CHMY - Chemistry

CHMY 102CS. Applying Chemistry to Society. 3 Credits. (3 Lec, 1 Lab) S
An introduction to contemporary chemistry in the contextual framework of current issues including the effect of human impact on the air, water, and earth. This course will examine the scientific basis for current scientific and societal issues such as depletion of the ozone layer, water pollution, acid rain, genetic engineering and nuclear fusion among other issues. Topics will be addressed from a scientific viewpoint to develop knowledge and understanding of the chemical concepts that underlie these contemporary issues. The goal is to inform non-science majors of chemical and scientific issues in order to help them to become well-informed, inquiring citizens.

CHMY 121IN. Introduction to General Chemistry. 4 Credits. (3 Lec, 1 Lab) F,S,Su
PREREQUISITE: C- or above in M 096 or M 097 or placement in a Math Level 3 via MAPLE/ACT/SAT (ACT 23 or SAT 540). Introductory general chemistry. Measurement systems, atomic structure, chemical periodicity, bonding, chemical reactions, acid-base chemistry, electrochemistry, nuclear chemistry, Common Exams. Students who have already taken this course and scored an 80% or better in lab are eligible to be lab exempt. Contact the department to register 994-4884.

CHMY 123. Introduction to Organic Chemistry and Biochemistry. 4 Credits. (3 Lec, 1 Lab) F,S,Su
PREREQUISITE: C- or above in CHMY 121IN or CHMY 143. An introduction into functional group organic chemistry and important biochemical structures, concepts, and processes. The laboratory is closely integrated with lecture coverage. Students who have already taken this course and scored an 80% or better in lab are eligible to be lab exempt. Contact the department to register 994-4884.

CHMY 141. College Chemistry I. 4 Credits. (3 Lec, 1 Lab) F,S,Su
PREREQUISITE: C- or above in M 121Q or placement in a Math Level 4 (ACT 25 or SAT 580). The first of a two-semester course sequence about the general principles of modern chemistry with emphasis on atomic structure, chemical bonding, the periodic table, equilibria, chemical reactivity, and kinetics. It is recommended that students registering for this course have taken high school chemistry. Common Exams. Students who have already taken this course and scored an 80% or better in lab are eligible to be lab exempt. Contact the department to register 994-4884.

CHMY 143. College Chemistry II. 4 Credits. (3 Lec, 1 Lab) F,S,Su
PREREQUISITE: C- or above in CHMY 141. The second semester of the two-semester general chemistry sequence. Students who have already taken this course and scored an 80% or better in lab are eligible to be lab exempt. Contact the department to register 994-4884.

CHMY 151. Honors College Chemistry I. 4 Credits. (3 Lec, 1 Lab) F
PREREQUISITE: Placement in a level 5 Math (Math ACT score of 27 or SAT of 620). Recommended that students registering for this course either have taken calculus or are concurrently enrolled. Also recommended that students registering in this course have taken high school chemistry and/or physics, preferably AP Chemistry and/or Physics. Topic coverage parallels CHMY 141, with emphasis on critical and analytical thought and with a greater reliance on math skills. For departmental honors program and the University honors program. Students who have already taken this course and scored an 80% or better in lab are eligible to be lab exempt. Contact the department to register 994-4884.

CHMY 153. Honors College Chemistry II. 4 Credits. (3 Lec, 1 Lab) S
PREREQUISITE: A grade better than a C in CHMY 141 or CHMY 151. Topic coverage parallels CHMY 143, with emphasis on critical and analytical thought and with a greater reliance on math skills. For departmental honors program.

CHMY 194. Seminar/Workshop. 1 Credit. (1 Sem) F
For the new student. Integration into the department and its research and educational program. Scientific communication and chemical literature searching skills. Cross-listed with BCH 194.

CHMY 211. Elements of Organic Chemistry. 5 Credits. (4 Lec, 1 Lab) F,S
PREREQUISITE: C- or above in CHMY 121N, CHMY 143, or CHMY 153. A one-semester introduction to organic chemistry. The unique character of carbon: bonding, structure, nomenclature, and common reactions of hydrocarbons and functional organic compounds. Students who have already taken this course and scored an 80% or better in lab are eligible to be lab exempt. Contact the department to register 994-4884.

CHMY 290R. Undergraduate Research. 1-6 Credits. (1-6 Ind; max unlimited) F,S
Directed undergraduate research/creative activity which may culminate in a written work or other creative project. Course will address responsible conduct of research. May be repeated.

CHMY 291. Special Topics/Expmntl Crse. 1-4 Credits. (1-4 Sem; 12 cr max) On Demand
Max 12 cr. PREREQUISITE: None required, but some may be determined necessary by each offering department. Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

CHMY 292. Independent Study. 1-3 Credits. (1-3 Ind; 6 cr max) On Demand
Max 6 cr. PREREQUISITE: Consent of instructor and approval of department head. Directed research and study on an individual basis.

CHMY 294. Seminar/Workshop. 1 Credit. (1 Sem) S
PREREQUISITE: CHMY 194 or BCH 194. Introduction to faculty research through faculty mini seminars. Departmental research facilities. Research groups. Research planning decisions (MSU laboratory, summer internship, student exchange, REU, USP, etc.). Cross-listed with BCH 294.

CHMY 311. Fundamental Analytical Chem. 4 Credits. (3 Lec, 1 Lab) S
PREREQUISITE: CHMY 143 or CHMY 153. Introduction to wet analytical chemistry with an emphasis on the systematic treatment of equilibria, acid-base chemistry, redox equilibria and titrations, complexometric equilibria and titrations, Beer’s law, fundamental lab skills and chromatography.

CHMY 321. Organic Chemistry I. 4 Credits. (3 Lec, 1 Lab) F,S
PREREQUISITE: CHMY 143 or CHMY 153. The first of a two-semester professional sequence in organic chemistry. In-depth coverage of stereochemistry, synthetic organic chemistry, physical organic chemistry, spectroscopy, and nomenclature. Students should register for both semesters. Students who have already taken this course and scored an 80% or better in lab are eligible to be lab exempt. Contact the department to register 994-4884.

CHMY 323. Organic Chemistry II. 4 Credits. (3 Lec, 1 Lab) S,Su
PREREQUISITE: CHMY 321. The second semester of the two-semester professional sequence in organic chemistry. Students who have already taken this course and scored an 80% or better in lab are eligible to be lab exempt. Contact the department to register 994-4884.

CHMY 331. Honors Organic Chemistry I. 4 Credits. (3 Lec, 1 Lab) F
PREREQUISITE: CHMY 151 and CHMY 153 or consent of instructor. CHMY 331 is the first of a two-semester honors sequence in organic chemistry. Topic coverage parallels CHMY 321, but at an accelerated pace with in-depth coverage of physical organic chemistry, stereochemistry, synthetic organic chemistry, spectroscopy, and nomenclature. Students who have already taken this course and scored an 80% or better in lab are eligible to be lab exempt. Contact the department to register 994-4884.

CHMY 333. Honors Organic Chemistry II. 4 Credits. (3 Lec, 1 Lab) S
PREREQUISITE: A grade of better than a C in CHMY 331. CHMY 333 is the second semester of the two-semester honors sequence in organic chemistry. Topic coverage parallels CHMY 323, with more in-depth coverage of mechanisms and more emphasis on retrosynthetic analysis and on solving multi step synthesis problems. Students who have already taken this course and scored an 80% or better in lab are eligible to be lab exempt. Contact the department to register 994-4884.

CHMY 350. Astrobiology. 3 Credits. (3 Lec) F
PREREQUISITE: BIOL 170IN, CHMY 121IN, and ASTR 110IN (or equivalent) and junior standing. This course examines the science of Astrobiology focused on the origin, evolution, and distribution of life in the universe. Topics that will be discussed include planetary evolution, origin of life, habitability, evolution, intelligence, and the search for life beyond Earth.

CHMY 351. Astrobiology Recitation. 1 Credit. (1 Rct) F
PREREQUISITE: BIOL 170IN, CHMY 121IN, and ASTR 110IN (or equivalent) and junior standing. COREREQUISITE: CHMY 350 These interactive sessions will complement the study of astrobiology as students become both better consumers of and practitioners of science communications. We’ll discuss trends, challenges and opportunities in science communications; analyze and critique current communications campaigns; and strategize how to best convey the diverse aspects of astrobiology through strategies such as science writing; working with the media; social media and Websites; and more. Students will create and present their own communications pieces, and will be encouraged to disseminate their work to the public. This recitation recommended, but not required.
CHMY 361. Elements of Physical Chemistry. 4 Credits. (4 Lec) F
PREREQUISITE: M 161Q or M 172Q and PHSX 207, and CHMY 211 or CHMY 323 or CHMY 331. A physical chemistry course directed toward the life sciences, health professions, and agricultural sciences.

CHMY 362. Elements of Physical Chemistry Lab. 1 Credit. (1 Lab) F
PREREQUISITE: CHMY 311. CHMY 361 can be a prerequisite or corequisite. The laboratory to accompany CHMY 361.

CHMY 371. Physical Chemistry-Quantum Chemistry and Spectroscopy I. 3 Credits. (3 Lec) F
PREREQUISITE: CHMY 143 or CHMY 153 and M 172Q and PHSX 222.
COREQUISITE: M 273Q. The first semester of a two-course sequence for science and engineering majors on quantum chemistry, statistical thermodynamics, spectroscopy, classical thermodynamics and kinetics.

CHMY 372. Physical Chemistry Laboratory I. 1 Credit. (1 Lab) F
PREREQUISITE: CHMY 311 or COREQUISITE: CHMY 371 or CHMY 373 (Prerequisite or Corequisite). Laboratory to accompany CHMY 371 or 373. Fundamental experiments in thermodynamics and kinetics.

CHMY 373. Physical Chemistry - Kinetics and Thermodynamics. 3 Credits. (3 Lec) S
The second semester of a two-course physical chemistry sequence for science/ engineering majors. Students should take both semesters of the sequence.

CHMY 374. Physical Chemistry Lab II. 2 Credits. (2 Lab) S
PREREQUISITE: CHMY 372, COREQUISITE: CHMY 373. The advanced laboratory to accompany CHMY 373. In-depth experiments and data analysis. Required of all chemistry majors who take CHMY 373.

CHMY 394. Seminar/Workshop. 1 Credit. (1 Sem) F

CHMY 401. Advanced Inorganic Chemistry. 3 Credits. (3 Lec) S
COREQUISITE: CHMY 361 or CHMY 373. A systematic presentation of atomic structure and chemical bonding with emphasis on properties, structure, and the reactions of representative members of the various families of the periodic table.

CHMY 417. Synthetic Chemistry. 3 Credits. (3 Lec) F alternate years, to be offered odd years.
PREREQUISITE: CHMY 323. Organic and inorganic reaction chemistry for advanced students. Modern reagents and transformations are treated in detail, along with relevant theoretical and mechanistic considerations.

CHMY 421. Advanced Instrument Analysis. 3 Credits. (2 Lec, 1 Lab) F, alternate years
PREREQUISITE: CHMY 311 and CHMY 361 or CHMY 371. An advanced analytical chemistry course which covers modern instrumental methods based on spectrochemical and electrochemical principles.

CHMY 490R. Undergraduate Research. 1-6 Credits. (1 Ind; 2 cr max) F,S,Su
Max 12 cr. PREREQUISITE: Consent of instructor. Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research. May be repeated.

CHMY 491. Special Topics/Expmtl Course. 1-4 Credits. (1-4 Lec; 12 cr max)
On Demand
Max 12 cr. PREREQUISITE: Course prerequisites as determined for each offering. Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

CHMY 492. Independent Study. 1-3 Credits. (1-3 Ind; 6 cr max)
On Demand
Max 6 cr. PREREQUISITE: Junior standing, consent of instructor, and approval of department head. Directed research and study on an individual basis.

CHMY 494. Seminar/Workshop. 1 Credit. (1 Sem) S
PREREQUISITE or COREQUISITE: CHMY 394 or BCH 394. Senior capstone course. Taught in collaboration with departmental Honors Thesis, CHMY 499. The chemistry/biochemistry research undergraduate experience constitutes a synthesis of our (bio)chemistry class room and laboratory education. The projects are orally presented in seminar form, discussed on the basis of acquired knowledge, and analyzed using stringent scientific methods and criteria. A complete personal resume is prepared. May be repeated once. Cross-listed with BCH 494.

CHMY 499. Senior Thesis/Capstone. 1 Credit. (1 Lec) S
PREREQUISITE: CHMY 490R or BCH 490R (minimum of 3 cr.) Thesis format and style will be illustrated, discussed, and monitored. Draft portions of manuscripts are to be completed on a regular schedule. Required of all candidates for departmental honors. Cross-listed with BCH 499.

CHMY 505. Critical Concepts in Chemistry. 3 Credits. (2 Lec, 1 Lab) Su
PREREQUISITE: CHMY 121H or equivalent. Course explores new learning strategies that encourage discovery-based learning. Class will explore ways to use computer technology to engage students in discovery-based learning.

CHMY 506. Integrating Computers into Laboratory Instruction. 2 Credits. (1 Lec, 1 Lab) Su
PREREQUISITE: Secondary teacher certification and 2 years teaching experience.

CHMY 513. Computational Chemistry. 3 Credits. (1 Lec, 2 Lab) F
PREREQUISITES: CHMY 153 or CHMY 361. The course provides a comprehensive overview of computational chemistry methods with curatory, but adequate treatment of related theory. Thus, basic quantum or theoretical chemistry background is assumed. The focus of the lectures and hands-on laboratory exercises will be on using computational tools correctly and creatively as well as comparing and contrasting theoretical methods and experimental results from literature. The textbook is used to provide a good background of the relevant theoretical concepts, as needed. Each student will work on an individual project throughout the class that is preferably from past experimental research experience or current graduate thesis topics.

CHMY 515. Structure and Bonding in Inorganic Chemistry. 3 Credits. (3 Lec) F
PREREQUISITE: CHMY 401. Spectroscopy, structure, and bonding of coordination and organometallic compounds.

CHMY 516. Mechanisms and Dynamics in Inorganic Chemistry. 3 Credits. (3 Lec) S
PREREQUISITE: CHMY 401. Mechanisms and dynamics of the reactions of coordination and organometallic compounds.

CHMY 523. Organic Reaction Mechanisms. 3 Credits. (3 Lec) F
PREREQUISITE: CHMY 323, COREQUISITE: CHMY 533. A problem solving course concentrating on analyzing organic reactions and transformations via electron-pushing mechanisms. Problems chosen will be from the current chemical literature. Designed for incoming graduate students and upper-class undergraduates who want to learn or brush up on their electron-pushing skills.

CHMY 524. Mass Spectrometry. 3 Credits. (3 Lec) F alternate years, to be offered odd years.

CHMY 525. Chemical Reactions. 3 Credits. (3 Lec) S alternate years, to be offered even years.
PREREQUISITE: CHMY 373. Treatment of complex chemical equilibria, kinetics, and mass transport in the solution and gas phases with respect to their effects on methods of chemical analysis.

CHMY 526. Adv Protein NMR Spectroscopy. 3 Credits. (3 Lec) F alternate years, to be offered even years.
PREREQUISITE: CHMY 371. This lecture-based course is designed to teach the fundamental principles of nuclear magnetic resonance (NMR) spectroscopy as it applies to the structural elucidations of proteins in solution. Pre-requisites include familiarity with linear algebra and basic trigonometric functions and CHMY 323. Cross-referenced with BCHM 526.

CHMY 527. Analytic Optical Spectroscopy. 3 Credits. (3 Lec) F alternate years, to be offered even years.
PREREQUISITE: CHMY 371. Use of optical spectroscopic methods for chemical analysis.

CHMY 533. Physical Organic Chemistry. 3 Credits. (3 Lec) F
PREREQUISITE: CHMY 417. A semi-quantitative description of the mechanisms of organic reactions. Topics include M.O. theory, orbital symmetry, addition and elimination reactions, the kinetics and thermodynamics of organic reactions, solvent effects, etc.
CHMY 535. Reagent Chemistry. 3 Credits. (3 Lec) S
PREREQUISITE: CHMY 417. A thorough study of synthetic processes, methodologies and reagents.

CHMY 540. Organic Synthesis. 3 Credits. (3 Lec)
PREREQUISITE: CHMY 533 and CHMY 535. A thorough study of strategies for the synthesis of complex natural products.

CHMY 551. Organic Structure Elucidation. 3 Credits. (3 Lec) S alternate years, to be offered even years.
PREREQUISITE: CHMY 417. Spectroscopic structure elucidation of small organic molecules. Techniques to be discussed include 1-D and 2-D NMR spectroscopy, UV, IR, MS, and Raman spectroscopies. Emphasis will be on interpreting spectra to deduce the structure of the compound in question.

CHMY 554. Organometallic Chemistry. 3 Credits. (3 Lec) S alternate years, to be offered even years.
PREREQUISITE: CHMY 321, CHMY 323 and CHMY 553. Application of organometallic chemistry to organic transformations.

CHMY 557. Quantum Mechanics. 3 Credits. (3 Lec) F alternate years, to be offered even years.
PREREQUISITE: CHMY 373 or equivalent. Applications of quantum mechanics to molecules and spin systems.

CHMY 558. Classical & Stat Thermodynamic. 3 Credits. (3 Lec) F alternate years, to be offered odd years.
PREREQUISITE: CHMY 373 or equivalent. Classical & statistical thermodynamics applied to chemical systems.

CHMY 559. Kinetics & Dynamics. 3 Credits. (3 Lec) S alternate years, to be offered even years.
PREREQUISITE: CHMY 373 or equivalent Chemical kinetics, theories of reaction rates, molecular reaction dynamics, with applications to Chemical reactions in the gas phase, on surfaces, and in solution.

CHMY 560. Symmetry, Orbitals, and Spectroscopy. 3 Credits. (3 Lec) F alternate years, to be offered odd years.
PREREQUISITE: CHMY 373. Group theory with applications, semi-empirical and ab initio calculations, vibrational and electronic spectroscopy, and their interrelationship will be covered.

CHMY 564. Adv Quantum Chemistry. 3 Credits. (3 Lec) S alternate years, to be offered odd years.
PREREQUISITE: CHMY 557 or equivalent. Time independent and time dependent quantum mechanics with application to chemical bonding and molecular spectroscopy.

CHMY 575. Professional Paper. 1-6 Credits. (1-6 Ind; 6 cr max) F,S
Maximum 6 credits. PREREQUISITE: Consent of instructor. A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee. Cross-Listed with BCH 575.

CHMY 588. Professional Development. 1-3 Credits. (1-3 Lec; 3 cr max) On Demand
Max 3 cr. PREREQUISITE: Graduate standing; teaching experience and/or current employment in a school or organization; and consent of instructor and Dean of Graduate Studies. Courses offered on a one-time basis to fulfill professional development needs of in-service educators. A specific focus is given to each course which is appropriately subtitled. May be repeated.

CHMY 589. Graduate Consultation. 1-3 Credits. (3 Ind) F,S,Su
PREREQUISITE: Master's standing and approval of the Dean of Graduate Studies. This course may be used only by students who have completed all of their course work (and thesis, if on a thesis plan) but who need additional faculty or staff time or help.

CHMY 590. Master's Thesis. 1-10 Credits. (1-10 Ind; max unlimited) F,S,Su
IND Maximum credits unlimited. PREREQUISITE: Master's standing.

CHMY 591. Special Topics. 1-4 Credits. (1-4 Lec; 12 cr max) On Demand
PREREQUISITE: Upper division courses and others as determined for each offering. Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

CHMY 592. Independent Study. 1-3 Credits. (1-3 Ind; 3 cr max) On Demand
Max 3 cr. PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies. Directed research and study on an individual basis.

CHMY 594. Seminar. 1 Credit. (1 Sem; 4 cr max) On Demand
Max 4 cr. PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering. Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material. Cross-Listed with BCH 594.

CHMY 689. Grad Research/Instruction. 1-3 Credits. (1-3 Lec; 3 cr max) F,S,Su
PREREQUISITE: Graduate standing. COREQUISITE: CHMY 590 or CHMY 690. Classroom instruction associated with directed graduate research/creative activity projects.

CHMY 690. Doctoral Thesis. 1-10 Credits. (1-10 Ind; max unlimited) F,S,Su
PREREQUISITE: Doctoral standing.
Font Notice

This document should contain certain fonts with restrictive licenses. For this draft, substitutions were made using less legally restrictive fonts. Specifically:

Times was used instead of Adobe Garamond Pro.

The editor may contact Leepfrog for a draft with the correct fonts in place.