4132 Chemical Engineering Thermodynamics (F) Prereq.: CHE 2171 and credit or registration in CHE 3102.
4171 Heterogeneous Equilibrium (S) Prereq.: CHE 3172. Theory of vapor-liquid, liquid-liquid, and solid-liquid equilibrium, including the effects of chemical reactions; application of thermodynamic theory to the correlation of equilibrium data and the prediction of equilibrium compositions.
4242, 3250 Engineering Practice (1-3, 1-3) Su only Prereq.: consent of instructor. Pass-fail grading. A minimum of 6 weeks of full-time employment by an industry participating in the summer program. Selected engineering problems in an industrial environment.
3271, 3272 Senior Projects (1-2, 1-2) Prereq.: consent of department; and the successful completion of the Comprehensive Examination. Senior projects analyzed as applications of chemical engineering fundamentals to industrial processes and transport phenomena; use of these principles in design calculations.
4162 Unit Operations Laboratory (F) Prereq.: CHE 3104 and credit or registration in CHE 4151. 1 hr. lecture; 6 hrs. lab. Obtaining and interpreting data needed to solve typical problems in design or operation of chemical engineering equipment.
4172 Process Design (S) Prereq.: CHE 4151 and 4190. 3 hrs. lecture; 3 hrs. lab. Chemical plant design from initial concept through preliminary estimate; flow diagrams, equipment cost estimation, economic analysis, safety, and environmental issues; computer-aided process design.
4190 Chemical Reaction Engineering (F) Prereq.: CHE 3102, 3171, or 3172. Prereq.: CHE 3102 or equivalent. Unit operations analyzed as applications of chemical engineering fundamentals and transport phenomena; use of these principles in design calculations.
4245, 4250 Engineering Practice (1-3, 1-3) Su only Prereq.: consent of instructor. Pass-fail grading. A minimum of 6 weeks of full-time employment by an industry participating in the summer program. Selected engineering problems in an industrial environment.
3271, 3272 Senior Projects (1-2, 1-2) Prereq.: consent of department; and the successful completion of the Comprehensive Examination. Senior projects analyzed as applications of chemical engineering fundamentals to industrial processes and transport phenomena; use of these principles in design calculations.
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3271, 3272 Senior Projects (1-2, 1-2) Prereq.: consent of department; and the successful completion of the Comprehensive Examination. Senior projects analyzed as applications of chemical engineering fundamentals to industrial processes and transport phenomena; use of these principles in design calculations.
topics including: turbulence, non-Newtonian fluids, interfacial flows, computational fluid dynamics, micromagnetics, and deep-throat techniques.

7110 Mathematical Methods in Chemical Engineering (3)* F Review of physical-chemical problem formulation; analytical and numerical techniques for the solution of linear and nonlinear differential equation models in chemical engineering systems.

7120 Chemical Engineering Thermodynamics (3) F Thermodynamic properties, first and second laws of thermodynamics, entropy, Maxwell relations, and relationship of thermodynamics to intermolecular potentials; physical equilibrium with emphasis on partial free energy, fugacity, Raoult's law, K-values, equations of state, and activity coefficients; chemical equilibrium and free energies; fundamentals of statistical mechanics.

7130 Fundamentals of Transport Phenomena (3) S Foundations of heat and mass transport in continuum: modeling and solution techniques; transport by diffusion, convection, and turbulence; forced convection; buoyancy-driven introduction to computational fluid dynamics.

7140 Chemical Reactor Design Methods (3) S Basic principles of chemical kinetics, fluid flow, heat transfer, and mass transfer used in design of chemical reactors; chemical equilibria, chemical kinetics, design of isothermal reactors, effects of nonideal flow, nonisothermal reactors, and solid-gas catalytic reactions.

7141 Chemical Thermodynamics (3) S Techniques of optimization including analytical methods, linear and nonlinear programming, geometric and dynamic programming, and variational methods with application to systems of interest to chemical engineers.

7525 Distillation and Other Separation Processes (3) M Mathematical models, phase equilibria, and calculations procedures related to design and behavior of distillation columns, absorbers, extractor-settlers, etc.; emphasis on computational techniques.

7526 Advanced Chemical Engineering Thermodynamics (3) Prereq.: CHE 7120 or equivalent. May be taken for a max. of 6 hrs. of credit with consent of department. Thermodynamics of chemical engineering processes, such as nonequilibrium thermodynamic properties.

7532 Advanced Chemical Engineering Fluid Mechanics (3) Prereq.: CHE 7100 or equivalent. May be taken for a max. of 6 hrs. of credit with consent of department. Chemical engineering flow processes, such as turbulence, boundary layer theory, hydrodynamic stability, compressible flow, multiphase flow, chemically reacting flows, and non-Newtonian and viscoelastic fluids.

7534 Advanced Chemical Engineering Heat Transfer (3) Prereq.: CHE 7130 or equivalent. May be taken for a max. of 6 hrs. of credit with consent of department. Thermophysical processes: heat transfer; phase change and moving boundary problems; heat transfer mechanisms, natural and forced convection, radiation, and conductive heat transfer. Laboratory usage deposit.

7536 Advanced Chemical Engineering Mass Transfer (3) Prereq.: CHE 7130 or equivalent. May be taken for a max. of 6 hrs. of credit with consent of department. Thermophysical processes: transport of mass in chemical engineering processes, such as diffusional operations, models for mass transfer in multi-component, multiphase, stationary, flowing, and recirculating systems.

7542 Catalysis (3) Prereq.: CHE 7140 or equivalent. Heterogeneous catalysis: adsorption phenomena, physical mechanisms, solid state spectroscopies, and reaction mechanisms as applicable to fundamental and industrially significant processes.

7544 Chemical Kinetics and Reaction Mechanisms (3) Prereq.: CHE 7140 or equivalent. Gas-phase reactions and modern approach to deduction of reaction mechanism; collision theory, including RRK and RRKM theories, bond energy correlations, kinetics of complex reaction systems, fast reactions, computer modeling, and sensitivity analysis.

7721 Environmental Control Process (3) Prereq.: CHE 4198 or equivalent. Application of digital computer based control systems to air pollution control; relationships between computer and process control schemes, control algorithms, valve dynamics, modeling techniques.

7822 Polymerization and Polycrystalline Processes (4) Prereq.: CHEM 4160 or 4562 or CHEM 4285 or equivalent. 5 hrs. laboratory in addition. Also offered as CHEM 7261. Preparation and characterization of high polymers, typical commercial procedures for plastics production.

7502 Design Problems in Chemical Engineering (3) Prereq.: CHEM 3491. May be repeated for a max. of 2 yrs. Credit will not be given for this course and CHEM 2501 or 2502. Credit will not be given for both this course and CHEM 2501 or 2502. Representative cases of industrial concern to students in modern chemical engineering and chemical processes.

8206 Survey of Organic Chemistry (3) Prereq.: CHEM 2060 and 2461. Aliphatic and aromatic compounds; biological aspects of organic chemistry. May be taken for a max. of 6 hrs. Credit will not be given for this course and CHEM 2060 and 2461. Chemical analysis techniques for use in industrial practice of modern and classical methods for molecular characterization.

8208 Physical Chemistry Laboratory (2) S Prereq.: CHEM 2060 or 2461. Laboratory usage deposit. May be taken for a max. of 3 hrs. of credit with consent of instructor. One or more phases of advanced chemical engineering practice.

8000 Thesis Research (1-12 per sem.) S'TU' grading. 9000 Dissertation Research (1-12 per sem.) S'TU' grading.

CHEMISTRY + CHEM Laboratory Expenses • Students registering for laboratory courses in chemistry are charged a laboratory usage deposit on their fee bill.

Corequisites • A student may not continue in a course if the prerequisite course is dropped prior to the last day of the midterm examination period.

General education courses are marked with stars (★)
★★ 1001 Fundamental Chemicals (3) Prereq.: ACT mathematics score of at least 21 or eligibility for MATH 1021. For those students whose curricula require only one year of chemistry or physical science. Also may be taken as a preparatory course for CHEM 1201. An overview of chemical theory with emphasis on the role of chemistry in the modern world.
★★ 1002 Chemistry of Life and the Environment (3) Prereq.: CHEM 1001 or CHEM 1001A. An overview of organic chemistry and biochemistry; emphasis on the molecular basis for the biological, materials, and environmental sciences.
★★ 1201 General Chemistry I (3) Prereq.: credit or registration in MATH 1022, 1023, 1431, 1550, or 1551. Credit will not be given for this course and CHEM 1421. For chemistry majors who qualify should take this course. Preparation in chemistry and a quantitative approach to the study of the chemical sciences. May be taken for a max. of 3 hrs. of credit with consent of instructor. One or more phases of advanced chemical engineering practice.
★★ 1202 General Chemistry II (3) Prereq.: credit or registration in MATH 1022, 1023, 1431, 1550, or 1551. Credit will not be given for both this course and CHEM 1422. For science/engineering majors. Laboratory usage deposit.
★★ 1401 Physical Chemistry (3) Prereq.: CHEM 1201 or 1431. May be taken as a preparatory course for CHEM 1201. May be taken as a preparatory course for CHEM 1201. An overview of chemical principles and problem solving; descriptive chemistry of selected elements and compounds.
★★ 1203 General Chemistry (3) Prereq.: credit or registration in MATH 1022, 1023, 1431, 1550, or 1551. Credit will not be given for this course and CHEM 1421. For chemistry majors who qualify should take this course. Preparation in chemistry and a quantitative approach to the study of the chemical sciences. May be taken for a max. of 3 hrs. of credit with consent of instructor. One or more phases of advanced chemical engineering practice.
★★ 1421 HONORS: General Chemistry (3) Prereq.: ACT mathematics score of at least 27 or eligibility for MATH 1550. Credit will not be given for both this course and CHEM 1201. Chemistry majors who qualify should take this course. For well-prepared students with a special interest in chemistry. Credit will be given for this course and CHEM 1421.
★★ 1422 HONORS: General Chemistry (3) Prereq.: credit or registration in CHEM 1201, 1202, 1431, or 1432. 6 hrs. lab. Credit will not be given for both this course and CHEM 1413. Laboratory usage deposit. May be taken for a max. of 6 hrs. of credit with consent of instructor. One or more phases of advanced chemical engineering practice.
★★ 1423 HONORS: General Chemistry (3) Prereq.: CHEM 1201 or 1431 with consent of department chair. Chemistry majors who qualify should take this course. For well-prepared students with a special interest in chemistry. Credit will not be given for both this course and CHEM 1202. Continuation of CHEM 1421.
★★ 1431 HONORS: General Chemistry Laboratory (2) Prereq.: credit or registration in CHEM 1202, 1431, or 1432. 6 hrs. lab. Credit will not be given for both this course and CHEM 1431. Laboratory usage deposit. May be taken for a max. of 6 hrs. of credit with consent of instructor. One or more phases of advanced chemical engineering practice.
★★ 1432 HONORS: General Chemistry (3) Prereq.: CHEM 1201 or 1431 with consent of department chair. Chemistry majors who qualify should take this course. For well-prepared students with a special interest in chemistry. Credit will not be given for both this course and CHEM 1201. Chemistry majors who qualify should take this course. For well-prepared students with a special interest in chemistry. Credit will be given for this course and CHEM 1421.
★★ 1441 HONORS: General Chemistry Laboratory (2) Prereq.: credit or registration in CHEM 1202. 6 hrs. lab. Credit will not be given for both this course and CHEM 1431. Laboratory usage deposit. May be taken for a max. of 6 hrs. of credit with consent of instructor. One or more phases of advanced chemical engineering practice.
★★ 1425 HONORS: General Chemistry (3) Prereq.: CHEM 1201 or 1431 with consent of department chair. Chemistry majors who qualify should take this course. For well-prepared students with a special interest in chemistry. Credit will not be given for both this course and CHEM 1202. Continuation of CHEM 1421.
★★ 1431 HONORS: General Chemistry Laboratory (2) Prereq.: credit or registration in CHEM 1202. 6 hrs. lab. Credit will not be given for both this course and CHEM 1431. Laboratory usage deposit. May be taken for a max. of 6 hrs. of credit with consent of instructor. One or more phases of advanced chemical engineering practice.
★★ 1441 HONORS: General Chemistry Laboratory (2) Prereq.: credit or registration in CHEM 1202. 6 hrs. lab. Credit will not be given for both this course and CHEM 1431. Laboratory usage deposit. May be taken for a max. of 6 hrs. of credit with consent of instructor. One or more phases of advanced chemical engineering practice.
★★ 1425 HONORS: General Chemistry (3) Prereq.: CHEM 1201 or 1431 with consent of department chair. Chemistry majors who qualify should take this course. For well-prepared students with a special interest in chemistry. Credit will not be given for both this course and CHEM 1202. Continuation of CHEM 1421.