

CHEMISTRY (CHMY)

CHMY 099 - Developmental. 1-99.99 Credits.

CHMY 104 - Preparation for Chemistry. 4.000 Credits.

Offered autumn. Prereq. ALEKS Level 3, M01-Maplesoft Arithmetic score ≥ 19 , M02-Maplesoft Algebra score ≥ 12 or M 090 Introductory Algebra w/RC+ or better. An introduction to concepts and calculations in chemistry that provides preparation for CHMY 121N or CHMY 141N. Not appropriate toward chemistry requirement in any major.

CHMY 121N - Introduction to General Chemistry. 3.000 Credits.

Offered autumn and spring. First semester of an introduction to general, inorganic, organic and biological chemistry.

Gen Ed Attributes: Natural Science Course (N)

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

Offered autumn and spring. Prereq., Enrolled in the College of Technology ASRN 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. 3.000 Credits.

Offered autumn and spring. Prereq., "C-" or equiv. in 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. 2.000 Credits.

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

CHMY 141N - College Chemistry I. 4.000 Credits.

Offered autumn and spring. Prereq., ALEKS Placement Level 4, M02-Maplesoft Algebra score ≥ 12 or M 095 Intermediate Algebra w/ RC+ or better and Chemistry Placement Exam score ≥ 13 . Coreq., 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 Course (N)

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

Offered Autumn and Spring. Co-requisite 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 Course (N)

CHMY 143N - College Chemistry II. 4.000 Credits.

Offered spring and summer. Prereq., "C-" or better in CHMY 141N or consent of instr. Coreq., CHMY 144N. A continuation of CHMY 141N.

Gen Ed Attributes: Natural Science Course (N)

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

Offered Spring semester. Co-requisite CHMY 143N. Continuation of CHMY 142N. Gen Ed Attributes: Natural Science Lab Course (N)

Gen Ed Attributes: Natural Science Course (N)

CHMY 191 - 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 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. 2.000 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 305E - Ethics, Literature and Writing in the Sciences. 3 Credits.

Offered autumn and spring. Prereq., CHMY 223 and chemistry or biochemistry majors. Practicum for developing and improving skills in scientific writing and evaluation. Presentation, discussion and written evaluations of standard ethics traditions and ethical issues related to the professional practice of science. Use of library and search tools to access current literature in chemistry.

Gen Ed Attributes: Ethical & Human Values Course, Writing Course-Advanced

CHMY 311 - Analytical Chem-Quant Analysis. 4.000 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 360 - Applied Physical Chemistry. 3 Credits.

Offered spring. Prereq., CHMY 123 OR 143 AND M 162. Basic thermodynamics and chemical kinetics with applications in the biological and environmental sciences. Credit not allowed for both 360 and 373.

CHMY 371 - Phys Chem-Qntm Chm & Spctrscopy. 4 Credits.

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

CHMY 373 - Phys Chem-Kntcs & Thrmdynmcs. 4 Credits.

Offered autumn. Prereq., CHMY 143N, M 273, PHSX 207N or 217N. Systematic treatment of the laws and theories relating to chemical phenomena. Credit not allowed for both CHMY 360 and 373.

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/Expmntl Crse. 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 Educ. 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 AND 360 OR 373 or consent of instr. Theory and principles of inorganic chemistry and a systematic coverage of descriptive inorganic chemistry in the context of the periodic table.

CHMY 402 - Advanced Inorganic Chem 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.

CHMY 403 - Descriptive Inorganic Chem. 3 Credits.

Offered spring. 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.

CHMY 411 - Advanced Organic Chemistry. 3 Credits.

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.

CHMY 421 - Advanced Instrument Analysis. 4.000 Credits.

Offered spring. Prereq., CHMY 311. Theory and use of instrumental methods in the study of analytical and physical chemistry.

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.

CHMY 465 - Organic Spectroscopy. 3 Credits.

Offered intermittently. Prereq., CHMY 360 or 373 and 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.

CHMY 466 - FT-NMR Optn for Undrgrd Rsrch. 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.

CHMY 485 - Laboratory Safety. 1 Credit.

Offered autumn. Prereq., one year of college chemistry and permission of instructor. 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.

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.

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.

CHMY 490 - Undergraduate Research. 1-9 Credits.

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

CHMY 491 - Special Topics/Expmntl Crse. 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 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.

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.

CHMY 498 - Internship/Cooperative Educ. 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.

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.

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 autumn odd-numbered years. Prereq., CHMY 421, CHMY 360 or 373. Theory, method development, and application of analytical separations; solvent extraction; solid phase extraction; various forms of chromatography; electrophoresis. 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 - Inor Chem and Curr Lit. 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 - Org Structure and Mech. 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 563 - Organic Synthesis. 3 Credits.

Offered intermittently. Prereq., CHMY 221-223. Theoretical treatise of the common methods used in organic synthesis including: oxidation, reduction, organometallics, C-C bond forming reactions, synthetic strategies and total synthesis. 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 573 - Advanced Physical Chem. 3 Credits.

Offered intermittently. Prereq., CHMY 371-373. Fundamental principles of physical chemistry and special applications. Level: Graduate

CHMY 580 - Adv Graduate Res 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 593 - Professional Project. 3 Credits.

Offered autumn and spring. Prereq., consent of instr. Preparation of a professional project appropriate to the needs and objectives of the individual student. Level: Graduate

CHMY 595 - Special Topics. 1-9 Credits.

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

CHMY 596 - Independent Study. 1-9 Credits.

(R-9) Offered autumn and spring. Prereq., consent of instr. Course material appropriate to the needs and objectives of the individual student. Level: Graduate

CHMY 597 - Research. 1-10 Credits.

Offered autumn and spring. Prereq., consent of instr. Directed individual research and study appropriate to the background and objectives of the student. Level: Graduate

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. 1-6 Credits.

(R-6) Offered autumn and spring. Prereq., consent of instr. Preparation of a thesis or manuscript 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 - Intro Grad 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 697 - Research. 1-10 Credits.

(R-60) Offered autumn and spring. Prereq., consent of instr. 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