MASTER COURSE OUTLINE

A. CHEM 1000 Introductory Chemistry

B. COURSE DESCRIPTION:

This course is a laboratory course intended for non-science majors and may serve as preparation for General Chemistry. Topics include measurement, atomic theory and structure, chemical bonding, chemical reactions, equilibrium, types of reactions, stoichiometry, solutions and concentration, gases, nuclear chemistry, redox chemistry, acids and bases, and an introduction to organic chemistry. This course also discusses the application of chemistry to current environmental topics.
MnTC (Goal 3/NS, and 10/PE); (4 Cr – 3 lect, 1 lab)

C. *Core Theme: People and the Environment **Discipline Area (if MnTC): Natural Sciences

D. RIVERLAND INSTITUTIONAL LEARNING OUTCOMES:

This course addresses the following Riverland Institutional Learning Outcome(s):
☐ ILO 1: critical thinking *(Core Theme Goal 2)*
☐ ILO 2: awareness of the larger global community *(Core Theme Goal 7 or 8)*
☒ ILO 3: ethical, engaged citizenship *(Core Theme Goal 9 or Goal 10)*
☐ ILO 4: communication and collaboration *(Discipline Goal 1 and by any learning outcome(s) involving communication or collaboration)*

E. MAJOR CONTENT AREAS:

- Unit Conversion
- Density
- The Scientific Method
- Law of Definite Proportions
- Law of Conservation of Mass
- Law of Multiple Proportions
- Atomic Theory (Bohr model of atom and quantum mechanical model of atom)
- Ionic and Covalent Bonding
- Chemical Nomenclature
- Drawing Chemical Structures
- Molecular Shape and Polarity

- The Periodic Table
- Stoichiometry
- Acid/Base Theory
- Radioactivity
- Redox Chemistry
- Energy
- Solution Chemistry
- Hydrocarbon Structure
- Organic Functional Groups

F. GOAL TYPE, OBJECTIVES AND OUTCOMES:

GOAL TYPE	**OBJECTIVES** **Students will be able to**	**OUTCOMES** **The student will successfully**
MnTC Goal 3a	demonstrate understanding of scientific theories.	1. demonstrate an understanding of the scientific method. 2. apply knowledge of scientific theories to problem-solving applications. 3. complete a critical analysis of laboratory experimental findings. 4. identify an unknown gas by observation of its emission spectra.
MnTC Goal 3b	formulate and test hypotheses by performing laboratory, simulation or field experiments in at least two of the natural science disciplines. One of these experimental components should develop, in greater depth, students' laboratory experience in the collections of data, its statistical and graphical analysis, and an appreciation of its sources or error and uncertainty.	1. perform an in-depth analysis of a laboratory experiment, including statistical and graphical analysis. 2. explain the sources error (% error) in the analysis above.
MnTC Goal 3c	communicate their experimental findings, analyses and interpretations both orally and in writing.	1. communicate laboratory experimental findings in oral and written format.
MnTC Goal 10b	discern patterns and interrelationships of bio-physical and sociocultural systems.	1. explain how acid rain is formed and how it damages the environment. 2. explain what a greenhouse gas is and their impact on the environment. 3. research a current topic on the environment and its impact on the environment and human health.

MnTC Goal 10d	evaluate critically environmental and natural resource issues in light of understandings about interrelationships, ecosystems, and institutions.	1. explain sources of human impact on the environment related to a current environmental topic. 2. report on a current environmental topic. Assess their potential impact on the environment and how to address the issue researched.
MnTC Goal 10e	propose and assess alternative solutions to environmental problems.	1. explain potential ways to limit impact from greenhouse gases.
MnTC Goal 10f	articulate and defend the actions they would take on various environmental issues.	1. explain their stance, using supporting information, about the current topic in chemistry discussed under MnTC Goal 10d.
CS	demonstrate mastery of density.	1. demonstrate how density is determined.
CS	distinguish between mixtures, compounds and elements.	1. identify a mixture and explain separation of it by physical means. 2. articulate the relationship between elements and compounds.
CS	utilize trends and obtain information from the periodic table.	1. predict properties of the elements based on their position on the periodic table.
CS	demonstrate mastery of scientific laws.	1. explain how the Law of Conservation of Mass can be tested and verified. 2. explain the difference between the Law of Multiple Proportions and the Law of Definite Proportions.
CS	determine the makeup and structure of the elements.	1. explain the structure of the atom. 2. compare and contrast the different models of the atom. 3. articulate the relationship between electronic structure and the periodic table.
CS	determine the chemical formula of a compound, name it, and draw its structure.	1. write formulas for named compounds and named compounds from written formulas. 2. draw simple chemical structures.
CS	determine the type of bond and the shape and polarity of molecules.	1. explain covalent and ionic bonding. 2. identify the shape and polarity of a molecule. 3. determine if two chemicals are miscible.
CS	demonstrate an understanding of chemical reactions.	1. balance a chemical equation. 2. predict the products for simple chemical reactions.

CS	demonstrate an understanding of stoichiometry.	1. determine molar relationships between chemicals. 2. convert between grams and moles. 3. determine the limiting reagent for a chemical reaction.
CS	demonstrate an understanding of concentration.	1. calculate concentration using percent by mass and by volume. 2. determine the molarity of a solution. 3. complete dilution calculations.
CS	demonstration an understanding of gas laws.	1. explain the relationship between volume, temperature, moles, and pressure. 2. apply Boyle's Law, Charles Law, Avogadro's Law, Gay-Lussac's Law, the Combined Gas Law and the Ideal Gas Law.
CS	demonstrate an understanding of acid/base chemistry.	1. identify an acid and a base based on pH. 2. name acids and bases. 3. determine pH from concentration and vice versa. 4. identify acid/base conjugate pairs. 5. explain how a buffer works.
CS	demonstrate an understanding of redox chemistry.	1. identify what is being reduced/oxidized in a chemical reaction. 2. balance redox reactions in aqueous solution. 3. explain how a galvanic cell and electrolytic cell work.
CS	demonstrate an understanding of organic chemistry.	1. identify organic functional groups from structures and names. 2. draw organic compounds using expanded, condensed and skeletal structures. 3. identify isomers.

G. SPECIAL INFORMATION:

This course may require use of the Internet, the submission of electronically prepared documents and the use of a course management software program. Students who have a disability and need accommodations should contact Accessibility Services at the beginning of the semester. This information will be made available in alternative format, such as Braille, large print, or current media, upon request.

H. COURSE CODING INFORMATION:

Course Code C/B; Class Maximum 48/24; Letter Grade

Revision date: 11/17/13; 11/29/17; 02/24/22; 10/01/24
AASC Approval date: 12/12/17; 04/19/22; 11/19/24

*These five MnTC Goals have been identified as Riverland Community College Core Themes. Every course in the Riverland Community College curriculum shall meet outcomes from one of these themes.

**These five MnTC Goals have been identified as Riverland Community College Disciplines. Riverland's MnTC courses also shall meet outcomes from a Discipline Area.

NOTE: The Minnesota Transfer Curriculum "10 Goal Areas of Emphasis" are reflected in the five required discipline areas and five core themes noted in the Riverland Community College program of study guide and/or college catalog.

***Riverland Community College Core Themes**	**MnTC Goal Number**
Critical Thinking (CT)	**2**
Human Diversity (HD)	**7**
Global Perspective (GP)	**8**
Ethical and Civic Responsibility (EC)	**9**
People and the Environment (PE)	**10**

****Riverland Community College Discipline Areas**	**MnTC Goal Number**
Communication (CM)	**1**
Natural Sciences (NS)	**3**
Mathematics/Logical Reasoning (MA)	**4**
History and the Social & Behavioral Sciences (SS)	**5**
Humanities and Fine Arts (HU)	**6**