

**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:

6. Classify matter and relate its classification to physical and chemical properties.
7. Relate the properties of elements to their structure, location on the periodic table, and natural state.
8. Measure quantities in the laboratory using appropriate equipment and perform calculations preserving the precision of those measurements.
9. Identify the bonding characteristics of substances based upon their properties and elemental makeup.
10. Perform quantitative calculations to predict projected yields of reactions with regard to products, masses, and energy output or consumption.

11. Calculate specific concentration ratios and predict the dependence of reaction mechanisms (rate and direction) on relative quantities.
12. Identify acids and bases as to their properties and reactions, as well as methods to determine the concentration of acids and bases.
13. Apply theoretical ideas studied to practical situations in the laboratory.
14. 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	1.5–1.9 2.1–2.4	Basic Concepts About Matter Measurement	
Lab 1		Lab Safety & Lab Orientation	*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
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,

Class 6	3.6–3.8	Electron Configuration	59, 71, 73, 75, 81, 83, 99
Lab 3		Elements	
Class 7	1–3	Review	Study!
Class 8		TEST 1	
Lab 4		<i>Ionic & Covalent Compounds</i>	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	4.9–4.11	Ionic Nomenclature	Chapter 5 # 1, 7, 13, 25, 27, 29, 47, 49, 61, 65, 79, 89, 93, 94
	5.2, 5.2, 5.6	Covalent Bonding	
Lab 5		<i>Qualitative Analysis</i>	
Class 11	5.3, 5.4, 5.8–12	Geometry, Polarity, Nomenclature	
Class 12	4–5	Review	Study!
Lab 6		<i>Covalent Molecules</i>	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		<i>Chemical Reactions</i>	
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		<i>Stoichiometry</i>	
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		<i>Gases & Gas Laws</i>	
Class 19	8.5–8.6, 8.8–8.9	Concentration, Colligative Properties	
Lab 11		<i>Solutions</i> Review 6-8	Study!
Class 20	6-8	TEST 3	
Lab 10		<i>Determination of R</i>	
Class 21	9.1–9.3	Redox Reactions	*Memorize ox. number rules (p. 242-3)*
Class 22	9.4–9.7	Reaction Energetics, Equilibria	Chapter 9 # 3, 7, 8, 11, 13, 14, 18, 23, 25, 32, 46, 49, 61, 64, 70, 83, 88
Lab 12		<i>LeChâtelier's Principle</i>	
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)*
Lab 13		<i>Acids & Bases</i>	
Class 25	10.7–10.9, 10.15, 10.16	Neutralization, Titration	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
Class 26	10.10–10.14	Buffers	
Class 27	12, 13	Introduction to Hydrocarbons	Study...
Lab 14		<i>Final Exam Review</i>	Keep studying...
Class 28	1–10	Final Exam Review	Study some more...
	1–10	Final Exam according to University exam schedule	

