

CHEM: CHEMISTRY (CHEM)

CHEM 100. Chemistry in Society. (1-4 Credits)

A development of the fundamental principles of chemistry focusing on elements and compounds and their role in environmental, biochemical, technological, and industrial applications relevant to society.

CHEM 105. Introductory Chemistry. (1-4 Credits)

A development of the fundamental basis for the further study of chemistry designed for students lacking the pre-requisites for General Chemistry (CHEM151). Emphasis will be placed on problem solving techniques. Topics will include: international system of units, dimensional analysis, properties of atoms and molecules, atomic structure and the periodic table, common chemical reactions, and stoichiometry calculations. The course and associated laboratory can be counted towards the general education science requirement. Lab Accompanying laboratory exercises for CHEM105 are designed to emphasize basic techniques in laboratory including measurements, basic graphical presentation and interpretation, basis data interpretation, laboratory statistics and laboratory safety practices. The laboratory can be counted towards the general education science requirement. Co-requisite: CHEM 105 Introductory Chemistry.

CHEM 132. Professional Practices in CHEM. (2 Credits)

A course designed to foster ethical practices and safety in chemistry and related fields. Pre-requisite: Permission of Instructor Co-requisite: CHEM 161 and CHEM 163.

CHEM 151. General Chemistry I. (3 Credits)

A development of the fundamental principles of chemistry and their applications. Chemical nomenclature, stoichiometry, atomic structure, bonding theories, thermochemistry, periodic properties, solution calculations, gas laws and the properties of solids and liquids are among the topics discussed. Pre-requisite: MATH 120 with a C or better or higher placement or CHEM 105 with a C or better. Co-requisite: CHEM 153 General Chemistry I Laboratory.

CHEM 152. General Chemistry II. (3 Credits)

A continuation of the study of the principles of chemistry and their applications. The topics include solution properties, acids and bases, ionic equations, oxidation-reduction, equilibrium, kinetics, descriptive chemistry of the elements, nuclear chemistry and an introduction to organic chemistry. Pre-requisite: CHEM 151 General Chemistry I Co-requisite: CHEM 154 General Chemistry Laboratory II.

CHEM 153. General Chemistry I Laboratory. (1 Credit)

An introduction to the principles and techniques of experimental chemistry with emphasis upon formula investigations, equations, elementary laboratory statistics, and chemical reactivity. Co-requisite: CHEM 151 General Chemistry I.

CHEM 154. General Chemistry II Laborator. (1 Credit)

A continuation of CHEM 153 with emphasis upon solution properties, kinetics, equilibrium, acids and bases, and qualitative analysis. Pre-requisite: CHEM 153 General Chemistry Laboratory I Co-requisite: CHEM 152 General Chemistry II 201608.

CHEM 161. Chemistry I. (3 Credits)

A development of the fundamental principles of chemistry and their application. Chemical nomenclature, stoichiometry, atomic structure, bonding theories, thermochemistry, periodic properties, solution calculations, gas laws and the properties of solids and liquids are among the topics discussed in depth. Emphasis will be placed on problem solving skills to better prepare students for careers in chemistry and related life science fields. Pre-requisite: Chemistry Majors or Permission from the Department Chair Co-requisites: CHEM 163 Chemistry Laboratory I.

CHEM 162. Chemistry II. (3 Credits)

A continuation of development of the fundamental principles of chemistry and their application. The topics that will be covered in depth include solution properties, acids and bases, ionic equations, oxidation reduction, equilibrium, kinetics descriptive chemistry of the elements, nuclear chemistry and an introduction to organic chemistry. Emphasis will be placed on problem solving skills to better prepare students for careers in chemistry and related life science fields. Pre-requisite: CHEM 161 Chemistry I with a C or better Co-requisite: CHEM 164 Chemistry Laboratory II.

CHEM 163. Chemistry Laboratory I. (1 Credit)

An introduction to the principles and techniques of experimental chemistry with emphasis upon the application of course material to problem solving in the laboratory. Co-requisite: CHEM 161 Chemistry I.

CHEM 164. Chemistry Laboratory II. (1 Credit)

A continuation of CHEM 163 with emphasis upon problem solving and presenting professional graphical data while exploring, solution properties, kinetics, equilibrium acids and bases, and qualitative analysis. Pre-requisite: CHEM 153 General Chemistry I Laboratory, CHEM 163 Chemistry Laboratory I Co-requisite: CHEM 162 Chemistry II.

CHEM 210. Hist of Blk & Underrep Chemist. (2 Credits)

A thorough assessment of the groundbreaking work of the Black and Underrepresented pioneers responsible for the current practice of the science of chemistry and biochemistry. Pre-requisites: CHEM 151 or CHEM161 of CHEM 100.

CHEM 214. Inorganic Chemistry. (3 Credits)

A detailed study of the representative elements and their compounds, involving both theoretical and descriptive approaches. Topics greatly expand upon the subject material in the Freshman level chemistry course and include atomic and molecular structure, descriptive chemistry of the elements, d metal complexes, molecular shape and symmetry, group theory, the structure of solids, acids/bases, oxidation/reduction and an introduction to ligand and crystal field theories. Pre-requisite: CHEM152 General Chemistry II or CHEM 162 Chemistry II.

CHEM 215. Inorganic Chemistry Laboratory. (1 Credit)

Experiments designed to complement inorganic chemistry lecture by introducing synthetic and instrumental methodology used in the study of inorganic compounds. Co-requisite: CHEM 214 Inorganic Chemistry.

CHEM 218. Analytical Chemistry I. (3 Credits)

A survey of the methods of inorganic quantitative analysis, including the methods of gravimetric and volumetric analysis with the use of simple instrumental methods included. Pre-requisites: CHEM 152/154 General Chemistry II or 162/164 Chemistry II 201608.

CHEM 219. Analytical Chemistry Lab I. (1 Credit)

Laboratory experiences involving the qualitative and quantitative analysis of chemical compounds including gravimetric, volumetric and spectrophotometric methods. Pre-requisites: CHEM 154 General Chemistry Laboratory II or CHEM 164 Chemistry Laboratory II Co-requisite: CHEM 218 Analytical Chemistry I.

CHEM 305. Organic Chemistry I. (3 Credits)

A survey of the chemistry of carbon compounds, their nomenclature, physical properties, structure and reactions with an introduction to reaction mechanisms and instrumental analysis. Pre-requisite: CHEM 152 General Chemistry II or CHEM 162 Chemistry II Co-requisite: CHEM 307 Organic Chemistry Laboratory I 201608.

CHEM 306. Organic Chemistry II. (3 Credits)

A continuation of CHEM 305. Pre-requisite: CHEM 305 Organic Chemistry I Co-requisite: CHEM 308 Organic Chemistry Laboratory II.

CHEM 307. Organic Chemistry Lab I. (1 Credit)

An examination of fundamentals of and practice in organic synthesis, separation, purification and the identification of organic compounds. Pre-requisites: CHEM 154 General Chemistry Laboratory II or CHEM 164 Chemistry Laboratory II Co-requisite: CHEM 305 Organic Chemistry I.

CHEM 308. Organic Chemistry Lab II. (1 Credit)

A continuation of the fundamentals of and practice in organic synthesis, separation, purification and the identification of organic compounds. Pre-requisite: CHEM 307 Organic Chemistry Laboratory I Co-requisite: CHEM 306 Organic Chemistry II 201608.

CHEM 318. Analytical Chemistry II. (3 Credits)

An advanced course with emphasis on general principles and applications of analytical instrumental analysis. Pre-requisites: CHEM 218 Analytical Chemistry I; CHEM 219 Analytical Chemistry Laboratory I.

CHEM 319. Analytical CHEM Laboratory II. (1 Credit)

Experiments in Instrumental Analysis Co-requisite: CHEM 318 Analytical Chemistry II.

CHEM 320. Org Reaction Mech/Mod Inst. (3 Credits)

A course designed for a more in depth treatment of reaction mechanisms in organic chemistry and instrumental analytical techniques for structure determination of organic compounds, to include: Infrared spectroscopy; Ultraviolet-Visible spectroscopy; Mass spectrometry; and Nuclear Magnetic Resonance spectroscopy. Pre-requisite: CHEM 306 Organic Chemistry II.

CHEM 330. Intro Chemical Research. (2 Credits)

An aid to the student in making efficient use of chemical literature both online and in the printed form, with an emphasis upon obtaining the appropriate sources for a research project in the field of chemistry or biochemistry. Pre-requisite: CHEM 306 Organic Chemistry II and CHEM 308 Organic Chemistry II Laboratory.

CHEM 340. Forensics Chemistry. (3 Credits)

A course designed to give the forensics student the necessary background in specialized chemical methods and concepts as they apply to the field of forensics. Pre-requisite: CHEM 306, 308 Organic Chemistry & Laboratory II.

CHEM 341. Forensics Chemistry Laboratory. (1 Credit)

A laboratory course designed to give the forensics student the necessary practical experience in specialized chemical methods as they apply to the field of forensics. Co-requisite: CHEM 340 Forensics Chemistry.

CHEM 361. Environmental Chemistry I. (3 Credits)

Chemical aspects of the atmosphere and air pollution: greenhouse effect and global climate change; CFCs, the ozone layer, and the ozone hole; carbon monoxide, nitrogen oxides, and photochemical smog, particulate matter; radon, asbestos, indoor air pollution; sulfur oxides and acid deposition, particularly relating to atmospheric reactions and control options.

CHEM 362. Environmental Chemistry II. (3 Credits)

An in-depth look at chemical aspects of water and water pollution: alkalinity; acid deposition, particularly relating to lake and stream acidification and forest decline; drinking water treatment and THMs; wastewater treatment; detergents, builders, and eutrophication; pesticides; other toxic organic compounds such as PCBs and dioxin; hazardous wastes; toxic elements such as Pb, Hg, Sn, Cd, and Se.

CHEM 363. Environmental Chemistry Lab. (1 Credit)

Applicability of modern day chemical instrumentation to the solution of present-day environmental problems. Includes instruction in operation of instrumentation, calculations, and interpretation of results from environmental analyses of a variety of air, water and soil samples.

CHEM 400. Special Topics In Chemistry. (3 Credits)

An advanced course for chemistry majors designed to promote interest and experience in specialized areas of chemistry. Topics in the area of organic, physical, analytical, inorganic and biochemistry are based on the expertise of the faculty and current trends within these disciplines in chemistry. Pre-requisite: Permission of instructor. 201608.

CHEM 401. Physical Chemistry I. (3 Credits)

A non-laboratory treatment of physical chemistry with emphasis on chemical thermodynamics, phase equilibria, kinetic theory and chemical kinetics. Pre-requisites: CHEM 152 General Chemistry II or CHEM 162 Chemistry II; MATH 201 Calculus II or consent of instructor 201608.

CHEM 402. Physical Chemistry II. (3 Credits)

A continuation of CHEM 401 with emphasis on the condensed states of matter, atomic and molecular structure, spectroscopy, statistical mechanics and electrochemistry. Pre-requisite: CHEM 401 Physical Chemistry I.

CHEM 404. Experimental Physical Chem. (1 Credit)

An introduction to the advanced techniques of physicochemical measurements and their application to chemistry. Pre-requisite: CHEM 401 Physical Chemistry I.

CHEM 414. Advanced Inorganic Chemistry. (3 Credits)

Advanced study of the representative elements and their compounds, involving both theoretical and descriptive approaches. Review of ligand field and crystal field theories, reaction mechanisms of d-block complexes, electronic spectra of transition metal complexes, characterization methods in inorganic chemistry, organometallic chemistry, catalysis and bioinorganic chemistry are among the topics discussed. Pre-requisite: CHEM 214, 215 Inorganic Chemistry & Laboratory.

CHEM 415. Adv Inorganic Chemistry Lab. (1 Credit)

Laboratory experiments in inorganic synthesis and spectroscopic methods in inorganic chemistry. Co-requisite: CHEM 414 Advanced Inorganic Chemistry.

CHEM 418. Advanced Organic Chemistry. (3 Credits)

A course designed for a more in-depth treatment of reaction mechanisms in organic chemistry and instrumental analytical techniques for structure determination of organic compounds, to include: Infrared spectroscopy; Ultraviolet-Visible spectroscopy; Mass spectrometry; and Nuclear Magnetic Resonance spectroscopy. Pre-requisite: CHEM 306.

CHEM 420. Seminar In Chemistry. (1 Credit)

A presentation and discussion of topics of current interest and an introduction to the preparation of technical presentations and presentation methods. Pre-requisite: 15 semester hours of chemistry courses.

CHEM 422. Biochemistry I. (3 Credits)

An introduction to the chemistry of life processes, the composition of living matter and the changes associated with biological processes Pre-requisites: CHEM 306 Organic Chemistry II; CHEM 308 Organic Chemistry Laboratory II.

CHEM 423. Biochemistry Laboratory I. (1 Credit)

A laboratory course in which the properties of biochemical molecules are explored and common biochemical reactions are examined. Co-requisite: CHEM 422 Biochemistry I.

CHEM 424. Biochemistry II. (3 Credits)

A continuation of the chemistry of life processes, the composition of living matter, and the changes associated with biological processes. Pre-requisite: CHEM 422 Biochemistry I.

CHEM 425. Biochemistry Laboratory II. (1 Credit)

A continuation laboratory course in which the properties of biochemical molecules are explored and common biochemical reactions are examined. Pre-requisite: CHEM 422 Biochemistry I; CHEM 423 Biochemistry Laboratory I Co-requisite: CHEM 424 Biochemistry II.

CHEM 441. Research Laboratory I. (2 Credits)

The first part of a capstone research experience. Students are expected to spend a minimum of 6 hours per week on an independent and original research project designed in consult with their research advisor. Pre-requisites: CHEM 320 Organic Chemistry III; CHEM 318 Analytical Chemistry II, CHEM319 Analytical Chemistry II Laboratory, CHEM330 Introduction to Chemical Research 201608.

CHEM 442. Research Laboratory II. (2 Credits)

A continuation of CHEM 441 with an emphasis upon the independent development of a research project. A written report of the research and an oral presentation of the results are required. Pre-requisite: CHEM 441 Research Laboratory I.

CHEM 443. Advanced Forensics Lab I. (2 Credits)

This laboratory-based course is designed to give the advanced student crime laboratory experience in examining, analyzing and identifying evidence. In several simulated court presentations, students sharpen their skill in presenting evidence as a scientific expert. The areas covered are: hairs, fibers and polymers, glass, soil, gunshot residue, fire and bomb debris, and drugs. Pre-requisites: CHEM 318 Analytical Chemistry II and CHEM 319 Analytical Chemistry II Laboratory, CHEM 330 Introduction to Chemical Research, CHEM 340 Forensics Chemistry, CHEM 341 Forensics Chemistry Laboratory, and CJUS 380 Criminal Procedures,

CHEM 444. Advanced Forensics Lab II. (2 Credits)

A continuation of CHEM 443. Pre-requisites: CHEM 443 Advanced Forensics Laboratory I.

CHEM 445. Internship in Criminalistics. (3 Credits)

This on- off-campus internship is designed to give the student an opportunity to expand and apply their classroom knowledge through workplace gained experience in forensic chemistry. It is a lecture/ laboratory course. The site supervisor and faculty supervisor will develop the internship criteria and then evaluate the student's performance. Pre-requisites: CHEM444 Advanced Forensics Laboratory II and Permission of Department Chair 201608.