

## Chemistry - Science with Chemistry Concentration

### Associate in Science

Minimum of 61-66 credit hours

Do you want to research cures for cancer? Find alternative fuel and energy sources? Transform everyday materials into useful, unique products? Careers in chemistry can offer you worlds of discovery every day. At Oklahoma City Community College, you can earn an associate degree in chemistry. In this program, you'll learn how to identify substances and how to alter their structures through chemical changes. Course topics include atomic structure, structure and bonding, electrochemistry, thermodynamics, radioactivity and synthesis. With this solid foundation, you can continue studying at a four-year college or university and then pursue opportunities in education, pharmacology, petroleum analysis, research, patent development, substance analysis, geology, medicine, nutrition and more.

### Course Sequence

Course ID	Course Name	Credits	Type	Min Gd
<b>Suggested Freshman 1st Semester</b>				
SCL 1001	Success in College and Life	1	Life Skills	
ENGL 1113	English Composition I	3	Gen Ed	
CHEM 1115	General Chemistry I	5	Gen Ed	C
MATH 1483	Functions and Modeling*	OR	Gen Ed	C
MATH 1533	Pre Calculus and Analytic Geometry	OR	Gen Ed	C
MATH 1613	Trigonometry	OR	Gen Ed	
MATH 1743	Calculus I for Business, Life Sciences, and Social Sciences	OR	Gen Ed	
MATH 2013	Introduction to Statistics	OR	Gen Ed	
MATH 2104	Calculus and Analytic Geometry I	3-4	Gen Ed	
POLSC 1113	American Federal Government	3	Gen Ed	
<b>Suggested Freshman 2nd Semester</b>				
ENGL 1213	English Composition II	3	Gen Ed	
MATH 1613	Trigonometry	OR	Gen Ed	
MATH 1743	Calculus I for Business, Life Sciences, and Social Sciences	OR	Gen Ed	
MATH 2013	Introduction to Statistics	OR	Gen Ed	
MATH 2104	Calculus and Analytic Geometry I	OR	Gen Ed	
MATH 2214	Calculus and Analytic Geometry II	3-4	Gen Ed	
CHEM 1215	General Chemistry II	5	Major	C
BIO 1124	General Biology I (Majors)	4	Gen Ed	
<b>Suggested Sophomore 1st Semester</b>				
CHEM 2114	Organic Chemistry I	4	Major	C
CHEM 2111	Organic Chemistry I Laboratory	1*	Major	C
PHYS 1114	College Physics I	OR	Gen Ed	
PHYS 2014	Engineering Physics I	4	Gen Ed	
PSY 1113	General Psychology	OR		
SOC 1113	Introduction to Sociology	3	Gen Ed	
HUM	Humanities Elective	3	Gen Ed	
<b>Suggested Sophomore 2nd Semester</b>				
HUM	Humanities Elective	3	Gen Ed	
HIST 1483	U.S. History to 1877	OR	Gen Ed	
HIST 1493	U.S. History 1877 to Present	3	Gen Ed	
CHEM 2121	Organic Chemistry II Laboratory	1*	Major	C
CHEM 2124	Organic Chemistry II	4	Major	C
CH SUPP ELEC	Chemistry Support Electives	5-8	Support	

### Course Grouping

Major Courses: (15 credit hours) CHEM 1215 (C); CHEM 2114 (C); CHEM 2111\* (C); CHEM 2124 (C); CHEM 2121\* (C)

General Education Courses: (40-42 credit hours) English: ENGL 1113; ENGL 1213; History: HIST 1483 or HIST 1493; Political Science: POLSC 1113; Chemistry: CHEM 1115 (C); Physics: PHYS 1114 or PHYS 2014; Biological Science: BIO 1124; Humanities: Six credit hours; PSY 1113 or SOC 1113; Mathematics: Six to eight credit hours chosen from MATH 1483 (C); MATH 1533 (C); MATH 1613; MATH 1743\*\*; MATH 2013; MATH 2104; or MATH 2214

Life Skills Courses: (1 credit hour) Life Skills: SCL 1001

Support Courses: (5-8 credit hours) Five to eight credit hours chosen from the following approved support courses: BIO 1134, BIO 2125, BIO 2215, BIO 2203, BIO 2234, BIO 2255, CHEM 2990, COM 2213, CS 1143, CS 2163, CS 2363, ECON 2123, ECON 2143, ENGL 1233, ENGL 2143, any ENGR, MATH 2013, MATH 2123, MATH 2314, MATH 2413, PHYS 1114, PHYS 1214\*\*\*, PHYS 2014\*\*\*, or PHYS 2114.

\*Pending OSRHE approval

(C) A grade of "C" or higher must be achieved.

### Program Notes

Notes: This program is designed for students planning to continue their education at a four-year college or university. See the front general section for information and requirements about University Parallel/Transfer Programs.

(C) Indicates a grade of "C" or higher must be achieved.

\*\* Math 1743 is appropriate for pre-dentistry, pre-medicine, and pre-pharmacy students only.

\*\*\* Either PHYS 1214 or PHYS 2114 is strongly recommended for students pursuing careers in chemistry, medicine, dentistry, or forensic science.

## Degree Program Course Descriptions

**BIO 1124 - General Biology I (Majors)**

*Prerequisites:* ENGL 0203 or adequate placement score or by meeting determined placement measures; MATH 0313 or adequate math placement.

4 Credits An introductory course required for all biological science majors and pre-health profession students. The fundamental principles of biology are described using a cellular approach. Students gain knowledge regarding the chemical basis of life, structural characteristics of cells to include a discussion of energetics, metabolism and genetics. Evolution and ecology are also discussed in order to provide an understanding of both the diversity of living organisms and the living world. Students recognize, discuss and correctly apply fundamental biological principles influencing their personal relationship with other life forms. A discussion of the scientific method, logical (deductive) reasoning, hypothesis testing and some common fallacies and misconceptions that cloud scientific explanations of the natural world are included. Laboratory work, an integral and required part of the course, will enhance the student's understanding of fundamental biological concepts as well as scientific procedures, laboratory technical skills, dissection and statistical analysis.

**CH SUPP ELEC - Chemistry Support Electives**

5-8 Credits Five to eight credit hours chosen from the following approved support courses: BIO 1134, BIO 2125, BIO 2215, BIO 2203, BIO 2234, BIO 2255, CHEM 2990, COM 2213, CS 1143, CS 2163, CS 2363, ECON 2123, ECON 2143, ENGL 1233, ENGL 2143, any ENGR, MATH 2013, MATH 2123, MATH 2314, MATH 2413, PHYS 1114, PHYS 1214, PHYS 2014, or PHYS 2114.

**CHEM 1115 - General Chemistry I**

*Prerequisites:* ENGL 0203, adequate placement score, or by meeting determined placement measures; MATH 1483 or MATH 1533, or both MATH 0313 and High School Chemistry or CHEM 1123.

5 Credits This course is designed for science and engineering majors. The course covers nomenclature, atomic and molecular structure, stoichiometry, acid/base and other aqueous reactions, states of matter, phase changes, gas laws, and an introduction to thermochemistry. Laboratory experience is an integral part of the course.

**CHEM 1215 - General Chemistry II**

*Prerequisites:* CHEM 1115 with a grade of "C" or better; MATH 1483 or MATH 1533 with a grade of "C" or better.

5 Credits This course is a continuation of CHEM 1115 with emphasis on thermochemistry, intermolecular forces, properties of solutions, acid/base properties, kinetics, equilibrium, thermodynamics, electrochemistry, and organic chemistry. Laboratory is an integral part of the course.

**CHEM 2111 - Organic Chemistry I Laboratory**

*Prerequisites:* Concurrent enrollment in CHEM 2114 or completion of CHEM 2114 with a "C" or better

1 Credit Designed to accompany Organic Chemistry I lecture, this lab course emphasizes techniques used for purifying and characterizing organic compounds, including infrared spectroscopy. Writing lab reports is an integral part of the course.

**CHEM 2114 - Organic Chemistry I**

*Prerequisites:* CHEM 1215 with a grade of "C" or better.

4 Credits This course is the first of a two-semester sequence of organic chemistry for science and chemical engineering majors as well as students seeking to enter the fields of medicine, dentistry, pharmacy, and veterinary medicine. Students will master the fundamental concepts of structure, functional groups, and reactions of aliphatic compounds along with selected reaction mechanisms.

**CHEM 2121 - Organic Chemistry II Laboratory**

*Prerequisites:* CHEM 2111 with a "C" or better and either concurrent enrollment in CHEM 2124 or completion of CHEM 2124 with a "C" or better

1 Credit Designed to accompany Organic Chemistry II lecture, this lab course emphasizes organic synthesis and structure analysis methods such as proton NMR. Writing lab reports is an integral part of the course.

**CHEM 2124 - Organic Chemistry II**

*Prerequisites:* CHEM 2114 with a grade of "C" or better.

4 Credits This course is the second of a two-semester sequence of organic chemistry for science and chemical engineering majors as well as students seeking to enter the fields of medicine, dentistry, pharmacy, and veterinary medicine. Students will master the concepts of structural theory, reactions, and reaction mechanisms of the principal functional groups of organic compounds which were not included in the first course.

**ENGL 1113 - English Composition I**

*Prerequisites:* ENGL 0203, adequate placement score, or by meeting determined placement measures

3 Credits The student will write well-developed compositions which demonstrate the principles of unity, coherence, and organization and which contain specific details and vivid language. The students will locate library material and incorporate researched materials into compositions.

**ENGL 1213 - English Composition II**

*Prerequisites:* ENGL 1103 or ENGL 1113 taken within the last year, with strong encouragement for immediate continuation.

3 Credits In this advanced writing course, students will create essays that explore and evaluate a variety of issues and perspectives suggested by fiction, poetry, drama, essays, and other types of cultural texts. Students will refine and augment the writing techniques they learned in ENGL 1113 or ENGL 1103 to develop well-reasoned, well-structured arguments in a clear, fluid, and engaging prose style.

**HIST 1483 - U.S. History to 1877**

*Prerequisites:* ENGL 0203, adequate placement score, or by meeting determined placement measures

3 Credits After analyzing events in American history from 1400 to 1877 in such areas as revolution, geographic and social mobility, political reform, government precedents and war, students will be able to identify patterns of present day mobility, describe governmental operations in their society and help resolve conflict in society based on the student's search for change, precedents, and conflict in the American past. A general education requirement.

**HIST 1493 - U.S. History 1877 to Present**

*Prerequisites:* ENGL 0203, adequate placement score, or by meeting determined placement measures

3 Credits After analyzing events in American history from 1877 to the present in such areas as geographic and social mobility, political reform, government precedents and war, students will be able to identify patterns of present day mobility, describe governmental operations in their society and help resolve conflict in society based on the student's search for change, precedents, and conflict in the American past. A general education requirement.

**HUM - Humanities Elective**

3 Credits Humanities elective

**MATH 1483 - Functions and Modeling\***

*Prerequisites: MATH 0313 or adequate math placement; ENGL 0203, adequate placement score, or by meeting determined placement measures*

3 Credits The student will demonstrate: an understanding of the general concepts of relation and function and specifically of polynomial, rational, exponential and logarithmic functions; the ability to solve systems of equations by utilizing matrices and determinants; and, the ability to solve practical problems using algebraic and digital techniques. \*Pending OSRHE approval

## **MATH 1533 - Pre Calculus and Analytic Geometry**

*Prerequisites: Adequate math placement OR co-enrollment in MATH 0531 and ENGL 0203, adequate placement score, or by meeting determined placement measures*

3 Credits This course is intended to serve students for whom Calculus and Analytic Geometry I is a requirement. Topics will include conic sections, systems of equations (both linear and nonlinear), and a general discussion of functions with emphasis on polynomial, rational, exponential, and logarithmic functions.

## **MATH 1613 - Trigonometry**

*Prerequisites: Pre or Corequisite: MATH 1483 or MATH 1533 or adequate math placement and ENGL 0203, adequate placement score, or by meeting determined placement measures*

3 Credits The student will evaluate trigonometric functions and their inverses using both degree and radian measure; graph trigonometric functions and their transformations; identify properties of trigonometric functions; verify and apply trigonometric identities; solve trigonometric equations; solve problems involving right and oblique triangles, vectors, and indirect measurement; and identify and graph polar curves.

## **MATH 1743 - Calculus I for Business, Life Sciences, and Social Sciences**

*Prerequisites: MATH 1483 or adequate math placement*

3 Credits This is the first of a two-semester sequence in elementary calculus in which students use the concepts of differential and integral calculus to solve theoretical and applied problems in business, life sciences, and social sciences.

## **MATH 2013 - Introduction to Statistics**

*Prerequisites: MATH 0313 or adequate math placement; ENGL 0203, adequate placement score, or by meeting determined placement measures*

3 Credits The student will solve problems applying the concepts of random sampling, elementary probability, testing hypotheses,

descriptive measures, chi-square, regression and correlation, and analysis of variance.

## **MATH 2104 - Calculus and Analytic Geometry I**

*Prerequisites: MATH 1533 and MATH 1613 or adequate math placement.*

4 Credits The student will compute, interpret, and apply the basic concepts of limits, differentiation, and integration to algebraic and transcendental functions and will solve applied problems that include rates of change, optimization, area, and total change in a function. This course satisfies the computer proficiency requirement.

## **MATH 2214 - Calculus and Analytic Geometry II**

*Prerequisites: MATH 2104 within the last year.*

4 Credits The student will use integration techniques to find antiderivatives, use integrals to solve problems from geometry and physics, use vectors to solve problems in higher dimensions, test infinite series for convergence, approximate functions by using series, solve elementary first-order differential equations, and analyze functions of three variables and their contour plots. This course satisfies the computer proficiency requirement.

## **PHYS 1114 - College Physics I**

*Prerequisites: ENGL 0203, adequate placement score, or by meeting determined placement measures and MATH 1483 or higher or APPM 1223, within the last two years or by evaluation. § Criteria for evaluation is in division office.*

4 Credits Students will demonstrate their understanding of useful concepts of kinematics and dynamics, energy and momentum, waves and sound, fluids and thermodynamics by (1) developing numerical and graphical descriptions of physical phenomena, (2) numerically predicting the results of physical occurrences, and (3) applying laboratory skills to analyze real situations. Numerical computations will utilize algebra and basic trigonometry where appropriate.

## **PHYS 2014 - Engineering Physics I**

*Prerequisites: MATH 2104 (or at least 4 hours of calculus) within the last year or by evaluation. Prerequisite or Corequisite: MATH 2214*

4 Credits This is a physics course designed primarily for pre-engineering, chemistry and physics majors. Students will demonstrate their understanding of concepts in mechanics, heat and sound by (1) developing qualitative and quantitative descriptions of physical phenomena, and (2) predicting the results of physical occurrences based on physics theory and laboratory experiments. Quantitative descriptions and predictions will incorporate methods of calculus where appropriate.

## **POLSC 1113 - American Federal Government**

*Prerequisites: ENGL 0203, adequate placement score, or by meeting determined placement measures*

3 Credits A study of the principles, structure, processes and functions of the United States federal government.

## **PSY 1113 - General Psychology**

*Prerequisites: ENGL 0203, adequate placement score, or by meeting determined placement measures*

3 Credits A survey of the major areas of study in psychology such as motivation, learning, physiology, personality, social psychology, abnormal behavior, perception, memory, cognition/thought, and treatment.

## **SCL 1001 - Success in College and Life**

*Prerequisites: ENGL 0106 or adequate reading/writing assessment scores*

1 Credit Students will learn best practices for academic, career, and personal success. Students will discover their individual strengths, interests, and values to create a personalized plan; select and utilize resources that are applicable to their growth and success; and engage as active and responsible members of the academic community. This course should be taken during a student's first semester of college work at Oklahoma City Community College and is a required course in degree plans to satisfy the Life Skills requirement.

## **SOC 1113 - Introduction to Sociology**

*Prerequisites: ENGL 0203, adequate placement score, or by meeting determined placement measures*

3 Credits The student will identify the sociological dimensions of human behavior by analyzing the concepts of society, culture, socialization, institutions, social stratification and social change.