

CHEMISTRY (CHMY)

CHMY 104 - Preparation for Chemistry. 4 Credits.

Offered autumn. Prereq., EdReady placement level 2; or SAT 530; or ACT 21; or Maplesoft Arithmetic score ≥ 16 ; or Maplesoft Algebra score ≥ 14 ; or M 090 (Introductory Algebra) w/ C+ or better. An introduction to concepts and calculations in chemistry that provides preparation for CHMY 141N. Not appropriate toward chemistry requirement in any major.

CHMY 121N - Introduction to General Chemistry. 4 Credits.

Offered autumn and spring. First semester of an introduction to general, inorganic, organic and biological chemistry. The course consists of three 1-hour face-to-face lectures per week plus a 1-hour integrated recitation each week.

Gen Ed Attributes: Natural Science

CHMY 122 - Introduction to General Chemistry Lab. 1 Credit.

Offered autumn and spring. Prereq., Enrolled in the Missoula College Nursing program. Prereq. or coreq., CHMY 121N or equivalent. A laboratory course emphasizing inorganic chemistry, quantitative relations and synthesis of inorganic and organic compounds.

CHMY 123 - Introduction to Organic and Biochemistry. 4 Credits.

Offered autumn and spring. Prereq., CHMY 121N or CHMY 141N or consent of instr. Second semester of an introduction to general, inorganic, organic and biological chemistry.

CHMY 124 - Introduction to Organic and Biochemistry Lab. 2 Credits.

Offered autumn and spring. Prereq. or coreq., CHMY 123. Laboratory to accompany CHMY 123.

CHMY 141N - College Chemistry I. 4 Credits.

Offered autumn and spring. Prereq., EdReady placement level 3; or SAT 560; or ACT 23; or Maplesoft Algebra score ≥ 14 ; or M 095 Intermediate Algebra w/ RC+ or better and Chemistry Placement Exam score ≥ 13 ; or CHMY 104 w/ C- or better. Coreq. or Prereq., CHMY 142N. For science majors and other students intending to take more than one year of chemistry. Properties of elements, inorganic compounds, liquid solutions, chemical equilibria and chemical kinetics.

Gen Ed Attributes: Natural Science

CHMY 142N - College Chemistry I Lab. 1 Credit.

Offered Autumn and Spring. Prereq., or Coreq., CHMY 141N. Use of experimental methodologies, scientific questioning and hypothesis driven guided inquiry experiments to explore and understand important fundamental chemical and laboratory concepts including stoichiometry, measurements, molecular structure, and thermodynamics. Gen Ed Attributes: Natural Science Lab Course (N)

Gen Ed Attributes: Natural Science Lab Course, Natural Science

CHMY 143N - College Chemistry II. 4 Credits.

Offered spring and summer. Prereq., CHMY 141N or consent of instr. Prereq., or Coreq., CHMY 144N. A continuation of CHMY 141N.

Gen Ed Attributes: Natural Science

CHMY 144N - College Chemistry II Lab. 1 Credit.

Offered spring and summer. Prereq., or Coreq., CHMY 143N. Continuation of CHMY 142N. Gen Ed Attributes: Natural Science Lab Course (N)

Gen Ed Attributes: Natural Science Lab Course, Natural Science

CHMY 191 - Special Topics/Experimental Course. 1-6 Credits.

(R-6) Offered intermittently. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics.

CHMY 192 - Independent Study. 1-10 Credits.

CHMY 195 - Student Teaching. 1-6 Credits.

(R-6) Offered intermittently. Offered at Missoula College. Organized student teaching.

CHMY 221 - Organic Chemistry I. 3 Credits.

Offered autumn. Prereq., CHMY 123N or 143N. The chemical and physical properties of organic compounds.

CHMY 222 - Organic Chemistry I Lab. 2 Credits.

Offered autumn. Coreq., CHMY 221; prereq., one semester of 100-level laboratory. Microscale techniques are emphasized.

CHMY 223 - Organic Chemistry II. 3 Credits.

Offered spring. Prereq., CHMY 221. Continuation of 221.

CHMY 224 - Organic Chemistry II Lab. 2 Credits.

Offered spring. Prereq., CHMY 222; prereq. or coreq., CHMY 223.

CHMY 290 - Undergraduate Research. 1-6 Credits.

(R-6) Offered intermittently. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics.

CHMY 291 - Special Topics/Expmntl Crse. 1-6 Credits.

(R-6) Offered intermittently. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics.

CHMY 292 - Independent Study. 1-10 Credits.

(R-10) Offered autumn and spring. Prereq., one semester of chemistry and consent of instr. Laboratory investigations and research in the laboratory of a faculty member.

CHMY 294 - Seminar/Workshop. 1-3 Credits.

(R-6) Offered intermittently. Topic varies.

CHMY 311 - Analytical Chemistry-Quantitative Analysis. 4 Credits.

Offered autumn. Prereq., one year of college chemistry, including laboratory. Classroom and laboratory work in gravimetric, volumetric, colorimetric and electrochemical methods of analysis; theory of errors; ionic equilibria in aqueous solutions.

CHMY 313 - Introduction to Brewing Science. 1 Credit.

Offered autumn. Prereq., CHMY 123 and BIOB 160. Introduction and review of chemistry, biochemistry and microbiology fundamentals needed to complete CHMY 314 Brewing Science.

CHMY 314 - Brewing Science. 3 Credits.

Offered autumn. Prereq., CHMY 313 or BIOM 360, CHMY 311, and BCH 380 or BCH 480. Advanced malting and brewing chemistry, biochemistry and microbiology, including lecture, laboratory, and practical components.

CHMY 371 - Physical Chemistry-Quantum Chemistry & Spectroscopy. 4 Credits.

Offered spring. Prereq., CHMY 373. Systematic treatment of the laws and theories relating to chemical phenomena.

CHMY 373 - Physical Chemistry-Kinetics & Thermodynamics. 4 Credits.

Offered autumn. Prereq., CHMY 143N, M 172, and PHSX 217N. Systematic treatment of the laws and theories relating to chemical phenomena.

CHMY 390 - Undergraduate Research. 1 Credit.

Offered every term. Prereq., CHEM 161N-162N with B or better and consent of instr. Methods of peer-led team learning as applied to general chemistry instruction. Review of concepts from general chemistry. Student leaders mentor a team of general chemistry students in working toward constructing chemistry knowledge and developing problem-solving skills.

CHMY 391 - Special Topics/Experimental Course. 1-9 Credits.

(R-9) Offered intermittently. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics.

CHMY 392 - Independent Study. 1-9 Credits.

(R-9) Offered intermittently. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics.

CHMY 397 - Teaching Chemistry. 1 Credit.

Offered every term. Prereq., CHMY 141N-143N with B or better and consent of instr. Methods of peer-led team learning as applied to general chemistry instruction. Review of concepts from general chemistry. Student leaders mentor a team of general chemistry students in working toward constructing chemistry knowledge and developing problem-solving skills.

CHMY 398 - Internship/Cooperative Education. 1-6 Credits.

Offered autumn and spring. Prereq., consent of department. Extended classroom experience which provides practical application of classroom learning during placements off campus. Prior approval must be obtained from the faculty supervisor and the Internship Services office. A maximum of 6 credits of Internship (198, 298, 398, 498) may count toward graduation.

CHMY 401 - Advanced Inorganic Chemistry. 3 Credits.

Offered autumn. Prereq., CHMY 223. Theory and principles of inorganic chemistry and a systematic coverage of descriptive inorganic chemistry in the context of the periodic table. Level: Undergraduate-Graduate

CHMY 402 - Advanced Inorganic Chemistry Lab. 2 Credits.

Offered spring. Prereq., CHMY 224 AND 360 or 373 and consent of instr. Preparation of inorganic and coordination compounds. Isolation and characterization by ion exchange, column chromatography, IR, UV-VIS, derivatives, MP, and BP. Level: Undergraduate-Graduate

CHMY 403 - Descriptive Inorganic Chemistry. 3 Credits.

Prereq., CHMY 221-222, 360 or 373-371, and 401. A survey of the chemistry of the elements including transition metal reaction mechanisms, redox chemistry, organometallic chemistry, bioinorganic chemistry. Level: Undergraduate

CHMY 411 - Advanced Organic Chemistry. 3 Credits.

Offered intermittently. Prereqs., CHMY221 and CHMY223 (the sophomore organic chemistry sequence). The course is study of organic chemistry which covers chemoinformatics, structure and conformation, acid-base properties, kinetics/thermodynamics, mechanisms and reactivity, and synthetic strategy and key reactions. Level: Undergraduate-Graduate

CHMY 420 - Chemoinformatics. 3 Credits.

Offered Spring in even years. Demonstration of the wide possibilities of chemical computer modeling through a series of lectures and guided programming/simulation projects. The course will cover structure representations, representation interconversions, structure/reaction database searching, and structure similarity searching, followed by methods for the prediction of bulk properties, structures, reaction mechanisms, biological activity predictions and the design of drugs. Level: Undergraduate-Graduate

CHMY 421 - Advanced Instrument Analysis. 4 Credits.

Offered spring. Prereq., CHMY 311. Theory and use of instrumental methods in the study of analytical and physical chemistry. Level: Undergraduate-Graduate

CHMY 442 - Aquatic Chemistry. 3 Credits.

Offered autumn odd-numbered years. Prereq., CHMY 311 or consent of instr. Application of chemical equilibria theory for understanding and modeling chemical processes in natural waters with an emphasis on spreadsheet computations. In depth examination of concepts such as pH, alkalinity, buffering, and solubility as they apply to natural waters. Level: Undergraduate-Graduate

CHMY 465 - Organic Spectroscopy. 3 Credits.

Offered intermittently. Prereq., one year of organic chemistry or consent of instr. Theory and interpretation of the NMR, IR, UV, and mass spectra of organic compounds with the goal of structure identification. Enrollment is capped at 16 for this course. Level: Undergraduate-Graduate

CHMY 466 - FT-NMR Option for Undergraduate Research. 1 Credit.

Offered intermittently. Prereq., CHMY 221-222; research project using NMR; consent of instr. Operation of the FT-NMR spectrometer and brief background of NMR spectroscopy. Level: Undergraduate

CHMY 485 - Laboratory Safety. 1 Credit.

Offered autumn. Prereq., one year of college chemistry. This course is for students who plan to teach high school and middle school science. Legal responsibilities of teachers, awareness of laboratory hazards and how to manage those hazards, resources for information regarding laboratory hazards. Level: Undergraduate-Graduate

CHMY 488 - Forensic Research. 3 Credits.

Offered autumn, spring and summer. Prereq., consent of instr. Laboratory investigations and research on forensic chemistry topics under the direction of a faculty member. Level: Undergraduate

CHMY 489 - Forensic Research Seminar. 1 Credit.

Offered autumn. Prereq., CHMY 421 and ANTH 286N. Seminar speakers on forensic science topics in the areas of ethics, law, anthropology and criminology; tours of the Montana State Crime Laboratory. Level: Undergraduate

CHMY 490 - Undergraduate Research. 1-9 Credits.

(R-9) Offered autumn, spring, and summer. Prereq., consent of instr. Laboratory investigations and research in the laboratory of a faculty member. Level: Undergraduate

CHMY 491 - Special Topics/Experimental Course. 1-9 Credits.

(R-9) Offered intermittently. Experimental offerings of visiting professors, experimental offerings of new courses or one-time offerings of current topics. Level: Undergraduate-Graduate

CHMY 492 - Independent Study. 1-9 Credits.

(R-9) Offered autumn and spring. Prereq., consent of instr. Laboratory investigations and research in the laboratory of a faculty member. Level: Undergraduate-Graduate

CHMY 494 - Seminar/Workshop. 1-9 Credits.

(R-9) Offered autumn and spring. Prereq., consent of instr. Laboratory investigations and research in the laboratory of a faculty member. Level: Undergraduate-Graduate

CHMY 497 - Teaching Laboratory Chemistry. 1-3 Credits.

Offered every semester. Prereq., CHMY 143N and CHMY 144N or consent of instructor. Methods of peer-led learning as applied to general chemistry laboratory instruction. Review of concepts from general chemistry along with instruction in laboratory techniques, instrumentation, and data analysis. Student leaders mentor a group of general chemistry students in working toward constructing "hands-on" chemistry laboratory skills and developing data collection and problem-solving skills. Level: Undergraduate

CHMY 498 - Internship/Cooperative Education. 1-6 Credits.

Prereq., consent of department. Extended non-classroom experience which provides practical application of classroom learning during placements off campus. Prior approval must be obtained from the faculty supervisor and the Internship Services office. A maximum of 6 credits of Internship (198, 298, 398, 498) may count toward graduation. Level: Undergraduate

CHMY 499 - Senior Thesis/capstone. 3 Credits.

Offered autumn and spring. Prereq., CHMY 490 or consent of instr. and senior standing. Students complete and report on undergraduate research initiated as CHEM 490 or equivalent research experience. Reports are both oral and written. Level: Undergraduate

CHMY 501 - Teaching University Chemistry. 1 Credit.

Offered autumn. Preparation for teaching chemistry at the college level. A survey of teaching fundamentals and educational psychology as applied to chemistry instruction. Level: Graduate

CHMY 541 - Environmental Chemistry. 3 Credits.

Offered intermittently. Prereq., CHMY 360 OR 373. Chemical principles and reactions in natural systems: Fate of chemical contaminants in the environment; partitioning of contaminants between phases (air/water/soil); chemistry of atmospheric pollutants; computer modeling of equilibrium and kinetic processes; degradation and transformation of organic contaminants. Level: Graduate

CHMY 542 - Separation Science. 3 Credits.

Offered intermittently. Prereq., CHMY 421, CHMY 360 or CHMY 373. Theory, method development, and application of analytical separations; solvent extraction; solid phase extraction; various forms of chromatography; electrophoresis. Level: Graduate

CHMY 543 - Mass Spectrometry. 3 Credits.

Offered spring semester of odd years. Prereq., Graduate standing or CHMY 421. Fundamentals, instrumentation and applications of mass spectrometry in chemistry and biochemistry. Level: Graduate

CHMY 544 - Applied Spectroscopy. 3 Credits.

Offered intermittently. Prereq., CHMY 421 or consent of instr. The function and application of optical (ultraviolet to infrared) chemical instrumentation. Specific topics include optics, light sources, detectors and a wide variety of spectrochemical methods with an emphasis on methods not typically covered in undergraduate instrumental analysis courses. Level: Graduate

CHMY 553 - Inorganic Chemistry and Current Literature. 4 Credits.

Offered spring. Prereq., CHMY 401. A survey of the elements including transition metal reaction mechanisms, redox chemistry, organometallic chemistry, bioinorganic chemistry. Oral and written presentations on primary literature. Level: Graduate

CHMY 562 - Organic Structure and Mechanisms. 3 Credits.

Offered intermittently. Prereq., one year of organic chemistry. Topics may include: stereochemistry, conformational analysis, aromaticity, transition state theory, isotope effects, solvent effects, substitution and elimination reactions, and mechanisms that involve carbocations, carbanions, radicals and carbenes as reactive intermediates. Level: Graduate

CHMY 566 - FT-NMR for Graduates. 1 Credit.

Offered intermittently. Prereq., CHMY 221-222; research project using NMR; consent of instr. Operation of the FT-NMR spectrometer and brief background of NMR spectroscopy. Level: Graduate

CHMY 568 - Organometallic Chemistry. 3 Credits.

Offered intermittently in autumn. Prereq., CHMY 221, 223, 401, 403. Survey of the reactivity and structure of main group and transition metal organometallic compounds with an emphasis on applications to organic synthesis and catalysis. Level: Graduate

CHMY 580 - Advanced Graduate Research Seminars. 1 Credit.

(R-10) Offered every term. Prereq., consent of instr. Formal oral and written presentations of research results and selected literature topics in a designated area. Level: Graduate

CHMY 590 - Research. 1-10 Credits.

(R-18) Offered autumn and spring. Requires consent of instructor. Directed individual research and study appropriate to the background and objectives of the student. Level: Graduate

CHMY 591 - Special Topics. 1-9 Credits.

(R-24) Offered intermittently. Requires consent of instructor. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics. Level: Graduate

CHMY 592 - Independent Study. 1-9 Credits.

(R-9) Offered autumn and spring. Requires consent of instructor. Course material appropriate to the needs and objectives of the individual student. Level: Grad

CHMY 598 - Internship. 1-8 Credits.

(R-8) Offered autumn and spring. Prereq., consent of department. Extended non-classroom experience which provides practical application of classroom learning during placements off campus. Prior approval must be obtained from the faculty supervisor and the Internship Services office. Level: Graduate

CHMY 599 - Thesis/Professional Project. 1-6 Credits.

(R-6) Offered autumn and spring. Requires consent of instructor. Preparation of a thesis, manuscript, or professional project based on research for presentation and/or publication. Level: Graduate

CHMY 630 - Seminar. 1 Credit.

(R-14) Offered autumn and spring. Prereq., graduate standing in chemistry or biochemistry, or consent of instr. Level: Graduate

CHMY 640 - Introductory Graduate Seminar. 1 Credit.

(R-20) Offered autumn. Prereq., graduate standing in chemistry or biochemistry or consent of instr. Seminar to acquaint new graduate students with departmental research. Level: Graduate

CHMY 650 - Graduate Chemistry Seminar. 1 Credit.

(R-2) Offered spring. Prereq., graduate standing. A review and discussion of current research. Topics vary. Level: Graduate

CHMY 652 - Original Research Proposal. 1 Credit.

Offered autumn. Prereq., CHMY 640 and CHMY 650. Preparation and presentation of original research proposals for third year graduate students. Level: Graduate

CHMY 690 - Research. 1-10 Credits.

(R-60) Offered autumn and spring. Requires consent of instructor. Directed individual research and study appropriate to the background and objectives of the student. Level: Graduate

CHMY 699 - Dissertation. 1-10 Credits.

(R-10) Offered autumn and spring. Preparation of extensive thesis or manuscript based on research for presentation and/or publication. Level: Graduate