



**MERCER**  
COUNTY COMMUNITY COLLEGE

## COURSE OUTLINE

<b>Course Number</b> CHE 100	<b>Course Title</b> Introductory Chemistry	<b>Credits</b> 3
<b>Hours:</b> 3 lecture	<b>Co- or Pre-requisite</b> Prerequisite - MAT-037 Co requisite - placement in ENG 101	<b>Implementation</b> sem/year Spring 2022

**Catalog description:**

Selected fundamental principles of general chemistry. The course is designed for college students who have not had high school chemistry and for those who need a review of chemistry before taking other chemistry courses. This course does not include laboratory instruction.

**General Education Category:**  
**Not GenEd**

**Course coordinator:**  
Michael Dorneman, ext 3369, dornemam@mccc.edu

**Required texts & Other materials:**

1. "Introductory Chemistry", 7<sup>th</sup> Ed., Corwyn, Pearson Pub.
2. "Course Manual for CH100, Introductory Chemistry", Dorneman, MCCC

**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 the nature of chemistry, measuring and measurements, properties and changes of matter, chemical symbology, elements, compounds, formulas, and equations, the Periodic Table and atomic structure. ILG 2,3,11
2. The student will be able to analyze, explain, solve problems with, discuss, and answer questions about the Periodic Table and atomic structure, bonding and the formation of compounds, nomenclature and formulas of compounds, calculations involving formulas, elements, and compounds (basic stoichiometry). ILG 2,3,11
3. The student will be able to analyze, explain, solve problems with, discuss, and answer questions about equations and chemical reactions, calculations from chemical equations, liquids and changes of state, and the properties of solutions. ILG 2,3,11

**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 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

### **Units of study in detail – Unit Student Learning Outcomes:**

#### **I. Introduction and History**

The Student will evidence a knowledge and understanding of chemistry, its history, the development of chemistry and science, the scientific method, mass, weight, and chemistry subdivisions, and other topics generally important and related to an understanding of these concepts, by written discussions, answering questions, and solving problems (**SLO 1**)

#### **II. Measurements:**

The Student will evidence a knowledge and understanding of measurements and related concepts, Qualitative & Quantitative measurements, Parts of a Measurement, Accuracy, Precision, Significant Figures, Fundamental & Derived Quantities, Solving Word Problems, Rounding, and Scientific Notation, , and other topics generally important and related to an understanding of these concepts, by written discussions, answering questions, and solving problems (**SLO 1**)

#### **III. Metric System:**

The Student will evidence a knowledge and understanding of the Metric System and a variety of measured quantities (such as Distance, Prefixes, Mass, Weight, Volume, Temperature, Heat, Density) and demonstrate the ability to convert between various metric and other units by written discussions, answering questions, and solving problems. (**SLO 1**)

#### **IV. Properties and Changes of Matter:**

The Student will evidence a knowledge and understanding of the Properties and Changes of Matter, including concepts such as States of Matter, Pure substances, Mixtures, Organic vs. Inorganic, Physical Changes, Chemical Properties and Changes, Law of Conservation of Mass, Energy, Changes and Energy, Endothermic, Exothermic, Law of Conservation of Energy,  $E=MC^2$ , and Einstein by written discussions, answering questions, and solving problems. (**SLO 1**)

#### **V. Chemical Symbology, Elements, Compounds, Formulas, and Equations Electromagnetic Interactions:**

Chemical Symbology, Elements, Compounds, Formulas, and Equations, including concepts such as Elements in the Earth's Crust and living things, Symbols, Types of Elements (Metals, Nonmetals, Diatomic elements, monatomic elements, Semi-metals or Metalloids), Compounds (Molecular - covalent, Ionic/Salts), Ions (Cations, Anions, Polyatomic Ions), elementary ionic Binary Nomenclature, Formulas, Chemical Equations and Balancing, and related concepts by written discussions, answering questions, and solving problems. (**SLO 1**)

**VI. The Periodic Table and Atomic Structure:**

The Student will evidence a knowledge and understanding of The Periodic Table, Atomic Structure, and Periodic Properties including concepts such as the Periodic Law, Predicting formulas, Periodic Table Features, Daltons Atomic Theory, Subatomic particles, Rutherford, the nucleus, Bohr, Quantum Mechanics model, Electronic Structure, orbital shapes, Valence Electron Configuration, Mass number, Isotopes, Periodic Table Trends of atomic size, ionization energy, and electronegativity, and related concepts by written discussions, answering questions, and solving problems. (**SLO 1**)

**VII. Bonding and the Formation of Compounds:**

The Student will evidence a knowledge and understanding of Bonding and the Formation of Compounds, ions and ionic bonding, molecules and covalent bonds, Lewis dot structures, multiple bonds, polar, non-polar, and coordinate bonds, polyatomic ions, predicting formulas, and related concepts by written discussions, answering questions, and solving problems. (**SLO 2**)

**VIII. Nomenclature and Formulas of Compounds:**

The Student will evidence a knowledge and understanding of Nomenclature and the Formulas of Compounds including concepts such as Predicting Formulas of Ionic Compounds, Variable Oxidation State Element Nomenclature, Binary Compounds, Ternary compounds, Acids and Salts, Bases, Neutralization Reactions, Determining formulas from names, and related concepts by written discussion, answering questions, and solving problems. (**SLO 2**)

**IX. Calculations Involving Formulas, Elements, and Compounds:**

The Student will evidence a knowledge, understanding, and ability to calculate quantities involving moles, Avogadro's number, mol-atom, atomic weight, Formula weight and calculations, percent composition, empirical formula and molecular formula, and related concepts by, answering questions, and solving problems. (**SLO 2**)

**X. Chemical Reactions and Equations:**

The Student will evidence a knowledge and understanding of Chemical Reactions and Equations, completing and balancing, Types of Chemical Equation, combination, Decomposition, Single displacement, activity series, oxidation and reduction, acid, base, neutralization reactions, precipitation reactions, energy and chemical reactions, ionic equations, and related concepts by written discussions, answering questions, and solving problems. (**SLO 3**)

**XI. Calculations from Chemical Equations:**

The Student will evidence a knowledge, understanding, and ability to calculate quantities involved in Chemical Equations, Avogadro's Number, the mole concept, and related concepts by written discussions, answering questions, and solving problems. (**SLO 3**)

**XII. Liquids and Changes of State:**

Student will evidence a knowledge and understanding of Liquids and Changes of State, how and why water is unique, Hydrogen bonding, decomposition, hydrogen fuel

cell, ozone, hydrates, reaction with oxides and acid rain, Sublimation, Heating and cooling curves, pollution and related concepts by written discussions, answering questions, and solving problems. (**SLO 3**)

**XIII. Properties of Solutions:**

The student will evidence a knowledge and understanding of the Properties of Solutions, terms, Structure of Solutions, factors that affect solubility and rate of dissolving, why solutions are important, concentration units calculations, and related concepts by written discussions, answering questions, and solving problems. (**SLO 3**)

**Evaluation of student learning:**

Students are graded by quizzes, exams, and homework.

Weekly quizzes are given. Homework is evaluated at times each semester.

Three major multiple choice exams are given, one exam for each course competency. In addition there is a comprehensive final exam which must be passed to receive a passing grade in the course.