MASTER COURSE OUTLINE

A. CHEM 1121 General, Organic and Biochemistry

B. COURSE DESCRIPTION:

This is a laboratory science course covering the principles of general, organic and biological chemistry with emphasis on chemical applications in biological systems. Topics include the scientific method, atomic theory, chemical bonding, organic functional groups, biological chemicals, and metabolic processes.
MnTC (Goals 3/NS and 10/PE); (3 Cr - 2 lect, 1 lab)

C. *MnTC Discipline: Natural Sciences Core Theme: People & the Environment

D. RIVERLAND INSTITUTIONAL LEARNING OUTCOMES

This course addressed 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:

- The Scientific Method
- The Periodic Table
- Classification of Matter
- Gas Laws
- Atomic Theory
- Radioactivity
- Intramolecular and Intermolecular Forces
- Hydrocarbons
- Organic Functional Groups
- Carbohydrates
- Molarity and Percent Concentration
- Rates of Reaction
- Types of Chemical Reactions
- Electrolytes
- Acids/Base Theory
- Amino Acids and Proteins
- Enzymes
- Lipids
- Fatty Acids
- Nucleic Acids
- Redox Chemistry
- Metabolic Pathways

F. GOAL TYPES, OBJECTIVES, AND OUTCOMES

GOAL	OBJECTIVES Students will be able to:	OUTCOMES The student will successfully:
MnTC Goal 3a	demonstrate an understanding of scientific theories	1. apply the scientific method. 2. apply knowledge of scientific theories to problem-solving applications.

MnTC Goal 3b	formulate and test hypotheses by performing laboratory, simulation or field experiments in at least two of the natural science disciplines. 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. analyze laboratory experiments, including statistical and graphical analysis. 2. explain the sources of error (% error) and uncertainty in experimental findings. 3. explain the potential sources of bias in experimental design.
MnTC Goal 3d	evaluate societal issues from a natural science perspective, ask questions about the evidence presented, and make informed judgments about science-related topics and policies.	1. students will be able to explain potential societal, environmental, and biological issues regarding how pollution impacts the environment and human health. 2. students will be able to explain their reasoning using supporting data.
MnTC Goal 10b	discern patterns and interrelationships of bio-physical and sociocultural systems	1. explain how pollution damages the environment. 2. identity possible consequences of pollution in the human body.
MnTC Goal 10d	evaluate critically environmental and natural resource issues in light of understandings about interrelationships, ecosystems, and institutions.	1. report on the pros and cons of the use of pesticides or fertilizers, and how it impacts human health and the environment.
MnTC Goal 10e	propose and assess alternative solutions to environmental problems.	1. research alternative methods of pest control or nutrient supplementation and the implications for the environment.
MnTC Goal 10f	articulate and defend the actions they would take on various environmental issues.	1. explain their stance, using supporting information, on the issues discussed under MnTC Goals 10d and 10e.
CS	demonstrate a mastery of the application of density and the Law of Conservation of Matter.	1. demonstrate how to determine density. 2. explain how the Law of Conservation of Matter can be tested and verified.
CS	distinguish between mixtures, compounds, and elements.	1. identify a mixture as homogeneous or heterogeneous. 2. distinguish between an element and a compound.
CS	demonstrate an understanding and application of Atomic Theory.	1. explain the structure of an atom.
CS	determine the chemical formula, draw the structure, and identify the shape and polarity of a compound.	1. write the name and formula for a compound. 2. identify the difference between ionic and covalent bonding. 3. draw chemical structures. 4. determine the shape and polarity of a molecule.
CS	demonstrate an understanding of stoichiometric relationships of chemical reactions.	1. interpret and balance a chemical equation. 2. convert between grams and moles. 3. determine molar relationships between two compounds.
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. 6. explain how a buffer works and give examples of buffers in everyday life.
CS	identify different types of chemical reactions.	1. identify different types of chemical reactions.
CS	demonstrate an understanding of redox chemistry.	1. identify what is being reduced/oxidized in 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, Dalton's Law of Partial Pressures, and the Combined Gas Law.
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 and draw isomers. 4. identify chiral centers and stereoisomers.
CS	demonstrate a chemical understanding of metabolic process in the body, such as Glycolysis and the Citric Acid Cycle	1. explain key metabolic processes in the body. 2. identify the products of key metabolic processes in the body. 3. explain the function of major biological chemicals in the body. 4. identify major biological molecules based on their structure.
CS	demonstrate an understanding of the structure of DNA and RNA.	1. compare and contrast the structure and functions of RNA and DNA. 2. explain the process of replication, translation, and transcription.

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 the instructor or the Student Success Center 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. This course will cover the characteristics of hazardous wastes and its safe handling, storage, and disposal. A scientific calculator will be necessary for this course.

H. COURSE CODING INFORMATION: Course Code C/B; Class Maximum 48/24; Letter Grade

Revision date: 12/2/13; 11/29/17; 2/24/2022
AASC Approval date: 12/12/17 ; 4/19/2022

*Riverland Community College Disciplines	MnTC Goal Number
Communication	**1**
Natural Sciences	**3**
Mathematics/Logical Reasoning	**4**
History and the Social & Behavioral Sciences	**5**
Humanities and Fine Arts	**6**

**Riverland Community College Core Themes	MnTC Goal Number
Critical Thinking	**2**
Human Diversity	**7**
Global Perspective	**8**
Ethical and Civic Responsibility	**9**
People and the Environment	**10**

*These five MnTC Goals have been identified as Riverland Community College Disciplines.
** These five MnTC Goals have been identified as Riverland Community College Core Themes.
***The Minnesota Transfer Curriculum "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.