

COURSE DESCRIPTIONS

Note: Students may not register for a course lower in number than that required by their major. When a change in degree requirements forces a student to take a higher number course after completing a lower number course, a maximum of two credits (earned in CHEM 299) will be awarded for the higher number course. Students should check the curricular requirements for their major to be sure they are registered for the correct chemistry class.

CHEM 050 *Chemistry Fundamentals* (0 cr). Chemical problem solving, SI unit conversion, mole concept, chemical stoichiometry, solution concentration problems, periodic table, chemical formulas and nomenclature, and equation balancing. Graded P/N/F. A special fee is charged for this course.

CHEM 101 *Introduction to Chemistry I* (4 cr). May be used as core credit in J-3-b. Full credit may be earned in only one of the following: CHEM 100, 101, or 111. General treatment of the fundamentals of chemistry. Three lectures and one 3-hr lab a wk. Does not satisfy the prereq for CHEM 112. No prerequisite.

CHEM 111 *Principles of Chemistry I* (4 cr). May be used as core credit in J-3-b. Full credit may be earned in only one of the following: CHEM 100, 101, or 111. Intensive treatment of principles and applications of chemistry. Three lectures, one 3-hr lab, and one optional recitation a wk. Prereq: CHEM 050 or adequate score on the chemistry fundamentals exam or satisfy departmental requirement.

CHEM 112 *Principles of Chemistry II* (5 cr). May be used as core credit in J-3-b. Continuation of CHEM 111. Some work in inorganic chemistry, kinetics, equilibrium, liquids, solids, acid-base, electrochemistry, nuclear chemistry, thermodynamics, and qualitative inorganic analysis. Three lectures, one recitation, and one 3-hr lab a wk. Prereq: CHEM 111 or perm.

CHEM 121 *Glassblowing* (1 cr). Techniques used in constructing scientific apparatus from glass. Graded P/F. One 3-hr lab a wk. Prereq: perm of dept.

CHEM 253 *Quantitative Analysis* (3 cr). Fundamental principles and techniques of chemical analysis; intro to sampling, standardization, data evaluation, gravimetric/volumetric methods, and instrumental techniques. Three lectures per wk. Prereq: CHEM 112. (Fall only)

CHEM 254 *Quantitative Analysis Lab* (2 cr). Companion course to CHEM 253; two 3-hr labs a week. Prereq or coreq: CHEM 253. (Fall and Spring)

CHEM 275 *Carbon Compounds* (3 cr). Aspects of organic chemistry important to students in the life sciences. Prereq: CHEM 101, 111, or perm.

CHEM 276 *Carbon Compounds Lab* (1 cr). Lab to accompany CHEM 275; for students who need only 1 cr of lab. One 3-hr lab a wk. Prereq or coreq: CHEM 275 or 277.

CHEM 277 *Organic Chemistry I* (3 cr). Principles and theories of organic chemistry; properties, preparation, and reactions of organic compounds. Prereq: CHEM 112.

CHEM 278 *Organic Chemistry I Lab* (1 cr). One 3-hr lab a wk. Prereq or coreq: CHEM 277.

CHEM 299 (s) *Directed Study* (cr arr). Prereq: perm.

CHEM 302 *Principles of Physical Chemistry* (3 cr). Emphasis on topics important to biological and agricultural science. Prereq: CHEM 112, Math 160 or 170 or 175, and Phys 111, or perm. (Fall only)

CHEM 303 *Principles of Physical Chemistry Lab* (1 cr). Lab to accompany CHEM 302. One 3-hr lab a wk. Prereq or coreq: CHEM 302. (Fall only)

CHEM 305-306 *Physical Chemistry I and II* (3 cr). Kinetic theory, thermodynamics, quantum mechanics, and spectroscopy. Prereq: CHEM 112, and Math 275. Prereq or coreq: Phys 212 or 213. (CHEM 305: fall only. CHEM 306: spring only)

CHEM 307-308 *Physical Chemistry Lab I and II* (1 cr). Lab to accompany CHEM 305-306. One 3-hr lab a wk. Prereq or coreq for CHEM 307: CHEM 305. Prereq or coreq for CHEM 308: CHEM 306. (CHEM 307: fall only. CHEM 308: spring only)

CHEM 372 *Organic Chemistry II* (3 cr). Continuation of CHEM 277. Prereq: CHEM 277. (Spring only)

CHEM 374 *Organic Chemistry II Lab* (1 cr). Lab to accompany CHEM 372; includes synthesis, structure determination, and mechanisms. One 3-hr lab a wk. Prereq: CHEM 278. Prereq or coreq: CHEM 372. (Spring only)

CHEM 409 *Proseminar* (1 cr). Current publications in chemistry and chemical engineering with reports on typical scientific papers. Prereq: CHEM 372 and Sr standing. (Fall only)

CHEM J418/J518 *Environmental Chemistry* (3 cr) Chemistry of atmosphere, soil, and water; pollution monitoring and remediation; treatment of waste in the environment. Additional projects/assignments reqd for grad cr. Prereq: CHEM 253, and CHEM 275 or 277, or perm. (Spring only)

CHEM J436/J535 *Electronics for Scientists* (2 cr). Practical theory and application of modern analog/digital electronics and small computers to chemical measurement and control systems. Registration for CHEM 535 requires completion of an additional term paper or other assignment. One hour of lecture and one 3-hr lab a wk. Prereq: Perm. (Fall only)

CHEM 441 *Chemical Literature* (1 cr). Survey of important chemistry reference works and periodicals; use of these sources. Prereq: perm. (Spring only)

CHEM J453/J553 *Separation Theory and Chromatography* (2 cr). Gas and liquid chromatography and related fields. Students enrolled in CHEM 553 are required to complete additional written assignments. Prereq: CHEM 306.

CHEM 454 *Instrumental Analysis* (4 cr). For students in chemistry and allied fields. Techniques in operating new and specialized instruments for qualitative and quantitative analysis and analytical methods of an advanced nature. Three lec and one 4-hr lab a wk. Prereq: CHEM 253 and 305. Prereq or coreq: CHEM 306. (Spring only)

CHEM 455 *Survey of Analytical Chemistry* (3 cr). Fundamentals of modern analytical chemistry. Open only to chemistry M.S. and Ph.D. students. Prereq: perm.

CHEM 463-J464/ID-J564 *Inorganic Chemistry* (3 cr). WSU CHEM 507. Principles, complex ions and coordination compounds, theory of acids and bases, bonding theory, non-aqueous

solvents, familiar elements and their relationship to the periodic table. Additional projects/assignments reqd for grad cr. Prereq for 463: CHEM 305 or perm. Prereq or coreq for CHEM J464/J564: CHEM 463, or 466, or perm. (CHEM 463: fall only. CHEM 464: spring only; both courses alt yrs.)

CHEM 465 *Inorganic Chemistry Laboratory* (1 cr). Lab to accompany CHEM 464. One 3-hr lab a wk. Coreq: CHEM 464. (Spring only; alt yrs.)

CHEM 466 *Survey of Inorganic Chemistry* (3 cr). Fundamentals of modern inorganic chemistry. Open only to chemistry M.S. and Ph.D. students. Prereq: perm.

CHEM 468 *Organometallic Chemistry* (2 cr). Structure, bonding, and reaction chemistry of organotransition metal compounds; applications to homogeneous catalysis. Additional projects/assignments reqd for grad cr. Prereq: CHEM 305-306. Prereq or coreq: CHEM 463 or perm. (alt yrs)

CHEM J472/J572 *Rational Design of Pharmaceuticals* (3 cr). Synthetic chemistry necessary for design and preparation of medicinal agents, and mechanistic chemistry germane to action of pharmaceuticals. Graduate students are required to write an original research proposal on a topic related to drug discovery. Prereq or coreq: CHEM 473 or perm. (alt yrs)

CHEM 473 *Intermediate Organic Chemistry* (3 cr). Theories and mechanisms of organic chemistry. Prereq: CHEM 372. Prereq or coreq: CHEM 306. (Fall only)

CHEM 476 *Survey of Organic Chemistry* (3 cr). Fundamentals of modern organic chemistry. Open only to chemistry M.S. and Ph.D. students. Prereq: perm.

CHEM 484 *Biochemistry Laboratory* (2 cr). See MMBB 484.

CHEM 491 (s) *Research* (1-6 cr, max 6). Submission of a report of the research done for placement in the permanent dept files is required. Prereq: perm of dept.

CHEM 495 *Statistical Thermodynamics* (3 cr). Classical thermodynamics, entropy, thermodynamic potentials, kinetic theory, classical and quantum statistical mechanics, ensembles, partition functions, introduction to phase transitions. Prereq: CHEM 306 or permission. (Fall only)

CHEM 496 *Survey of Physical Chemistry* (3 cr). Fundamentals of modern physical chemistry. Open only to chemistry M.S. and Ph.D. students. Prereq: perm.

CHEM 497 (s) *Practicum in Tutoring* (1 cr, max 2). Tutorial services performed by advanced students under faculty supervision. Graded P/F. Prereq: perm.

CHEM 498 (s) *Internship* (cr arr). Prereq: perm.

CHEM 499 (s) *Directed Study* (cr arr). Prereq: perm.

CHEM 500 *Master's Research and Thesis* (cr arr).

CHEM 501 (s) *Seminar* (cr arr). Prereq: perm.

CHEM 502 (s) *Directed Study* (cr arr). Prereq: perm.

CHEM 506 *Introduction to Teaching and Research Skills* (2 cr). Skills required of teaching assistants in laboratory, recitations, office hours, help sessions; skills required for research; use of library; introduction to faculty research. Graded P/F. Prereq: perm. (Fall only)

CHEM 507 (s) *Topics in Physical Chemistry* (1-9 cr, max 9). Selected topics in modern physical chemistry such as computational quantum mechanics, statistical mechanics, nonequilibrium thermodynamics, group theory, molecular dynamics, theory of condensed phases, or other topics not covered in regularly scheduled courses. Prereq: CHEM 495 or perm.

CHEM 509-510 *Advanced Physical Chemistry* (3 cr). Application of quantum theory to chemical bonding, molecular spectroscopy, and molecular structure. Prereq: CHEM 306, 495 or perm. (CHEM 509: spring only. CHEM 510: fall only)

CHEM 513 *Nuclear Chemistry* (2 cr). Intro to artificial and natural radioactivity, tracer methods, and atomic energy. Prereq: CHEM 306 or Phys 305 or perm. (alt yrss)

CHEM 518 *Environmental Chemistry* (3 cr). See CHEM J418/J518.

CHEM 535 *Electronics for Scientists* (2 cr). See CHEM J436/J535.

CHEM 541 *Biochemistry* (3 cr). See MMBB 541.

CHEM 542 *Biochemistry and Molecular Biology* (3 cr). See MMBB J442/J542.

CHEM 550 *Radioanalytical Chemistry* (2 cr). Fundamental concepts of radiochemistry, including the principles of radioactive decay processes and counting techniques; in-depth treatment of radioanalytical techniques, especially neutron activation and isotope dilution methods; decay processes as sources of x-rays; the use of synchrotron radiation in analytical chemistry. Prereq: CHEM 454 or perm. (alt yrs)

CHEM 551 *Electronic Spectrometry* (2 cr). A brief review of fundamental concepts, including electronic transitions, optical properties of materials, and laws of radiation absorption; detailed coverage of instrumentation used for ultraviolet and visible absorption spectroscopy, with regard to optical components, overall design strategy, and signal processing; analytical performance related to these aspects and presented from both theoretical and practical standpoints; in-depth coverage of luminescence spectroscopy, including phosphorimetry and fluorimetry; atomic spectroscopy (both flame and plasma-based versions), including principles of operation, instrumental requirements, and analytical application; survey of x-ray absorption and fluorescence spectroscopy. Prereq: CHEM 454 or perm. (alt yrs)

CHEM 552 *Analytical Vibrational Spectrometry* (2 cr). Introduction to vibrational transitions, optical properties of materials, and laws of radiation absorption and emission (including why they are not always obeyed in practice); detailed discussion of instrumentation used for mid-infrared, near infrared, and Raman spectrometry; illustration of transmission spectrometry with examples including microscopy and spectral imaging, open-path monitoring, and spectroscopy of aqueous solutions and hyphenated techniques; introduction of time- and phase-resolved measurements; detailed coverage of specular reflection, reflection-absorption of thin films, diffuse reflection, attenuated total reflection spectrometry, and remote measurements through optical fibers; discussion of application of near infrared spectroscopy to agricultural commodity analysis and process monitoring. Prereq: CHEM 454 or perm. (alt yrs)

CHEM 553 *Separation Theory and Chromatography* (2 cr). See CHEM J453/J553.

CHEM 556 *Molecular Spectroscopy* (3 cr). Interpretation of IR, UV, NMR, and mass spectra. Registration for CHEM 556 requires completion of additional assignments. Prereq: CHEM 306 or perm.

CHEM 557 (s) *Topics in Analytical Chemistry* (1-9 cr, max 9). Atomic and molecular analytical spectroscopy; modern electrochemical methods; radioanalytical techniques; surface analysis techniques. Prereq: CHEM 454 or perm.

CHEM 558 *Electrochemistry* (2 cr). Fundamental concepts of electrochemistry, including the principles of redox processes; in-depth treatment of electroanalytical techniques, especially voltammetric and potentiometric methods; advanced treatment of selected topics, including ultramicro and in vivo electrochemical techniques. Prereq: CHEM 454 or perm.

CHEM 561 *Advanced Inorganic Chemistry* (3 cr). Theoretical approach to the underlying principles of inorganic chemistry; integration of theory and descriptive chemistry. Prereq: CHEM 306, 463, or perm.

CHEM ID564 *Inorganic Chemistry* (3 cr). See CHEM 463-J464/J564.

CHEM ID565 (s) *Topics in Inorganic Chemistry* (1-9 cr, max 9). WSU CHEM 508. Coordination compounds; halogens; less familiar elements; clathrate, interstitial, nonstoichiometric compounds; chemical bonding; inorganic reaction mechanisms. Prereq: CHEM 463 or perm

CHEM 571 (s) *Topics in Organic Chemistry* (1-9 cr, max 9). Selected topics from the current literature. Prereq: CHEM 473 or perm.

CHEM 572 *Rational Design of Pharmaceuticals* (3 cr). See CHEM J472/J572.

CHEM 573 *Synthetic Organic Chemistry* (3 cr). Use of organic reactions in synthesis. Prereq: CHEM 473 or perm.

CHEM 590 *Doctoral Research Proposal* (1 cr). Taken no later than one semester after completion of cumulative exams; required for advancement to Ph.D. candidacy. Includes review of relevant literature and original research proposal describing the student's intended research project.

CHEM 600 *Doctoral Research and Dissertation* (cr arr).