

CHAD 496 (3)**Observation and Assessment Laboratory in Child and Adolescent Development**

Advanced research methods course covering assessments used in research on infants, children, and adolescents, including observation, event- and time-sampling, and standardized tests of social, emotional, physical, and cognitive development. Course will culminate in a written research report on the student's own empirical study. Students must successfully complete a background check, a TB test, and provide proof of full immunization to measles, mumps and rubella. *Two hours of lecture and three hours of laboratory. PSYC 100, 220, 230, 331, and 349 with a grade of C (2.0) or better.*

CHEMISTRY (CHEM)**College of Science and Mathematics****CHEM 021 (1)****Supplemental Instruction in Introductory Organic Chemistry**

Peer-facilitated learning sessions focused on development of skills needed to succeed in CHEM 201 and subsequent Chemistry courses. Participation in such supplemental instruction can raise student performance in traditionally difficult courses. Intended to provide a collaborative learning environment where students can work on problem solving, general study skills, and CHEM 201 course content. *Strongly recommended for all students enrolled in CHEM 201. May be repeated for a total of three (3) units. Graded Credit/No Credit. Corequisite: CHEM 201.*

CHEM 101 (3)**Preparatory Chemistry**

Prepares students for CHEM 105 or CHEM 150. Introduces students to fundamental chemical concepts and quantitative problem-solving skills in chemistry. Topics include atomic theory, chemical nomenclature, the periodic table, stoichiometry, atomic structure, and chemical bonding. *Intended for students who have not successfully completed high school chemistry or other preparatory courses within the last five years, or those students who need additional preparation before taking CHEM 105 or CHEM 150. Enrollment Restriction: Students must be a declared major in BIOL, BIOC, BIOT, CHEM, KINE, MATH, NURS, PHYS.*

CHEM 105 (4)**General, Organic, and Biochemistry for Life**

Covers the basic principles of general, organic and biochemistry as applied to the biochemistry, pathophysiology, pharmacology and nutrition of human body systems. Intended for students pursuing a degree in a variety of health-related areas such as nursing. *Recommended: High school chemistry and/or CHEM 101. Prerequisite: Completion of the Entry Level Mathematics (ELM) requirement or consent of instructor. Co/Prerequisite: CHEM 105L.*

CHEM 105M (1)**General, Organic, and Biochemistry for Life Laboratory**

Covers the basic principles of weight and volume measurements, solutions, suspensions, colloids, osmosis, energy of biochemical transformations, buffered solutions, the properties of acids and bases and pH balance in the biochemistry of human body systems. *Intended for students pursuing a degree in a health-related field. Content is identical to CHEM 105L, except that CHEM 105M is delivered in high school classrooms.*

CHEM 105L (1)**General, Organic, and Biochemistry for Life Laboratory**

Covers the basic principles of weight and volume measurements, solutions, suspensions, colloids, osmosis, energy of biochemical transformations, buffered solutions, the properties of acids and bases and pH balance in the biochemistry of human body systems. *Intended for students pursuing a degree in a health-related field. Prerequisite: Completion of the entry Level Mathematics (ELM) requirement or consent of instructor. Co/Prerequisite: CHEM 105.*

CHEM 106 (3)**Introduction to Organic and Biochemistry**

Basic principles of organic and biochemistry as applied to human body systems. Subjects covered include: Structure and reactions of organic compounds such as alcohols, carboxylic acids, amides, ketones, and aldehydes; protein synthesis, structure, and function; enzymes; nutrition; and the chemistry of energy production. Intended for Kinesiology or Nursing majors. *May not be substituted for CHEM 201, 202, 341, 351 and/or 352. Prerequisite: CHEM 101 with a minimum grade of C (2.0). Co/Prerequisite: CHEM 106L.*

CHEM 106L (2)**Introduction to Organic and Biochemistry Laboratory**

Covers the basic laboratory principles of general, organic, and biochemistry as applied to human body systems. Complements the topics covered in CHEM 101 and CHEM 106 with experiments focused on molecular modeling, chemical synthesis, enzyme catalysis, and the characterization of carbohydrates, lipids, and proteins. Intended for Kinesiology or Nursing majors. *Prerequisite: CHEM 101 with a minimum grade of C (2.0). Co/Prerequisite: CHEM 106.*

CHEM 150 (4)**General Chemistry**

Introduction to the basic qualitative models and principles in chemistry. The areas covered include: basic atomic structure, the periodic table, covalent and ionic bonding, states of matter, intermolecular forces, energy, changes, chemical equilibria, acid-base and redox chemistry, stoichiometry, properties of gases, and chemical properties of the common elements. Intended for science majors. *Three hours of lecture and one hour of discussion per week. Enrollment restricted to students with declared majors in: Biochemistry, Biological Sciences, Biotechnology, Chemistry, Kinesiology, Liberal Studies, Mathematics, and Physics. Prerequisite: Completion of the Entry Level Mathematics (ELM) requirement. Recommended: High School Chemistry and/or CHEM 101. Co/Prerequisite: CHEM 150L.*

CHEM 150L (1)**General Chemistry Lab**

Introduction to some of the basic laboratory techniques used in chemistry. The experiments are designed to complement the material covered in CHEM 150. *Three hours of laboratory per week. Co/Prerequisite: CHEM 150.*

CHEM 160 (3)**General Chemistry II**

Introduces quantitative approaches to chemical equilibria and kinetics. Fundamental principles of thermodynamics introduced in CHEM 150 are explored in greater depth. Topics include solubility, acids and bases, oxidation and reduction, and nuclear chemistry. Applications of these topics to practical chemical analysis are discussed. *Co/Prerequisite: MATH 125 or MATH 132 with enrollment in the Pre-Health Certificate Program. Enrollment Requirement: CHEM 150 and CHEM 150L with a minimum grade of C (2.0). May not be taken for credit by students who received credit for CHEM 250.*

CHEM 175 (1)**General Chemistry Lab II – Pre-Health**

A laboratory designed to support and illustrate chemical concepts studied in CHEM 160, as well as to introduce quantitative laboratory techniques and encourage analytical thinking. Not intended for Chemistry and Biochemistry majors, who should take CHEM 275. *May not be taken for credit by students who received credit for CHEM 250L. Corequisite: CHEM 160. Enrollment Requirement: CHEM 150 and CHEM 150L with a minimum grade of C (2.0).*

CHEM 200 (1)**Bridge to Organic Chemistry**

Reviews important concepts from the introductory chemistry course and casts them within the context of organic chemistry. Includes composition, bonding models, formal charge, resonance, isomerism, stereo-chemistry, chemical reactivity, and an introduction to functional group nomenclature and reaction mechanisms using the electron-pushing model. *Prerequisite: CHEM 160.*

CHEM 201 (3)**Organic Chemistry**

First course of a sequence designed to introduce the student majoring in science to the properties of organic compounds. The entire sequence covers bonding, structure, stereochemistry, nomenclature, chemical and physical properties of each functional group, acid/base phenomena, reaction mechanisms and kinetics, organic synthesis, and an introduction to spectroscopic structure determination. *Prerequisite: CHEM 160 with a minimum grade of C (2.0). Co/Prerequisite: CHEM 201L.*

CHEM 201L (2)**Organic Chemistry Laboratory**

The laboratory experiments are designed to illustrate the basic techniques of organic chemistry and to complement the lecture material covered in CHEM 201. *Six hours of laboratory. Enrollment Requirement: CHEM 150 and CHEM 150L with a minimum grade of C (2.0). Co/Prerequisite: CHEM 201.*

CHEM 202 (3)**Organic Chemistry**

Second course of a sequence designed to introduce the student majoring in science to the properties of organic compounds. The entire sequence covers bonding structure, stereochemistry, nomenclature, chemical and physical properties of each functional group, acid/base phenomena, reaction mechanisms and kinetics, organic synthesis, and an introduction to spectroscopic structure determination. *Prerequisite: CHEM 201 and 201L with a minimum grade of C (2.0).*

CHEM 202L (2)**Organic Chemistry Laboratory**

The laboratory experiments are designed to illustrate the basic techniques of organic chemistry and to complement the lecture material covered in CHEM 202. *Six hours of laboratory. Prerequisite: CHEM 201 and 201L with a minimum grade of C (2.0). Co/Prerequisite: CHEM 202.*

CHEM 275 (4)**Quantitative Investigations in Chemistry**

A laboratory designed to give chemistry majors practical experience in standard methods of separation and quantitative analysis. These are applied to investigations of the fundamental topics presented in CHEM 160, and to analyses with industrial, environmental, or medical relevance. Volumetric, gravimetric, spectrophotometric, chromatographic, and electrochemical methods of analysis may be included. *One hour of lecture and six hours of laboratory. Prerequisite: MATH 160 and CHEM 201L with a minimum grade of C (2.0). Co/Prerequisite: CHEM 160.*

CHEM 300 (3)**Literature of Chemistry**

Introduces the student to techniques of finding, reading, and writing chemical and other scientific literature for upper-division work in the natural sciences. Includes standard reference works in Chemistry, journals and monographs, Chemical Abstracts, Science Citation Index, and other print and online resources. Students write research proposals and journal-quality scientific papers, including figures and graphs using up-to-date computer tools. Students learn strategies for reading difficult scientific papers and give oral presentations of research. *Enrollment Requirement: CHEM 201.*

CHEM 308 (3)**Environmental Chemistry**

An introduction to the basic chemical processes in the environment. The subject matter will include environmentally related processes of both natural and human origin. Also included will be the chemistry relevant to air, water, and land-based pollution. All areas to be studied will utilize the ideas of chemical bonding, kinetics, and/or thermodynamics as a basis for understanding the environmental processes. *Enrollment Requirements: CHEM 160 and 201.*

CHEM 311 (3)**Chemicals and the Environment**

A survey on chemicals of natural and industrial origin found in the environment, with emphasis on the chemical reactions of these substances and the effect on the quality of life on planet Earth. The areas covered are: chemical structures, inorganic and organic chemicals of natural and synthetic origins and the reactions of these chemicals, the effects of these chemicals on the environment (the atmosphere, soil, water ways, plants, and animals, especially human nutrition and health.) *Intended for the non-chemistry major.*

CHEM 312 (3)**Chemistry of Life**

Structure, function, and properties of bioorganic/biochemical molecules important to life, health and nutrition. The areas covered are: atomic and molecular structure, chemical and physical properties of bio-organic functional groups, carbohydrates, fats, amino acids, proteins, enzymes, hormones, nucleic acids, digestion, nutrition. Also discusses the aesthetic, humanistic and practical aspects of science, where applicable, related to economic, health, historical (including contributions made by women and minorities), and/or political issues influenced by chemistry. *Intended for the non-chemistry major.*

CHEM 315 (3)**Science in Film and TV**

Intended for the non-science major, the goal of this course is to introduce students to the fundamental concept in the physical and life sciences. Popular motion pictures, television programs and commercials, and video documentaries that contain scientific themes will be used to introduce relevant concepts, and will also serve as a common background from which students can expand their scientific understanding. *Also offered as PHYS 315. Students may not receive credit for both.*

CHEM 316 (3)**Chocolate: A Chemical Investigation**

A survey of interesting natural products in today's society, with emphasis on the historical and modern production and consumption of chocolate along with several other plant-derived foods and drugs. The areas covered are: chemical structure and bonding, chemical reactivity, solubility, acidity, energy of reactions, and natural organic molecules and their effects on our bodies. Intended for the non-chemistry major. *May not be taken for credit by students who have received credit for CHEM 390-1.*

CHEM 318 (3)**Chemistry of Wine and Beer**

Introduces basic concepts of chemistry to the non-science major using examples from the wine and beer industries. Focuses on the use of the processes of wine making and beer brewing to introduce chemical principles. The history, composition, analysis, metabolism, and impact on human health of wine and beer will also be covered. *Intended for the non-chemistry major.*

CHEM 341 (3)**General Biochemistry**

A one-semester introduction to the concepts and language of biochemistry. Includes a description of the biochemistry of proteins, lipids, carbohydrates and nucleic acids, and an overview of cellular metabolism. Intended for science majors, but not for biochemistry and certain biological sciences majors (consult biological science department). *May not be substituted for CHEM 351 and/or CHEM 352. Prerequisite: CHEM 201 with a minimum grade of C (2.0).*

CHEM 351 (3)**Biochemistry I**

Thermodynamics of biological systems, properties of amino acids, protein structure, introduction to enzyme kinetics, inhibition and regulation, nomenclature and structure of carbohydrates and lipids, the structure of biological membranes and membrane transport, and the structure of nucleic acids. Together with CHEM 352, designed for students majoring in chemistry, biochemistry and certain concentrations in biological sciences. *Prerequisite: CHEM 202 with a minimum grade of C (2.0).*

CHEM 351L (2)**Biochemistry Laboratory**

Designed to complement the lecture material and illustrate the basic techniques of biochemistry. *Six hours of laboratory. Co/Prerequisite: CHEM 341 or CHEM 351.*

CHEM 352 (3)**Biochemistry II**

Introduces the student majoring in science to principles of bioenergetics and metabolism. Covered areas are the generation and storage of metabolic energy; the synthesis and degradation of carbohydrates, lipids, amino acids and nucleotides; the interdependence of metabolic pathways; the types of metabolic regulation and the key regulatory reactions of each pathway. *Prerequisite: CHEM 351 with a minimum grade of C (2.0).*

CHEM 390 (1-3)**Special Topics in Chemistry and Biochemistry**

A survey course of selected topics in current literature in Chemistry and Biochemistry. *Enrollment Requirement: CHEM 160 and 201.*

CHEM 390L (1-3)**Special Topics in Chemistry and Biochemistry Laboratory**

A survey course of selected laboratory topics in current literature in Chemistry and Biochemistry. *Enrollment Requirement: CHEM 160 and 201.*

CHEM 395 (1)**Workshop for Future Chemistry Educators**

A discussion forum for students pursuing the Chemistry Education Option. Discussion focuses on various chemistry topics typically presented in secondary level classrooms. Students should take this course simultaneously with EDUC 350 so that they are better able to link their observations from the field experience to their own study of chemistry. *Prerequisites: CHEM 160 and 202 with grades of C (2.0) or better.*

CHEM 397 (1)**Supervised Chemistry Lecture/Laboratory Instruction**

Practical experience for science majors interested in chemistry teaching. Involves assisting the faculty member teaching in a chemistry laboratory or classroom setting. Includes individual supervision of teaching. A written report/journal is required. (*One hour conference and three hours lab/lecture per unit*). *May be repeated for a total of two (2) units. Graded Credit/No Credit. Enrollment is restricted to students who have obtained consent of instructor. Prerequisites: CHEM 160 and 202 with minimum grades of C (2.0).*

CHEM 398A (1) 398B (2)**Special Problems in Chemistry – Library**

Individual investigation that involves reading and researching the literature on an issue/topic in chemistry. The project must be performed in consultation with a faculty member in a related sub-discipline and a contract stating the proposed goals will be signed by both the student and the instructor. A written report or exam demonstrating an in-depth understanding of the issue/topic will be completed at the end of each semester of work. *May be repeated for a total of four (4) units but may not be substituted for CHEM 498. Enrollment restricted to students who have obtained consent of instructor.*

CHEM 399A (1) 399B (2)**Special Problems in Chemistry – Laboratory**

Individual investigation that involves a research project in the laboratory in collaboration with a faculty member in a related subdiscipline. A contract stating the proposed goals of the project will be signed by both the student and the instructor. A written report summarizing the research findings must be submitted to the instructor at the end of each semester of work. *May be repeated for a total of four (4) units of credit, but may not be substituted for CHEM 499. Enrollment restricted to students who have obtained consent of instructor.*

CHEM 401 (3)**Physical Chemistry – Classical**

Designed to introduce the student majoring in science to the basic principles of Chemical Thermodynamics and Kinetics. The areas covered include: Basic laws of thermodynamics, chemical and physical equilibria, electrochemistry, transport processes, and theories and experimental determination of chemical reaction rates. *Enrollment Requirement: CHEM 160, MATH 162, and PHYS 202 or PHYS 206.*

CHEM 402 (3)**Physical Chemistry – Quantum**

Designed to introduce the student majoring in science to the basic principles of Quantum Mechanics and Spectroscopy as applied to chemical problems. The areas covered include: quantum mechanics of model systems, electronic structure of atoms and molecules, and atomic and molecular spectroscopic principles. *Enrollment Requirement: CHEM 160, MATH 162, and PHYS 202 or PHYS 206.*

CHEM 404 (3)**Inorganic Chemistry**

Presents students majoring in science with more advanced concepts of inorganic chemistry than those introduced in lower-division courses. The areas covered are: atomic structure, the periodic table, chemical applications of group theory, theories of chemical bonding, the solid state, acid/base chemistry and non-aqueous solvents, coordination chemistry of the transition metals, and spectroscopy of transition metal complexes. *Corequisite: CHEM 404L. Prerequisite: CHEM 160 and 201 with minimum grades of C (2.0) in each.*

CHEM 404L (1)**Inorganic Chemistry Laboratory**

Designed to introduce the students majoring in science to laboratory techniques for the manipulation, synthesis, and characterization of inorganic compounds. Principles of structure and bonding, spectroscopy, magnetic characterization, thermodynamics and kinetics of inorganic compounds introduced in CHEM 404 are demonstrated in laboratory experiments. *Three hours of laboratory per week. Co/Prerequisite: CHEM 404L.*

CHEM 405 (2)**Physical Chemistry Laboratory**

Designed to introduce the student to experimental and computational techniques in physical chemistry. The laboratory experiments will cover topics in chemical thermodynamics, molecular spectroscopy, chemical kinetics, and computational chemistry. Emphasizes the application of theoretical principles in the interpretation of the experimental and computational results. *May be repeated with consent of instructor. One hour of lecture and three hours of laboratory per week. Co/Prerequisite: CHEM 401.*

CHEM 416 (5)**Instrumental Methods of Analysis – Separations and Structure**

Designed to introduce the student majoring in science to basic theory and practical application of instrumental methods of chemical separation and structure determination. The areas covered are: chromatography (GC/HPLC), spectrometry (atomic absorption, mass, infrared, ultraviolet, and proton and carbon-13 nuclear magnetic resonance). The laboratory experiments are designed to complement the lecture material and illustrate the basic techniques of chemical separation and structure determination. *Three hours of lecture and six hours of laboratory. Prerequisites: CHEM 202, CHEM 202L, CHEM 275, and MATH 160 with a minimum grade of C (2.0).*

CHEM 450 (3)**Protein Structure and Function**

Fundamentals of protein structure including structural motifs, domains, and folding; methods of protein structure determination; structural bioinformatics; and an in-depth consideration of the structure-function relationship in representative proteins involved in important biological functions such as transport, enzyme catalysis, protein-nucleic acid interactions, signal transduction, immunity, and membrane channels and receptors. *May not be taken for credit by students who have received credit for CHEM 491B. Prerequisite: CHEM 341 or 351 with a minimum grade of C (2.0).*

CHEM 455 (3)**Enzymology**

Focuses on enzyme kinetics, the mechanisms of enzyme catalysis, and enzymatic regulation. Includes a review of basic enzymatic concepts, enzyme kinetics of single substrate reactions, enzyme inhibition and multi-substrate enzyme systems, mechanisms of enzyme catalysis, active site studies, the description of specific well-characterized enzymes, and mechanisms of enzyme regulation. *Prerequisites: CHEM 341 or 351 with a minimum grade of C (2.0).*

CHEM 490 (1-3)**Selected Topics in Analytical Chemistry**

A survey course of selected topics from the current chemical literature in analytical chemistry. *May be repeated for credit as topics change for a total of six (6) units. Students should check the Class Schedule for listing of actual topics. Prerequisite: CHEM 416 with a minimum grade of C (2.0).*

CHEM 491 (1-3)**Selected Topics in Biochemistry**

A survey of selected topics from the current chemical literature in biochemistry. *May be repeated for credit as topics change for a total of six (6) units. Students should check the Class Schedule for listing of actual topics. Prerequisite: CHEM 341 or 351 with a minimum grade of C (2.0).*

CHEM 492 (1-3)**Selected Topics in Inorganic Chemistry**

A survey of selected topics from the current chemical literature in inorganic chemistry. *May be repeated for credit as topics change for a total of six (6) units. Students should check the Class Schedule for listing of actual topics. Prerequisite: CHEM 404 with a minimum grade of C (2.0).*

CHEM 493 (1-3)**Selected Topics in Organic Chemistry**

A survey of selected topics from the current chemical literature in organic chemistry. *May be repeated for credit as topics change for a total of six (6) units. Students should check the Class Schedule for listing of actual topics. Prerequisite: CHEM 201 with a minimum grade of C (2.0).*

CHEM 494 (1-3)**Selected Topics in Physical Chemistry**

A survey of selected topics from the current chemical literature in physical chemistry. *May be repeated for credit as topics change for a total of six (6) units. Students should check the Class Schedule for listing of actual topics. Enrollment Requirement: CHEM 401 and CHEM 402 with a minimum grade of C (2.0).*

CHEM 497 (1)**Chemistry in the Community**

Designed to introduce the student majoring in science to learning through service. *Students will participate in safe and exciting chemical demonstrations, K-12 tutoring in chemistry, and community events involving chemistry. Two hours of discussion, tutoring, or laboratory work per week. Enrollment requirement: Completion of three (3) units of upper-division chemistry courses. Enrollment restricted to students who have obtained consent of instructor prior to registration.*

CHEM 498 (2)**Senior Library Thesis and Seminar**

An in-depth reading and researching of the literature on current issues in chemistry. The student must consult with a faculty member in the discipline to decide on the subject and then produce a research paper (approximately 10-20 pages) with a list of literature citations in American Chemical Society style. The research paper (thesis) must summarize the current state of knowledge on the subject. The project will involve an average of two hours of consultation with the faculty supervisor and four (4) hours of library work each week. The student will defend the thesis in a seminar to the faculty and students of the Department of Chemistry. *May be repeated for a total of four (4) units of credit. Enrollment restricted to students who have obtained consent of instructor.*

CHEM 499 (2)**Senior Laboratory Thesis and Seminar**

An original research project in the laboratory or in collaboration with a faculty member in the discipline. The student must consult with a faculty member in the discipline to decide on the research problem and then produce a research paper (approximately 10-20 pages) with a list of literature citations in American Chemical Society style. The research paper (thesis) must summarize the current state of knowledge on the research problem as well as the progress in the laboratory experiments aimed at the completion of the research project. The student will defend the thesis in a seminar to the faculty and students of the Department of Chemistry. The project will involve an average of six hours of supervised laboratory work each week. *May be repeated for a total of four (4) units of credit. Enrollment restricted to students who have obtained consent of instructor.*

CHINESE (CHIN)**College of Humanities, Arts, Behavioral and Social Sciences****CHIN 101 (4)****Beginning Chinese I**

An introduction to the Chinese language and Chinese speaking cultures with emphasis on the development of communicative skills and grammar structures. *Though no prior knowledge of Chinese is assumed, to promote language acquisition, this course is conducted in Chinese. May not be taken for credit by students who received credit for MLAN 101-1.*

CHIN 102 (4)**Beginning Chinese II**

Further study of the Chinese language and Chinese speaking cultures, with an emphasis on the development of communicative skills and grammatical structures. At time of enrollment, basic knowledge of Chinese (equivalent to that demonstrated upon successful completion of CHIN 101) is mandatory. *May not be taken for credit by students who received credit for MLAN 102-1. Conducted in Chinese. Enrollment Requirement: CHIN 101.*