



Course Syllabus

Course Information

Course Title: General Education Chemistry

Subject and Number: CHM 1020

Course Description: This course provides students with an introduction to chemical principles and applications for the non-science major. Students will engage in problem solving and critical thinking while applying chemical concepts. Topics will include the scientific method of problem solving, classification of matter, atomic theory, the periodic table, gases, chemical reactions, energy, and chemical bonds. Student learning outcomes: students will be able to distinguish between physical and chemical properties and changes; students will recognize components of gaseous chemistry; students will recognize components of aqueous chemistry including properties of water, solutions, and acids and bases; students will correlate the design of the periodic table to periodic trends and physical and chemical properties elements; and students will write and interpret chemical formula and write balanced chemical equations.

Class Number: LOREM IPSUM

Term and Year: LOREM IPSUM

Course Modality: [MDC Modalities](#)

Instructor Information

Name: LOREM IPSUM

Department and Campus: LOREM IPSUM

Office location: LOREM IPSUM

Office hours: *(communicate course office hours with students)*

Phone number: 123-456-7890

Email: LOREM IPSUM

Communication Policy: *(Faculty will establish protocols for communication with students)*

Required Textbook, Course Materials, and Technology

Required course materials: *(Textbook(s), library reserves, shark pack, and/or other required readings. Include ISBN Number and author(s))*

List optional/supplemental materials/OER: LOREM IPSUM

Technology & Technical Skill Requirements: *(Technology tools or equipment students need to complete this course are included)*

Grading Policy & Assessment Methods

List all activities, papers, quizzes, tests, etc. including grading scale used for final grade calculation. Relationships between the final grade and the learner's accumulated points or percentages/weights breakdown for each assessment or component of the course grade.

Include policy on late submissions.

For MDC Live and MDC Online courses, include policy regarding exams (e.g., ProctorU, Respondus Lockdown and Monitor, etc.)

If applicable, include guidelines for extra credit.

Incomplete Grades: [View the college's procedures for Incomplete Grades](#)

Miami Dade College Policies

Attendance Policy: *(Faculty include precise statements about illnesses/emergencies/ tardiness, missed assignments/make-up.)*

Students Rights and Responsibilities: *Policies addressing academic integrity and plagiarism, code of conduct, grade appeals, religious observations, services for students with special needs, student complaints, and other.*

[For more information, visit the Student's Rights and Responsibilities page](#)

Available Support Services & Resources

- [Tutoring Labs and Technology – Learning Resources](#)
- [Virtual Tutoring through Learning Resources or Smarthinking Online Tutoring](#)
- [ACCESS: A Comprehensive Center for Exceptional Student Services](#)
- [Advisement](#)
- [Password and Login Technical Support](#)
- [Technical Support for MDC Live and MDC Online Courses](#)
- [SMART Plan](#)

(Faculty select from the above if applicable and include additional course/campus specific resources)

Available Support Services & Resources

- [Public Safety - Services](#)
- [Hurricane and Other Natural Disasters](#): In the event of a hurricane or other disaster, the class follows the schedule established by the College for campus-based courses. Please visit the MDC website or call the MDC Hotline (305-237-7500) for situation updates.

Course Description

CHM1020 | General Education Chemistry | 3 credits

This course provides students with an introduction to chemical principles and applications for the non-science major. Students will engage in problem solving and critical thinking while applying chemical concepts. Topics will include the scientific method of problem solving, classification of matter, atomic theory, the periodic table, gases, chemical reactions, energy, and chemical bonds. Student learning outcomes: students will be able to distinguish between physical and chemical properties and changes; students will recognize components of gaseous chemistry; students will recognize components of aqueous chemistry including properties of water, solutions, and acids and bases; students will correlate the design of the periodic table to periodic trends and physical and chemical properties elements; and students will write and interpret chemical formula and write balanced chemical equations.

Course Competencies

Competency 1:

The student will be able to demonstrate knowledge of the basic methodologies of science by:

- Describing the steps involved in the scientific method.

Learning Outcomes

- Communication

Competency 2:

The student will be able to demonstrate knowledge of the basic units, calculations, conversions, and measurements that are the very foundation of chemistry by:

- Demonstrating how very large or very small numbers are expressed in scientific or exponential notation.
- Converting ordinary numbers into scientific or exponential notation advice- versa.
- Converting measurements from one metric unit to another using conversion factors.
- Defining density and performing basic density calculations.

Learning Outcomes

- Numbers / Data

Competency 3:

The student will demonstrate knowledge of matter's classification, properties, and changes by:

- Comparing and contrasting several properties of the different states of matter.
- Explaining how the interconversion between states of matter can occur as well as describing and naming these processes.

- Identifying the symbols used to represent the most common elements.
- Distinguishing matter as either pure substance or mixture.
- Distinguishing pure substances as elements or compounds.
- Distinguishing mixtures as either homogeneous or heterogeneous.
- Distinguishing between physical and chemical properties and physical and chemical changes of matter.

Learning Outcomes

- Communication
- Critical thinking
- Information Literacy

Competency 4:

The student will be able to demonstrate knowledge of the basic building blocks of matter by:

- Identifying several properties and general arrangement of the three major subatomic particles (i.e., electrons, protons, and neutrons) of the atom.
- Defining isotopes and describing how various isotopes of a single element differ.
- Identifying the number of protons, neutrons, electrons, mass number, atomic number that an atom has, given its isotopic symbol.

Learning Outcomes

- Communication
- Critical thinking
- Information Literacy

Competency 5:

The student will be able to demonstrate an ability to understand several of the intricacies of the periodic table by:

- Distinguishing between periods and groups on the periodic table.
- Showing the relationship between position on the periodic table and atomic number.
- Distinguishing elements by using the structure of the periodic table and the periodic law (e.g., metal, non-metal, metalloid, noble gas, representative element, transition element, alkali metal, alkaline earth metal, and halogen).
- Describing the relationship that exists between the number of valence electrons an element has and its group number.
- Describing the relationship between an element's group number and the ion that it commonly forms.

Learning Outcomes

- Communication
- Information Literacy
- Numbers / Data

Competency 6:

The student will be able to demonstrate knowledge of electronic structures by:

- Demonstrating the relationship that exists between wavelength, frequency, and energy of electromagnetic radiation.
- Stating the number of electrons that can be accommodated in the main energy levels of an atom.
- Using the Bohr Model to determine the electronic configuration for the first twenty elements in the periodic table.
- Stating the number of valences electrons in an atom.

Learning Outcomes

- Communication
- Computer / Technology Usage
- Numbers / Data

Competency 7:

The student will be able to demonstrate knowledge of chemical bonding and intermolecular forces by:

- Predicting the bond that two atoms will form depending on where they are located on the periodic table.
- Describing the formation of ions from their parent atoms.
- Describing how and why ionic and covalent bonds form.
- Writing the Lewis electron dot structure of elements, ions, ionic compounds, and covalent compounds.
- Comparing and contrasting ionic and covalent bonding.
- Defining electronegativity.
- Describing the difference between polar and non-polar covalent bonds.
- Predicting bond polarity by calculating the difference in electronegativity between two elements involved in a chemical bond.
- Describing how forces of attraction, such as hydrogen bonding, operate between molecules.

Learning Outcomes

- Communication
- Critical thinking
- Information Literacy

Competency 8:

The student will be able to demonstrate knowledge of the composition, nomenclature, and reactivity of several chemical substances by:

- Identifying what atoms are present in a compound and in what ratio.
- Naming and writing the formula of binary ionic and covalent compounds.
- Naming and writing the formula of common polyatomic ions.
- Naming and writing the formula of ternary ionic compounds.
- Defining a mole.
- Computing the molar mass of substance from the sum of the atomic masses of the elements from which it is made.
- Manipulating conversions between mass and moles.
- Producing balanced chemical equations.
- Identifying the significance of the coefficients in a balanced chemical equation.
- Solving basic stoichiometry problems.
- Applying the Law of Conservation of Mass.
- Comparing and contrasting endothermic and exothermic reactions.

Learning Outcomes

- Communication
- Critical thinking
- Information Literacy
- Numbers / Data

Competency 9:

The student will be able to demonstrate knowledge of the properties and characteristics of water and aqueous solutions by:

- Showing the distribution of water resources on the surface of the earth and how water is recycled in the hydrologic cycle.
- Distinguishing between the components in a solution.
- Distinguishing between the different types of solution (i.e., saturated, unsaturated, and supersaturated).
- Showing how polarity, temperature, and pressure affect solubility.
- Performing mass percent and molarity calculations.
- Identifying several unique properties of water.
- Comparing and contrasting several properties of solution (e.g., freezing point depression, boiling point elevation, osmosis).
- Explaining water hardness and its effects.
- Explaining steps to treat, purify, and disinfect water.

Learning Outcomes

- Communication
- Critical thinking
- Information Literacy
- Numbers / Data

Competency 10:

The student will be able to demonstrate knowledge of acid-base chemistry by:

- Predicting the products and producing balanced equations for ionization reactions of acids, bases, and salts.
- Differentiating between different types of electrolytes (e.g., strong, weak, and nonelectrolytes).
- Comparing and contrasting properties of acids and bases.
- Predicting the products and producing balanced equations for neutralization reactions.
- Describing the interrelationship between pH, pOH, [H⁺], and [OH⁻] and the conversion from one to another.
- Comparing and contrasting properties of buffered and unbuffered solutions.

Learning Outcomes

- Communication
- Critical thinking
- Information Literacy
- Numbers / Data

Competency 11:

The student will be able to demonstrate knowledge of the nature and nomenclature of organic compounds by:

- Providing dash structural formulas and condensed structural formulas for various classes of organic compounds.
- Identifying and producing formulas for structural isomers.
- Distinguishing between functional groups (alkanes, alkenes, alkynes, arenes, halides, alcohols, phenols, ethers, amines, aldehydes, ketones, carboxylic acids, esters, and amides).
- Applying the International System of Pure and Applied Chemistry (IUPAC) nomenclature to simple organic compounds.

Learning Outcomes

- Communication
- Critical thinking
- Information Literacy

Competency 12:

The student will be able to demonstrate knowledge of the nature of biomolecules by:

- Comparing and contrasting the properties, sources, caloric value, and dietary and nutritional importance of carbohydrates, lipids, and proteins.
- Comparing and contrasting the composition and properties of nucleic acids.

Learning Outcomes

- Communication
- Critical thinking
- Information Literacy
- Numbers / Data

Competency 13:

The student will be able to demonstrate knowledge of nuclear chemistry by:

- Comparing and contrasting the relative harmfulness, shielding requirements, and penetrating ability of several types of nuclear radiation emitted from atomic nuclei.
- Producing balanced nuclear reactions.
- Identifying the risks, benefits, disposal, and uses of radioisotopes.
- Solving half-life problems.
- Comparing and contrasting nuclear fission and fusion.

Learning Outcomes

- Communication
- Information Literacy
- Numbers / Data