



COURSE OUTLINE

CHM190

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Prepared: Christine Giardino Approved: Bob Chapman

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| Course Code: Title | CHM190: CHEMISTRY I FOR PADD |
| Program Number: Name | 3065: PRE-HEALTH DIP DGR |
| Department: | PRE-HEALTH |
| Semester/Term: | 17F |
| Course Description: | <p>In this course, students will examine the fundamental concepts, procedures, and calculations of chemistry. Course work will include examples and problems that relate to health and the human body.</p> <p>Topics in this course include properties of matter, chemical bonding, atomic and molecular structure, chemical nomenclature, chemical quantities, chemical equations, stoichiometry, the gas laws, and solutions and solubility.</p> <p>Laboratory investigations in this course will focus on safety, measurement, and common practices and procedures. The purpose of the lab work is to develop practical skills while gaining a better understanding of the theoretical concepts and calculations.</p> |
| Total Credits: | 5 |
| Hours/Week: | 5 |
| Total Hours: | 75 |
| This course is a pre-requisite for: | CHM191 |
| Vocational Learning Outcomes (VLO's): | <p>#2. Examine concepts, processes and systems of chemistry, including atomic and molecular structure; quantities in chemical reactions; solutions and solubility; acids and bases; as well as organic chemistry and biochemistry in relation to health and the human body.</p> <p>#6. Investigate health sciences and science-related questions, problems and evidence using the scientific method.</p> |
| Essential Employability Skills (EES): | <p>#4. Apply a systematic approach to solve problems.</p> <p>#5. Use a variety of thinking skills to anticipate and solve problems.</p> <p>#6. Locate, select, organize, and document information using appropriate technology and information systems.</p> <p>#7. Analyze, evaluate, and apply relevant information from a variety of sources.</p> <p>#8. Show respect for the diverse opinions, values, belief systems, and contributions of others.</p> |

Please refer to program web page for a complete listing of program outcomes where applicable.



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#9. Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals.

#10. Manage the use of time and other resources to complete projects.

#11. Take responsibility for ones own actions, decisions, and consequences.

Course Evaluation:

Passing Grade: 50%, D

Other Course Evaluation & Assessment Requirements:

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.

Evaluation Process and Grading System:

| Evaluation Type | Evaluation Weight |
|----------------------|-------------------|
| Final Exam | 20% |
| Labs (5 x 6% each) | 30% |
| Tests (5 x 10% each) | 50% |

Books and Required Resources:

General, Organic, and Biological Chemistry: Structures of Life by Karen C. Timberlake
Publisher: Pearson Edition: 5
ISBN: 9780321967466

Course Outcomes and Learning Objectives:**Course Outcome 1.**

Report measurements and calculations that are accurate and precise.

Learning Objectives 1.

Identify a number as measured or exact.

Indicate the uncertainty associated with a particular measurement.

Use appropriate metric or SI units, especially when recording measurements of length, mass, volume, temperature, and time.

Describe three commonly used temperature scales and perform conversions from one to the other.

Express a measured or calculated value using scientific notation.

Round off the results of a calculation to the appropriate number of significant digits.



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Course Outcome 2.

Classify matter and describe its characteristics.

Learning Objectives 2.

Classify matter based upon its state (solid, liquid, or gas) and composition (type of pure substance or mixture).

Distinguish between physical and chemical properties.

Describe atomic structure and determine numbers of subatomic particles in a given element.

Write electron configurations for atoms and relate electron structure of an element to its position in each block (s,p, and d) on the periodic table.

Define isotope and explain the effect that isotopes have on the atomic mass of an element.

Represent an isotope using its atomic and mass numbers.

Describe the organization of the periodic table and categorize elements as metals, non-metals, alkali metals, alkaline earth metals, halogens, and noble gases.

Describe periodic trends such as atomic size, ionization energy, electronegativity, energy levels, and number of valence electrons.

Course Outcome 3.

Explain and apply principles of chemical bonding.

Learning Objectives 3.

Determine the number of valence electrons and their involvement in the formation of chemical bonds.

Determine the polar character of bonds using the concept of electronegativity.

Write the Lewis structures for atoms, molecules and polyatomic ions.

Apply VSEPR theory to draw linear, trigonal planar, trigonal pyramidal, tetrahedral, and bent shapes for covalently bonded molecules.

Use electronegativity and molecular shape to describe the polarity of a molecule.

Relate polarity to the intermolecular forces (i.e. hydrogen bonds, dipole-dipole attractions, and dispersion forces) that occur between molecules.

Explain how bond types and intermolecular forces account for the properties of molecular and ionic solids, covalent networks, and metallic substances.



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Course Outcome 4.

Use systematic nomenclature guidelines to represent ions, diatomic molecules, and compounds by name and chemical formula.

Learning Objectives 4.

Use the octet rule to predict ion symbols and chemical formulae.
Use the chemical formula of a compound to determine its IUPAC name.
Use the IUPAC name of a compound to determine its chemical formula.

Course Outcome 5.

Use appropriate terminology, notation, and units to communicate chemical quantities and perform calculations involving the quantity of a substance.

Learning Objectives 5.

Use an appropriate conversion factor to convert from one unit to another.
Define and calculate density, volume, and mass.
Define and explain the meaning of moles, mass, molar mass, and Avogadro's number.
Calculate moles, mass, molar mass, and number of particles for a pure substance.
Calculate the percent composition of a compound or mixture.
Determine the empirical and molecular formulae of a compound.

Course Outcome 6.

Write and analyze a balanced chemical equation and use it to perform stoichiometric calculations.

Learning Objectives 6.

Distinguish between a physical and chemical change.
Identify the parts of a chemical equation representing a physical or chemical change.
Predict the products and write balanced equations for synthesis, decomposition, combustion,



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single and double displacement, and redox reactions.
Identify the stoichiometric relationships among all of the chemical species involved in a balanced chemical reaction.
Given a quantity in moles or mass of a substance, use a mole-mole factor from the balanced equation to calculate the moles or mass of another substance in the reaction.
For a given reaction, determine the limiting reactant and calculate the percent yield of a product.

Course Outcome 7.

Describe the types and characteristics of solutions, the concept of concentration, and perform quantitative calculations involving solutions.

Learning Objectives 7.

Use appropriate chemical terminology to describe the types and characteristics of solutions.
Describe the factors that affect the solubility of a solute.
Explain and predict solubility of both ionic and molecular compounds in water based on intermolecular forces.
Explain the importance of water as a solvent.
Define and describe strong, weak, and non- electrolytes.
Define concentration and perform calculations involving mass/mass percent, mass/volume percent, volume/volume percent, and molarity for ions and compounds in solution.
Describe the dilution process and perform calculations involving the dilution of a solution.
Perform stoichiometric calculations involving reactions in solution.

Course Outcome 8.

Describe the properties of gases and apply the gas laws.

Learning Objectives 8.

Use appropriate terminology to describe the properties of an ideal gas.
Describe and apply the gas laws theoretically and quantitatively.
Perform stoichiometric calculations for chemical reactions involving gases.



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Course Outcome 9.

Conduct laboratory investigations using appropriate scientific techniques.

Learning Objectives 9.

- Follow a provided lab procedure accurately and efficiently.
- Select the most appropriate equipment for performing a particular measurement.
- Use proper measurement techniques for the precise and accurate collection of quantitative data.
- Make clear and concise qualitative observations.
- Record data using tables.
- Use scientific reasoning to draw conclusions that explain investigation results.

Date:

Wednesday, August 30, 2017

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