

CHM 05

Developmental Chemistry for Health Sciences

COURSE OUTLINE

Course Description:

(4 CR) Prerequisites: MTE 1, 2, 3, 4, 5 and 6; and a placement recommendation for ENG 111, co-enrollment in ENF 3/ENG 111, or successful completion of all developmental English requirements. Introduces basic principles of inorganic, organic, and biological chemistry. Emphasizes applications to the health sciences. Can be used as a preparatory course for CHM 111- 112. Lecture 3 hours. Laboratory 2 hours. Total 5 hours per week.

Semester Credits: 4 Lecture Hours: 3 Lab/Recitation Hours: 2

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Course Outcomes

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

1. Understand the basic tenets of the modern atomic-molecular theory.
2. Perform basic laboratory techniques safely and accurately.
3. Appreciate the relationship between chemistry and aspects of health.
4. Perform calculations and metric conversions using correct significant figures and scientific notation.
5. Balance chemical reactions and calculate stoichiometric relationships.
6. Use the periodic chart to predict binary compound formulas, bonding, names and properties.
7. Provide a foundation for Chemistry 111.

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Required Materials:

Textbook. Lab manual, and online homework access code

Textbook:

Chemistry – An Introduction to General, Organic, & Biological Chemistry, 12th edition, by Timberlake, Pearson. ISBN: 9780133899573

Lab:

Lab - Developmental Chemistry for the Health Sciences, custom edition, by Timberlake, (Benjamin Cummings/Pearson Custom Publishing). ISBN: 9780558539146

The following supplementary materials are available:

1. Previous version of textbook in library on reserve
2. Study Guide/Solutions manual (available in bookstore) – 12th ed ISBN: 9780321933461, Pearson Custom Publishing.

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Topical Description:

<u>Section</u>	<u>Topics</u>	<u>Chapter</u>
	Chemistry in Our Lives	1
1.1	Chemistry and Chemicals	
1.2	Scientific Method: Thinking Like a Scientist	
1.3	Learning Chemistry: A Study Plan	
1.4	Key Math Skills for Chemistry	
	Chemistry and Measurements	2
2.1	Units of Measurement	
2.2	Measured Numbers and Significant Figures	
2.3	Significant Figures in Calculations	
2.4	Prefixes and Equalities	
2.5	Writing Conversion Factors	
2.6	Problem Solving Using Unit Conversion	
2.7	Density	
	Matter and Energy	3
3.1	Classification of Matter	
3.2	States and Properties of Matter	
3.3	Temperature	
3.4	Energy	
3.5	Energy and Nutrition	
3.6	Specific Heat	
3.7	Changes of State	
	Atoms and Elements	4
4.1	Elements and Symbols	
4.2	The Periodic Table	
4.3	The Atom	
4.4	Atomic Number and Mass Number	
4.5	Isotopes and Atomic Mass	
4.6	Electron Energy Levels	
4.7	Trends in Periodic Properties	

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<u>Section</u>	<u>Topics</u>	<u>Chapter</u>
	Nuclear Chemistry	5
5.1.	Natural Radioactivity	
5.2.	Nuclear Reactions	
5.3.	Radiation Measurement (optional)	
5.4.	Half-life of a Radioisotope	
5.5.	Medical Applications Using Radioactivity (optional)	
5.6.	Nuclear Fission and Fusion	
	Ionic and Molecular Compounds	6
6.1.	Ions: Transfer of Electrons	
6.2.	Writing Formulas for Ionic Compounds	
6.3.	Naming Ionic Compounds	
6.4.	Polyatomic Ions	
6.5.	Molecular Compounds: Sharing Electrons	
6.6.	Electronegativity and Bond Polarity	
6.7.	Shapes and Polarity of Molecules	
6.8.	Attractive Forces in Compounds	
	Chemical Quantities and Reactions	7
7.1.	The Mole	
7.2.	Molar Mass and Calculations	
7.3.	Equations for Chemical Reactions	
7.4.	Types of Reactions	
7.5.	Oxidation-Reduction Reactions	
7.6.	Mole Relationships in Chemical Equations	
7.7.	Mass Calculations for Reactions	
7.8.	Energy in Chemical Reactions	
	Gases	8
8.1.	Pressure and Volume (Boyle's Law)	
8.2.	Temperature and Volume (Charles' Law)	
8.3.	Temperature and Pressure (Gay-Lussac's Law)	
8.4.	The Combined Gas Law	
8.5.	Volume and Moles (Avogadro's Law)	
8.6.	Partial Pressures (Dalton's Law)	
	Ideal Gas Law – not in book	

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<u>Section</u>	<u>Topics</u>	<u>Chapter</u>
	Solutions	9
9.1.	Solutions	
9.2.	Electrolytes and Nonelectrolytes	
9.3.	Solubility	
9.4.	Concentrations of Solutions	
9.5.	Dilution of Solutions	
9.6.	Properties of Solutions	
	Acids and Bases and Equilibrium	10
10.1.	Acids and Bases	
10.2.	Strengths of Acid and Bases	
10.3.	Acid-Base Equilibrium	
10.4.	Ionization of Water	
10.5.	The pH Scale	
10.6.	Reactions Acids and Bases	
10.7.	Buffers	
	Introduction to Organic Chemistry: Hydrocarbons	11
11.1.	Organic Compounds	
11.2.	Alkanes	
11.3.	Alkanes with Substituents	
11.4.	Properties of Alkanes	
11.5.	Alkenes and Alkynes (optional)	
11.6.	Cis-Trans Isomers (optional)	
11.7.	Addition Reactions (optional)	
11.8.	Aromatic Compounds (optional)	
	Functional Groups – not in book	



Lab Outline

Lab manual: Developmental Chemistry for the Health Sciences, custom edition, by
Timberlake, (Benjamin Cummings/Pearson Custom Publishing)

<u>Experiment Number</u>	<u>Experiment Title</u>	<u>Page</u>
	Check-in and Safety Rules	
1	Measurement and Significant Figures	7
2	Density and Specific Gravity	17
3	Energy and States of Matter	25
4	Atomic Structure	37
5	Compounds and Their Formulas	45
6	Chemical Reactions and Equations	59
7	Moles and Chemical Formulas	69
8	Gases	Handout
9	Solutions, Electrolytes and Concentration	79
10	Solutions, Colloids, and Suspensions	91
11	Acids, Bases, pH, and Buffers	99
12	Acid-Base Titration (optional)	107
13	Properties of Organic Compounds	117
14	Polymers	Handout

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Notes to Instructors

1. Please note that a two-hour time slot is allotted to the laboratory and the student should be aware that this time will be fully utilized. The laboratory time is used not only for experimentation, but may also be used for demonstrations, movies, and problem solving. Whenever time permits, homework problems will be worked out in the beginning of the laboratory and the student is expected to participate.
2. Attendance in the laboratory is mandatory at the scheduled time. In case of an unavoidable situation, the student should contact the instructor beforehand to be excused and to see if any arrangements can be made to make up the laboratory. It may or may not be possible. Approved safety glasses must be worn in the laboratory **over the eyes** as required by state law.
3. Laboratory reports are due at the beginning of the next lab period. The report consists of the data report sheets included in the lab manual or handout. To aid not only the instructor but especially the students, reports will not be accepted two weeks after the lab was assigned. Completion of the lab experiment followed by turning in the data and calculations on the due date with appropriate write-up insures a good grade. Grading scales for laboratory reports are at the professor's discretion, but will count towards the overall grade for the course.

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