

Chemistry (CHE)
Physical Sciences & Mathematics Department
School of Natural & Social Sciences
Carhart Science Building

Objectives: The offerings in Chemistry are for those students desiring a combination of scientific and professional knowledge that will assist them in rendering a service to the world in which science is of fundamental importance. The courses are basic to pre-professional areas and to careers in science.

Major in Chemistry (BA or BS) 39-56 hours

Chemistry Core: 16-17 hours

BIO 110 must be taken as the Block 2 Life Science General Education requirement.

Computer literacy requirements in the discipline will be addressed in CHE 305.

CHE	106 General Chemistry I.....	4
	107 General Chemistry II.....	4
	305 Analytical Chemistry.....	4
PHY	201 General Physics I (3) or	
	301 University Physics I (4).....	3-4
	321 Physics Laboratory I.....	1

Plus one of the following concentrations:

Subject Endorsement-Chemistry Education

Concentration: 23 hours + core

MAT 130 Pre-Calculus Math (5) or both MAT 121 College Algebra (3) and MAT 122 Applied Trigonometry (1) must be taken as the Block 2 Mathematics General Education requirement.

CHE	208 Intro Organic Chem or	
	314 Organic Chem I.....	4
	326 Biochemistry I.....	4
	393 Laboratory Techniques.....	1
	456 Physical Chemistry I.....	3
	493 Laboratory Management.....	1

EAS	110 Introduction to Meteorology or	
	120 Intro to Geology.....	4

BIO, CHE, NAT, PHY elective courses numbered 300 or above.....6

EDU 409 Science Content Area Methods and Materials is required. A second subject endorsement is required for Nebraska state certification.

Chemical Sciences Concentration: 37-38 hours + core

MAT 140 Calculus I (5) must be taken as the Block 2 Mathematics General Education requirement.

CHE	314 Organic Chemistry I.....	4
	315 Organic Chemistry II.....	4
	370 Introduction to Research.....	1
	380 Instrumental Analysis.....	4
	390 Inorganic Chemistry.....	3

CHE	393 Laboratory Techniques.....	1
	456 Physical Chemistry I.....	3
	457 Physical Chemistry II.....	3
	458 Physical Chemistry Lab.....	1
	470 Research Project.....	1
	493 Laboratory Management.....	1
PHY	202 General Physics II or (3)	
	302 University Physics II (4).....	3-4
	322 Physics Laboratory II.....	1

Chemistry electives numbered 300 or above.....7
 Up to 4 hours of CHE 490 may be counted toward CHE electives.

Chemistry Health Sciences Concentration:

37-38 hours + core

MAT 140 Calculus I (5) must be taken as the Block 2 Mathematics General Education requirement.

BIO	220 Human Anatomy.....	4
	320 Molecular Genetics.....	4
	340 Human Physiology.....	4
CHE	314 Organic Chemistry I.....	4
	315 Organic Chemistry II.....	4
	326 Biochemistry I.....	4

MAT	180 Applied Probability & Stat.....	3
PHY	202 General Physics II (3) or	
	302 University Physics II (4).....	3-4
	322 Physics Laboratory II.....	1

Electives (choose from list below)6

CHE	380 Instrumental Analysis (4)	
	390 Inorganic Chemistry (3)	
	426 Biochemistry II (3)	
	456 Physical Chemistry I (3)	

The B.S. in Health Sciences will also be awarded when a student:

a. Completes 95 semester hours of a prescribed pre-professional curriculum accepted by WSC and successfully completes the first year of the approved professional program at a professional school awarding Master's or Doctoral degrees. (3+1 degree)
 Students register at WSC for HSC 498 (no tuition requirement) for 30 hours and complete one year of course work in an approved professional program.

OR

b. Completes a minimum of 63 hours of a prescribed preprofessional curriculum accepted by WSC and successfully completes the first two years of the approved professional program at a professional school awarding Master's or Doctoral degrees (2+2 degree), where MS or Doctorate is

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the sole professional degree offered. Students register at WSC for 31 hours of HSC 498 (no tuition requirement) in both their junior and senior years and complete two year of course work in an approved professional program.

Minor in Chemistry: 21 hours

A minor must include a minimum of 12 hours unduplicated by the student's major(s) and minor(s).

CHE 106 General Chemistry I.....	4
107 General Chemistry II.....	4
305 Analytical Chemistry.....	4
Electives.....	9

9 hours of Chemistry electives selected by advisement.

In addition to General Education requirements, students must meet the computer literacy requirements of the Math and Sciences departments. NAT 112 Introduction to Personal Computers or any course with a CSC prefix meets this requirement.

Undergraduate Courses

CHE 102 Chemistry for General Education (3) Selected topics of chemistry to be presented by laboratory-oriented approach and in compliance with requirements of General Education. Does not apply to any major, minor, or endorsement in any science area (BIO, CHE, EAS, NAT, PHS, PHY) unless specified. (4 hours of laboratory-lecture combined)

CHE 106 General Chemistry I (4) Prerequisite: High school chemistry or CHE 102. Emphasis on nomenclature, atomic structure, bonding, gaseous and liquid states, equilibrium, and stoichiometry. (3 hours of lecture and 3 hours of laboratory)

CHE 107 General Chemistry II (4) Prerequisite: C- or better in CHE 106 or by consent of instructor. A continuation of CHE 106 with emphasis on kinetics, redox reactions, molecular geometry, hydrolysis, electrochemistry, and solubility products. Qualitative analysis included. (3 hours of lecture and 3 hours of laboratory)

CHE 208 Introductory Organic Chemistry (4) Prerequisite: C- or better in CHE 107. Emphasis on nomenclature, functional groups, and organic structures as related to living matter. (3 hours of lecture and 3 hours of laboratory)

CHE 301 Introduction to Clinical Chemistry (1) Prerequisite: Three semesters of college chemistry. Introduction to Medical Laboratory, including visitations and observation in a hospital laboratory. Does not apply to subject endorsement.

CHE 305 Analytical Chemistry (4) Prerequisite: CHE 107. Emphasis on theories and application of quantitative analysis including gravimetric and volumetric procedures. (3 hours of lecture and 3 hours of laboratory)

CHE 314 Organic Chemistry I (4) Prerequisite: C- or better in CHE 107. The chemistry of carbon compounds, type reactions, mechanisms and applications. (3 hours of lecture and 3 hours of laboratory)

CHE 315 Organic Chemistry II (4) Prerequisite: C- or better in CHE 314. A continuation of CHE 314. (3 hours of lecture and 3 hours of laboratory)

CHE 326 Biochemistry I (4) Prerequisite: C- or better in CHE 208 or 315. Study of proteins, lipids, nucleic acids, and carbohydrates with emphasis on their structure, function, and metabolism. (3 hours of lecture and 3 hours of laboratory)

CHE 370 Introduction to Research (1) Prerequisite: 8 hours of Chemistry. This course is designed for Chemistry majors as an introduction to scientific writing, library research, data collection and data analysis. The student will be expected to use the skills learned in this course to establish a proposal for a research project for CHE 470.

CHE 380 Instrumental Analysis (4) Prerequisite: C- or better in CHE 305. Instrumental analysis in qualitative and quantitative procedures employing IR, UV, visible and atomic absorption spectrometers as well as other modern instruments such as gas chromatographs and electroanalytical system. (3 hours of lecture and 3 hours of laboratory)

CHE 390 Inorganic Chemistry (3) Prerequisites: C- or better in CHE 107. Principles and theories of inorganic chemistry.

CHE 393 Laboratory Techniques (1) Prerequisite: C- or better in CHE 107. Introduction to the direction of students in freshman or sophomore laboratories. Preparation of solutions,

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supervision of laboratory activities, evaluation of laboratory reports and instruction in the principles of laboratory safety. (3 to 6 hours a week) Cannot be repeated.

CHE 400 Environmental Chemistry (3) Prerequisite: C- or better in CHE 107. A combined lecture-laboratory course with emphasis on man's intrusion into the natural chemical processes of the biosphere. Topics in industrial effluence, energy sources, plastics, detergents, fertilizers, biocides, trace metals, human waste, etc., which lead to pollution of the air and water.

CHE 426 Biochemistry II (3) Prerequisite: C- or better in CHE 326. Bioenergetics, membrane transport, enzymes, mechanisms, and special topics in intermediary metabolism.

CHE 456 Physical Chemistry I (3) Prerequisite: CHE107. Investigations into the properties of ideal and real gases, the first and second laws of thermodynamics, the thermodynamics of pure substances, simple mixtures, chemical equilibrium, and equilibrium electrochemistry.

CHE 457 Physical Chemistry II (3) Prerequisite: C- or better in CHE 456 or by permission of instructor. Investigations into special relativity, quantum theory, atomic structure, atomic spectra, molecular structure, molecular spectroscopy: including rotational, vibrational, electronic, and magnetic resonance spectroscopy. Cross-listed as PHY 457 Modern Physics.

CHE 458 Physical Chemistry Lab (1) Prerequisite or corequisite: CHE 456. Laboratory investigations of physical chemistry concepts including: the properties of gases, thermochemistry, chemical equilibrium, quantum chemistry, and spectroscopy. (3 hours lab)

CHE 470 Research Project (1) Prerequisite: CHE 370. This course is a continuation of CHE 370. Students will take this course as a means of completing their individual research project under the direction of a chosen instructor. A presentation of this research in both oral and written form is required at the conclusion of the course. This course may be repeated up to three hours.

CHE 490 Chemistry Seminar (1-2) Prerequisite: 16 hours of Chemistry courses. An advanced course of study for

chemistry majors. Research and advanced reading in an area chosen by the student and the instructor in charge. Course may be repeated with different topics.

CHE 493 Laboratory Management (1-2 maximum of 2 hours) Prerequisite: C- or better in CHE 393. Management of advanced laboratories. Preparation of reagents, maintenance of equipment, laboratory supervision, evaluation of student performance, grading of laboratory notebooks, instructions in experimental design. (6-12 hours a week)

Eligible seniors may enroll in 500 level graduate courses.
Graduate Courses

CHE 500 Environmental Chemistry (3) A study of natural chemical processes in the biosphere. Special emphasis on topics in industrial effluents, air and water pollution, and the safe disposal, treatment and storage of waste.

CHE 610 Modern Inorganic Chemistry (3) Selected inorganic topics of special interest to secondary science teachers. Emphasis will be placed on the development of new laboratory and demonstration material.

CHE 616 Organic and Biological Chemistry for Teachers (3) A review of Organic Chemistry and functional groups important in biological molecules. Selected topics dealing with the role and suitability of biomolecules as they relate to living processes. Emphasis will be placed on current developments in both Biochemistry and Biotechnology.

CHE 650 Computer Applications in Chemistry and Science Education (3) The use of computers for classroom instruction activities including data collection, analysis and presentation. Interfacing computers with simple laboratory apparatus including spectrophotometers, pH meters, balances and other common laboratory equipment. The use of computer networks for transferring data between students, teachers and scientists at remote locations as well as using the Internet for locating scientific information will be presented.