

## 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); (3Cr - 2 lect, 1 lab)**

C. \*MnTC Discipline: Natural Sciences      Core theme: Critical Thinking

D. MAJOR CONTENT AREAS:

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| <ul style="list-style-type: none"> <li>• The Scientific Method</li> <li>• The Periodic Table</li> <li>• Classification of Matter</li> <li>• Gas Laws</li> <li>• Atomic Theory</li> <li>• Radioactivity</li> <li>• Intramolecular and Intermolecular Forces</li> <li>• Hydrocarbons</li> <li>• Organic Functional Groups</li> <li>• Carbohydrates</li> <li>• Molarity and Percent Concentration</li> </ul> | <ul style="list-style-type: none"> <li>• Rates of Reaction</li> <li>• Types of Chemical Reactions</li> <li>• Electrolytes</li> <li>• Acids/Base Theory</li> <li>• Amino Acids and Proteins</li> <li>• Enzymes</li> <li>• Lipids</li> <li>• Fatty Acids</li> <li>• Nucleic Acids</li> <li>• Redox Chemistry</li> <li>• Metabolic Pathways</li> </ul> |
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E. GOAL TYPES, OBJECTIVES, AND OUTCOMES

<u>GOAL</u>	<u>OBJECTIVES</u>	<u>OUTCOMES</u>
<b><u>MnTC Goal 3a</u></b>	Students will be able to: demonstrate an understanding of scientific theories	<b>The student will successfully:</b> 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.
<b><u>MnTC Goal 3b</u></b>	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. perform an in-depth analysis of a laboratory experiment, including statistical and graphical analysis. 2. explain the sources of bias, error (% error) and uncertainty in the analysis above.

<b><u>GOAL</u></b>	<b><u>OBJECTIVES</u></b> <b>Students will be able to:</b>	<b><u>OUTCOMES</u></b> <b>The student will successfully:</b>
<b><u>MnTC Goal 3d</u></b>	evaluate societal issues from a natural science perspective, ask questions about the evidence presented, and make informed judgments about science-related topics and policies.	<ol style="list-style-type: none"> <li>1. students will be able to explain potential societal, environmental, and biological issues regarding how pollution has changed our environment and impacts our health.</li> <li>2. students will be able to explain their reasoning using supporting data.</li> </ol>
<b><u>MnTC Goal 10b</u></b>	discern patterns and interrelationships of bio-physical and sociocultural systems	<ol style="list-style-type: none"> <li>1. explain how acid rain is formed and how it damages the environment.</li> <li>2. identify possible environmental causes for mutations in the body.</li> </ol>
<b><u>MnTC Goal 10d</u></b>	evaluate critically environmental and natural resource issues in light of understandings about interrelationships, ecosystems, and institutions.	<ol style="list-style-type: none"> <li>1. report on the pros and cons of the use of pesticides, fertilizers, and genetic modification in food and how it impacts human health and the environment.</li> </ol>
<b><u>MnTC Goal 10e</u></b>	propose and assess alternative solutions to environmental problems.	<ol style="list-style-type: none"> <li>1. explain how sunscreen protects humans from the sun's rays.</li> <li>2. explain how antioxidants prevent damage from oxygen to living tissue.</li> </ol>
<b><u>MnTC Goal 10f</u></b>	articulate and defend the actions they would take on various environmental issues.	<ol style="list-style-type: none"> <li>1. explain their stance, using supporting information, about the food production issues discussed under MnTC Goal 10d.</li> </ol>
<b><u>CS</u></b>	gather factual information and apply it to a given problem in a manner that is relevant, clear, comprehensive, and conscious of possible bias in the information selected.	<ol style="list-style-type: none"> <li>3. complete an analysis of scientific findings the topic indicated in #1 of MnTC Goal 3d (discussed above)</li> <li>4. explain the sources of possible bias and uncertainty in the analysis above.</li> </ol>
<b><u>CS</u></b>	imagine and seek out a variety of possible goals, assumptions, interpretations or perspectives which can give alternative meanings or solutions to given situations or problems.	<ol style="list-style-type: none"> <li>1. choose and analyze a research study on the selected chemical topic as part of the report discussed for meeting MnTC Goal 2a.</li> <li>2. examine and analyze this selected study for underlying assumptions and/or bias on the part of the researcher, and suggest an alternative perspective that disputes it, and/or explains the issue, solution or finding from at least two points of view.</li> </ol>
<b><u>CS</u></b>	analyze the logical connections among the facts, goals, and implicit assumptions relevant to a problem or claim and then generate and evaluate implications that follow from them.	<ol style="list-style-type: none"> <li>1. explain the implicit assumptions and the subsequent decision-making options relative to the report specified in the outcomes for MnTC Goals 2a and 2b.</li> </ol>
<b><u>CS</u></b>	demonstration a mastery of the application of density and the Law of Conservation of Matter.	<ol style="list-style-type: none"> <li>1. explain and demonstrate how to determine density</li> <li>2. explain how the Law of Conservation of Matter can be tested and verified.</li> </ol>

<u>GOAL</u>	<u>OBJECTIVES</u> Students will be able to:	<u>OUTCOMES</u> The student will successfully:
<u>CS</u>	distinguish between mixtures, compounds, and elements.	1. identify a mixture as homogeneous or heterogeneous. 3. distinguish between an element and a compound.
<u>CS</u>	be able to explain the makeup and structure of elements and how bonds are formed.	1. demonstrate an understanding and application of Atomic Theory. 2. explain how electron interaction between elements forms bonds.
<u>CS</u>	determine the chemical formula, draw the structure, and identify the shape of a compound.	1. explain and demonstrate how to determine and verify a chemical formula. 2. be able to write the name and formula for a compound. 3. identify the difference between ionic and covalent bonding. 4. articulate an understanding of Valence Shell Electron Pair Repulsion Theory.
<u>CS</u>	balance chemical equations and determine the mass/volume relationships for a chemical equation	1. be able to interpret and balance a chemical equation. 2. demonstrate an understanding of stoichiometric relationships of chemical reactions. 3. explain and demonstrate the stoichiometric analysis
<u>CS</u>	identify acids and bases and their relationship to the pH scale	1. demonstrate an understanding of acid/base chemistry. 2. explain how a buffer works and give examples of buffers in everyday life.
<u>CS</u>	identify different types of chemical reactions.	1. identify different types of chemical reactions.
<u>CS</u>	identify and draw the chemical structures of various organic compounds, carbohydrates, fats, oils, amino acids, and proteins	1. demonstrate an understanding of the structures and properties of organic compounds and functional groups. 2. demonstrate an understanding of the structure of biological structures.
<u>CS</u>	explain key metabolic processes in the body	1. demonstrate a chemical understanding of metabolic process in the body, such as Glycolysis and the Citric Acid Cycle
<u>CS</u>	explain the importance of DNA and RNA	1. demonstrate an understanding of the structure of DNA and RNA. 2. be able to explain the process of replication, translation, and transcription.

#### F. 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.

G. COURSE CODING INFORMATION:

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

Revision date: 12/2/13

AASC Approval date: 1/21/14

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

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

\*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.