Instructor: Charles C. Kirkpatrick, Ph.D.

Contact Information: Monsanto 201  
kirkpacc@slu.edu  
314-977-3202  
Office hours are posted on the course website


Course Objectives:

Our primary objective in this course is to build a good foundation in chemical knowledge that allows students to make qualitative and quantitative inquiries into chemical topics and be prepared for the next course in the general chemistry sequence.

At the completion of this course student should be able to:

1. Describe the nature of matter on the microscopic and macroscopic levels.
2. Write chemical formulas for ionic and covalent compounds and name them appropriately.
3. Balance chemical reactions and perform stoichiometry calculations.
4. Describe the nature of aqueous acid-base, precipitation, and redox reactions.
5. Solve problems using the Ideal Gas Laws, and understand the principles of the Kinetic Theory of Gases.
6. Apply the First Law of Thermodynamics to chemical and physical changes.
7. Describe the modern theories of atomic structure, including nuclear and electronic configurations.
8. Understand the principles of ionic and covalent bonding.
9. Write Lewis structures for molecules, predict their shapes using VSEPR Theory, and determine molecular polarity.
10. Identify intermolecular forces and their roles in physical properties of materials and phase changes.

**Significant Course Content and Approximate Dates and/or Calendar:** A list of topics is attached. A Google Calendar is provided to the students on the course web site (Blackboard). A printed version for Fall 2014 is attached.

**Significant Learning Activities and Approximate Deadlines and/or Calendar:** Homework problems (written and online using McGraw-Hill Connect) are listed on Blackboard. Homework is not collected and not graded.

**Major Assessment / Evaluation Strategies and/or Calendar:** Test and final exam dates are listed on the class calendar.

**Method for Determining Final Grade for Course and Grading Scale:** Course grades are based on three exams and a final exam as listed below.

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Exam 1</td>
<td>100 pts</td>
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<tr>
<td>Exam 2</td>
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<tr>
<td>Exam 3</td>
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<tr>
<td>Final Exam</td>
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<td>Total</td>
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<th>Letter Grade</th>
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<td>432</td>
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<tr>
<td>A-</td>
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<td>422</td>
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<td>398</td>
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<td>B</td>
<td>80</td>
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<td>B-</td>
<td>78</td>
<td>374</td>
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<tr>
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<td>C-</td>
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<td>288</td>
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<td>D</td>
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<td>240</td>
</tr>
<tr>
<td>F</td>
<td>&lt;50</td>
<td>&lt;240</td>
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**Academic Integrity Statement:** This class holds the same standards of academic integrity as other classes at Saint Louis University. Complete, specific college guidelines are available at [http://www.slu.edu/x12657.xml](http://www.slu.edu/x12657.xml).
Saint Louis University, Department of Chemistry
CHEM 163—General Chemistry I Lecture (3 credit hours)

Course Lecture Topics

Chapter 1—Keys to the Study of Chemistry
- Matter—states and properties
- History of Chemistry
- Scientific Method
- Measurement, Uncertainty and Units

Chapter 2—The Components of Matter
- Elements, Compounds and Mixtures
- Dalton’s Atomic Theory
- Modern Atomic Theory
- Compounds and Bonding
- Formulas, Names, and Masses

Chapter 3—Stoichiometry
- Mole Concept
- Determining Chemical Formulas
- Balancing Chemical Reactions
- Yields
- Solution Stoichiometry

Chapter 4—Classes of Chemical Reactions
- Water as a Solvent
- Aqueous Ionic Reactions
- Precipitation Reactions
- Acid-Base Reactions
- Redox Reactions
- Introduction to Chemical Equilibrium

Chapter 5—Gases and Kinetic-Molecular Theory
- Pressure
- Gas Laws
- Applications of Gas Laws
- Gases and Reaction Stoichiometry
- Kinetic-Molecular Theory
- Real Gases

Chapter 6—Thermochemistry
- Forms of Energy—Heat and Work
- Enthalpy Changes in a Chemical Reaction
- Calorimetry
• Thermochemical Equations and Stoichiometry
• Hess’s Law
• Heats of Formation

Chapter 7—Quantum Theory and Atomic Structure
• Nature of Light—Wave and Particle Theories
• Atomic Spectra
• Bohr Model of the Atom
• Wave-Particle Duality
• Quantum-Mechanical Model

Chapter 8—Electron Configuration and Chemical Periodicity
• Periodic Table
• Many-Electron Atom
• Quantum-Mechanics and the Periodic Table
• Trends in Atomic Properties—Size, Ionization Energy, Electron Affinity
• Electronic Structure and Chemical Reactivity

Chapter 9—Models of Chemical Bonding
• Ionic Bonding—Energy Considerations
• Covalent Bonding—Energy Considerations, Chemical Change
• Metallic Bonding

Chapter 10—Shapes of Molecules
• Lewis Structures
• VSEPR Theory
• Molecular Polarity

Chapter 11—Theories of Covalent Bonding
• Valence Bond Theory
• Orbital Overlap—Sigma and Pi Bonding
• Molecular Orbital Theory

Chapter 12—Intermolecular Forces
• Physical States of Matter
• Energy Changes in Phase Changes
• Phase Diagrams
• Types of Intermolecular Forces
• Properties of Liquids
• Water
• Solid State Structures
• Advanced Materials

Chapter 13—Properties of Mixtures
• Solutions of Liquids with Solids and Gases
• Energy and Entropy Changes
• Equilibrium
• Concentration Units
• Colligative Properties
• Colloids


Prepared by: C. Kirkpatrick (kirkpacc@slu.edu)
CHEM 163-01

Mon Aug 25, 2014
10 am Welcome and Course Information
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Wed Aug 27, 2014
10 am Chapter 1
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Fri Aug 29, 2014
10 am Chapter 1, 2
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Mon Sep 1, 2014
10 am Labor Day Holiday-No Class
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Wed Sep 3, 2014
10 am Chapter 2
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Fri Sep 5, 2014
10 am Chapter 2
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Mon Sep 8, 2014
10 am Chapter 2, 3
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Wed Sep 10, 2014
10 am Chapter 3
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu
CHEM 163-01

Fri Sep 12, 2014

10 am Chapter 3

Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Mon Sep 15, 2014

10 am Chapter 3, 4

Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Wed Sep 17, 2014

10 am Chapter 4

Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Fri Sep 19, 2014

10 am Chapter 4

Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Mon Sep 22, 2014

10 am Chapter 4

Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Wed Sep 24, 2014

10 am Chapter 4, 5

Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Thu Sep 25, 2014

6 pm TEST 1

Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Fri Sep 26, 2014

10 am Chapter 5

Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu
Mon Sep 29, 2014

10 am  Chapter 5
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Wed Oct 1, 2014

10 am  Chapter 5
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Fri Oct 3, 2014

10 am  SLU Presidential Inauguration--No Class
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Mon Oct 6, 2014

10 am  Chapter 5,6
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Wed Oct 8, 2014

10 am  Chapter 6
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Fri Oct 10, 2014

10 am  Chapter 6
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Mon Oct 13, 2014

10 am  Chapter 6
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Wed Oct 15, 2014

10 am  Chapter 6
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
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CHEM 163-01

Fri Oct 17, 2014

10 am  Chapter 6,7
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Mon Oct 20, 2014

10 am  Fall Break--No Class
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Wed Oct 22, 2014

10 am  Chapter 7
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Thu Oct 23, 2014

6 pm  TEST 2
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Fri Oct 24, 2014

10 am  Chapter 7
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Mon Oct 27, 2014

10 am  Chapter 7
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Wed Oct 29, 2014

10 am  Chapter 8
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Fri Oct 31, 2014

10 am  Chapter 8
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu
CHEM 163-01

Mon Nov 3, 2014

10 am  Chapter 8
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Wed Nov 5, 2014

10 am  Chapter 8,9
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Fri Nov 7, 2014

10 am  Chapter 9
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Mon Nov 10, 2014

10 am  Chapter 9
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Wed Nov 12, 2014

10 am  Chapter 9
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Fri Nov 14, 2014

10 am  Chapter 9,10
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Mon Nov 17, 2014

10 am  Chapter 10
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Wed Nov 19, 2014

10 am  Chapter 10
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu
CHEM 163-01

Fri Nov 21, 2014
10 am  Chapter 10,11
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Mon Nov 24, 2014
10 am  Chapter 11
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Wed Nov 26, 2014
10 am  Thanksgiving Holiday--No Class
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Fri Nov 28, 2014
10 am  Thanksgiving Holiday--No Class
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Mon Dec 1, 2014
10 am  Chapter 11,12
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Wed Dec 3, 2014
10 am  Chapter 12
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Thu Dec 4, 2014
6 pm  TEST 3
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Fri Dec 5, 2014
10 am  Chapter 12,13
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu
CHEM 163-01

Mon Dec 8, 2014

10 am  Chapter 12,13 -- Last Day of Class
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu

Fri Dec 12, 2014

2 pm  Final Exam
Where: SLU Kelley Auditorium
Calendar: CHEM 163-01
Created by: kirkpacc@slu.edu