



COURSE OUTLINE

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| Course Number CHE 102 | Course Title GENERAL CHEMISTRY II | Credits 4 |
| Hours: lecture/Lab/Other 2/3/1 | Co- or Pre-requisite Prerequisite: CHE 101 (C or better or permission of Course Coordinator) Corequisite: MAT 146 or higher | Implementation sem/year Spring 2022 |

Catalog description:

Theoretical and practical aspects of kinetics; simple and ionic chemical equilibria; thermodynamics; spectrophotometry; electrochemistry; nuclear chemistry; and the major families of chemical elements with emphasis on the transition elements. Lab work includes qualitative cation and anion analysis plus additional computer applications for data collection and analysis.

General Education Category: Goal 3: Science

Course coordinator:

Carlo Alfare Professor of Chemistry & Course Coordinator
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Required texts & Other materials:

General Chemistry: Whitten, Davis, Peck, and Stanley
Thompson Brooks/Cole Pub.,
10th Ed., 2007 with Interactive CD ROM

General Chemistry II: Course Manual Alfare, Carlo MCCC, 13th Edition

General Chemistry II: Laboratory Manual Alfare, Carlo MCCC, 16th Edition

Course Student Learning Outcomes (SLO):

Upon successful completion of this course the student will be able to:

1. The student will be able to analyze, explain, solve problems with, discuss, and answer questions about Chemical Thermodynamics, Chemical Kinetics, Chemical Equilibrium, Spectrophotometry **ILG 2, 3, 4, 11. PLO 1, 2, 3.**
2. The student will be able to analyze, explain, solve problems with, discuss, and answer questions about Electrochemistry, Acids and Bases, Ionic Equilibria **ILG 2, 3, 4, 11. PLO 1, 2, 3.**
3. The student will be able to analyze, explain, solve problems with, discuss, and answer questions about Chemistry of the Representative Elements I: The Metals, Chemistry of the Rep. Elements II: The Metalloids and Nonmetals, and The Transition Elements; Coordination Chemistry, Nuclear Chemistry, Organic Chemistry **ILG 2, 3, 11. PLO 1, 2, 3.**
4. Each student will perform chemical experimentation in a safe and scientific manner, using proper scientific and laboratory safety procedures, manipulate chemicals and glassware, use laboratory balances, perform quantitative analysis such as titrations, pipetting and preparation of solutions, wet qualitative analysis, and treat the data that the student collects. Students will

also use a Laboratory Information Management System to collect and treat data. **ILG 2, 3, 4, 11. PLO 1, 2, 3.**

5. Each student will collect and analyze data from experiments (working alone), using critical thinking and quantitative reasoning skills in observing, organizing and analyzing data, synthesizing information, interpreting results, and communicating the results of the analyses and laboratory investigations orally and in writing. **ILG 2, 3, 4, 11. PLO 1, 2, 3.**

Course-specific Institutional Learning Goals (ILG):

Institutional Learning Goal 2. Mathematics. Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.

Institutional Learning Goal 3. Science. Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.

Institutional Learning Goal 4. Technology. Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.

Institutional Learning Goal 11. Critical Thinking: Students will use critical thinking skills understand, analyze, or apply information or solve problems.

Program Learning Outcomes for Chemistry(PLO)

1. Demonstrate an understanding of the fundamental principles, concepts, and terminology of chemistry.
2. Develop a working knowledge of chemical principles and methods including problem solving, analytical reasoning, and laboratory skills;
3. Utilize critical thinking, qualitative, and quantitative reasoning skills to organize, evaluate, and interpret data, expressing the results in a clearly written laboratory report or oral presentation;

Units of study in detail – Unit Student Learning Outcomes:

I. Chemical Thermodynamics: SLO 1, 4, 5

The Student will evidence a knowledge and understanding, both quantitative and qualitative, of the Laws of Thermodynamics, related concepts, and other topics generally important to an understanding of chemical thermodynamics through laboratory participation, written discussions, answering questions, and solving problems.

II. Chemical Kinetics: SLO 1, 4, 5

The Student will evidence a knowledge and understanding, both quantitative and qualitative, of Chemical Kinetics, theories, thermodynamical considerations, related concepts, and other topics generally important to an understanding of chemical kinetics through laboratory participation, written discussions, answering questions, and solving problems

III. Chemical Equilibrium: SLO 1, 4, 5

The Student will evidence a knowledge and understanding, both quantitative and qualitative, of chemical equilibria, spectrophotometry, related concepts, and other topics generally important to an understanding of Chemical Equilibrium and Spectorphotometry through laboratory participation, written discussions, answering questions, and solving problems.

IV. Electrochemistry: SLO 2, 4, 5

The Student will evidence a knowledge and understanding, both quantitative and qualitative, of Electrochemistry, thermodynamic and equilibrium relations, equivalents, Gibbs Free Energy, related concepts, and other topics generally important to an understanding of Electrochemistry through laboratory participation, written discussions, answering questions, and solving problems.

V. Acids and Bases: SLO 2, 4, 5

The Student will evidence a knowledge and understanding, both quantitative and qualitative, of Acid and Base theories, related concepts, and other topics generally important to an understanding of these concepts through laboratory participation, written discussions, answering questions, and solving problems.

VI. Ionic Equilibria: SLO 2, 4, 5

The Student will evidence a knowledge and understanding, both quantitative and qualitative, of Ionic Equilibria, related concepts, and other topics generally important to an understanding of these concepts through laboratory participation, written discussions, answering questions, and solving problems.

VII. Chemistry of the Representative Elements I: The Metals: SLO 3, 4, 5

The Student will evidence a knowledge and understanding of the properties, electron configurations, reactions, trends, and industrial processes involving the representative metals, related concepts, and other topics generally important to an understanding of these concepts through laboratory participation, written discussions, answering questions, and solving problems.

VIII. Chemistry of the Representative Elements I: The NonMetals: SLO 3, 4, 5

The Student will evidence a knowledge and understanding of the properties, electron configurations, reactions, trends, and industrial processes involving the representative non-metals and metalloids, related concepts, and other topics generally important to an understanding of these concepts through laboratory participation, written discussions, answering questions, and solving problems.

IX. The Transition Metals SLO 3, 4, 5

The Student will evidence a knowledge and understanding of the properties, electron configurations, reactions, trends, industrial processes, compounds, and complexes and coordination chemistry involving the transition metals, traditional wet laboratory qualitative analysis, related concepts, and other topics generally important to an understanding of these concepts through laboratory participation, written discussions, answering questions, and solving problems.

X. Nuclear Chemistry: SLO 3

The Student will evidence a knowledge and understanding of nuclear structure, nuclear chemistry, reactions, radioactivity, fission, fusion, applications, related concepts, and other topics generally important to an understanding of these concepts through written discussions, answering questions, and solving problems.

XI. Organic Chemistry: SLO 3, 4, 5

The Student will evidence a knowledge and understanding of carbon chemistry, organic formulas, nomenclature, functional groups, reactions, related concepts, and other topics generally important to an understanding of these concepts through laboratory participation, written discussions, answering questions, and solving problems.

Evaluation of student learning:

14 weekly quizzes, three major exams, comprehensive and cumulative final exam, and 14 Laboratory Reports. Acceptable laboratory participation and performance along with a passing grade on the final examination are required to pass the course. All evaluations are focused on Course Student Learning Outcomes.

Student performance objectives include:

1. You must satisfactorily complete the assigned laboratory experiments. (Missing 3 or more will constitute an F for the course).

2. You must participate in weekly recitations (missing 3 or more may constitute an F for the course).
3. You must complete the weekly quizzes and hour tests as assigned.
4. You must achieve a passing grade on a comprehensive final examination.
5. You must complete a minimum of six hours of work on chemistry at home each week, including the use of the Text CD.
6. You must demonstrate your level of performance (see page 3 for "grading") by mastering a large part of the material covered by lectures, films, homework, laboratory work and the textbooks as detailed in the specific course objectives that follow.