CHEM M01B: GENERAL CHEMISTRY II

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csjoiner

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College
Moorpark College

Attach Support Documentation (as needed)
December_2021_C-ID_Newsletter (4).pdf
Chem 120S.pdf

Discipline (CB01A)
CHEM - Chemistry

Course Number (CB01B)
M01B

Course Title (CB02)
General Chemistry II

Banner/Short Title
General Chemistry II

Credit Type
Credit

Start Term
Fall 2022

Catalog Course Description
Examines chemical kinetics; phase equilibria; equilibria in gases and solutions; acids and bases; solubility and complex ions; thermodynamics; electrochemistry; qualitative and quantitative chemical analyses. Provides an overview of nuclear chemistry, coordination chemistry, and organic chemistry. Addresses, through hands-on laboratory activities, chemical kinetics; equilibria; thermodynamics; spontaneous oxidation-reduction reactions and electrolysis; selective precipitation; titrations; and exposure to ultraviolet, infrared, and nuclear magnetic resonance spectroscopy.

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
Will not 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 M01A or CHEM M01AH and MATH M05 or equivalent

Entrance Skills

Entrance Skills
CHEM M01A or CHEM M01AH and MATH M05

Prerequisite Course Objectives
CHEM M01A-conduct various quantitative and qualitative 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.
CHEM M01A-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.
CHEM M01A-use dimensional analysis to perform mathematical conversions and solve problems involving stoichiometry, thermochemistry, quantum mechanics, solids, liquids, gases, and solutions.
CHEM M01A-identify the symbols of common elements, the structures of molecules and polyatomic ions; name/write formulas for various elements, acids, salts, bases and inorganic compounds as well as simple organic compounds.
CHEM M01A-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.
CHEM M01A-solve stoichiometry and solution concentration problems involving limiting reactants, theoretical and percent yields, dilutions, titrations, gases, liquids, solids, and colligative properties.
CHEM M01A-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.
CHEM M01A-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.
CHEM M01A-list and describe the distinguishing characteristics of solids, liquids, gases, and solutions.
CHEM M01A-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.
CHEM M01A-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.
CHEM M01AH-conduct various quantitative and qualitative 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.
CHEM M01AH-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.
CHEM M01AH-use dimensional analysis to perform mathematical conversions and solve problems involving stoichiometry, thermochemistry, quantum mechanics, solids, liquids, gases, and solutions.
CHEM M01AH-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.
CHEM M01AH-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.
CHEM M01AH-solve stoichiometry and solution concentration problems involving limiting reactants, theoretical and percent yields, dilutions, titrations, gases, liquids, solids, and colligative properties.
CHEM M01AH-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.
CHEM M01AH-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.
CHEM M01AH-list and describe the distinguishing characteristics of solids, liquids, gases, and solutions.
CHEM M01AH-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.
CHEM M01AH-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.
MATH M05-state and apply the definition of a function and use the vertical line test.
MATH M05-evaluate functions at both numerical and algebraic domain values.
MATH M05-determine the domain and range of a relation or function given its equation or its graph.
MATH M05-form a new function from original functions using the functional operations of addition, subtraction, multiplication, division, and composition.
MATH M05-recognize the relationship between functions and their inverses algebraically and graphically.
MATH M05-graph the functions which yield the parabola, the absolute value, the cubic, the square root, the cube root, and ones defined piecewise; solve linear and radical equations, and absolute value equalities and inequalities, and use these graphs to model real-life applications.

MATH M05-test equations of graphs for symmetries about the x-axis, the y-axis, and the origin.
MATH M05-apply transformations to the graphs of functions.
MATH M05-graph a parabola given by a quadratic function.
MATH M05-give a rough sketch of the graph of a polynomial function of degree three or larger given its factored form.
MATH M05-determine the domain and range as well as the horizontal and vertical asymptotes of a rational function and use that information to graph it; be able to solve rational equations.
MATH M05-graph exponential and logarithmic functions.
MATH M05-convert equations back and forth from exponential to logarithmic form.
MATH M05-apply the rules of logarithms involving logarithms of products, quotients, powers, and change of base and solve logarithmic functions, and use logarithms to solve real-life application problems.
MATH M05-solve exponential equations which have the same base on both sides and ones that do not have the same base on both sides of the equation by using logarithms, and use exponents to solve real-life application problems.
MATH M05-solve systems of linear equations using substitution and addition (elimination) with two and three variables and determine consistency and dependency as germane.
MATH M05-solve systems of nonlinear equations and linear and non-linear systems of inequalities.
MATH M05-identify and analyze the algebraic representations of conic sections to determine their properties and sketch their graphs, including circles, ellipses and hyperbolas.
MATH M05-determine and identify terms for sequences and series, and evaluate sums for both finite and infinite series.
MATH M05-apply rational and polynomial equations and apply functions and other algebraic techniques to model real-world STEM applications.

Requisite Justification

Requisite Type
Prerequisite

Requisite
CHEM M01A or CHEM M01AH or equivalent

Requisite Description
Course in a sequence

Level of Scrutiny/Justification
Required by 4 year institution

Requisite Type
Prerequisite

Requisite
MATH M05 or equivalent

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	quantitatively solve and demonstrate an understanding of various equilibrium problems involving acids and bases, buffered solutions, and titrations
2	balance chemical reactions, interpret data, and solve various stoichiometry problems which include limiting reactant problems, generating correct answers with appropriate significant figures.
3	apply scientific methodology by developing hypotheses to explain observed chemical phenomena, testing these hypotheses by analysis of provided or acquired data to evaluate the validity and limitations of the hypotheses.
4	use and interpret vocabulary related to chemical phenomena, solving problems applying chemical principles.
5	understand how the theory of thermodynamics, kinetics and equilibrium allow chemists to explain a vast array of observations about molecules.

6	assess the validity of their obtained hands-on experimental results, critique/analyze the data, and construct a formal laboratory report with their conclusions following the standard manuscript style prescribed by the National Science Foundation

Course Objectives

	Upon satisfactory completion of the course, students will be able to:
1	determine how rates of chemical reactions are measured, written, and used to deduce probable reaction mechanisms as well as describe the transition state and collision theory of reactions that produce effective collisions.
2	write and solve equilibrium constant expressions for chemical reactions, calculate final equilibrium values of a reaction from a variety of initial conditions, and apply Le Chatelier's Principle to various mixtures.
3	state the general principles of Arrhenius, Bronsted-Lowry, and Lewis acid/base theories, explain the nature of the pH scale as well as perform a multitude of pH calculations, plot and analyze titration curves, solve quantitative buffer solution problems using the Henderson-Hasselbalch equation, calculate the value of all equilibrium species for a polyprotic acid, and predict the relative strengths of binary and oxoacids.
4	define solubility equilibria and use the law of mass action to write equilibrium expressions, perform equilibrium calculations involving the solubility product constant, predict if precipitates will form upon mixing ionic solutions of various concentrations, identify complex ions, write equilibrium formation and dissociation reactions, calculate equilibrium values for complex ion solutions, and calculate the solubility of slightly soluble solutes in solutions involving the formation of complex ions.
5	apply the principles of acid/base and solubility equilibria in quantitative and qualitative chemical analyses.
6	state and apply the First, Second, and Third Laws of Thermodynamics along with Hess's Law, calculate heats of reactions using coffee-cup and bomb calorimeters, and quantitatively incorporate the concepts of work and internal energy.
7	define entropy, Gibbs Free Energy, and calculate changes in entropy and Gibbs Free Energy in a chemical reaction for standard and nonstandard state conditions in order to determine overall spontaneity.
8	discuss the nature of standard reduction potentials and reference standard reduction potential tables to solve overall standard cell potentials for a galvanic cell; predict the effect of varying reactant and product concentrations and/or partial pressures on calculated cell voltages using the Nernst equation; define, describe, and diagram electrolytic cells, and apply Faraday's law to calculate any unknown variable in a chemical change produced by a certain quantity of electrical charge.
9	correlate the combined concepts of equilibrium, free energy change, and cell potential.
10	distinguish between and note the properties of various organic compounds including functional group recognition, draw resonance structures for a molecule or ion and utilize the curved arrow formalism within a given mechanism, and identify major products in certain organic chemistry reactions.
11	describe the different types of nuclear radiation and decay, discuss and quantify radioactive decay rates and their half-life, calculate the energy associated with nuclear reactions, and compare and contrast the processes of nuclear fission and fusion.
12	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.
13	identify coordination compounds, assign nomenclature, and properties.

Course Content

Lecture/Course Content

18%
Chemical Kinetics:
Rates of Chemical Reactions
Factors that Affect Reaction Rates
Rate Law and Elementary Reactions
Integrated Rate Equations
Collision Theory and Transition State Theory
Temperature Effects
Activation Energy and the Arrhenius Equation
Reaction Mechanisms
Effect of Catalysts

10.00%
Principles of Chemical Equilibrium:
Process of Dynamic Equilibrium
Mass Action Expression

Equilibrium Constant and Reaction Quotient
K_c and K_p
Le Chatelier's Principle

16.00%
Acid-Base Equilibrium:
Arrhenius, Bronsted-Lowry, and Lewis Theories
Ionization of Water and the *p*H Scale
Strong and Weak Electrolytes
Molecular Structure and Acid-Base Properties
Weak Acid and Base Equilibria
Acid-Base Properties of Salt Solutions
Common-Ion Effect
Buffer Solutions and the Henderson-Hasselbalch Equation
Acid-Base Indicators
Titration Curves
Polyprotic Acids

8.00%
Solubility and Complex Ion Equilibria:
Solubility and the Solubility Product
Common-Ion Effect and Solubility
Solubility and *p*H
Complex Ion Equilibria
Solubility and Complex Ions
Selective Precipitation and Qualitative Analysis

14.00%
Chemical Thermodynamics:
Review of the First Law of Thermodynamics
Hess's Law
Spontaneous Processes
Second Law of Thermodynamics
Third Law of Thermodynamics
Gibbs Free Energy and its Applications to Equilibrium and Nonstandard Conditions

14.00%
Electrochemistry:
Review Oxidation-Reduction Reactions and Concepts
Voltaic or Galvanic Cells
Standard Half-Cell and Cell Potentials
Concentration Effects and the Nernst Equation
Faraday's Law and Electrolysis
Batteries and Fuel Cells
Corrosion

8.00%
Nuclear Chemistry:
Radioactivity; Patterns of Nuclear Stability
Types and Rates of Decay
Energy Changes in Nuclear Reactions
Fission and Fusion

6.00% Coordination Compounds:
Nomenclature and Properties

6.00%
Introduction to Organic Chemistry:
Structure and Nomenclature of Alkanes, Alkenes, Alkynes, Cyclic, and Aromatic Compounds
Functional Group Recognition
Reactions

Laboratory or Activity Content

5.00%
Safety in the laboratory

14.00%
Hands-on kinetics experiments such as:
Iodination of Acetone
Iodine Clock Reaction

16.00%
Hands-on equilibrium experiments such as:

Equilibrium constant of FeSCN2+
Solubility Constant of PbI2
Determination of Ka of an Unknown Acid

14.00%
Hands-on thermodynamics experiments such as:
Calorimetry
Hess's Law
Bomb Calorimetry

14.00%
Hands-on electrochemistry experiment labs such as:
Electrochemical Cells
Determination of Equivalent Mass by Electrolysis

18.00%
Hands-on qualitative analysis labs such as:
Identification of unknown Group I cations
Identification of Main Group and Transition Metal Cations
Identification of Common Anions
Hands-on graphing and statistics in such labs as:
Iodine Clock Reaction
Colorimetric Determination of [Co+2]
Graphing and Statistics Workshop

6.00%
Hands-on synthesis and characterization of an organic compound in such labs as:
Synthesis and Characterization of Aspirin

8.00% Spectroscopy: Hands-on spectrophotometer, IR, NMR in such labs as:
Introduction to IR and NMR Spectroscopy

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
Laboratory activities
Laboratory practical examinations
Laboratory reports
Objective exams
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
Practica
Problem-solving examples
Readings
Small group activities
Web-based presentations

Describe specific examples of the methods the instructor will use:

Chemical demonstrations performed by instructor.

Instructor will utilize a variety of instructional methods such as PowerPoint, whiteboard, and over-head projector to deliver lecture content.

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

Instructor will demonstrate the use of Excel for graphing of data to determine trends.

Representative Course Assignments

Writing Assignments

write answers questions from laboratory experiments such as: How does a buffer solution resist changes in pH upon addition of a strong acid or a strong base? or In the titration of a weak acid with a strong base, explain why the pH at equivalence point is not equal to 7.

write reflects on readings from the newspaper, journal articles, and/or Internet sources.

prepare a short laboratory report using a formal format commonly used in scientific journals such as: In experiment 3, you used a type of calorimetry to determine the thermodynamic parameters of the combustion of butanol. Using the provided rubric as a guide, summarize the results of your work in a typed report.

write answers to questions from lectures such as:What is the difference between a catalyst and an intermediate? or What is activation energy?

Critical Thinking Assignments

apply chemical principles to discuss various environmental and consumer issues such as air pollution, toxic wastes, energy sources, etc., such as: Explain how radioactive particles are used in smoke detectors; or explain the differences between a lead acid battery and a rechargeable lithium battery; or explain the theory behind techniques to prevent or corrosion of metals.

compare and contrast different methods of solution to a particular problem.

describe and apply a series of steps for obtaining the solution to quantitative chemical problems, such as: Use an ICE table to determine the pH of a solution of 0.1 M HA (weak acid) given its Ka.

participate in class discussions on select example and homework problems, such as: Estimate the age of an organic material using concepts of kinetics and Carbon dating given its radioactivity; or read the story of the Ottawa Society of the Living Dead and explain using the concept of penetration power of radioactive particles why this group of young women suffered from radiation poisoning in comparison to Marie Curie.

Reading Assignments

research relevant background material related to a hands-on experiment performed in lab and use this to write an introduction to a laboratory report.

use the chemical literature to find the expected infrared spectrum of a given substance and then compare it to the infrared spectrum obtained in lab.

Skills Demonstrations

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

use a bomb calorimeter to determine the heat of combustion of butan-1-ol.

Outside Assignments

Representative Outside Assignments

read from the newspaper, journal articles, and/or Internet sources.

prepare a schematic diagram that can be used to analyze an unknown solution in the laboratory. such as: Draw a schematic diagram that can be used to identify an unknown solution containing the following ions: Mg^{2+}, Ca^{2+}, Ba^{2+}, Fe^{3+}, Mn^{2+}, Al^{3+}, Co^{2+}, Cu^{2+} and Ni^{2+}.

complete homework problems selected from the textbook, such as: Calculate the solubility of $PbCl_2$ in pure water and in 0.1 M HCl given the K_{sp} from the Appendix; or calculate the half life of a substance at 298 K given the rate constant.

Articulation

C-ID Descriptor Number

CHEM 120S (with CHEM M01A or CHEM M01AH)

Status

Approved

Equivalent Courses at 4 year institutions

University	Course ID	Course Title	Units
UC Berkeley	CHEM 1B	General Chemistry	4
CSU Channel Islands	CHEM 122	General Chemistry II	4
CSU Chico	CHEM 112	General Chemistry	4
San Diego State Univ.	CHEM 201	General Chemistry	5
CSU Northridge	CHEM 102 & 102L	General Chemistry II and General Chemistry II Lab	4 & 1

Comparable Courses within the VCCCD

CHEM R122 - General Chemistry II
CHEM V01B - General Chemistry II
CHEM V01BL - General Chemistry II Laboratory

Equivalent Courses at other CCCs

College	Course ID	Course Title	Units
Pierce College	Chem 102	General Chemistry II	5

Attach Syllabus

Syllabus CHEM M01B Fall 2019.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:
F1995

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
Robinson, Jill Kirsten, John E. McMurry, and Robert C. Fay. *Chemistry.* 8th ed., Pearson, 2019.

Resource Type
Textbook

Description
Moorpark College Chemistry Faculty (2020). *Chemistry M01B Laboratory Manual.* V. 4.0, 2020, https://www.moorparkcollege.edu/departments/academic/chemistry/chemistry-m01b-laboratory-manual. Accessed April 2022.

Resource Type
Textbook

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

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
Research using the library's print and online resources.

Sufficient Library Resources exist
Yes

Example of 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, kinetics.

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
03/25/2022

Dean
03/25/2022

Technical Review
04/21/2022

Curriculum Committee
5/4/2022

DTRW-I
MM/DD/YYYY

Curriculum Committee
MM/DD/YYYY

Board
MM/DD/YYYY

CCCCO
MM/DD/YYYY

Control Number
CCC000523404

DOE/accreditation approval date
MM/DD/YYYY