, ENGR 201.
Description: Discussion of the policies and procedures for cooperative education; instruction in job search techniques, including resume preparation, forwarding letters, and behavioral interviewing. The student performance appraisal is explained, along with how to be successful in the workplace. The job market is discussed along with company descriptions. In addition the requirements for the Co-op Report are explained. Question and answer sessions with returning students and co-op employers are included. The student also receives training in the use of the University Career Services Management System. This seminar is a prerequisite for the first cooperative education term.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 289. Chemical Engineering Cooperative Education I **1 Unit**
Grading Basis: Pass/Fail
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): ENGR 201, CHE 211, CHE 288, and CHE 305.
Fee: An additional $300.00 is charged for this course.
Description: Full-time technical work experience related to the student's academic program.
Course Attribute(s): CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.

For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 305. Material and Energy Balances **4 Units**
Term Typically Offered: Fall Only
Prerequisite(s): ENGR 102 and CHE 205.
Description: Stoichiometry, material balances, energy balances, combined material and energy balances for non-flow and flow systems. Problem solving and introduction of computer methods in chemical engineering. Career orientation. Open-ended problems introduce design concepts.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 312. Chemical Engineering Thermodynamics II **3 Units**
Term Typically Offered: Summer Only
Prerequisite(s): CHE 211.
Description: Fluid mixtures and mixed phase systems, basic vapor-liquid equilibrium (VLE), followed by theory and application of solution thermodynamics, chemical-reaction equilibrium; extension of phase equilibria to include liquid-liquid (LL), vapor-liquid-liquid (VLL), solid-liquid (SL), and solid-vapor (SV) systems.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 331. Principles of Fluid Dynamics **3 Units**
Term Typically Offered: Summer Only
Prerequisite(s): CHE 305 Principles of momentum transfer; Newtonian and non-Newtonian behavior; friction factors and pressure drops in laminar and turbulent flow; design of piping systems and fluid metering devices; fluid moving machinery-types, characteristics and selection of pumps and compressors.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 351. Physical Chemistry **3 Units**
Term Typically Offered: Spring Only
Prerequisite(s): CHE 312.
Description: Correlation of molecular, physical and chemical phenomena to properties of matter and to common engineering situations. Topics include statistical thermodynamics, kinetics and surface chemistry, photochemistry and electrochemical systems.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 389. Chemical Engineering Cooperative Education II **1 Unit**
Grading Basis: Pass/Fail
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): ENGR 205, CHE 289, CHE 312, and CHE 331.
Fee: An additional $300.00 is charged for this course.
Description: Full-time technical work experience related to the student's academic program.
Course Attribute(s): CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.

For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 401. Safety, Health and Environment **1 Unit**
Term Typically Offered: Summer Only
Prerequisite(s): CHE 305.
Description: A survey of the common regulations that Chemical Engineers deal with in the process industries, e.g., OSHA, RCRA, TSCA, etc. Overview of safety, health and environmental issues that Chemical Engineers in the process industries must consider.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 405. Practicum in Chemical Engineering Education **1 Unit**
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): CHE 253, CHE 305, and consent of the instructor.
Description: A guided learning experience in inquiry-based instructional techniques and best practices in STEM education that includes field experience as an undergraduate teaching assistant. Permission to enroll is required.
Note: May be repeated for a maximum of 3 credit hours.

For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 430. Computer Applications in Chemical Engineering **3 Units**
Term Typically Offered: Spring Only
Prerequisite(s): ENGR 205, CHE 312, and CHE 331.
Description: Computer solutions of selected problems involving thermodynamics, fluid dynamics, heat transfer, and reactor design. May include introduction to process simulators such as ASPEN PLUS, ChemCAD etc. Problems include modeling and design of piping networks, reactors, separation processes, etc.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 433. Principles of Heat and Mass Transfer **3 Units**
Term Typically Offered: Spring Only
Prerequisite(s): ENGR 205, CHE 312, and CHE 331.
Description: Fundamental mechanisms of heat transfer through conduction, convection and radiation and their correlation to the principles of mass transfer with applications to the design of heat exchange equipment as well as continuous and stage-wise mass transfer operations.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 436. Separation Operations **4 Units**
Term Typically Offered: Fall Only
Prerequisite(s): CHE 433.
Description: A study of mechanical and chemical separation operations based on the principles of momentum transfer and simultaneous heat and mass transfer. Both traditional and newer separation methods included. Component design is emphasized.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 441. Kinetics and Chemical Reactors **3 Units**
Term Typically Offered: Spring Only
Prerequisite(s): CHE 312 and CHE 331.
Description: Basic kinetics for batch reactors, including data analysis by integral and differential methods. Design of tubular and tank reactors for homogeneous reaction systems, including non-isothermal effects and product selectivity problems. Enzyme kinetics.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 461. Elements of Process Control **3 Units**
Term Typically Offered: Spring Only
Prerequisite(s): ENGR 205 and CHE 436.
Description: Linear control theory and its application to the solution of process control problems. Design of control schemes.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 471. The Strategy of Design **3 Units**
Term Typically Offered: Fall Only
Prerequisite(s): CHE 401, CHE 433 and CHE 441.
Description: The techniques and strategies of chemical process design. Technical factors, including synthesis paths, process synthesis, utilities, controls, instrumentation, safety, health and environmental issues, etc. and economic factors such as measures of profitability, time value of money, etc. are considered in developing flowsheets for a chemical process. A case-study approach is used. Computer techniques involving spreadsheets and simulators are used where applicable. Rewriting and editing of a series of written assignments is expected.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 485. Unit Operations Laboratory I **2 Units**
Term Typically Offered: Fall Only
Prerequisite(s): CHE 433.
Description: Selected experiments covering the areas of fluid mechanics, momentum and heat transfer. Written technical communications covering experiments will be emphasized.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 486. Unit Operations Laboratory II **2 Units**
Term Typically Offered: Spring Only
Prerequisite(s): CHE 436 and CHE 441.
Description: Selected mass transfer experiments covering such areas as filtration, drying, distillation, evaporation, absorption, membrane separations, kinetics, fermentation, environmental concerns, etc. Written and oral technical communications covering the experiments will be emphasized.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 489. Chemical Engineering Cooperative Education III **1 Unit**
Grading Basis: Pass/Fail
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): CHE 389 and CHE 433.
Fee: An additional $300.00 is charged for this course.
Description: Full-time technical work experience related to the student's academic program.
Course Attribute(s): CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.

For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 493. Undergraduate Research in Chemical Engineering **1-6 Units**
Term Typically Offered: Occasionally Offered
Prerequisite(s): Approval of a faculty sponsor.
Description: Students will perform independent and guided research under the direction of a faculty member.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 494. Current Topics in Chemical Engineering **3 Units**
Prerequisite(s): Permission of instructor; varies depending on the topic.
Description: Current topics and recent developments in the field of Chemical Engineering will be presented on an as-needed basis.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 502. Biochemical Engineering **3 Units**
Term Typically Offered: Occasionally Offered
Prerequisite(s): CHE 433 (or concurrent) and CHE 441 (or concurrent).
Description: Engineering principles related to operations involving biological processes, e.g., fermentation. Basic microbiology and biochemistry; biochemical reaction mechanisms, kinetics, rate processes, and separation techniques. Applications to foods, pharmaceuticals, and waste treatment, including system design.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 503. Fundamentals of Engineering Examination Review **2 Units**
Grading Basis: Pass/Fail
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): 4th-year standing.
Description: Review of topics covered on eight-hour NCEES Fundamentals of Engineering examination. Not to be counted towards meeting the requirements for a degree.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 509. Environmental Processes and Systems **3 Units**
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): CEE 309 or CHE 401.
Description: This course examines scientific and engineering aspects of environmental problems, stressing important issues, existing technical solutions and new solutions. The course presents engineering approaches to natural systems and describes techniques to treat/eliminate environmental problems.
Note: Cross-listed with CEE 509.

For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 520. Modeling and Transport Phenomena **3 Units**
Term Typically Offered: Spring Only
Prerequisite(s): CHE 433 and CHE 441.
Description: An introduction to the interrelationship of momentum, heat and mass transport focusing on the development of the equations of change through the use of shell balances and their relation to earlier courses in fluids,heat and mass transfer. Some focus will be placed on this using material in the modeling of basic chemical engineering systems.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 532. Advanced Material Science **3 Units**
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): 90 or more credit hours.
Description: Advanced study of materials science. Topics may include the electronic and atomic structure of materials; properties characterized by electron motion; properties associated with atomic motion; applications and synthesis of fundamentals to several real problems; science of thin films; or other topics selected by the instructor.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 533. Chemical Engineering Safety and Health **3 Units**
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): 90 or more credit hours.
Description: Overview of regulations and industrial practices, emphasizing chemical hazards, including: industrial hygiene, toxicology, controls and hazards analysis. Safety considerations in process design.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 534. Industrial Waste Management **3 Units**
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): 90 or more credit hours.
Description: A survey of regulations, generation, control and management of industrial wastes and environmental hazards: airborne, aqueous, solids and hazardous wastes. Course includes guest speakers, site visits and a term project. Design of waste treatment facilities.
Note: Cross-listed with CEE 534.

For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 535. Pollution Prevention **3 Units**
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): 90 or more credit hours.
Description: Multimedia pollution prevention and waste minimization of hazardous and non-hazardous wastes and emissions: toxics use reduction; source reduction; reuse, reclamation and recycling; product life-cycle analysis; economic evaluation; assessments; planning and management.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 550. Kinetics of Polymer Reactions **3 Units**
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): CHE 441 and CHEM 341.
Description: Kinetic expressions are developed for several polymer reaction mechanisms including chain, step, ionic and emulsion reactions; copolymerization; polymer reaction engineering; molecular weight distributions; structural considerations; design considerations.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 551. Polymer Science **3 Units**
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): CHEM 341.
Description: Introduction to polymer science and engineering. Polymer synthesis, kinetics, structure, and properties; commercial polymers; polymer processing; equipment design.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 562. Process Control Laboratory **1 Unit**
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): CHE 461.
Description: A laboratory course demonstrating computer simulation and the characteristics of sensing and control devices and their interactions when incorporated into process control systems.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 572. Plant Process and Project Design - CUE **3 Units**
Term Typically Offered: Spring Only
Prerequisite(s): CHE 471.
Description: The design and economic evaluation of a chemical plant, from process definition and flow sheet construction to a cash position diagram and measures of profitability.
Course Attribute(s): CUE - This course fulfills the Culminating Undergraduate Experience (CUE) requirement for certain degree programs. CUE courses are advanced-level courses intended for majors with at least 90 earned credits/senior-level status., CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.

For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 574. Techniques of Research **3 Units**
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): 90 or more credit hours.
Description: The design, analysis, and interpretation of experimental results to obtain the desired information within reasonable constraints of time and expense. Testing predictions and making reliable decisions utilizing graphical, numerical, and statistical techniques.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 581. Chemical Vapor Deposition and Processing **3 Units**
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): CHE 253, CHE 441 and CHE 436 or the consent of the instructor.
Description: Theoretical and experimental concepts involved with chemical vapor desposition and processing of advanced and nanomaterials.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 593. Independent Study in Chemical Engineering **1-6 Units**
Term Typically Offered: Fall, Spring, Summer
Description: Independent research conducted with the approval and supervision of a faculty member.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 594. Special Topics in Chemical Engineering **3 Units**
Term Typically Offered: Fall, Spring, Summer
Description: An examination of one or more specific areas of Chemical Engineering. Details announced each semester.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

CHE 595. Master of Engineering Seminar in Chemical Engineering **1 Unit**
Grading Basis: Pass/Fail
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): Fifth-year standing.
Description: Presentation and/or discussion of topics of current interest. This course is available to students enrolled in the professional school, division of higher studies or the Graduate School.
For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)