Chemistry

SCI-1100

2022 07/01/2022 to 06/30/2023 Modified 04/29/2022

Course Description

Chemistry is the investigation of atomic and molecular-level properties and interactions. The course begins with properties of matter, atomic structure, and basic atomic bonding. It then lays a mathematical and conceptual groundwork for which more complex molecular interactions can be understood. This course will provide the student with a number of analytical tools needed for scientific investigation and thought. The student will apply these principles in an online virtual lab where lab experiments are simulated in a way that is virtually equivalent to the engagement in a classroom laboratory.

Rationale

Chemistry allows the student an opportunity to explore substances, their properties, and how the interactions of these substances can generate a different set of properties. The study of chemistry generates critical cognition and analysis that enlightens the student's perception of the function of substances within Creation. Chemistry is a necessary component of the student's understanding of physical processes in the world around them.

Prerequisite

Completion or current enrollment in Algebra II

Measurable Learning Outcomes

A. The student will investigate and understand that experiments in which variables are measured, analyzed, and evaluated produce observations and verifiable data.

B. The student will investigate and understand that the placement of elements on the periodic table is a function of their atomic structure.

C. The student will investigate and understand how conservation of energy and matter is expressed in chemical formulas and balanced equations.

D. The student will investigate and understand that chemical quantities are based on molar relationships.

E. The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles.

F. The student will investigate and understand how basic chemical properties relate to organic chemistry and biochemistry.

Course Resources

See LUOA's Systems Requirements for computer specifications necessary to operate LUOA curriculum. Also view Digital Literacy Requirements for LUOA's expectation of users' digital literacy.

- Note: Embedded YouTube videos may be utilized to supplement LUOA curriculum.

YouTube videos are the property of the respective content creator, licensed to YouTube for distribution and user access. As a non-profit educational institution, LUOA is able to use YouTube video content under the YouTube Terms of Service. For additional

information on copyright, please contact the Jerry Falwell Library.

Scripture Attribution

- Grades 7-12: All Scripture quotations, unless otherwise indicated, are from the ESV® Bible (The Holy Bible, English Standard Version®), copyright © 2001 by Crossway, a publishing ministry of Good News Publishers. Used by permission. All rights reserved. May not copy or download more than 500 consecutive verses of the ESV Bible or more than one half of any book of the ESV Bible.

Policies

Students are accountable for all information in the Student Handbook (https://www.liberty.edu/online-academy/wp-content/uploads/2021/11/LUOA-Student-Handbook.pdf). Below are a few policies that have been highlighted from the Student Handbook.

Course Grading Policies

The student's grades will be determined according to the following grading scale and assignment weights. The final letter grade for the course is determined by a 10-point scale. Assignments are weighted according to a tier system, which can be referenced on the Grades page in Canvas. Each tier is weighted according to the table below. Items that do not affect the student's grade are found in Tier 0.

Grading Scale	Assignment Weights
A 90-100%	Tier 0 0%
B 80-89%	Tier 1 25%
C 70-79%	Tier 2 35%
D 60-69%	Tier 3 40%
F 0-59%	

In order for students to receive credit for a course, the following conditions have to be met:

- All semester exams and module tests have to be completed.
- All Tier 3 projects or papers have to be completed.
- Fewer than 10 zeros exist in the gradebook for blank submissions in a full credit course and 5 zeros for blank submissions in a semester course.

Types of Assessments

To simplify and clearly identify which policies apply to which assessment, each assessment has been categorized into one of four categories: Lesson, Assignment, Quiz, or Test. Each applicable item on the course Modules page has been designated with an identifier chosen from among these categories. Thus, a Quiz on the American Revolution may be designated by the title, "1.2.W - Quiz: The American Revolution." These identifiers were placed on the Modules page to help students understand which Resubmission and Honor Code policies apply to that assessment (see the Resubmission Policy and Honor Code Policy below for further details).

- **Lesson:** *Any item on the Modules page designated as a "Lesson"*

  These include instructional content and sometimes an assessment of that content. Typically, a Lesson will be the day-to-day work that a student completes.

- **Assignment:** *Any item on the Modules page designated as an "Assignment"*

Typical examples of Assignments include, but are not limited to, papers, book reports, projects, labs, and speeches. Assignments are usually something that the student should do his or her best work on the first time.

- **Quiz:** *Any item on the Modules page designated as a "Quiz"*

  This usually takes the form of a traditional assessment where the student will answer questions to demonstrate knowledge of the subject. Quizzes cover a smaller amount of material than Tests.

- **Test:** *Any item on the Modules page designated as a "Test"*

  This usually takes the form of a traditional assessment where the student will answer questions to demonstrate knowledge of the subject. Tests cover a larger amount of material than Quizzes.

Resubmission Policy

Students are expected to submit their best work on the first submission for every Lesson, Assignment, Quiz, and Test. However, resubmissions may be permitted in the following circumstances:

- **Lesson**: Students are automatically permitted two attempts on a Lesson. Students may freely resubmit for their first two attempts without the need for teacher approval.
- **Assignment**: Students should do their best work the first time on all Assignments. However, any resubmissions must be completed before the student moves more than one module ahead of that Assignment. For example, a student may resubmit an Assignment from Module 3 while in Module 4, but not an Assignment from Modules 1 or 2. High School students may not resubmit an Assignment without expressed written permission from the teacher in a comment.
- **Quiz**: Students may NOT resubmit for an increased grade.
- **Test**: Students may NOT resubmit for an increased grade.

If a student feels that he or she deserves a resubmission on a Lesson, Assignment, Quiz, or Test due to a technical issue such as a computer malfunction, the student should message his or her teacher to make the request.

Honor Code Policy

Every time a student violates the Honor Code, the teacher will submit an Honor Code Incident Report. The Student Support Coordinator will review the incident and allocate the appropriate consequences. Consequences, which are determined by the number of student offenses, are outlined below:

- **Warning:** This ONLY applies to high school Lessons and elementary/middle school Assignments and Lessons. Students should view these actions as learning opportunities.
  - **Lessons**: A zero will be assigned for the question only.
  - **Elementary/Middle School Assignment**: The student must redo his or her work; however, the student may retain his or her original grade.
- **1st Offense**:
  - **Lesson, Quiz, or Test**: The student will receive a 0% on the entire assessment.
  - **Assignment**: The student will either:
    - Receive a 0% on the original assignment
    - Complete the Plagiarism Workshop
    - Retry the assignment for a maximum grade of 80%
- **2nd Offense**: The student will receive a 0% and be placed on academic probation.
- **3rd Offense**: The student will receive a 0% and the Director of Faculty will determine the consequences that should follow, possibly including withdrawal from the course or expulsion from the academy.

Materials Selection Policy

LUOA curates educational materials that are consistent with the school's philosophy; however, the fallen human condition depicted in literature (as in Scripture itself) is not always pleasant. Valuable works sometimes have objectionable or profane elements. Good books provide four (4) recognized values.

- They build godly attitudes and character traits.
- They deepen our social and cultural awareness.

- They strengthen our use of written language.
- They provide a lifelong source of enjoyment and relaxation.

In order to instill these values in students and fulfill the stated objectives of the school, all LUOA students are expected to read and study good books on a regular basis. Recognizing that materials designed for one level may not be appropriate for another, three (3) levels of criteria are applied:

- Elementary materials must contain no objectionable material,
- Objectionable elements in sixth through eighth-grade materials must be limited and must serve a specific educational purpose, and
- Objectionable content may be included in high school materials but must be outweighed by positive literary, curricular, and/or Christian values.

The curriculum department has approved required educational materials for students.

Schedule

Module 1: Metric System & Unit of Measure & Atoms & Molecules

Week 1: Converting Units

Week 2: Scientific Notation & Figures

Week 3: Dimensional & Conservation

Week 4: Density

Module 2: Atomic Structure

Week 5: Atomic Theory & the Periodic Table

Week 6: Electron Configuration

Week 7: Periodic Properties

Week 8: Frequency and Energy

Week 9: Quiz and 1st Quarter Test

Module 3: Molecular Structure & Geometry & Polyatomic Ions

Week 10: Ionic & Covalent Bonding

Week 11: Covalent Bonds & Topics in Molecular Structure

Module 4: Changes in Matter & Chemical Reactions

Week 12: Chemical Equations

Week 13: Types of Chemical Reactions

Module 5: Stoichiometry

Week 14: The Mole

Week 15: Empirical & Molecular Formulas

Week 16: Using Stoichiometry

Week 17: Stoichiometry & Volume

Week 18: Quiz & 2nd Quarter Test

Module 6: The Chemistry of Solutions

Week 19: Moles & Molar Mass

Week 20: Concentration & Dilutions

Week 21: Acids & Bases

Week 22: Neutralization & Titration

Module 7: Gases

Week 23: Four Gas Laws

Week 24: Working with Gases

Module 8: Energy, Heat, & Temperature

Week 25: How Energy and Temperature is Measured

Week 26: Using Energy and Heat

Week 27: Quiz & 3rd Quarter Test

Module 9: Thermodynamics & Kinetics

Week 28: Enthalpy

Week 29: Thermodynamics

Week 30: Kinetics

Module 10: Chemical Equilibrium & Reduction-Oxidation Reactions

Week 31: Chemical Equilibrium

Week 32: La Chatelier's Principle

Week 33: Acid-Base with pH Scale

Week 34: Reduction-Oxidation Reactions

Week 35: How Batteries Work

Week 36: 4th Quarter Review & Test