

**CHEMISTRY 101**

**FUNDAMENTAL CHEMISTRY I**

**BULLETIN INFORMATION**

CHEM 101 – Fundamental Chemistry I (4 credit hrs)

**Course Description:**

A science elective surveying inorganic and solution chemistry. First of a terminal two-semester sequence.
**Note:** Three lecture, one recitation, and two laboratory hours per week.

**SAMPLE COURSE OVERVIEW**

CHEM 101 is an introductory course in chemistry designed to provide a fundamental understanding of chemistry; its purpose is to prepare students for higher level chemistry classes by introducing them to basic chemistry concepts and calculations. The material centers on the basics of matter and its changes and relates this information to medical, engineering and other fields of work and study. This course consists of a lecture and laboratory portion. The lectures will include demonstrations, interactive questioning sessions, and problem-solving practice. Each laboratory will include a homework question session, pre-lab discussion, procedural explanation, safety requirements and precautions, and a student-led experiment.

**ITEMIZED LEARNING OUTCOMES**

**Upon successful completion of CHEM 101, students will demonstrate…:**

1. A good understanding of the scientific method
2. A broad understanding of the fundamental concepts of chemical bonding, reactions, and practical applications
3. The ability to recognize and understand the impact that chemistry has on every aspect of their lives
4. A working knowledge of chemistry especially as it relates to the world around them
5. The ability to read popular media and understand the significance of chemistry as it relates to the world around them

**…by specifically being able to:**

1. Classify matter and relate its classification to physical and chemical properties.
2. Relate the properties of elements to their structure, location on the periodic table, and natural state.
3. Measure quantities in the laboratory using appropriate equipment and perform calculations preserving the precision of those measurements.
4. Identify the bonding characteristics of substances based upon their properties and elemental makeup.
5. Perform quantitative calculations to predict projected yields of reactions with regard to products, masses, and energy output or consumption.
6. Calculate specific concentration ratios and predict the dependence of reaction mechanisms (rate and direction) on relative quantities.
7. Identify acids and bases as to their properties and reactions, as well as methods to determine the concentration of acids and bases.
8. Apply theoretical ideas studied to practical situations in the laboratory.
9. Perform data collection and analysis drawing meaningful conclusions from the data as part of a cooperative group in the laboratory.

**SAMPLE REQUIRED TEXTS/SUGGESTED READINGS/MATERIALS**

1. Stoker, S.H.*General, Organic, and Biological Chemistry,**Sixth Edition,*2010. Houghton Mifflin. Boston, Mass.
2. Bundy, Robert, Castiglia *Lab Manual for Fundamental Chemistry I, Chemistry 101*, *2014-2015 Edition.*
3. Safety Goggles
4. Scientific Calculator **-**This must have logarithms and exponential functions.

**SAMPLE ASSIGNMENTS AND/OR EXAMS**

1. **3 Hour Exams:** There will be 3 exams covering lecture topics, reading assignments, laboratory experiments, and assigned homework. Each exam will be approximately 40 – 50 questions (short answer, multiple choice and/or problem solving.)
2. **Final Exam:**The final exam is a cumulative exam covering material from the entire semester.
3. **Homework:**Homework assignments will consist of practice exercises, examples, questions, and problems associated with the readings to be covered in the next lecture. Homework assignments will be graded, and this material will be tested.
4. **Lab:**Each laboratory will include a homework question session, pre-lab discussion, procedural explanation, safety requirements and precautions, and a student-led experiment. For each laboratory, student assignments include pre- and post-lab questions and a lab report.The lab component will include 14 labs, which consist of lab reports, exercises, and discussions of research methodology

**SAMPLE COURSE OUTLINE WITH TIMELINE OF TOPICS, READINGS/ ASSIGNMENTS, EXAMS/PROJECTS**

|  |  |  |  |
| --- | --- | --- | --- |
|  **DATE** | **CHAPTER** | **TOPIC** | **HOMEWORK** |
| Class 1 | 1.1–1.4 | Course Overview, Intro to Chemistry | *\*Memorize elements in pink (p. 13)\**Chapter 1 # 3, 9, 17, 27, 33, 49, 65, 67, 69, 81 |
| Class 2 | 1.5–1.92.1–2.4 | Basic Concepts About Matter |
| Measurement | *\*Memorize metric prefixes in pink (p. 26)\**Chapter 2 # 4, 9, 13, 22, 23, 24, 25, 26, 31, 45, 49, 51, 55, 77, 80, 91, 95, 105 |
| *Lab 1* |   | *Lab Safety & Lab Orientation* |
| Class 3 | 2.4–2.8 | SF Calculations, Conversions |
| Class 4 | 2.8–2.9 | More Conversions |
| *Lab 2* |   | *Measurement & Physical Properties* |
| Class 5 | 3.1–3.5, 3.9 | Atomic Structure | Chapter 3 # 1, 5, 13, 15, 27, 31, 33, 41, 57, 59, 71, 73, 75, 81, 83, 99  |
| Class 6 | 3.6–3.8 | Electron Configuration |
| *Lab 3* |   | *Elements* |
| Class 7 | 1–3 | Review | Study! |
| Class 8 |   | **TEST 1** |
| *Lab 4* |   | *Ionic & Covalent Compounds* | Chapter 4 # 1, 2, 3, 5, 11, 13, 23, 27, 39, 53, 57, 61, 79, 83, 87, 95, 107, 113, 115 |
| Class 9 | 4.1–4.8 | Ionic Bonding |
| Class 10 | 4.9–4.115.2, 5.2, 5.6 | Ionic Nomenclature |
| Covalent Bonding | Chapter 5 # 1, 7, 13, 25, 27, 29, 47, 49, 61, 65, 79, 89, 93, 94 |
| *Lab 5* |   | *Qualitative Analysis* |
| Class 11 | 5.3, 5.4, 5.8–12 | Geometry, Polarity, Nomenclature |
| Class 12 | 4–5 | Review | Study! |
| *Lab 6* |   | *Covalent Molecules* | Study some more! |
| Class 13 | **4–5** | **TEST 2** |
| Class 14 | 6.1–6.6 | Calculations, Moles, Reactions | Chapter 6 # 1, 7a, 9, 13a, 17, 23a, 33, 35, 47, 55, 61a, 75a, 81, 87, 91 |
| *Lab 7* |   | *Chemical Reactions* |
| Class 15 | 6.7–6.9 | Stoichiometry |
| Class 16 | 7.1–7.6 | Gases, Gas Laws | Chapter 7 # 1, 2, 5, 11, 18, 21, 25, 29, 33, 45, 57, 61, 73, 81, 85, 91, 92 |
| *Lab 8* |   | *Stoichiometry* |
| Class 17 | 7.7–7.12 | Gas Laws, Phases |
| Class 18 | 8.1–8.4, 8.7 | Solution Formation | Chapter 8 # 3, 5, 7, 9, 11, 15, 17, 19, 21, 23, 25, 33a, 40, 53b, 55a, 66a, 77, 83, 95, 105  |
| *Lab 9* |   | *Gases & Gas Laws* |
| Class 19 | 8.5–8.6, 8.8–8.9 | Concentration, Colligative Properties |
| *Lab 11* |   | *Solutions*Review 6-8 |  Study! |
| Class 20 | 6-8 | **TEST 3** |
| *Lab 10* |   | *Determination of R* |   |
| Class 21 | 9.1–9.3 | Redox Reactions | *\*Memorize ox. number rules (p. 242-3)\**Chapter 9 # 3, 7, 8, 11, 13, 14, 18, 23, 25, 32, 46, 49, 61, 64, 70, 83, 88 |
| Class 22 | 9.4–9.7 | Reaction Energetics, Equilibria |
| *Lab 12* |   | *LeChâtelier’s Principle* |
| Class 23 | 9.8–9.9 | Equilibrium Constant, LeChâtelier |
| Class 24 | 10.1–10.6 | Acids, Bases, Salts | *\*Memorize strong acids & strong bases**(p. 277-8)\**Chapter 10 # 1, 2, 3, 4, 6, 7, 12, 15, 20, 25, 30, 33, 35, 42, 44, 45, 51, 56, 61, 63, 73, 77, 97, 109, 113, 125, 129, 147 |
| *Lab 13* |   | *Acids & Bases* |
| Class 25 | 10.7–10.9, 10.15, 10.16 | Neutralization,Titration |
| Class 26 | 10.10–10.14 | Buffers |
| Class 27 | 12, 13 | Introduction to Hydrocarbons | Study… |
| *Lab 14* |   | *Final Exam Review* | Keep studying… |
| Class 28 | 1–10 | Final Exam Review | Study some more… |
|   | **1**–**10** | **Final Exam according to University exam schedule** |