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**MASTER SYLLABUS**

**2020-2021**

A. Academic Division: Health Sciences

B. Discipline: Science

C. Course Number and Title: CHEM 1220 Chemistry II

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: CHEM1210

G. Syllabus Effective Date: Fall, 2020

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

1. 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 second semester of chemistry for science majors or pre-professional students. A quantitative introduction to intermolecular forces, phase changes, colligative properties, chemical kinetics, chemical equilibrium, acid-base equilibria, thermodynamic, electrochemistry, organic chemistry and nuclear chemistry. Student will be exposed to applications of chemistry in society. (TAG # OSC009; If combined with CHEM1210 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. Demonstrate intermolecular forces and phase diagrams. | Quiz - 2nd week  Written lab report  Midterm Exam – 4th week  Final – 15th week |
| 1. Describe the solution process and demonstrate colligative properties. | Quiz – 3rd week  Written Lab Report  Mid-Term Exam – 4th week  Final – 15th week |
| 1. Explain chemical kinetics | Written Lab Report  Mid-Term Exam – 4th week  Final – 15th week |
| 1. Demonstrate chemical equilibrium | Quiz – 5th week  Written Lab Report  Mid-Term Exam-8th week  Final Exam – 15th week |
| 1. Explain and demonstrate acid-base equilibria and buffers. | Quiz-6th, 7th week  Written Lab Reports  Mid-Term Exam-8th week  Final Exam – 15th week m – 8th week |
| 1. Describe chemical thermodynamics, entropy and free energy. | Quiz-9th week  Mid-Term Exam- 12th week  Final Exam – 15th week |
| 1. Explain and demonstrate electrochemistry. | Quiz- 10th & 11th week  Written Lab Report  Mid-Term Exam-12thweek |
| 1. Define organic chemistry. | Quiz- 13th week  Formal Written Lab Report  Mid-Term Exam- 12th week |
| 1. Explain transition metals & coordination chemistry. | Quiz – 14th week  Final Exam – 15th week |
| 1. Describe nuclear chemistry. | Quiz- 14th week  Final Exam 15th week |
| 1. Discuss social and philosophical implications of scientific discoveries and describe the potential of science and technology to address problems of the contemporary world. | Formal Written Lab Reports - weekly  Midterm Exam – 12th week  Final Exam – 15th week |

M. Topical Timeline (Subject to Change):

**Lecture Topics**

1. Liquids and Intermolecular Forces: A molecular comparison of gases, liquids and solids, Intermolecular forces Select properties of liquids ,Phase changes, Vapor pressure, Phase diagrams.
2. Properties of solutions: The solution process, Solubility and saturated solutions, Factors affecting solubility
3. Properties of solutions **:** Expressing solution concentration, Colligative properties, Colloids
4. Chemical Kinetics: Reaction rates, Concentration and rate laws, Concentration vs. time, Temperature and rate, Reaction mechanisms
5. Chemical Equilibrium: The concept of equilibrium, Equilibrium constants, Heterogeneous equilibria, Calculating equilibrium constants (ICE tables), Applications of equilibrium constants, Le Châtelier’s principle
6. Acid Base Equilibria: Acid‐Base Equilibria, Bronsted‐Lowry acids and bases, the pH Scale, Strong acids and bases, Weak acids and bases, Relationship between Ka and Kb, pH of salt solutions, Chemical structure and acidity/basicity, Lewis acids and bases
7. Additional Aspects of Aqueous Equilibria : Common ion effect, Buffered solutions, Acid‐Base titrations, Solubility equilibria and Ksp, Factors that affect solubility, Selective precipitation of ions
8. Chemical thermodynamics: Spontaneous processes, Entropy and the 2nd law of thermodynamics, Molecular interpretation of energy, Gibbs Free Energy, Free Energy Equilibrium
9. Electrochemistry: Oxidation states and balancing redox reactions, Voltaic cells, Cell potentials, Free energy, redox reactions, the Nernst equation, Batteries and fuel cells, Corrosion, Electrolysis
10. Organic Chemistry: organic compounds, nomenclature, elementary reactions
11. Transition metals and coordination chemistry: The transition metals, coordination complexes, Ligands, Nomenclature, Isomerism, Color and magnetism of transition metal compounds, Crystal field theory
12. Nuclear Chemistry: Radioactivity, Patterns of nuclear stability, Nuclear transmutations, Rates of radioactive delay, Energy changes in nuclear reactions, Nuclear fission and fusion, Radiation in the environment and living systems

**Laboratory exercises**

1. Check-in/Intermolecular Forces
2. Freezing Point Depression
3. Rate of an Iodine Clock Reaction
4. Volumetric Analysis: Standardization of NaOH and HCl
5. Equilibrium
6. Investigation of Buffer Systems
7. Some Nonmetals and their Compounds; Hydrolysis of Salts
8. Qualitative Analysis Group I
9. Redox Titration
10. Electrochemistry
11. Spectrophotometric Analysis of Commercial Aspirin
12. Research Experience
13. Synthesis of Acetanilide/Recitation Review/Checkout

N. Course Assignments:

* 1. Homework
  2. Formal Lab Reports
  3. Quizzes, Mid-Term, Final

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:

Click here to enter text.

Q. Examination Policy:

Click here to enter text.

R. Class Attendance and Homework Make-Up Policy:

Click here to enter text.

S. Classroom Expectations:

Click here to enter text.

T. College Procedures/Policies:

**Important information regarding College Procedures and Policies can be found on the** [**syllabus supplement**](http://catalog.ncstatecollege.edu/mime/download.pdf?catoid=5&ftype=2&foid=3) **located at**

[**http://catalog.ncstatecollege.edu/mime/download.pdf?catoid=5&ftype=2&foid=3**](http://catalog.ncstatecollege.edu/mime/download.pdf?catoid=5&ftype=2&foid=3)