Riverland Community College
Hayfield High School

General Chemistry I

INSTRUCTOR INFORMATION

Instructor Name: Mr. Bryon Meyer **Class Location:** 107
Phone: (507) 671-1537
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Office Hours: 7:15-8:00, 8th hour and by appointment

COURSE INFORMATION

CHEM 1201 – Section 30
5th Hour 11:57-12:39
Credits: 5 Hours

In order to fulfill the objectives of this 5-credit course, students are expected to spend 9 hours (3 hours/credit) of study time/week completing lecture materials and assignments and 6 hours (3 hours/credit) of study time/week working on lab materials outside of normal class time.

TEXTBOOK AND MATERIALS

Chemistry by OpenStax (https://openstax.org/details/books/chemistry-2e) (required)
Periodic Table (provided)
Scientific Calculator (required)

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)*
X 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)*

COURSE DESCRIPTION

This is the first course of a two-semester sequence in general inorganic chemistry, Atomic Theory, stoichiometry, chemical reactions, thermochemistry, chemical bonding, molecular structure, and atomic structure, periodicity, and the gas phase. This course is for students intending to transfer or pursue Bachelor's preparation and/or careers in chemistry and the other physical sciences, engineering and health sciences (medicine, pharmacy, veterinary medicine, four-year nursing).

COURSE RATIONALE

This course is designed to provide a basic understanding and appreciation of chemistry for those intending to major in a science field.

COURSE PRE-REQUISITES

Math 1110 or higher or concurrent registration in Math 1110 or higher.

COURSE RATIONALE

This course is designed to provide an understanding and appreciation of chemistry for students pursuing a science degree.

MAJOR CONTENT AREAS

- The Scientific Method
- Nomenclature
- Atomic Structure
- Stoichiometry
- Reaction Types
- Thermochemistry
- Molecular Structure – Bonding, Geometry and Polarity
- States of Matter – Gas Phase

This course satisfies Minnesota Transfer Credit (MnTC) Goal 3 (Natural Sciences) and Goal 10 (People and the Environment). A master course outline for this class can be obtained at https://www.riverland.edu/index.cfm/_api/render/file/?method=inline&fileID=C206379E-C78A-FDDC-B01D55C0F65B90DC.

COURSE 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. explain the primary chemical theories and laws, differentiating between a theory and a law. 2. define and explain vocabulary terms important in chemistry.
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. use the scientific method to formulate and test hypotheses in lab experimentation. 2. complete an analysis of laboratory experimental results (data) that will include calculations of accepted value, experimental value and % error design. 3. complete a second trial of the lab experiment above. 4. complete a statistical and graphical analysis of the two lab trials. 5. identify and explain the sources of bias, error and uncertainty in the lab trials.
MnTC Goal 3c	communicate their experimental findings, analyses and interpretations both orally and in writing.	1. discuss results of experimentation referenced in MnTC Goal 3c in oral and written formats.
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 the process of water treatment. 3. explain what a greenhouse gas is and their impact on the environment.
MnTC Goal 10d	evaluate critically environmental and natural resource issues in light of understandings about	1. explain sources of human impact on the environment related to a current environmental topic.

	interrelationships, ecosystems, and institutions.	2. report on a current environmental topic as outlined below. 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.	3. explain the potential impact of releasing untreated water into the environment. 4. 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, on the current environmental topic discussed under MnTC Goal 10d.
CS	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.	1. research, compile, and complete an analysis of scientific findings on the chemistry of a the current environmental topic researched.
CS	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.	1. analyze the current environmental topic (referenced in MnTC Goal 2a) vs. other options the limit environmental impact but achieve the same goal. 2. explain the alternative options and include analysis of underlying assumptions and/or bias on the part of the researcher. 3. suggest an alternative perspective that disputes, explains the issue, solution or finding form at least two points of view.
CS	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.	1. explain the implicit assumptions and the subsequent decision-making options relative to the report specified in the outcomes referenced for MnTC Goals 2a and 2b.
CS	describe and apply the scientific method used by scientists in solving problems.	1. apply knowledge of scientific theories to problem-solving applications. 2. develop a hypothesis for a scientific experiment. 3. identify the control, independent and dependent variable for an experiment. 4. predict next steps for a scientific study using data that has been collected. 5. draw conclusions based on experimental data.
CS	apply dimensional analysis with proper attention to units and significant figures.	1. express numbers in scientific and normal notation. 2. express values using the correct number of significant figures. 3. express measurements in and convert between metric units.

CS	determine the number of significant digits in a number and round numbers and calculated results to an appropriate number of significant figures.	1. identify the number of significant figures in a value. 2. complete calculations using the correct number of significant figures. 3. determine the accuracy and precision of a set of data.
CS	demonstrate mastery of density.	1. experimentally determine the density of an object.
CS	distinguish between mixtures, compounds and elements.	1. identify a mixture and explain separation by physical means. 2. articulate the relationship between elements and compounds.
CS	demonstrate mastery of scientific laws.	1. explain the Law of Conservation of Matter. 2. explain the Law of Multiple Proportions. 3. explain the Law of Definite Proportions.
CS	determine the makeup and structure of an atom.	1. describe electrons, protons, neutrons and the general structure of the atom. 2. define isotope and determine the atomic number, mass number, and number of neutrons for a specific isotope. 3. identify the atomic number and atomic mass for any element. 4. calculate the average atomic mass of an element from isotopic abundances and isotopic masses. 5. correlate wavelength, frequency, and energy of light with electron energy levels in the atom via and photoelectric effect and the Bohr model. 6. apply wave-particle duality and the uncertainty principle to describe properties of electrons. 7. apply the results of the Schrodinger quantum mechanical model of the atom to assign quantum numbers to electrons and write electron configurations of multi-electron atoms and ions. 8. identify valence vs core electrons and predict trends in atomic size, ionization energy, electron affinity, and charges on main-group ions.
CS	name chemical compounds.	1. write the name of a polyatomic ion from the formula. 2. write the formula of a polyatomic ion from the name. 3. write chemical formulas for ionic compounds from the name. 4. write names for ionic compounds given the formula. 5. write chemical formulas for covalent compounds from the name. 6. write names for covalent compounds given the formula.
CS	demonstrate stoichiometric relationships.	1. calculate molar mass from a chemical formula.

		2. calculate number of particles in an amount of substance using Avogadro's number. 3. balance chemical equations. 4. calculate produce and reactant amounts using stoichiometry relationships. 5. determine the limiting reagent in a reaction. 6. calculate percent yield. 7. determine the empirical formula of an unknown compounds using composition by mass or combustion analysis data. 8. calculate the mass, volume or molarity using molarity. 9. determine how to prepare a solution of a given molarity form the solute and water or by dilution of a more concentrated solution. 10. apply titration principles to determine the concentration of an known aqueous solution.
CS	write chemical reactions.	1. identify insoluble ionic compounds. 2. predict products in chemical reactions. 3. write net ionic equations. 4. identify spectator ions. 5. identify strong and weak acids and bases. 6. identify oxidizing and reducing agents in precipitation reactions. 7. identify acid-base and redox reactions.
CS	demonstrate an understanding of thermochemistry.	1. explain the First Law of Thermodynamics and express relationships among heat, work, energy, and enthalpy. 2. apply thermochemical equations to relate amount to heat energy to the quantity of substance reacted. 3. calculate heat transferred using temperature measurements, heat capacity or specific heats. 4. apply Hess's Law and enthalpies of formation to determine enthalpies of reaction. 5. calculate reaction enthalpies using calorimetry data.
CS	demonstrate an understanding of molecular structure.	1. describe bonding in pure covalent, polar covalent, and ionic structures. 2. draw Lewis structures for compounds including resonance, formal charge, and exceptions to the octet rule. 3. interpret VSPER Theory, Valance Bond Theory, and Molecular Orbital Theory to predict molecular shape, polarity and bonding.
CS	demonstrate an understanding of the gas phase of matter.	1. explain the major points of the kinetic molecular theory of gases. 2. describe the relationship between pressure, volume, moles, and temperature using gas laws. 3. write the equation for the ideal gas law and use it in calculations.

		4. apply Dalton's Law to determine the mole fraction, partial pressures, and the total pressure of a gas mixture.
CS	demonstrate proper laboratory technique.	1. conduct laboratory work in compliance with guidelines for personal lab safety and responsible management of chemical waste; this includes appropriate use of personal protective equipment and interpretation of Globally Harmonized System for Hazard Communication (GHS) labels. 2. measure quantities such as mass, volume, temperature, and absorbance with proper technique, and record the results of measurements with the appropriate number of significant figures and units. 3. record observations of chemical processes (such as precipitate formation, gas evolution, etc.) and write chemical reactions consistent with their observations. 4. demonstrate proper techniques for laboratory procedures, such as titration, filtration, solution preparation, spectrophotometric measurements, etc. 5. demonstrate proper use of glassware and equipment including beakers, Erlenmeyer flasks, volumetric pipets, burets, volumetric flasks, watch glasses, graduated cylinders, filtration apparatus, single-beam spectrophotometer, pH meter, balances. 6. communicate lab procedures, observations, and results in the form of laboratory notebook, written reports, and verbal presentations effectively. 7. interpret and analyze qualitative observations and quantitative results, incorporating graphs and tables as appropriate.

Course objectives outline what students will be learning in this course. They are useful for effectively utilizing course materials to learn course concepts and reviewing for exams. Course objectives for the lecture component of this course are provided on Moodle in a stand-alone document for each unit. These objectives are also referenced in the announcement for each module and on the semester schedule. Laboratory objectives are listed at the top of each experimental procedure. Please contact Mr. Meyer if you have any questions about how to use these objectives.

COMMUNICATION

The official communication method for Riverland Community College is Riverland's assigned email (@my.riverland.edu). Please check your Riverland student email frequently for class as well as college wide notices. I do not use the Pager option on Brightspace to communicate with students. Please do not attempt to contact me using this feature. I will not respond.

STUDENT RESPONSIBILITIES

- Access the textbook and other required course materials listed in this syllabus and use them as outlined during this course.
- Be prepared when you come to class. This includes but is not limited to reading the assigned textbook chapters, reviewing all lecture notes and/or videos, and reading the assigned laboratory experiment before lab begins.
- Communicate with the instructor for additional help on lecture and laboratory materials as necessary to master the concepts discussed in this course.
- Read, understand and abide by the course syllabus and laboratory safety rules.
- Complete laboratory experiments as provided.
- Bringing a pencil and scientific calculator to the laboratory final exam.
- Complete and submit all assignments, exams, quizzes, and laboratory experiments as outlines in the semester schedule.
- Be familiar with the use of Moodle and regularly check it for announcements and course materials.
- Be familiar with the use of word processing, spreadsheet, and presentation programs such as MS Word, MS Excel, and MS PowerPoint to prepare written assignments and presentations.
- Be able to access your email account, check it regularly, and know how to send and receive emails, including how to send attachments.
- Abide by the Hayfield and Riverland Student Code of conduct and maintain the highest levels of academic honesty throughout this entire course.

GRADING:

This class is a dual credit class, meaning you are able to receive both high school and college credit. For both grades, we will be using the Hayfield High School grading scale listed below. In most cases, your high school and college grade will be the same, although there may be times where your high school and college grade may differ.

Hayfield High School

A = 94-100%	C = 74-76%
A- = 90-93%	C- = 70-73%
B+ = 87-89%	D+ = 67-69%
B = 84-86%	D = 64-66%
B- = 80-83%	D- = 60-63%
C+ = 77-79%	F = Below 60%

DISTRICT GRADING POLICY- Since this is a senior high class, high school grading is based on a 75/25 scale. Your grade will be weighted 75% summative assignments, 25% formative assignments. If you have questions on the 75/25 scale please consult your student handbook or Mr. Meyer.

SAFETY

A science laboratory is a potentially dangerous environment. Horseplay, inappropriate or unauthorized use of equipment or materials, not following directions, or any other behavior that jeopardizes the safety of yourself or others may be grounds for immediate dismissal from class. A laboratory safety contract will be presented within the first week of class and all students and parents/guardians will be expected to sign and abide by these rules.

ATTENDANCE

See Student/Parent Handbook for attendance policies. Attendance for the class is required.

HOMEWORK POLICY

I understand students will miss school for various reasons; however, STUDENTS are responsible for making up any course work missed. For each day missed the student has a certain amount of time to complete missed work.

Day Missed	Days to Complete Work
1	2
2	3
3	4
4	5
5	6
5+	Ask Mr. Meyer

If a student is absent the day of a quiz or test, the student is expected to take the test the following day, during their own time (study hall). We can arrange something on an individual basis as well. **IT IS NOT MY RESPONSIBILITY TO ARRANGE A TIME FOR YOU TO TAKE YOUR TEST. YOU MUST COME TALK TO ME.**

If a student misses a single day leading up to a quiz or exam but not the day before the exam/quiz, they will be expected to take the quiz/exam as scheduled.

If a student is absent the day before an exam or quiz, the student is expected to take the exam or quiz within 2 days upon return.

The following all applies to excused absences. If a student has an unexcused absence on a day an assignment is due, the assignment will be considered late, and will not receive extra time for unexcused absences the day before an exam or quiz.

Retakes will cover the same content, but in a different format.
Students will have five calendar days to take the retake and must have all assessments completed and turned in. I may elect to give only part of the summative assessment as a retake.
The score a student receives on the retake is the score on the summative assessment entered in JMC.

I reserve the right to change these rules on a case-to-case basis!

Academic Responsibility

Dishonesty, cheating, plagiarism or other forms of academic dishonesty will not be tolerated. It is your responsibility to read and fully understand Hayfield Commuinity School's and Riverland Community College's *Student Code of Conduct*.

If a student violates a college or course policy, the following may occur:

1. The penalty at the course level is at the sole discretion of the instructor. The College may invoke additional sanctions (see student handbook).
2. If more than one student is involved in the incident, all students involved will be disciplined. For instance, the student allowing the use of their work and the student using the work will both be disciplined. If a group is involved, all members of the group will be

disciplined.

3. The seriousness of the incident will determine the penalty:
    a. Plagiarism/cheating on an assignment may result in a zero (0), partial loss of credit for that assignment or other penalties at the discretion of the instructor.
    b. Involvement in previous incidents in other courses, repeated incidences in this course, and incident after a warning, and cheating on examinations may result in immediate failure in the course or other penalties at the discretion of the instructor.

If a student violates a high school policy, students will be assigned five days of lunch detention to redo the assessment. A student's plagiarized assessment will be averaged with a 50% to determine the student's score.
NOTE If extensive plagiarism occurs in grades 6-12, the student may receive a zero per teacher discretion.

PERSONAL EMERGENCIES

If at any point during the semester you experience a major life emergency (such as the death/major illness of a close family member or major illness on your part) that impacts your ability to complete this course as outlined in the syllabus and semester schedule, please talk to your instructor **IMMEDIATELY**. I am willing to work with students in these situations so they can still complete the course; however, I can do nothing if you don't talk to me right away. If you wait until the very end of the semester to talk to me about a hardship you experienced months ago, I may not be able to help you.

ACCOMMODATION FOR DISABILITY

Riverland Community College complies with the provisions of the American with Disabilities Act, which prohibits discrimination in education based on an individual's disability. The Student Success Center provides reasonable and appropriate testing accommodations upon request for students who have documented physical or psychological disabilities. Requests for accommodations must be made at least one week in advance. Documentation of a disability must be on file in the Student Success Center prior to testing.

For information and application for testing, accommodations go to https://www.riverland.edu/student-services/accessibility-services/.

A copy of Riverland's policy for American's with Disabilities Act can be found at https://www.riverland.edu/policy/1000-Administration/Americans-with-Disabilities-Act.pdf.

STUDENT CODE OF CONDUCT AND ACCADEMIC DISHONESTY POLICY

Conduct by a single student or a group of students that unreasonably restricts others' freedoms and interferes with the college mission of promoting student learning is subject to regulation and/or sanction by the college. Plagiarism and other academic or student misconduct will result in disciplinary action including, but not limited to, receiving a score of '0' on the plagiarized assignment or failure of the course. For more information on Student Code of Conduct Policy, go to https://www.riverland.edu/about-riverland/policies-and-procedures/student-code-of-conduct-policy-procedure/

The Riverland Student Handbook can be accessed at https://www.riverland.edu/student-services/student-handbook/.

AFFIRMATIVE ACTION STATEMENT

Riverland Community College is an affirmative action, equal opportunity employer and educator accredited by the Higher Learning Commission. Individual college programs are accredited by other associated professional organizations. For more information, go to http://www.riverland.edu/about-riverland/policies-and-procedures/ to review the Equal Opportunity and Nondiscrimination in Employment and Education Policy or to complete the online Complaint Form.

EQUITY STATEMENT

Respect for All: The instructors and students in this class will act with integrity and strive to engage in equitable verbal and nonverbal behavior with respect to differences arising from age, race, ethnicity, color, national origin, gender, sex, pregnancy, disability, sexual orientation, genetic information, veteran's status, marital status, religion, or political affiliation.

ADA STATEMENT & ACCOMMODATIONS INFORMATION

Riverland Community College is committed to assuring that all educational activities are free from discrimination and harassment based on disability status. Students requesting accommodations for a documented disability are required to work directly with staff in Accessibility Services (AS) to establish eligibility and learn about related processes before accommodations will be identified. After eligibility is established, AS staff will create and issue a Notification Letter for each course listing approved reasonable accommodations. This document will be made available to the student and instructor either electronically or in hard-copy every semester. Students and instructors are encouraged to review contents of the Notification Letters as early in the semester as possible to identify a specific, timely plan to deliver/receive the indicated accommodations. Reasonable accommodations are not retroactive in nature and are not intended to be an unfair advantage. Additional information or assistance is available online at: https://www.riverland.edu/student-services/accessibility-services/
This information will be made available in alternative formats such as braille, large print, or audio upon advanced request by informing https://www.riverland.edu/student-services/accessibility-services/

VETERANS SUPPORT STATEMENT

Riverland is dedicated to assisting veterans and eligible family members in achieving their educational goals efficiently. Active duty and reserve/guard military members should advise their instructor of all regularly scheduled military appointments and duties that conflict with schedule course requirements. Instructors will make every effort to work with the student to identify adjusted timelines. If you are a veteran, please contact the Veterans Services Office at https://www.riverland.edu/admissions/studenttype/veterans-military-members/

STUDENT SERVICES

Riverland provides a plethora of academic and support services to help students succeed. Please see information of available resources at www.riverland.edu/student-services/ If at any time during the semester you are having difficulties or are thinking about withdrawing from the class, please let your faculty, advisor or student services staff know immediately so we can help.

DROPPING A CLASS

If at any time during the semester you are having academic difficulties or thinking about withdrawing from the course, please see your instructor immediately. If you are having personal difficulties or problems preventing you from being successful, contact the Riverland counselors by email at counselors@riverland.edu or call 507-433-0600 to schedule a counseling appointment.

If you are considering dropping this course, please come talk to your instructor first to evaluate your current grade and determine if dropping the class is your best option. It is your responsibility to understand the college's procedure for dropping or withdrawing from a class. If you stop attending this class but do not follow proper procedures for dropping or withdrawing, you will receive a failing grade. Failure to properly drop or withdraw from classes can have a detrimental effect on your grade point average and your future educational goals.
All policies of Minnesota State and Riverland Community College apply to this course. The instructor retains the right to change course requirements and the semester schedule at their discretion. Any exceptions to the above policies must be obtained from the instructor in advance and in writing. Failure to comply with the policies outlined in the course syllabus may result in course failure or a lowering of your grade, at the discretion of the instructor.

FACULTY ABSENCE

Students are reminded that faculty absences will be posted on the Riverland website at https://www.riverland.edu//index.cfm/current-students/ and if an instructor is able, on each course's Brightspace site along with any information concerning alternate assignments for the time the instructor is absent.

COLLEGE CLOSURE

For information related to possible college campus closure due to weather or other issues, please go to the Riverland Community College website at http://www.riverland.edu/current-students/ for further information and/or instructions. Students are encouraged to register for free cell phone or email StarAlert emergency notification system.

SUBJECT TO CHANGE STATEMENT

Course materials, testing requirements and grading subject to change at the discretion of the instructor.

Due to the COVID-19 pandemic the delivery method of this course may change to ensure the safety of the students and faculty. These changes may come through the governor's executive order or college administration. These adjustments may include but are not limited to:

- Adjustments to the amount of on-campus course sessions and online learning
- Adjustments to the course assignment due date
- Additional accommodations for students to complete tests, labs and assignments

If changes are needed, after I consult with college administration, I will communicate with you as soon as possible via email, D2L Brightspace or in-person during class time regarding any adjustments necessary to the course because of COVID-19.

*Mr. Meyer reserves the right to change the items listed as needed throughout the school year.