



## COURSE OUTLINE: CHM181 - CHEMISTRY II

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Approved: Bob Chapman, Chair, Health

<b>Course Code: Title</b>	CHM181: CHEMISTRY II FOR PCD
<b>Program Number: Name</b>	3060: PRE-HEALTH CERT DIPL
<b>Department:</b>	PRE-HEALTH
<b>Semesters/Terms:</b>	20W
<b>Course Description:</b>	<p>In this course, students will continue to examine the fundamental concepts, processes, and calculations of chemistry. Topics include the gas laws, solutions and solubility, acids and bases, nomenclature and properties of organic compounds, and biochemical reactions.</p> <p>This course approaches chemistry from a health and human body perspective and will highlight the connections of chemistry to health and the human body.</p> <p>Lab work in this course will focus on applying the scientific method to investigations in chemistry, the human body, and health. The purpose of the lab work is to develop investigative and research skills while gaining a better understanding of the theoretical concepts.</p>
<b>Total Credits:</b>	4
<b>Hours/Week:</b>	4
<b>Total Hours:</b>	60
<b>Prerequisites:</b>	CHM180
<b>Corequisites:</b>	There are no co-requisites for this course.
<b>Vocational Learning Outcomes (VLO's) addressed in this course:</b>	<b>3060 - PRE-HEALTH CERT DIPL</b>
Please refer to program web page for a complete listing of program outcomes where applicable.	VLO 2 Examine fundamental concepts, processes and systems of chemistry, including matter and chemical bonding; quantities in chemical reactions; solutions and solubility; acids and bases; as well as nomenclature, structure and properties of organic compounds in relation to health and the human body.
	VLO 6 Investigate health sciences and science-related questions, problems and evidence using the scientific method.
<b>Essential Employability Skills (EES) addressed in this course:</b>	EES 3 Execute mathematical operations accurately. EES 4 Apply a systematic approach to solve problems. EES 5 Use a variety of thinking skills to anticipate and solve problems. EES 6 Locate, select, organize, and document information using appropriate technology and information systems. EES 8 Show respect for the diverse opinions, values, belief systems, and contributions of others. EES 9 Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals. EES 10 Manage the use of time and other resources to complete projects. EES 11 Take responsibility for ones own actions, decisions, and consequences.



<b>General Education Themes:</b>	Science and Technology
<b>Course Evaluation:</b>	Passing Grade: 50%, D
<b>Other Course Evaluation &amp; Assessment Requirements:</b>	Students must achieve an average of 50% on test and exam material, independent of other components, to obtain a passing grade in this course.  Students must achieve an average of 50% on lab material, independent of other components, to obtain a passing grade in this course.
<b>Books and Required Resources:</b>	Chemistry: An Introduction to General, Organic, and Biological Chemistry by Karen C. Timberlake Publisher: Pearson Edition: 13 ISBN: 9780134421353

<b>Course Outcomes and Learning Objectives:</b>	<b>Course Outcome 1</b>	<b>Learning Objectives for Course Outcome 1</b>
	1. Describe and apply the gas laws.	1.1 Use the particle theory of matter to compare gases with solids and liquids. 1.2 Describe the characteristics of an ideal gas. 1.3 Describe and apply the gas laws theoretically and quantitatively.
	<b>Course Outcome 2</b>	<b>Learning Objectives for Course Outcome 2</b>
	2. Describe the types and properties of solutions, the concept of concentration, and perform calculations involving solutions.	2.1 Describe the components and characteristics of a solution, with an emphasis on solutions in the human body. 2.2 Define and describe unsaturated, saturated, supersaturated, concentrated, and dilute solutions. 2.3 Describe the factors that affect the solubility of a solute. 2.4 Define strong, weak, and non- electrolytes. 2.5 Define solubility and explain the solubility of both ionic and molecular compounds in water based on intermolecular forces. 2.6 Predict the solubility of a solute in polar and nonpolar solvents. 2.7 Define/describe concentration and perform calculations involving the concentration of solutions in different units such as mass/mass percent, mass/volume percent, volume/volume percent, and molarity. 2.8 Describe the dilution process and perform calculations involving the dilution of a solution. 2.9 Describe and differentiate between diffusion and osmosis.
	<b>Course Outcome 3</b>	<b>Learning Objectives for Course Outcome 3</b>
	3. Describe and analyze acid-base reactions and perform quantitative calculations involving pH.	3.1 Describe and compare the characteristics of acids and bases. 3.2 Identify acids, bases, acid-base reactions, and conjugate acid-base pairs. 3.3 Differentiate between strong and weak acids and strong and weak bases and give examples of each. 3.4 Explain neutralization and write a balanced chemical equation to describe the neutralization reaction between a strong acid and a strong base. 3.5 Characterize the amphoteric nature of water in the context of its ionization. 3.6 Calculate the pH of strong acids and strong bases from

	<p>concentration data.</p> <p>3.7 Determine the pH of a substance using simple lab techniques.</p> <p>3.8 Define buffer and describe how a buffer stabilizes the pH of a solution.</p>
<b>Course Outcome 4</b>	<b>Learning Objectives for Course Outcome 4</b>
<p>4. Classify and identify organic compounds by name, structure, and chemical formula.</p>	<p>4.1 Compare organic and inorganic compounds.</p> <p>4.2 Write condensed and structural formulae for saturated, unsaturated hydrocarbons, linear, and cyclic hydrocarbons.</p> <p>4.3 Use the IUPAC system to name hydrocarbons (alkanes, alkenes, alkynes, and arenes).</p> <p>4.4 Classify hydrocarbon derivatives based on functional groups such as haloalkanes, alcohols, ethers, aldehydes, ketones, carboxylic acids, esters, amines, and amides.</p> <p>4.5 Write the common name, IUPAC name, and structural formulae of simple haloalkanes, alcohols, ethers, aldehydes, ketones, carboxylic acids, esters, amines, and amides.</p> <p>4.6 Draw and name structural isomers of simple organic compounds.</p> <p>4.7 Recognize organic compounds and biomolecules that include heteroatoms such as alcohols, thiols, ethers, aldehydes, ketones, carboxylic acids, esters, amines, and amides.</p> <p>4.8 Construct models of organic compounds using a molecular modeling kit.</p>
<b>Course Outcome 5</b>	<b>Learning Objectives for Course Outcome 5</b>
<p>5. Describe the properties and reactions of organic compounds.</p>	<p>5.1 Describe the relationship between structure and physical properties of hydrocarbons.</p> <p>5.2 Examine some of the physical and chemical properties of organic compounds.</p> <p>5.3 Discuss some of the chemical reactions and products associated with alkenes and alkynes.</p> <p>5.4 Identify some biologically significant organic reactions.</p>
<b>Course Outcome 6</b>	<b>Learning Objectives for Course Outcome 6</b>
<p>6. Investigate health sciences and science-related questions, problems, and evidence using the scientific method.</p>	<p>6.1 Formulate research questions by defining a problem, developing a hypothesis, and making predictions.</p> <p>6.2 Prepare for and conduct laboratory experiments to investigate science questions using appropriate scientific techniques.</p> <p>6.3 Test a hypothesis by gathering, organizing, and documenting research data, analyzing the results, and determining if the results support the hypothesis.</p> <p>6.4 Portray scientific data using statistical methods, graphs, charts, tables, and appropriate statistical language.</p> <p>6.5 Use scientific reasoning to draw conclusions that explain investigation results.</p> <p>6.6 Report on the objectives, methods, results, and conclusions of scientific investigations.</p>

**Evaluation Process and Grading System:**

Evaluation Type	Evaluation Weight
Final Exam	20%

Labs	30%
Unit Tests	50%

**Date:** August 7, 2019

**Addendum:** Please refer to the course outline addendum on the Learning Management System for further information.