

# Chemistry

Degree: A.S. - General Science

Area: Science and Engineering

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American River College's chemistry program provides a series of courses designed to meet transfer requirements for physical and biological science majors as well as students majoring in other fields of study.

## Requirements for a degree major

Students must complete 18 units of transfer-level course work in science in addition to other graduation requirements.

## General Science Degree Requirements

Two laboratory courses must be included, one in a physical science and one in a biological. Courses may be selected from anatomy, astronomy, bacteriology, biology, botany, chemistry, geology, physical anthropology, physical geography, physical science, physiology, physics and zoology. See ARC graduation requirements.

## Mathematics & Physical Science Degree Requirements

18 units of transfer level course work in addition to other graduation requirements Courses may be selected from astronomy, chemistry, engineering, geology, mathematics, physical geography, physical science, physics and statistics. See Graduation requirements.

## CHEM 130 Chemistry for Funeral Services 4 Units

*Prerequisite:* None

*Advisory:* ENGWR 102 or 103, and ENGRD 116 with a grade of "C" or better; OR ESLR 320 and ESLW 337 with a grade of "C" or better; OR placement through assessment process.

*Course Not Transferable UC or CSU*

*Hours:* 72 hours LEC

This course is a survey of the basic principles of chemistry as they relate to Funeral Services. Especially stressed are the chemical principles involved in sanitation, disinfection, public health and embalming practices. The development and use of personal, professional and community sanitation practices are covered as well as use and precautions related to potentially harmful chemicals that are currently used in the field of funeral services.

## CHEM 305 Introduction to Chemistry 5 Units

*Formerly:* CHEM 2A

*Prerequisite:* MATH 100, 110 or 120 with a grade of "C" or better.

*Advisory:* ENGWR 102 or 103, and ENGRD 116 with a grade of "C" or better; or ESLR 320 and ESLW 320.; or placement through assessment

*Course Transferable to UC/CSU*

*Hours:* 72 hours LEC; 54 hours LAB

This course covers principles of chemistry and scientific method, including a brief introduction of organic chemistry. It is primarily designed for general education and majors in allied health, home economics, physical education, physical therapy(+), psychology(+), natural resources(+). (+)May require Chemistry 400. (CAN CHEM 6) AA/AS area 3A; CSU area B1; IGETC area 5A. (CHEM SEQ B Sum of CHEM 7,9,11 or CHEM 6,8)

## CHEM 306 Introduction to Chemistry 5 Units

*Formerly:* CHEM 2B

*Prerequisite:* CHEM 305 with a grade of "C" or better.

*Advisory:* ENGRD 116 and ENGWR 102 or 103, and ENGRD 116; OR ESLR 320 and ESLW 320; or placement through assessment.

*Course Transferable to UC/CSU*

*Hours:* 72 hours LEC; 54 hours LAB

This course is a continuation of CHEM 305. It covers the organic functional groups and reactions involved in the mechanisms of the chemistry of life processes (biochemistry), particularly applied to the health sciences. (CAN CHEM 8). (CHEM SEQ B Sum of CHEM 7,9,11 or CHEM 6,8)

## CHEM 310 Chemical Calculations 4 Units

*Formerly:* CHEM 3

*Prerequisite:* MATH 100 with a grade of "C" or better.

*Corequisite:* MATH 120.

*Advisory:* ENGRD 116 and ENGWR 102 or 103, and ENGRD 116; OR ESLR 320 and ESLW 320.

*Course Transferable to CSU*

*Hours:* 54 hours LEC; 54 hours LAB

This course is an introduction to chemical calculations, terminology, chemical concepts and laboratory techniques. It is designed for those who will take CHEM 400 and need intensive preparation in problem solving. AA/AS area 3A

## CHEM 320 Environmental Chemistry 4 Units

*Formerly:* CHEM 7

*Prerequisite:* MATH 32 with a grade of "C" or better.

*Corequisite:* ENGRD 116 or ESLR 320; or placement through assessment.

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC; 54 hours LAB

This course covers some basic principles of chemistry and their applications to our environment. It includes topics related to the chemistry of water, air, consumer products, and living systems. The laboratory is designed to familiarize students with the methods of science while investigating the presence and interactions of chemicals in the environment. AA/AS area 3A; CSU area B1; IGETC area 5A.

### **CHEM 334 Chemistry in the Kitchen 3 Units**

Formerly: CHEM 15

Prerequisite: None

Course Transferable to CSU

Hours: 54 hours LEC

This course qualitatively covers a variety of chemical principles in the context of cooking. These principles include basic atomic structure and geometry, phase changes, acids and bases, protein and denaturing, fermentation, fats and carbohydrates. This course is designed for K-6 educators who want to increase their understanding of chemistry principles. Many of the topics will be keyed to the new California State Science Standards.

### **CHEM 400 General Chemistry 5 Units**

Formerly: CHEM 1A

Prerequisite: MATH 120 with a grade of "C" or better and one of the following:

1) CHEM 310 with a grade of "C" or better; 2) Or CHEM 305 with a grade of "C" or better and placement through the chemistry assessment process; 3) Or High School chemistry with a grade of "C" or better and placement through the chemistry assessment process.

Advisory: ENGRD 116 and ENGWR 102 or 103, or ESLR 320 and ESLW 320.

Course Transferable to UC/CSU

Hours: 54 hours LEC; 108 hours LAB

This course covers the basic principles of chemistry with an emphasis on chemical calculations, chemical reactions including balancing of complicated redox reactions, stoichiometry, gas laws, thermochemistry, atomic structure and bonding theories, ionic equations, solutions, intermolecular forces and phases of matter and acid/base chemistry including titrations and pH. Laboratory work is devoted to investigations of the theoretical work discussed in lecture. (CAN CHEM 2) AA/AS area 3A; CSU area B1; IGETC area 5A. (CHEM SEQ A Sum of CHEM 1,3,5 or CHEM 2,4)

### **CHEM 401 General Chemistry 5 Units**

Formerly: CHEM 1B

Prerequisite: CHEM 400 with a grade of "C" or better.

Course Transferable to UC/CSU

Hours: 54 hours LEC; 108 hours LAB

This course is a continuation of the principles of chemistry with emphasis on types of equilibria, bonding, thermodynamics, kinetics and electrochemistry. A brief introduction to organic chemistry is included. Laboratory work is devoted to qualitative analysis and experiments dealing with the theoretical work discussed in lecture. (CAN CHEM 4) IGETC area 5A (CHEM SEQ A Sum of CHEM 1,3,5 or CHEM 2,4)

### **CHEM 410 Quantitative Analysis 5 Units**

Formerly: CHEM 5

Prerequisite: CHEM 401 with a grade of "C" or better.

Course Transferable to UC/CSU

Hours: 54 hours LEC; 108 hours LAB

This course covers principles and techniques involved in fundamental gravimetric and volumetric analyses and separation techniques including methods of data analysis, precipitation, acid/base neutralization, complex formation, oxidation-reduction, spectroscopy and chromatography. It includes an introduction to modern instrumental analytical procedures with emphasis on optical, electrochemical and chromatographic techniques including UV-visible and atomic absorption spectroscopy, electrodeposition, coulometry, and ion exchange, gas and high performance liquid chromatography. (CAN CHEM 12)

### **CHEM 420 Organic Chemistry 5 Units**

Formerly: CHEM 12A

Prerequisite: CHEM 401 with a grade of "C" or better.

Course Transferable to UC/CSU

Hours: 54 hours LEC; 108 hours LAB

This is a beginning course designed primarily for chemistry and chemical engineering majors, premedical, pharmacy and other students who desire a more intensive course than CHEM 423. Emphasis is on the application of modern principles regarding structure, reactivity, methods of synthesis and physical properties or carbon compounds.

### **CHEM 421 Organic Chemistry 5 Units**

Formerly: CHEM 12B

Prerequisite: CHEM 420 with a grade of "C" or better.

Course Transferable to UC/CSU

Hours: 54 hours LEC; 108 hours LAB

This course covers general physical and chemical properties of the carbonyl compounds amines, amides, carbonyl derivatives, and biological compounds of interest. Special attention is given to development of understanding of reaction mechanism methods of organic synthesis and instrumental analysis as it applies to organic chemistry.

### **CHEM 423 Organic Chemistry - Short Survey 5 Units**

Formerly: CHEM 8

Prerequisite: CHEM 401 with a grade of "C" or better.

Course Transferable to UC/CSU

Hours: 72 hours LEC; 54 hours LAB

This course is an introductory survey of the compounds of carbon with emphasis on those of biological interest, designed primarily for students majoring in the life sciences, nutrition/dietetics, and related fields. This course is not recommended for students majoring in chemistry, chemical engineering, medicine, dentistry, pharmacy, and chiropractics. IGETC area 5A.

### **CHEM 430 Molecular Modeling 1 Unit**

Formerly: CHEM 21

Prerequisite: CHEM 401.

Advisory: CHEM 420 or 423.

Course Transferable to CSU

Hours: 12 hours LEC; 27 hours LAB

This computer based course will cover a variety of topics involving molecular modeling and simulations. Some of the topics to be covered include reaction mechanisms, thermo chemistry, electrophilic and nucleophilic substitutions, complexes, and spectroscopy.

### **CHEM 480 Honors General Chemistry 1 Unit**

Formerly: CHEM 1H

Prerequisite: CHEM 400 with a grade of "C" or better; ENGWR 300 with a grade of "C" or better or honors placement on the English assessment; GPA of 3.0 or better.

Corequisite: CHEM 401.

Course Transferable to UC/CSU

Hours: 18 hours LEC

This honors course provides advanced studies for general chemistry students. It involves in-depth discussion and analysis of recent scientific articles in terms of general chemical principles.

### **CHEM 482 Biology/Chemistry Honors Seminar 1 Unit**

Formerly: CHEM 9H

Prerequisite: CHEM 400 with a grade of "C" or better; BIOL 400 with a grade of "C" or better; ENGWR 480 with a grade of "C" or better; 3.0 or better cumulative GPA.

Course Transferable to CSU

Hours: 18 hours LEC

This honors section will provide a seminar approach for advanced students of general chemistry and biology to discuss and analyze in-depth recent scientific articles in terms of the chemical and biological principles introduced in these curricula. Not open to students who have taken BIOL 480. May be taken twice.