North Central State College

MASTER SYLLABUS
2019-2020

A. Academic Division: Health Sciences

B. Discipline: Science

C. Course Number and Title: CHEM1210 Chemistry I

D. Course Coordinator:
Assistant Dean: Melinda S. Roepke, MSN, RN

Instructor Information:
- Name: Click here to enter text.
- Office Location: Click here to enter text.
- Office Hours: Click here to enter text.
- Phone Number: Click here to enter text.
- E-Mail Address Click here to enter text.

E. Credit Hours: 5
Lecture: 4 hours
Laboratory: 3 hours

F. Prerequisites: High School Chemistry (minimum of C- required)
-AND-
MATH 1110 (minimum of C- required) or qualifying placement test score

G. Syllabus Effective Date: Fall 2019

H. Textbook(s) Title:

Chemistry: The Central Science (plus Mastering Chemistry)
- Author(s): Brown, LeMay, Bursten, Murphy
- Copyright Year: 2018
- Edition: 14th
- ISBN: 9780134557328

Optional Textbooks: *Student's Guide to Accompany Chemistry: The Central Science*
- Author(s): Hill
- Copyright Year: 2018
- Edition: 14th
- IBSN: 9780134554075

I. Workbook(s) and/or Lab Manual:

Chemistry 1220 General Chemistry Laboratory Manual, Hayden-McNeil Publishing, Inc.
- Author(s): Hill
- Copyright Year: Produced for Ohio State University
- Edition:
- ISBN: 9780738091105

J. Course Description: This is the first semester of chemistry for science majors or pre-professional students. A quantitative introduction to dimensional analysis with significant figures, atomic structure, the molecule, principles of ionic bonding, stoichiometry, chemical solutions, thermochemistry, classification of elements including periodicity, electron configuration, gases, liquids, and solids. Student will be exposed to applications of chemistry in society. (TAG # OSC008; If combined with CHEM1220 TAG # OSC023)

K. College-Wide Learning Outcomes

College-Wide Learning Outcomes	Assessments - - How it is met & When it is met
Communication – Written	
Communication – Speech	
Intercultural Knowledge and Competence	
Critical Thinking	
Information Literacy	
Quantitative Literacy	

L. Course Outcomes and Assessment Methods:

Upon successful completion of this course, the student shall:

Outcomes	Assessments – How it is met & When it is met
1. Define the fundamentals of the properties of matter, measurement, and uncertainty.	Quiz-1st week Midterm Exam– 4th week Final – 15th week
2. Explain the modern theory of atomic structure and atomic level phenomena	Quiz – 2nd week Mid-Term Exam – 4th week Final – 15th week Formal Written Lab Report – weekly
3. Utilize the symbolism and language of chemistry by converting chemical elements, ionic and binary covalent compounds from chemical formulas.	Quiz – 2nd week Midterm Exam– 4th week Final Exam – 15th week Formal Written Lab Reports - weekly
4. Demonstrate an understanding of the organization and information conveyed by the periodic table of chemical elements	Quiz – 3rd week Mid-Term Exam – 4th week Formal Written Lab Reports – weekly Final Exam – 15th week
5. Describe and identify selected types of chemical reactions through acids, bases, salts, non-electrolytes and electrolyte, plus oxidation/reduction	Quiz – 5th week Mid-Term Exam – 8th week Written Lab Reports – weekly Final Exam – 15th week
6. Explain modern chemical bonding theories and their implications related to ionic, covalent, Lewis structures, atomic orbital overlap, and molecular orbital theories	Mid-Term Exam – 8th week Quiz-9th week Quiz-10th week Mid-Term Exam – 13th week Formal Written Lab Reports - weekly Final Exam – 15th week
7. Explain the quantitative implications of chemical formulas and chemical reactions including processes occurring in solutions using Avogadro's number and mole concept	Mid-Term Exam – 4th week Written Lab Reports – weekly Final Exam – 15th week

Outcomes	Assessments – How it is met & When it is met
8. Describe the various forms of energy and the various roles energy plays in physical processes and chemical systems and reactions including electromagnetic radiation, combustion reactions, thermodynamics, and Hess law	Quiz- 6th week Mid-Term Exam – 8th week Quiz- 9th week Mid-Term Exam – 13th week Formal Written Lab Reports – weekly Final Exam – 15th week
9. Explain the social and philosophical implications of scientific discoveries and understand the potential of science and technology to address problems of the contemporary world.	Final Exam – 15th week

M. Topical Timeline (Subject to Change):

Weeks	Lecture Topic
2	Classification of matter, Physical and chemical properties, Units, Significant figures, Dimensional analysis.
3	Atomic structure, Atomic weights, Periodic table, Molecular substances, Polyatomic ions, Ionic compounds, Naming compounds
4	Stoichiometry Balanced chemical equations, Simple reactions, Percent composition, Avogadro's number and the mole, Empirical Formulas
5	Stoichiometry Quantitative information from balanced equations, Limiting reactants Aqueous reactions: Strong and weak electrolytes, Precipitation reactions, Acid-base reactions
6	Aqueous reactions**:** Oxidation-reduction reactions, Molarity, Titrations and solution stoichiometry
7	Thermochemistry Kinetic & potential energy, System & surroundings, Work & heat, 1st Law of thermodynamics , Reaction enthalpy, Calorimetry, Hess' law, Enthalpy of formation, Foods and fuels
8	Electronic structure of atoms Wave nature of light, Photons, Line spectra and the Bohr model, Wave-particle duality of matter, Quantum mechanics and atomic orbitals
9	Basic Concepts of Chemical Bonding Electronic structure of atoms. Many electron atoms, Electron configuration, Electron configuration and the Periodic Table Periodic properties of the elements. Development of the periodic table, Effective nuclear charge, Atomic and ionic radii, Ionization energies, Electron affinities,
10	Periodic properties of the elements .Metals/Nonmetals/Metalloids, Trends for select groups in the periodic table Basic concepts of chemical bonding. Lewis symbols and the Octet rule, Ionic bonding,
11	Basic concepts of chemical bonding. Covalent bonding, Electronegativity and polar bonds, Lewis structures, Resonance structures. Exceptions to the octet rule, Bond enthalpy and bond length.
12	Molecular geometry and bonding theories. VSEPR model, Molecular shapes, Molecular polarity, Covalent bonding and orbital overlap, Hybrid orbitals, Sigma and pi bonding Gases
13	Molecular geometry and bonding theories. Phases of orbitals, Molecular orbital theory Gases: Characteristics of gases, Pressure, The gas laws, The ideal gas equation
14	Gases, Gas mixtures and partial pressures, Kinetic-molecular theory of gases, Molecular effusion and diffusion, Real gases. Solids and Modern Materials

	Bonding in solids, Translational symmetry and the structures of solids
15	Solids and Modern Materials: Structures of metallic solids, Metallic bonding, Alloys, Ionic solids, Molecular solids, Covalent-network solids, Polymeric solid, Nanomaterial

Laboratory exercises

Laboratory
Introduction to Scientific Measurement. Students use various instruments for measuring mass and volume. The lab introduces students to concepts associated with making scientific measurements.
Identification of an Unknown Compound. Students carry out precipitation reactions and balance chemical equations.
Empirical Formula of an Oxide. Students conduct a combustion reaction and derive an empirical formula.
How much Acetic Acid is in Vinegar? Students carry out an acid-base titration.
Activity Series. Students carry out displacement reactions and derive an activity series.
Line Spectra of Elements. Students collect and analyze helium and hydrogen atom emission spectra. Two Families on the Periodic Table: Alkaline Earths and Halogens. Students conduct precipitation reactions on compounds of alkaline earths and oxidation-reduction reactions on the halogens to identify the cation and anion in an unknown.
Bonding Types. Students conduct and analyze ionic and covalent compounds with regard to solubility, melting point and conductivity. Based on those observations, students identify bonding types of four unknowns.
Qualitative Determination of Select Metal Cations: Students carry out reactions between nine different metal cations with six different reagents and record their observations. Based on those observations students then design their own chemical tests to identify an unknown cation.
Molecular Models : Covalent Bonding and Shapes of Molecules. Students build models of ten compounds using concepts of covalent bonding, Lewis and resonance structures, and polarity.
Molar Mass of a Volatile Liquid. Students vaporize an unknown liquid. Using concepts of mass, temperature and volume and the ideal gas equation, they determine its molar mass.
Crystal Solids. Students use models to take a deeper look at the structures and properties of crystalline solids, including: unit cells, Bravais lattices, close packing, coordination numbers, and density.

N. Course Assignments:

1. Homework
2. Lab Reports

O. Recommended Grading Scale:

NUMERIC	GRADE	POINTS	DEFINITION
93–100	A	4.00	Superior
90–92	A-	3.67	Superior
87–89	B+	3.33	Above Average
83–86	B	3.00	Above Average
80–82	B-	2.67	Above Average
77–79	C+	2.33	Average
73–76	C	2.00	Average

70-72	C-	1.67	Below Average
67–69	D+	1.33	Below Average
63-66	D	1.00	Below Average
60-62	D-	0.67	Poor
00-59	F	0.00	Failure

P. Grading and Testing Guidelines:

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Q. Examination Policy:

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R. Class Attendance and Homework Make-Up Policy:

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S. Classroom Expectations:

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T. College Procedures/Policies:

Important information regarding College Procedures and Policies can be found on the syllabus supplement located at

https://sharept.ncstatecollege.edu/committees/1/curriculum/SiteAssets/SitePages/Home/SYLLABUS%20SUPPLEMENT.pdf

The information can be found Choose an item.