

CHEM M11: FOUNDATIONS OF GENERAL, ORGANIC, AND BIOCHEMISTRY

Originator

csjoiner

Co-Contributor(s)**Name(s)**

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College

Moorpark College

Attach Support Documentation (as needed)

December_2021_C-ID_Newsletter (4).pdf

Discipline (CB01A)

CHEM - Chemistry

Course Number (CB01B)

M11

Course Title (CB02)

Foundations of General, Organic, and Biochemistry

Banner/Short Title

Found. Gen, Org & Biochemistry

Credit Type

Credit

Start Term

Fall 2022

Catalog Course Description

Covers general, organic, and biological chemistry with an emphasis placed on medical applications. Explores topics in general chemistry such as the modern view of the atom, molecules, chemical compounds, reactions, and calculations. Includes topics in organic and biochemistry such as hydrocarbons, alcohols, aldehydes and ketones, amines, carboxylic acids and their derivatives, carbohydrates, lipids, proteins, and nucleic acids.

Additional Catalog Notes

This course is designed for students who are Allied Health Science majors and for students not planning to take CHEM M01A or CHEM M01AH.

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

MATH M01 or one year high school algebra or equivalent

Entrance Skills**Entrance Skills**

MATH M01

Requisite Justification**Requisite Type**

Prerequisite

Requisite

MATH M01 or one year high school algebra 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 | learn about the multiple components that comprise nucleic acids, their functionality, and how the sequence of nucleotides ultimately accounts for the genetic code. |
| 2 | demonstrate the program purpose of scientific inquiry. |
| 3 | record and handle measurements using correct hands-on scientific protocol, and how to organize their activity in a laboratory setting. |
| 4 | understand how many physiological functions and medically important biological processes are underpinned by chemical concepts. |
| 5 | demonstrate a basic knowledge of atomic theory, bonding theory, kinetics and equilibrium properties of molecules. Students will be able to categorize and identify biologically important molecules and the major classes of organic chemicals. |

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. |
| 2 | 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. |
| 3 | 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. |
| 4 | draw valid Lewis structures of common molecules, identify bond polarities using electronegativity values, predict the molecular geometry of molecules using VSEPR (Valence Shell Pair Electron Repulsion). |
| 5 | identify the Lewis structures of common functional groups, name simple organic compounds using IUPAC (International Union of Pure and Applied Chemistry) nomenclature rules, identify chiral molecules, label stereochemical relationships, and draw chair forms of cyclohexane rings. |
| 6 | classify and predict double displacement and acid-base reactions of inorganic compounds, perform stoichiometric calculations for reactions, calculate changes in ideal gases using the ideal gas law, rank the strength of intermolecular forces. |
| 7 | identify common acids and bases, calculate the pH of solutions, predict the pH of important physiological fluids. |
| 8 | predict the outcome of reactions of alkenes, alkyl halides, carbonyl compounds. |
| 9 | identify classes of carbohydrates, identify glycosidic bonds, predict the outcome of saponification reactions, classify properties of amino acids, identify the effects of structural organization on proteins. |
| 10 | identify the names of nucleic acids, predict the identity of base pairs, differentiate the structures of nucleotides and nucleosides, identify the sequence of DNA replication, identify the function of codons. |
| 11 | experiment with acids and bases, alkanes, alkenes, alcohols, aldehydes, ketones, amines, carboxylic acids and their derivatives, proteins, DNA, and enzymes in a hands-on environment. |
| 12 | conduct various quantitative and qualitative hands-on 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 | apply hands-on laboratory techniques such as chromatography, spectrophotometric analysis, filtration, differential solubilities to separate and analyze mixtures, organic synthesis and product characterization, and molecular modeling. |

Course Content

Lecture/Course Content

6% Measurements in Chemistry:

Measurement Systems
 Uncertainty and Significant Figures
 Scientific Notation
 Conversion Factors and Dimensional Analysis

6.00%

Matter and Energy:

The Different States and Properties of Matter
 Mixtures and Substances
 Temperature Conversions
 Specific Heat

6.00%

Atomic Structure:

Protons, Neutrons, and Electrons
 Isotopes and Atomic Mass
 Periodic Trends

6.00%

Molecular Structure:

Ionic and Covalent Compounds (Naming and Drawing)
 Shapes and Polarity of Molecules/Ions

6.00%

Chemical Equations and Calculations:

Types of Reactions
 Mole Relationships and Mass Calculations
 Energy Changes in Chemical Reactions

6.00%

Properties of Gases, Liquids, Solids, and Solutions:

Gas Pressure
 Unusual Nature of Water
 Electrolytes and Nonelectrolytes
 Solubility and Solution Concentration

6.00%

Characteristics of Nucleic Acids:

Primary Structure of Nucleic Acids, DNA Double Helix
 Replication of DNA, RNA, Protein Synthesis

6.00%

Saturated Hydrocarbons:

Alkanes and Cycloalkanes
 Basic Nomenclature
 Structural Formulas and Isomerism

6.00% Properties and Reactions of Alcohols, Aldehydes, and Ketones; Chiral Molecules

6.00% Properties of Carboxylic Acids and Esters; Phosphoesters and Thioesters

6.00% Properties of Amines and Amides, Medically Important Amines and Reactions, Medically Important Amides and Reactions

6.00%

Acids, Bases, and Buffers:

Arrhenius and Bronsted-Lowry Definitions
 Acid/Base Properties of Water
 pH Scale
 Buffer Solutions

6.00%

Lipids:

Characteristics of Lipids
 Structural Characteristics of Fatty Acids
 Triacylglycerols
 Reactions of Triacylglycerols
 Steroids

8.00%

Unsaturated Hydrocarbons:

Alkenes and Cycloalkenes
 Physical and Chemical Properties of Alkenes
 Alkynes and Aromatic Hydrocarbons

Isomerism in Alkenes and Cycloalkenes
Organic Mechanisms

8.00%

Carbohydrates:

Classification of Monosaccharides

Chemical Properties of Monosaccharides, Disaccharides and
Polysaccharides

6.00% Characteristics of Proteins, Amino Acids, Peptide Formation, Levels of Protein Structure, Enzymes

Laboratory or Activity Content

5.00% Safety in the chemistry laboratory

10.00%

Use of measurements

hands-on use of chemistry laboratory equipment

significant figures

conservation of mass

20.00%

Conduct hands-on reactions of aqueous ions, including single and double
displacement reactions, precipitation reactions, acid/base reactions, and stoichiometry

15.00% Use molecular modeling to understand the structure and
stereochemistry of inorganic, organic, and bio-molecules

15.00% Analyze properties of organic compounds in a hands-on environment

15.00% Analyze the properties of biochemical compounds in a hands-on environment

20.00% Synthesize and purify organic and bioorganic compounds in a hands-on environment

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 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
 Dialog
 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
 Oral Drills
 Practica
 Problem-solving examples
 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

summarize the results of a lab experiment in a clear and concise fashion, consistent with standard scientific writing style. An example would be: In a short paragraph, explain how your results explain that the formula of magnesium sulfate hydrate is correct and consistent with the known value.

write descriptions of observations and answer questions from laboratory experiments.

write definitions of chemical terms using correct terminology. Examples include: What is the defining characteristic of a chiral compound? or What is the difference between the Gibb's free energy and the enthalpy of a reaction?

Critical Thinking Assignments

use chemical principles from lecture to create a PowerPoint presentation that discusses the chemical nature of a medical or health-related issue such as high blood pressure, heart disease, or patient care.

apply the knowledge gained in the laboratory calculations to new problems in the lecture section. An example would be: Using the method from the calorimetry lab, calculate the amount of heat generated when 10.0 mL of a 0.1 M solution of an acid and base along with 80.0 mL of water are mixed and raise the temperature by 2.0°C. Use this value to find the heat per mole for the neutralization reaction.

participate in class discussions on select example and homework problems.

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 determine the expected density of a given substance and compare to the density obtained in lab.

Skills Demonstrations

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

use a buret to determine the molarity of an unknown sodium hydroxide solution by titration.

Outside Assignments

Representative Outside Assignments

complete online homework assigned through MasteringChemistry or similar online system.

conduct a service learning field trip to a local elementary school, during which you will conduct demonstrations and explain basic chemical principles.

Articulation

Equivalent Courses at 4 year institutions

University	Course ID	Course Title	Units
San Diego State Univ.	CHEM 102	Introduction to General, Organic, and Biological Chemistry with Lab	5
CSU San Marcos	CHEM 105 & 105L	General, Organic, and Biochemistry for Life & Lab	4/1
CSU Northridge	CHEM 110 & 110L	Chemistry in Action and Chemistry in Action Laboratory	3 & 1
CSU Channel Islands	CHEM 110	Chemistry for Life	4
CSU East Bay	CHEM 161 & 162	Basic Chemistry for the Health Sciences	4 & 4

Comparable Courses within the VCCCD

CHEM R104 - General, Organic, and Biological Chemistry

CHEM V30 - Chemistry for Health Sciences

CHEM V30L - Chemistry for Health Sciences Laboratory

Equivalent Courses at other CCCs

College	Course ID	Course Title	Units
LA Pierce College	CHEM 051	Fundamentals of Chemistry	5

Attach Syllabus

CHEM 11 Syllabus Spring 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:

F2007

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

DescriptionSmith, Janice Gorzynski. *Principles of General, Organic and Biological Chemistry*. 3rd ed., McGraw-Hill Education, 2023.**Resource Type**

Textbook

Description

Denniston, Katherine, et al. *General, Organic, and Biochemistry*. 11th ed., McGraw-Hill Education, 2023.

Resource Type

Textbook

Description

Moorpark College Chemistry Faculty. *Chemistry M11 Lab Manual*. V. 2.0, <https://www.moorparkcollege.edu/departments/academic/chemistry/chemistry-m11-laboratory-manual>. Accessed April 2022.

Resource Type

Textbook

Description

Bettelheim, Frederick A., et al. *Introduction to General, Organic, and Biochemistry*. 12th ed., Cengage, 2020.

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 relevant chemistry and background material in the introduction section of a written laboratory report about, for example, chemical structure.

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**

Asynchronous Dialog (e.g., discussion board)

Document typical activities or assignments for each method of instruction

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

MM/DD/YYYY

Dean

MM/DD/YYYY

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

CCC000452400

DOE/accreditation approval date

MM/DD/YYYY