

Special Topics in Chemistry (SCIT 1494)

Credit: 4 semester credit hours (3 hours lecture, 2 hours lab)

Corequisite: MATH 1332



Course Description

Topics address recently identified current events, skills, knowledge, and/or attitudes and behaviors pertinent to the technology or occupation and relevant to the professional development of the student.

Required Textbook and Materials

1. *Chemistry: Atoms First 2e*. Flowers, Paul, et al. OpenStax, 2019, <https://openstax.org>, <https://openstax.org/books/chemistry-atoms-first-2e/pages/1-introduction>. This book is available in its entirety in your Blackboard course content.
2. Three ring binder.
3. Tabbed dividers (8).
4. Scientific calculator.
5. Pens or pencils.
6. 882-E Scantrons.
7. Safety glasses or goggles.

Course Objectives

Upon completion of this course, the student will be able to:

1. Define the terminology as related to basic inorganic and organic chemistry.
2. Describe basic atomic and molecular structure.
3. Name and write chemical formulas for common inorganic compounds and hydrocarbons.
4. Write and balance chemical equations, and be able to describe how this relates to material balance in a process facility.
5. Identify reaction types and predict products of basic reactions.
6. Categorize hydrocarbon derivatives.
7. Describe basic polymer chemistry.
8. Draw the pH scale and explain its relationship to acids and bases.
9. Demonstrate laboratory skills related to chemistry principles, including measuring physical and chemical properties of matter, and applying safe laboratory practices.

Course Outline

- A. Introduction to Chemistry
 - 1. Evolution of Chemistry
 - 2. Modern Chemistry
- B. Scientific Measurement
 - 1. Uncertainty in Measurements
 - 2. Significant Digits
 - 3. Scientific Notation
 - 4. Unit Analysis
 - a. Conversion Factors
 - b. Dimensional Analysis
- C. The Metric System
 - 1. Basic Units, Symbols, and Prefixes
 - 2. Metric Conversion Factors
 - a. Metric-Metric
 - b. Metric-English
 - 3. Volume by Calculation
 - 4. Volume by Displacement
 - 5. Density
 - a. Concepts of Density
 - b. Density Calculations
 - c. Specific Gravity
- D. Matter and Energy
 - 1. Physical States of Matter
 - 2. Elements, Compounds and Mixtures
 - 3. Names & Symbols of Elements
 - 4. Metals, Nonmetals & Semimetals
 - 5. Compounds & Chemical Formulas
 - 6. Physical and Chemical Properties
 - 7. Physical and Chemical Changes
 - 8. Conservation of Mass
- E. Models of the Atom
 - 1. Atomic Notation
 - 2. Atomic Mass
- F. The Periodic Table
 - 1. Classification of Elements
 - 2. Periodic Law Concept
 - 3. Groups & Periods of Elements
 - a) Representative Elements
 - b) Transition Elements
 - 4. Periodic Trends
 - 5. Properties of Elements
 - 6. Valence Electrons
- 7. Electron Dot Formulas
- 8. Ionization Energy
- 9. Ionic Charges
 - a. Metals
 - b. Nonmetals
- G. Chemical Bonding
 - 1. The Chemical Bond Concept
 - 2. Ionic Bonds
 - a. Cations
 - b. Anions
 - 3. Covalent Bonds
 - a. Polar Covalent Bonds
 - b. Non Polar Covalent Bonds
 - c. Lewis Bonding Structures
- H. The Language of Chemistry
 - 1. Classification of Compounds
 - 2. Ions
 - a. Monatomic Ions
 - b. Polyatomic Ions
 - 3. Writing Chemical Formulas
 - 4. Ionic Compounds
 - a. Binary
 - b. Ternary
 - 5. Molecular Compounds
 - a. Binary Covalent
 - b. Binary Acids
 - c. Ternary Acids
- I. The Mole Concept
 - 1. Avogadro's Number
 - 2. Mole Calculations
 - 3. Molar Mass
 - 4. Percent Composition
- J. Chemical Reactions
 - 1. Evidence for Chemical Reactions
 - 2. Symbols in Chemical Reactions
 - 3. Writing Chemical Equations
 - 4. Balancing Chemical Equations
 - 5. Material Balance
- K. Classifying Chemical Reactions
 - 1. Combination Reactions
 - 2. Decomposition Reactions
 - 3. Single Replacement
 - 4. Double Replacement
 - a) Special type-Neutralization
 - 5. Combustion of Organics

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- L. Acids and Bases
 - 1. Properties of Acids and Bases
 - 2. The pH Scale
 - 3. Acid-Base Indicators
- M. Organic Chemistry
 - 1. Structures and Naming
 - 2. Hydrocarbons
 - 3. Alkanes
 - 4. Alkenes and Alkynes
 - 5. Arenes
 - 6. Hydrocarbon Derivatives
 - a) Halides
 - b) Alcohols
 - c) Aldehydes
 - d) Ketones
 - e) Carboxylic Acids
 - f) Ethers
 - g) Esters
 - h) Acid Anhydrides
 - i) Amides
 - j) Amines
 - 7. Common Reactions
 - 8. Polymers
 - a) Monomers vs Polymers
 - b) Addition Reactions
 - c) Condensation Reactions

Grade Scale

| | |
|----------|---|
| 90 – 100 | A |
| 80 – 89 | B |
| 70 – 79 | C |
| 60 – 69 | D |
| 0 – 59 | F |

Course Evaluation

Final grades will be calculated according to the following criteria:

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|------------------------------|-----|
| 1. 4 Unit Tests | 50% |
| 2. Comprehensive Final Exam | 20% |
| 3. Homework and Class Binder | 10% |
| 4. Laboratory | 20% |

Course Policies

1. **SAFETY GLASSES OR GOGGLES MUST BE WORN AT ALL TIMES IN THE LAB, NO EXCEPTIONS.**
2. **LAB APRONS MUST BE WORN AT ALL TIMES IN THE LAB, NO EXCEPTIONS.**
3. Each unit has assigned homework problems. All homework is due on/or about the testing day for that unit and must be completed on Blackboard by the assigned date. Each assignment may be completed twice, and the average of the two grades will be recorded as the final grade. One homework assignment grade will be dropped from your class average.
4. Makeup work, including labs and exams, may only be made up at the instructor's discretion. It is the responsibility of the student to contact the instructor as soon as possible to arrange for makeup work. All makeup work must be completed within one week of the original due date.

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5. There is a 20 point penalty for work turned in less than one week late. There is a 50 point penalty for work turned in more than one week late, but less than two weeks late. Work turned in more than two weeks late will not be accepted.
6. Students will not be automatically dropped from the class due to poor attendance or grades. Discontinuing class attendance without properly submitting a drop request will result in a failing grade (F).
7. Students are expected to stay for the full duration of the lab period or until all data is taken, calculations are performed and the lab assignment is turned in. Reports are to be neat and complete. **DO NOT USE RED INK.** Corrections should be made by a single line through the incorrect data and the correction entered next to the old data. Calculations may be done in pencil, but data should be recorded in ink.
8. Safety rules must be abided by at all times. Any student who continually breaks the safety rules will be removed from the class to insure the safety of the other students in the class.
9. During class time, **all electronic devices need to be turned to silent or off.** unless prior approval has been given by instructor to have them set to vibrate. (Permission will only be given in emergency situations.)

It shall be considered a breach of academic integrity (cheating) to use or possess on your body any of the following devices during any examination unless it is required for that examination and approved by the instructor:

- **Cell phone**
- **smart watch/watch phone**
- **laptop**
- **tablet**
- **electronic communication devices (including optical)**
- **earphones connected to or used as electronic communication devices.**

1st Offense: The exam will be taken from the student and the student will receive a grade of **ZERO (0)** for the exam which will be averaged into the student's class average and there will be **NO MAKEUP** of the test.

2nd Offense: The student will be removed from the class and will receive a grade of **FAILING (F)** for the entire lecture and lab grade.

Students with special needs and/or medical emergencies or situations should communicate with their instructor regarding individual exceptions/provisions. It is the student's responsibility to communicate such needs to the instructor.

10. Children are not allowed in either the lecture class or laboratory at any time.
11. No food, drinks, or use of tobacco products in class.
12. Attendance in class is vital to understanding chemistry. If an absence is unavoidable, arrange with the instructor to attend another session of the class. If you are absent, it is your responsibility to obtain copies of at least two other student's notes and rewrite them in your notebook. If you need further assistance, please set up an appointment with the instructor for a tutoring session. Excessive unexcused absences (per instructor's discretion) will result in a ten point deduction from the final semester grade. Attendance in lab is mandatory. Missed labs may be made up within one week without penalty at the instructor's discretion. Labs not made up within two weeks will result in a grade of zero (0). A lab that is one day to one week late will incur a 20 point penalty. A lab that is more than one week, but less than two weeks late will

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incur a 50 point penalty. At the end of the semester, three missed labs (grades of 0) will result in an automatic failing grade (F) for the course. The lowest lab grade will be dropped from your class average.

13. Additional class policies as defined by the individual course instructor (See syllabus addendum).

Technical Requirements

The latest technical requirements, including hardware, compatible browsers, operating systems, software, Java, etc. can be found online at:

https://help.blackboard.com/Learn/Student/Getting_Started/Browser_Support/Browser_Checker

A functional broadband internet connection, such as DSL, cable, or WiFi is necessary to maximize the use of the online technology and resources.

Disabilities Statement

The Americans with Disability Act of 1990 and Section 504, Rehabilitation Act of 1973 are federal anti-discrimination statutes that provide comprehensive civil rights for persons with disabilities. LIT provides reasonable accommodations as defined in the Rehabilitation Act of 1973, Section 504 and the American with Disability Act of 1990, to students with a diagnosed disability. The Special Populations Office is located in the Eagles' Nest Room 129 and helps foster a supportive and inclusive educational environment by maintaining partnerships with faculty and staff, as well as promoting awareness among all members of the Lamar Institute of Technology community. If you believe you have a disability requiring an accommodation, please contact the Special Populations Coordinator at (409)839-2018. You may also visit the online resource at [Special Populations - Lamar Institute of Technology \(lit.edu\)](http://www.lit.edu/special-populations)

Student Code of Conduct Statement

It is the responsibility of all registered Lamar Institute of Technology students to access, read, understand and abide by all published policies, regulations, and procedures listed in the *LIT Catalog and Student Handbook*. The *LIT Catalog and Student Handbook* may be accessed at www.lit.edu or obtained in print upon request at the Student Services Office. Please note that the online version of the *LIT Catalog and Student Handbook* supersedes all other versions of the same document

Starfish

LIT utilizes an early alert system called Starfish. Throughout the semester, you may receive emails from Starfish regarding your course grades, attendance, or academic performance. Faculty members record student attendance, raise flags and kudos to express concern or give praise, and you can make an appointment with faculty and staff all through the Starfish home page. You can also login to Blackboard or MyLIT and click on the Starfish link to view academic alerts and detailed information. It is the responsibility of the student to pay attention to these emails and information in Starfish and consider taking the recommended actions. Starfish is used to help you be a successful student at LIT.

<https://lit.edu/student-success/starfish>