CHEM M01AH: HONORS: GENERAL CHEMISTRY I

Originator
csjoiner

Co-Contributor(s)

Name(s)
Pawluk, Tiffany (tpawluk)
Keil, Robert (rkeil)
Franke, Deanna (dfranke)
Mallory, Jennifer (jmallory)
Crisostomo, Vincent Mark (vcrisostomo)

College
Moorpark College

Attach Support Documentation (as needed)
Chem 110.pdf
December_2021_C-ID_Newsletter (4).pdf
Chem 1A Justification.pdf

Discipline (CB01A)
CHEM - Chemistry

Course Number (CB01B)
M01AH

Course Title (CB02)
Honors: General Chemistry I

Banner/Short Title
Honors: General Chemistry I

Credit Type
Credit

Start Term
Fall 2023

Catalog Course Description
Studies atomic theory and stoichiometry; nomenclature and chemical reactions; thermochemistry; quantum theory and the electronic structure of atoms; chemical bonding and molecular structure; physical behavior of gases; states of matter and phase equilibria; and solutions. Addresses, through hands-on laboratory activities, spectroscopy; distillations; quantitative, qualitative and statistical analyses; titrations; thermochemistry; gravimetric and volumetric analyses; and colligative properties. Honors work challenges students to be more analytical and creative through expanded assignments, real-world applications and enrichment opportunities. Course Credit Limitations: Course Credit Limitations: Credit will not be awarded for both the honors and regular versions of a course. Credit will be awarded only for the first course completed with a grade of “C” or better or "P". Moorpark College Honors Program requires a letter grade.

Taxonomy of Programs (TOP) Code (CB03)
1905.00 - Chemistry, General

Course Credit Status (CB04)
D (Credit - Degree Applicable)

Course Transfer Status (CB05) (select one only)
A (Transferable to both UC and CSU)

Course Basic Skills Status (CB08)
N - The Course is Not a Basic Skills Course

SAM Priority Code (CB09)
E - Non-Occupational

Course Cooperative Work Experience Education Status (CB10)
N - Is Not Part of a Cooperative Work Experience Education Program

Course Classification Status (CB11)
Y - Credit Course

Educational Assistance Class Instruction (Approved Special Class) (CB13)
N - The Course is Not an Approved Special Class

Course Prior to Transfer Level (CB21)
Y - Not Applicable

Course Noncredit Category (CB22)
Y - Credit Course

Funding Agency Category (CB23)
Y - Not Applicable (Funding Not Used)

Course Program Status (CB24)
1 - Program Applicable

General Education Status (CB25)
Y - Not Applicable

Support Course Status (CB26)
N - Course is not a support course

Field trips
May be required

Grading method
(L) Letter Graded

Alternate grading methods
(O) Student Option- Letter/Pass
(P) Pass/No Pass Grading

Does this course require an instructional materials fee?
No

Repeatable for Credit
No

Is this course part of a family?
No

Units and Hours

Carnegie Unit Override
No

In-Class

Lecture
Minimum Contact/In-Class Lecture Hours
70

Maximum Contact/In-Class Lecture Hours
70

Activity

Laboratory
Minimum Contact/In-Class Laboratory Hours
52.5
Maximum Contact/In-Class Laboratory Hours
52.5

Total in-Class

Total in-Class
Total Minimum Contact/In-Class Hours
122.5
Total Maximum Contact/In-Class Hours
122.5

Outside-of-Class

Internship/Cooperative Work Experience

Paid

Unpaid

Total Outside-of-Class

Total Outside-of-Class
Minimum Outside-of-Class Hours
140
Maximum Outside-of-Class Hours
140

Total Student Learning

Total Student Learning
Total Minimum Student Learning Hours
262.5
Total Maximum Student Learning Hours
262.5

Minimum Units (CB07)
5
Maximum Units (CB06)
5

Prerequisites
CHEM M11 or CHEM M12 or equivalent AND MATH M03 (Intermediate Algebra) or equivalent as determined by the college's multiple measures assessment process.

Entrance Skills

Entrance Skills
CHEM M11 or CHEM M12 and MATH M03

Prerequisite Course Objectives
CHEM M11- list the basic units of measurement in the metric and English systems, perform unit conversions within and between systems, and express results appropriately with significant figures and in scientific notation.

CHEM M11- classify the states of matter, distinguish between chemical and physical changes, identify the basic components of the nuclear atom, identify the symbols of common elements, predict atomic trends, name simple inorganic compounds.
CHEM M11- experiment with acids and bases, alkanes, alkenes, alcohols, aldehydes, ketones, amines, carboxylic acids and their derivatives, proteins, DNA, and enzymes.
CHEM M11-conduct various quantitative and qualitative experiments with adherence to safety protocols, record observations and express numerical values appropriately, analyze acquired data, and formulate proper conclusions through written expression of results.
CHEM M11-apply laboratory techniques such as chromatography, spectrophotometric analysis, filtration, differential solubilities to separate and analyze mixtures, organic synthesis and product characterization, and molecular modeling.
CHEM M11-analyze and apply the scientific method to chemistry problems, including developing a hypothesis, hypothesis testing, evaluation, and modeling.
CHEM M11-draw valid Lewis structures of common molecules, identify bond polarities using electronegativity values, predict the molecular geometry of molecules using VSPER (Valence Shell Pair Electron Repulsion).
CHEM M12- analyze and apply the scientific method to chemistry problems, including developing a hypothesis, hypothesis testing, evaluation, and modeling.
CHEM M12- list the basic units of measurement in the metric and English systems, perform unit conversions within and between systems, and express results appropriately with significant figures and in scientific notation.
CHEM M12- use dimensional analysis to perform mathematical conversions and solve problems involving density, energy, stoichiometry, quantum mechanics, solids, liquids, gases, and solutions.
CHEM M12- classify matter, distinguish between physical/chemical changes and properties, and comprehend the principles of chemical reactions and energy relationships.
CHEM M12- list and describe the distinguishing characteristics of solids, liquids, gases, and solutions.
CHEM M12- describe the quantum mechanical model and construct the historical development of the nuclear atom, explain the nature of atomic spectra, and account for trends in chemical periodicity involving atomic and ionic radii, ionization energy, and electronegativity.
CHEM M12- write balanced molecular, ionic, and net-ionic equations for synthesis, decomposition, combustion, single-replacement, double-replacement, and oxidation-reduction reactions.
CHEM M12- apply Lewis and VSEPR (Valence Shell Electron Pair Repulsion) theories to draw structures and shapes, label electronic and molecular geometries, and predict polarities for molecules and ions.
CHEM M12- state the general principles of Arrhenius and Bronsted-Lowry acid/base theories, explain the nature of the pH scale as well as perform pH calculations, and identify buffer solutions.
CHEM M12-conduct various quantitative and qualitative experiments with adherence to safety protocols, record observations and express numerical values appropriately, analyze acquired data, and formulate proper conclusions through written expression of results.
CHEM M12- identify the symbols of common elements, the structures of molecules and ions, and name various inorganic compounds.
MATH M03-solve linear and literal equations for a specified variable.
MATH M03-solve absolute value equations and absolute value inequalities.
MATH M03-graph linear equations and test whether two lines are parallel, perpendicular, or neither.
MATH M03-write the equation of a line in point-slope form, slope-intercept form, and standard form.
MATH M03-solve a system of equations in three variables by substitution or by the elimination method and solve applications.
MATH M03-simplify rational expressions, perform operations with rational expressions, simplify complex fractions, and determine the domain of a simple rational function.
MATH M03-put radical expressions into simplest radical form, perform operations with radicals, solve equations containing radical expressions, and determine domain of a simple radical function.
MATH M03-add, subtract, multiply and divide complex numbers.
MATH M03-solve quadratic equations by each of the following methods where applicable: factoring, the square root method, completing the square, and the quadratic formula.
MATH M03-solve equations that are in quadratic form and solve quadratic equations involving radicals and substitution.
MATH M03-solve non-linear inequalities in one variable.
MATH M03-graph quadratic functions showing the vertex and intercepts.
MATH M03-find the sum, difference, product, quotient, and composition of two functions.
MATH M03-identify one-to-one functions and use the horizontal line test to determine whether or not a function is one-to-one, and find the inverse of a one-to-one function.
MATH M03-describe the relationship between the function and its inverse geometrically and algebraically.
MATH M03-graph exponential and logarithmic functions, and convert equations from exponential form to logarithmic form and vice versa.
MATH M03-use logarithmic properties to rewrite logarithmic expressions and solve logarithmic and exponential equations and related applications.

Requisite Justification

Requisite Type

Prerequisite

Requisite
CHEM M11 or CHEM M12 or equivalent

Requisite Description
Course in a sequence

Level of Scrutiny/Justification
Required by 4 year institution

Requisite Type
Prerequisite

Requisite
MATH M03 (Intermediate Algebra) or equivalent as determined by the college's multiple measures assessment process.

Requisite Description
Course not in a sequence

Level of Scrutiny/Justification
Required by 4 year institution

Student Learning Outcomes (CSLOs)

	Upon satisfactory completion of the course, students will be able to:
1	draw Lewis Structures, predict the shape and hybridization of central atoms, identify polar bonds and overall polarity, and use molecular orbital theory to describe orbital overlap and predict magnetic properties of molecules.
2	summarize and explain the results of experiments in clear, scientific language.
3	analyze measurements and understand how scientific data is properly recorded.
4	understand how bonding theory allows chemists to explain and predict the properties of molecules, and how structure and function and reactivity are related.

Course Objectives

	Upon satisfactory completion of the course, students will be able to:
1	analyze and apply the scientific method to chemistry problems, including developing a hypothesis, hypothesis testing, evaluation, and modeling; list the basic units of measurement in the metric and English systems, perform unit conversions within and between systems, and express results appropriately with significant figures and in scientific notation; classify matter, distinguish between physical/chemical changes and properties, and comprehend the principles of chemical reactions and energy relationships.
2	use dimensional analysis to perform mathematical conversions and solve problems involving stoichiometry, thermochemistry, quantum mechanics, solids, liquids, gases, and solutions.
3	identify the symbols of common elements, the structures of molecules and ions; name/write formulas for various elements,acids, salts,bases and inorganic compounds as well as simple organic compounds.
4	write balanced molecular, ionic, and net-ionic equations for synthesis, decomposition, combustion, single-replacement, double-replacement, and oxidation-reduction reactions; identify the various types of electrolytes and their behavior in chemical reactions.
5	solve stoichiometry and solution concentration problems involving limiting reactants, theoretical and percent yields, dilutions, titrations, gases, liquids, solids, and colligative properties.
6	state the various gas laws, their historical development and applications, the postulates and mathematical relationships of the kinetic molecular theory of gases, why real gases differ from ideal gases; quantify real gas behavior via the van der Waals equation.
7	explain and solve thermochemistry problems by considering potential and kinetic energies, internal energy, specific heat and specific heat capacity, calorimetry, the First Law of Thermodynamics, and Hess's Law.
8	describe the quantum mechanical model and construct the historical development of the nuclear atom; explain the nature of atomic spectra and Bohr's model; conceptualize and utilize the Planck-Einstein equation, Rydberg equation, de Broglie equation, and the Heisenberg Uncertainty Principle; state and apply the quantum numbers to wave mechanics; apply the Aufbau principle to writing electron configurations; account for trends in chemical periodicity involving atomic and ionic radii, ionization energy, metallic character, electron affinity, and electronegativity.

9	identify the different types of chemical bonding; apply Lewis and VSEPR (Valence Shell Electron Pair Repulsion) theories to draw structures and shapes, label electronic geometries, molecular geometries, and bond angles, and predict polarities for molecules and ions including resonance and structural isomers; understand and incorporate the use of Valence Bond Theory to explain and identify various hybridizations; explain the fundamental basis of Molecular Orbital Theory for diatomic species to predict electron configurations, bond orders, and magnetic properties.
10	list and describe the distinguishing characteristics of solids, liquids, gases, and solutions.
11	conduct various quantitative and qualitative hands-on experiments with adherence to safety protocols, record observations and express numerical values using appropriate significant figures, analyze acquired data, apply statistical analysis and formulate proper conclusions through written expression of results.
12	define and describe the different types of intermolecular forces and their effects on matter; calculate the energy involved with temperature and phase changes; construct and interpret phase diagrams for different substances; identify unit cells for crystalline solids.
13	perform calculations using concentration terms that include molarity, molality, normality, parts per million, and percent by mass; understand what affects solubilities and the concepts of colligative properties, perform quantitative calculations, and make qualitative comparisons; explain the liquid-vapor equilibrium and its effect on colligative properties; describe the behavior of electrolytes and nonelectrolytes in solution.
14	HONORS: read, analyze and summarize original scientific data, research and primary sources.
15	HONORS: identify, discuss and explain the theory behind current chemical issues that affect society.
16	HONORS: identify applications of various laboratory techniques and procedure in various technical fields such as, but not limited to, biotechnology, materials engineering, forensic science and food technology.

Course Content

Lecture/Course Content

5% - Matter and Measurement:
Scientific Method
Properties and Classification of Matter
Measurements - Types, Units, and Conversion Factors
Density and Percent - Definitions and Calculations
Uncertainty and Significant Figures

6.00% - Atoms and Atomic Theory:
Conservation of Mass and Constant Composition
Dalton’s Atomic Theory
Cathode Rays and Radioactivity
Thomson and Rutherford’s Models of the Atom
Atomic Number, Atomic Mass, Mass Number, and Isotopes
Elements and the Periodic Table
Mole Concept and Avogadro’s Number

10.00% - Chemical Compounds:
Chemical Compounds, Formulas, and the Mole Concept
Percent Composition, Empirical and Molecular Formulas
Oxidation States
Nomenclature of Inorganic and Simple Organic Compounds

11.00% - Reactions in Aqueous Solutions:
Electrical Conductivity Properties of Solutions
Precipitation and Acid-Base Reactions
Net Ionic Equations
Oxidation-Reduction Reactions

12.00% - Chemical Reactions and Calculations:
Chemical Reactions and Balanced Equations
Stoichiometry and the Factor Label Method of Problem Solving
Limiting Reactant and Percent Yields
Solution Concentration Terms
Molarity and Dilutions
Solution Stoichiometry

10.00% - Physical Properties of Solutions:
Solutions - Types and Terminology
Solution Concentration - Qualitative and Quantitative
The Dissolving Process
Factors Affecting Solubility
Colligative Properties of Solutions
Henry’s and Raoult’s Laws

Freezing and Boiling Points of Solutions
Colloids

8.00% - Thermochemistry:
Kinetic and Potential Energy
Heat, Temperature Change, Specific Heat and Heat Capacity
Calorimetry
First Law of Thermodynamics
Heats of Reaction and Hess's Law

10.00% - Gases:
Properties and Measurement of Gases
Simple, Combined, and Ideal Gas Laws
Gas Stoichiometry
Gas Mixtures and Dalton's Law of Partial Pressure
Kinetic Molecular Theory of Gases and Ideal Gases
Nonideal (Real) Gases and van der Waals Equation
Molecular Effusion and Diffusion

10.00% - Electrons and the Periodic Table:
Nature of Light and Electromagnetic Radiation
Atomic Spectra, Bohr Atom, Quantum Mechanics and Atomic Orbitals
Many-Electron Atoms
Electron Configurations and the Periodic Table
Classification of Matter and the Periodic Law
Periodic Table Trends

12.00% - Chemical Bonding:
Type and Nature of Chemical Bonds
Lewis Theory and Structures
Resonance and Structural Isomers
VSEPR and Molecular Geometry, Polarity, and Bond Angles
Valence Bond Theory, Hybrid Orbitals, and Molecular Orbital Theory

6.00% - States of Matter and Intermolecular Forces:
Properties of Liquids and Solids
Vapor Pressure
Boiling
Phase Diagrams
van der Waal Forces, Hydrogen Bonding
Structures of Solids and Unit Cells
Properties and Bonding of Metals

Laboratory or Activity Content

3.00% - Safety in the laboratory.

16.00% - Introductory hands-on experimentation involving graphical representation of data, statistical analysis of data, and techniques such as crystallization

20.00% - Hands-on experiments in stoichiometry, chemical reactions, and characterization of products labs such as:
Weight Analysis of a Copper Oxide
Determination of Avogadro's Number from Electrodeposition
Synthesis of Copper(II) Compounds
Preparation of Banana Oil and Characterization using Infrared (IR) Spectroscopy
Qualitative Analysis - The Ten Test Tube Mystery

11.00% - Hands-on Gas Law labs such as:
Molecular Weight of an Unknown Volatile Liquid
Molar Volume of a Gas and Percent KClO3 in an Unknown Sample

11.00% - Hands-on thermochemistry lab such as:
Calorimetry and the Law of Dulong and Petit

11.00% - Hands-on experiments in quantum Mechanics, chemical bonding, and classification of substance labs such as:
Emission Spectra of Hydrogen, Helium, and Mercury
Geometrical Structures of Molecules and Ions using Molecular Models
Classification of Chemical Substances

11.00% - Laboratory Final Exam:
In this multi-week hands-on lab, each student performs an organic synthesis, where an unknown compound "X" is converted into compound "Y". A series of subsequent tests and characterizations (i.e., solubility, pH, melting point, freezing point depression,

combustion analysis) are performed in order to deduce the structural formulas of both unknown compounds along with analyses of mass spectra and IR spectra. A formal lab report is written which outlines all observation, data, analysis, and conclusions based on a department rubric.

17.00% - Honors project:
Reproducing hands-on procedures from primary scientific literature.
Conducting multi-week analysis of data and interpreting data to improve techniques, such as water quality analysis, air quality analysis, 3-D microstereolithography, or synthesis of photoreactive polymers.

Methods of Evaluation

Which of these methods will students use to demonstrate proficiency in the subject matter of this course? (Check all that apply):

Written expression
Problem solving exercises
Skills demonstrations

Methods of Evaluation may include, but are not limited to, the following typical classroom assessment techniques/required assignments (check as many as are deemed appropriate):

Computational homework
Essay exams
Group projects
Individual projects
Journals
Laboratory activities
Laboratory practical examinations
Laboratory reports
Objective exams
Oral analysis/critiques
Oral presentations
Problem-solving exams
Problem-solving homework
Quizzes
Reports/papers
Research papers
Simulations
Skills demonstrations
Skills tests or practical examinations
Written analyses
Written compositions
Written homework
Classroom Discussion
Projects
Participation
Reports/Papers/Journals

Instructional Methodology

Specify the methods of instruction that may be employed in this course

Audio-visual presentations
Case studies
Class activities
Class discussions
Collaborative group work
Computer-aided presentations
Demonstrations
Distance Education
Field trips
Group discussions
Guest speakers
Instructor-guided interpretation and analysis
Instructor-guided use of technology
Internet research
Laboratory activities
Large group activities
Lecture
Modeling
Observation

One-on-one conference
Practica
Problem-solving examples
Readings
Small group activities
Web-based presentations

Describe specific examples of the methods the instructor will use:

Instructor will perform chemical demonstrations to aid student understanding of the concepts covered in class.

Instructor will observe to ensure proper hands-on gravimetric analysis of data collected by students in lab, and provide feedback as necessary.

Instructor will utilize molecular models to help students visualize electron and molecular geometries of chemical compounds.

Instructor will observe lab students to ensure proper hands-on data collection and analysis.

Representative Course Assignments

Writing Assignments

HONORS: write a proposal of your honors project that includes the following components: Title, Background and Purpose, Samples to be analyzed, List of Materials and Detailed procedure. An example project would be comparison of the tissue or cellular absorption of alkaline water and tap water.

HONORS: answer questions on a chemistry topic such as:How does Environmental Protection Agency (EPA) set primary drinking water standards?What is the difference between primary and secondary drinking water standards.

HONORS: develop posters of chemistry honors project. Present your honors project using a poster that has the following components: Abstract, Background of your project, Main Results, Conclusions and References. An example project would be analysis of fluoride in water.

prepare a short laboratory report using a formal format commonly used in scientific journals. An example assignment would be: In experiment 15, you transformed a molecule into a new form and measured the physical and chemical changes that occurred. Using the provided rubric as a guide, summarize the results of your work in a typed report.

write descriptions of observations and answer questions from hands-on laboratory experiments.

write answers to essay and short exam questions.

Critical Thinking Assignments

HONORS: apply knowledge gained in classroom to analyze chemistry problems. An example would be: Determine the phosphoric acid concentration of different types of soda drinks using a titrimetric method.

analyze a set of data to discover the underlying rules that govern the system. An example would be: Using the stack of cards with Lewis structures printed on them as a guide, what is the most number of bonds between two atoms that can form?

describe and apply a series of steps for obtaining the solution to quantitative chemical problems.

participate in class discussions on select examples and homework problems.

HONORS: apply knowledge gained in classroom to analyze data obtained from experiments. An example would be: Calculate the differences between experimental concentration of hydroxide (alkalinity) and the one obtained from bottle labels. Identify sources of discrepancies.

Reading Assignments

HONORS: research relevant background material related to your honors project and use this to write an introduction to a laboratory report.

using the chemical literature, determine an expected melting point for a substance and compare to the melting point obtained in lab.

Skills Demonstrations

demonstrate proper use of glassware while measuring volumes and masses of various solid and liquid substances.

determine the empirical formula of an unknown copper oxide.

Outside Assignments

Representative Outside Assignments

HONORS: propose a method of analysis for water samples using tools beyond the chemistry textbook. An example would be: Contact water treatment plants in your county and determine how you can get representative water samples for analyzing chlorine levels in tap water.

complete online homework assigned through MasteringChemistry or similar online system.

apply knowledge learned in class to discover chemicals encountered in the student's daily life. An example assignment would be: Using the list provided as a guide, find ten of these chemicals in your house, and make a note of where they were found and what their application is.

complete additional problem sets provided by the instructor.

HONORS: design projects and assignments requiring library and/or Internet research. An example would be: Propose a chemistry project that is based on analysis of drinking or environmental water sample that would be of interest to you as a consumer or resident of Ventura County.

Articulation

C-ID Descriptor Number

CHEM 110

Status

Approved

Additional C-ID Descriptor(s)

C-ID Descriptor(s)	Status
CHEM 120S (with CHEM M01B)	Approved

Equivalent Courses at 4 year institutions

University	Course ID	Course Title	Units
CSU Northridge	CHEM 101 & 101L	General Chemistry I and General Chemistry I Lab	4 & 1
UC Los Angeles	CHEM 20A	Chemical Structure	4
UC Berkeley	CHEM 1A & 1L	General Chemistry	3 & 1
San Diego State Univ.	CHEM 200	General Chemistry	5

Comparable Courses within the VCCCD

CHEM M01A - General Chemistry I
CHEM R120 - General Chemistry I
CHEM V01A - General Chemistry I
CHEM V01AL - General Chemistry I Laboratory

Equivalent Courses at other CCCs

College	Course ID	Course Title	Units
Pierce College	CHEM 101	General Chemistry I	5

Attach Syllabus

Syllabus CHEM M01A and M01AH TR Spring 2020.pdf

District General Education

A. Natural Sciences

A2. Physical Science

Approved

B. Social and Behavioral Sciences

C. Humanities

D. Language and Rationality

E. Health and Physical Education/Kinesiology

F. Ethnic Studies/Gender Studies

Course is CSU transferable
Yes

CSU Baccalaureate List effective term:
F2014

CSU GE-Breadth

Area A: English Language Communication and Critical Thinking

Area B: Scientific Inquiry and Quantitative Reasoning

B1 Physical Science
Approved

B3 Laboratory Activity
Approved

Area C: Arts and Humanities

Area D: Social Sciences

Area E: Lifelong Learning and Self-Development

Area F: Ethnic Studies

CSU Graduation Requirement in U.S. History, Constitution and American Ideals:

UC TCA

UC TCA
Approved

IGETC

Area 1: English Communication

Area 2A: Mathematical Concepts & Quantitative Reasoning

Area 3: Arts and Humanities

Area 4: Social and Behavioral Sciences

Area 5: Physical and Biological Sciences

Area 5A: Physical Science
Approved

Area 5C: Laboratory Science
Approved

Area 6: Languages Other than English (LOTE)

Textbooks and Lab Manuals

Resource Type
Textbook

Description
Tro, Nivaldo J. *Chemistry: A Molecular Approach*. 5th ed., Pearson, 2019.

Resource Type
Textbook

Description
Moorpark College Chemistry Faculty. *Chemistry M01A Laboratory Manual* . V. 4.0, 2020, https://www.moorparkcollege.edu/departments/academic/chemistry/chemistry-m01a-laboratory-manual. Accessed April 2022.

Resource Type
Textbook

Description
Atkins, Peter, Loretta Jones, and Leroy Laverman. *Chemical Principles; The Quest for Insight*. 7th ed., Freeman, 2016.

Resource Type
Textbook

Description
Chang, Raymond, and Jason Overby. *Chemistry.* 14th ed., McGraw-Hill, 2021.

Resource Type
Textbook

Classic Textbook
No

Description
Flowers, Paul, et al. *Chemistry*. 2nd ed., OpenStax, 2022, https://openstax.org/details/books/chemistry-2e. Accessed April 2022.

Library Resources

Assignments requiring library resources
Use the Library's print and online resources to research and report on the relevant chemistry and background material in the introduction section of a written laboratory report about, for example, freezing point depression.

Sufficient Library Resources exist
Yes

Example of Assignments Requiring Library Resources
Research and answer questions on a chemistry topic such as: How does Environmental Protection Agency (EPA) set primary drinking water standards? What is the difference between primary and secondary drinking water standards.

Distance Education Addendum

Definitions

Distance Education Modalities

Hybrid (1%–50% online)
Hybrid (51%–99% online)

Faculty Certifications

Faculty assigned to teach Hybrid or Fully Online sections of this course will receive training in how to satisfy the Federal and state regulations governing regular effective/substantive contact for distance education. The training will include common elements in the district-supported learning management system (LMS), online teaching methods, regular effective/substantive contact, and best practices.

Yes

Faculty assigned to teach Hybrid or Fully Online sections of this course will meet with the EAC Alternate Media Specialist to ensure that the course content meets the required Federal and state accessibility standards for access by students with disabilities. Common areas for discussion include accessibility of PDF files, images, captioning of videos, Power Point presentations, math and scientific notation, and ensuring the use of style mark-up in Word documents.

Yes

Regular Effective/Substantive Contact

Hybrid (1%–50% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Students may be required to post their ideas or solutions for class-related material on the course discussion boards. Students may also be required to comment on the posts of other students, including constructive criticism.
E-mail	The instructor may email students with announcements about the course or other college events and opportunities and answer student questions. Students may email questions and possibly assignments or projects, depending on the nature of the class, directly to the instructor.
Face to Face (by student request; cannot be required)	Students may have the option to visit the instructor in their office on campus for office hours or to discuss other class-related items.
Other DE (e.g., recorded lectures)	The instructor may use other instruction methods appropriate to the subject matter. For example, pre-recorded lectures may be posted perhaps leading to a class discussion on the discussion boards.
Synchronous Dialog (e.g., online chat)	The instructor may hold class in a regular schedule but in an online format using a program such as ConferZoom. Office hours may also be held in this manner or with an online chat tool.
Telephone	Students may have the option to call the instructor and/or the instructor may call students to facilitate office hours or to discuss other class-related items.
Video Conferencing	The Instructor may hold class in a regular schedule but in an online format using a program such as ConferZoom. Office hours may also be held in this manner.

Hybrid (51%–99% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Students may be required to post their ideas or solutions for class-related material on the course discussion boards. Students may also be required to comment on the posts of other students, including constructive criticism.
E-mail	The instructor may email students with announcements about the course or other college events and opportunities and answer student questions. Students may email questions and possibly assignments or projects, depending on the nature of the class, directly to the instructor.

Face to Face (by student request; cannot be required)	Students may have the option to visit the instructor in their office on campus for office hours or to discuss other class-related items.
Other DE (e.g., recorded lectures)	The instructor may use other instruction methods appropriate to the subject matter. For example, pre-recorded lectures may be posted perhaps leading to a class discussion on the discussion boards.
Synchronous Dialog (e.g., online chat)	The instructor may hold class in a regular schedule but in an online format using a program such as ConferZoom. Office hours may also be held in this manner or with an online chat tool.
Telephone	Students may have the option to call the instructor and/or the instructor may call students to facilitate office hours or to discuss other class-related items.
Video Conferencing	The Instructor may hold class in a regular schedule but in an online format using a program such as ConferZoom. Office hours may also be held in this manner.

Examinations

Hybrid (1%–50% online) Modality
On campus
Online

Hybrid (51%–99% online) Modality
On campus
Online

Primary Minimum Qualification
CHEMISTRY

Review and Approval Dates

Department Chair
01/24/2023

Dean
01/24/2023

Curriculum Committee
2/7/2023

DTRW-I
MM/DD/YYYY

Curriculum Committee
MM/DD/YYYY

Board
MM/DD/YYYY

CCCCO
MM/DD/YYYY

Control Number
CCC000553183

DOE/accreditation approval date
MM/DD/YYYY