

Dept. & Number	BIOL 190	BIOL 223	BIOL 224	BIOL 251	CHEM 121	CHEM 122
Course Credit Hours	4	4	4	4	4	4
Type of Course	Accelerated (8 weeks in length)	Accelerated (8 weeks in length)	Accelerated (8 weeks in length)	Accelerated (8 weeks in length)	Accelerated (8 weeks in length)	Accelerated (8 weeks in length)
WNC Catalog Course Description	<p>Covers the structure and function of cells. Included will be the major molecules of life, composition and physiology of cellular organelles, cellular metabolism, reproduction, motility, gene function and related topics.</p> <p>Three hours lecture/three hours' laboratory per week.</p> <p>Note: BIOL 190/190L plus BIOL 191/191L transfer to UNR as fulfilling BIOL 190, 191 and 192 requirements.</p>	<p>Offers detailed study of cellular functions and the integumentary, skeletal, muscular, and nervous systems. Primary for physical education, pre-nursing and other pre-health majors.</p> <p>Three hours' lecture/three hours' laboratory per week.</p> <p>NOTE: For programs that require BIOL 223 and 224, both courses must be completed at the same institution if taken outside Nevada.</p>	<p>Offers a detailed study of the anatomy and physiology of the circulatory, immune, respiratory, digestive, urinary, endocrine and reproductive systems. Primarily for physical education, pre-nursing and other pre-health majors.</p> <p>Three hours' lecture/three hours' laboratory per week.</p> <p>NOTE: For programs that require BIOL 223 and 224, both courses must be completed at the same institution if taken outside Nevada.</p>	<p>Emphasizes the distribution, form, structure and physiology of microorganisms in laboratory. Develops the student's skills in aseptic procedures, isolation and identification.</p> <p>Three hours lecture/three hours laboratory per week.</p>	<p>Provides fundamentals of chemistry including reaction stoichiometry, atomic structure, chemical bonding, molecular structure, states of matter and thermochemistry.</p> <p>Three hours lecture/three hours laboratory per week.</p>	<p>Provides fundamentals of chemistry including solutions, kinetics, equilibria, thermodynamics, electrochemistry, nuclear chemistry and properties of inorganic and organic compounds. Three hours lecture/three hours laboratory.</p>
Pre-Requisite or Co-Requisite Courses (If Applicable)	<p>Prerequisite: Math 96 or higher (excluding Math 120) with a grade of C- or better</p> <p>MATH 126 Strongly Recommended!</p> <p>or</p> <p>Co-requisite of Math 126 or higher or appropriate score on the WNC placement or equivalent test</p>	<p>Prerequisites: BIOL 190 with a grade of C or better or CHEM 121 with a grade of C or better.</p> <p>CHEM 121 NOT Recommended</p>	<p>Prerequisites: BIOL 223 with a grade of C or better.</p>	<p>Prerequisites: BIOL 190 with a grade of C or better or BIOL 223 with a grade of C or better or CHEM 121 with a grade of C or better.</p> <p>CHEM 121 NOT Recommended</p>	<p>Recommended Prerequisite for learners who intend to enroll in CHEM 122: MATH 126 &127 or MATH 128;</p> <p>Prerequisite: MATH 126 or higher with a grade of C or better OR appropriate score on the WNC placement or equivalent test.</p>	<p>Prerequisites: CHEM 121 & MATH 126 & MATH 127 or CHEM 121 & MATH 128</p>
Course Transferability	This course is designed to apply toward a WNC degree and/or transfer to other schools within the Nevada System of Higher Education, depending on the degree chosen and other courses completed. It may transfer to colleges and universities outside Nevada. For information about how this course can transfer and apply to your program of study, please contact Dr. Carman or a counselor.					
Course Rules/Syllabus	Rules/Syllabus for Dr. Carman's Courses – subject to change – subject to interpretation by Dr. Carman only.					
Minimum Lecture Hours/week (16-week semester)	3	3	3	3	3	3

Minimum Lecture Hours per week (8-week semester)	6	6	6	6	6	6
Minimum Lab Hours per week (16-week semester)	3	3	3	3	3	3
Minimum Lab Hours per week (8-week semester)	6	6	6	6	6	6
Lecture and Lab Experiment Source	https://www.drcarman.info/ Dr. Carman uses no traditional textbooks or lab books: this saves the learners money and keeps information more fluid and current. Periodically, OpenStax changes the links to their free online textbooks. Should that impact the below links, simply run a Google Search for OpenStax and find the text on their website (the text titles don't change, other than, possibly, the edition).					
Free, Web-Based Textbook NOT 100% Required, unless otherwise Stated: STRONGLY RECOMMENDED!	Open Stax General Biology Text	Open Stax Anatomy and Physiology Text	Open Stax General Microbiology Text	Open Stax General Chemistry Text Or General Chemistry, Atoms, First		
Minimum Studying Time Required (per day! 7 days a week!)	The general rule of thumb in higher academics/education for appropriate student studying time necessary for learning to occur in a college/university transfer course is 3 hours a week for every hour that a student is in lecture and/or lab. For a traditional science lab-based course, that means a minimum of 18 hours ... even better: 3 hours every day of the week. For an 8-week course, that goes up to 6 hours a day. For a three-week summer course, you go to class and lab, study and sleep.					
Student Performance/ Assessment Tool[s]	Daily Work Sheets, Laboratory Experiments and Regular Exams per Canvas Notifications in each Course					
Grading Scale	BIOL Courses' Grading Scale			CHEM Courses' Grading Scale		
Identify Any Risk Management Issues	Risk of minor physical injury (skin laceration) due to glass breakage; risk of minor physical injury (skin) due to the use of common mineral acids and bases; risk of serious physical injury if student fails to wear proper goggles (eyes) and lab coat (skin); risk of moderate injury if student fails to put hair up out of the way (skin); risk of moderate physical injury if student fails to wear proper foot wear (skin); risk of minor to severe physical injury due to fire/burn (Bunsen burners, pyrophoric compounds and skin); risk of serious infection if safety and aseptic technique is not adhered to 100%.					
Lab Safety Supplies: REQUIRED	Purchased at the WNC Bookstore unless otherwise advised in class/lab. ALL Learners: Tyvek Lab Coat and Encon Safety/Chemical Splash Goggles with Indirect Venting and UV Protection; Anatomy and Physiology II Learners: Add Nitrile Gloves to the list. SPRING 2021: No required lab supplies as the courses are remotely delivered courtesy of Sars-CoV-2 and COVID-19.					
Faculty Comment	Many learners believe that taking a BIOL course is “easier” than a CHEM or PHYS course. Nothing could be farther from the truth: if the three courses are taught with an integrating eye, it becomes clear early on that one can NOT study BIOL without a fundamental understanding of CHEM and PHYS, nor <i>vice versa</i> .	BIOL 223, 224 and 251 are designed specifically for learners who are studying towards entering a program of education in Nursing, Nutrition, Physical Education or Allied Health Fields. BIOL 223, 224 and 251 are not major’s courses outside of those fields, nor do they fulfill that roll in programs outside of undergraduate Allied Health, Nursing, Physical Education and/or Nutrition Departments at other institutions.			PERSPECTIVE: CHEM 121 is university-transfer and is 6-10 times as intense as HS CHEM! PERSPECTIVE: CHEM 121 covers the gamut of degree pre-requisite requirements: BCH; BIOL; CHEM; CHEM ENG; General Education; Genetics; NUTR; PHYS; PreDVM/Pre-DC/PreOD/Pre-R.Ph; Pre-MD/Pre-DO/Pre-DDS; Pre-PT; pre-PA.	PERSPECTIVE: CHEM 122 is university-transfer and is 6-10 times as intense as HS CHEM! PERSPECTIVE: CHEM 122 covers the gamut of degree pre-requisite requirements: BCH; BIOL; CHEM; CHEM ENG; General Education; Genetics; NUTR; PHYS; PreDVM/Pre-DC/PreOD/Pre-R.Ph; Pre-MD/Pre-DO/Pre-DDS; Pre-PT; pre-PA.

<p>Course Topics</p>	<p>All learners will have in-depth knowledge of the language of cellular and molecular biology, animal and plant cellular structure and function: Learners will explain fundamental concepts associated with atomic structure, chemical bonding, water chemistry, and pH, and apply these concepts to the functioning of biological systems; Learners will identify the basic structures and describe the functions of the four major classes of biological macromolecules and cellular structures, including eukaryotic organelles and membranes (and may include prokaryotic cells and viral particles, as well); Learners will describe the processes of cellular transport, signaling, introductory intermediary metabolism, photosynthesis, cell division (mitosis and meiosis), heredity, gene expression and gene regulation and explain their significance to the functioning of biological systems; Learners will apply scientific reasoning to draw conclusions from experimentally derived data using the Carolina Biological kit, Using a Single-Nucleotide Polymorphism to Predict Bitter-Tasting Ability laboratory experiment.</p>	<p>All learners will have in-depth (first semester of a lab-based two-semester sequence) knowledge of the human integumentary, muscular, skeletal (including major articulations), nervous, systems, and their applications to human health and some fundamental pathology to each organ system. In addition, all learners will have in-depth knowledge of the language of anatomy and physiology, the four major classes of biomolecules, cellular anatomy and physiology, introduction to tissues in the human body and introductory intermediary metabolism.</p>	<p>All learners will have in-depth (second semester of a lab-based two-semester sequence) knowledge of the human circulatory, immune, respiratory, digestive, urinary, endocrine and reproductive systems and their applications to human health and some fundamental pathology to each organ system, e.g., this may include lecture topics on elementary EKG interpretation and arterial blood gas interpretation.</p>	<p>All learners will have in-depth (one semester of a lab-based one-semester course) knowledge of microbial structures and the metabolic strategies, genetics, and ecology of prokaryotic microbes, eukaryotic microbes, and viruses using appropriate terminology; hypothetical or literature-based disease scenarios; scientific reasoning and the principles of disease prevention, pathogenicity, epidemiology, and host immune responses; and develop a plan of disease control or prevention; using proper aseptic laboratory technique to transfer, isolate, and stain cultured microorganisms, and then analyze their macro- and micro-morphological characteristics; to apply scientific reasoning to deduce the identification of or test hypotheses about microorganisms.</p>	<p>All learners will have a basic (first semester of a two semester laboratory based course) knowledge of the Principles of Chemical Reactions, Stoichiometry, Atomic Structure, Chemical Bonding, Molecular Structure, States of Matter, Aqueous Solutions, Acid-Base Chemistry, Redox Reactions, Thermochemistry; and will have practiced the laboratory methods needed to observe and measure the above.</p> <p>CHEM 121, on its own, is NOT an appropriate pre-requisite course for BIOL 223, 224 or 251 – for pre-requisite to these courses, enroll in BIOL 190.</p>	<p>All students will have a basic (second semester of a two semester laboratory-based course) knowledge of the Principles of Solutions, Solubility, Colligative properties, Kinetics, Chemical equilibrium, Applications of aqueous equilibria including acid-base equilibria and solubility product; Basic thermodynamics, electrochemistry, and nuclear chemistry; Properties of inorganic and organic compounds; Qualitative analysis; Applications to biologically important molecules; and have practiced the laboratory methods needed to observe and measure the above.</p>
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<p>General Education Course Goals, Outcomes and/or Objectives</p>	<p>Upon successful completion of BIOL 190: Introduction to Cell and Molecular Biology, (defined as a 75% course score or better) learners will be able to (Student Learning Outcomes = SLO): Describe and explain the processes of cellular transport, signaling, metabolism, photosynthesis, cell division (mitosis and meiosis), heredity, gene expression and gene regulation and explain their significance to the functioning of biological systems (SLO #1); Illustrate and explain the structure and function of animal and plant cells and sub-cellular organelles (SLO #1, #3 and #6); Illustrate and explain the function of biomolecules at the sub-cellular and cellular level (SLO #1, #3 and #6); Draw conclusions from experimentally derived data in the laboratory (SLO #1, #3 and #6). Draw conclusions from experimentally derived data from the polymerase chain reaction (PCR) laboratory experiment (SLO #1, #3 and #6).</p>	<p>Upon successful completion of BIOL 223, Human Anatomy and Physiology I, (defined as a 75% course score or better) Learners will be able to (Student Learning Outcomes = SLO): Describe and/or identify the anatomy and physiology of the tissues in the human body, the integumentary, skeletal (including the major articulations), muscular and nervous (to include the cranial nerves and special senses) systems of the body (SLO #1); Illustrate, explain and/or identify the function of cell and tissue types in the human body (SLO #1, #3 and #6); Illustrate, explain and/or identify the function of biomolecules at the sub-cellular and cellular level in the human body (SLO #1, #3 and #6); Draw and/or identify conclusions from experimentally derived data in the laboratory (SLO #1, #3 and #6).</p>	<p>Upon successful completion of BIOL 224, Human Anatomy and Physiology II, (defined as a 75% course score or better) learners will be able to (Student Learning Outcomes = SLO): Describe and/or identify The anatomy and physiology of the circulatory, immune, respiratory, digestive, urinary, endocrine and reproductive systems (SLO #1); Illustrate, explain and/or identify the function of cell and tissue types in the human body (SLO #1, #3 and #6); Illustrate, Explain and/or identify the function of biomolecules at the sub-cellular and cellular level in the human body (SLO #1, #3 and #6); Draw and/or identify conclusions from experimentally derived data in the laboratory (SLO #1, #3 and #6).</p>	<p>Upon successful completion of BIOL 251, General Microbiology, (defined as a 75% course score or better) learners will be able to (Student Learning Outcomes = SLO): Describe the anatomy and physiology, pathology and fundamental therapeutic treatments of the different genera of micro-organisms (SLO#1); Illustrate and explain the function of cellular and non-cellular types of micro-organisms (SLO#1); Illustrate and explain the characteristics of micro-organisms at the laboratory, sub-cellular and cellular level (SLO #1); Draw conclusions from experimentally derived data in the laboratory (SLO#1, #3 and #6).</p>	<p>Upon successful completion of CHEM 121, General Chemistry I, (defined as a 75% course score or better) learners will be able to (Student Learning Outcomes = SLO): Describe, identify and balance the six (6) general types of chemical, as well as college freshman level reduction-oxidation, reactions (SLO #1); Illustrate, explain and/or Identify the chemistry and function of aqueous solutions of acids and bases (SLO #1, #3 and #6); Illustrate, explain and/or Identify the role thermochemistry plays in forming molecules in the solid, liquid and gaseous states (SLO #1, #3 and #6); Illustrate, explain and/or identify the role the periodic table plays in chemistry (SLO #1, #3 and #6); Draw and/or identify conclusions with basic calculations of and from general chemistry laboratory experiences (SLO #1, #3 and #6).</p>	<p>Upon successful completion of CHEM 122, General Chemistry II, (defined as a 75% course score or better) learners will be able to (Student Learning Outcomes = SLO): Describe, identify and apply balanced college freshman level reduction-oxidation reactions to electrochemical applications (SLO #1); Illustrate and explain the role solubility and acid-base balance plays in solution chemistry (SLO #1); Illustrate and explain the role thermodynamics and kinetics play in determining reaction direction (SLO #1); Illustrate and explain introductory organic and biological chemistry reactions of a fundamental nature (SLO #1); Draw conclusions with basic calculations of and from general chemistry and qualitative analysis laboratory experiences to develop problem solving in a systematic manner (SLO #1, #4).</p>
<p>Course Broad-Based Student Learning Outcomes</p>	<p>The objectives of this course are to: 1) Introduce the basic methods and goals of science, especially as they apply to molecular and cell biology. 2) Introduce basic concepts in chemistry that support molecular and cell</p>	<p>Learners will describe the anatomical position, body directions, regions, planes and sections using correct anatomical terminology. Learners will describe the major body cavities, their subdivisions</p>	<p>Learners shall acquire an understanding, and explain, illustrate or diagram this understanding, of the physiological function and anatomical structure of the cardiovascular, respiratory, immune,</p>	<p>A) Learners will identify microbial structures and describe the metabolic strategies, genetics, and ecology of prokaryotic microbes, eukaryotic microbes, and viruses using appropriate terminology.</p>	<p>Learners will be able to demonstrate, illustrate or diagram how chemical composition and molecular structure determine the physical properties of pure substances and mixtures through textual materials,</p>	<p>Learners will explain and apply chemical principles of intermolecular forces, kinetics, equilibrium, acid/base chemistry, thermodynamics, and electrochemistry. Learners will explain and predict</p>

	<p>biology. 3) Introduce the basic structures and functions of cells as the basic units of all living things and as the building blocks of multicellular organisms. 4) Introduce basic biochemistry of cellular respiration and photosynthesis. 5) Introduce the molecular mechanisms and Mendelian principles of inheritance and gene expression. In Addition: Learners will illustrate and explain the functions of each of the 4 classes of bio-molecules. Learners will explain and illustrate a cell and its sub-cellular organelles. Learners will explain, diagram and draw intermediary metabolic pathways.</p>	<p>and the major organs contained within them. Learners will recognize anatomical structures, explain physiological functions, and recognize and explain the principle of homeostasis applied to the basic tissue types (histology), and the integumentary, skeletal, muscular, and nervous systems (including special senses).</p>	<p>endocrine, urinary, reproductive and gastrointestinal systems including their inter-relationships. Properly prepared learners will be able to identify a minimum of 80% of EKG rhythms and ABG analysis/results correctly. Learners shall acquire the ability to apply analytic thinking skills in interpreting both qualitative and quantitative data and case studies.</p>	<p>B) Learners will evaluate hypothetical or literature -based disease scenarios; apply scientific reasoning and the principles of disease prevention, pathogenicity, epidemiology, and host immune responses; and develop a plan of disease control or prevention. C) Using proper aseptic laboratory technique, learners will transfer, isolate, and stain cultured microorganisms, and then analyze their macro- and micro-morphological characteristics. D) Learners will apply scientific reasoning to deduce the identification of or test hypotheses about microorganisms.</p>	<p>lectures, practice problems, and laboratory work. Learners will be able to demonstrate, illustrate and/or diagram the nature of the physical and chemical properties of matter, e.g., on the periodic table, elements are arranged in sequence by increasing atomic number and this arrangement is useful for predicting the properties of elements and compounds, through textual materials, lectures, practice problems, and laboratory work. Learners will be able to illustrate, diagram or demonstrate the fundamental principles that explain chemical reactions through textual materials, lectures, practice problems, and laboratory work.</p>	<p>patterns of chemical properties and reactivity. Learners will apply basic mathematics and algebra to chemical concepts and problem solving. Learners will apply the scientific method in a laboratory setting to interpret data and draw conclusions based on the course topics. The properly prepared learners will be able to complete these activities at or above a minimum level of 75% on an appropriate assessment tool.</p>
<p>Course Linkage to Academic Degree Program[s]</p>	<p>General Education Mission: BIOL 190 is a general education class that promotes the development of knowledge, skills, and attitudes that will benefit learners in their personal and professional endeavors.</p> <p>General Education Student Learning Outcome: Learners who successfully complete BIOL 190 satisfy the general education learning outcome of understanding the methods</p>	<p>General Education Mission: BIOL 223 is a general education course only for the AAS degree in Nursing that promotes the development of knowledge, skills, and attitudes that will benefit learners in their personal and professional endeavors.</p> <p>General Education Student Learning Outcome: Learners who successfully complete BIOL 223 satisfy the general education learning outcomes by demonstrating that they: Can</p>	<p>General Education Mission: BIOL 224 is a general education course only for the AAS degree in Nursing that promotes the development of knowledge, skills, and attitudes that will benefit learners in their personal and professional endeavors.</p> <p>General Education Student Learning Outcome: Learners who successfully complete BIOL 224 satisfy the general education learning outcomes by demonstrating that they:</p>	<p>General Education Mission: BIOL 251 is a general education course only for the AAS degree in Nursing that promotes the development of knowledge, skills, and attitudes that will benefit learners in their personal and professional endeavors.</p> <p>General Education Student Learning Outcome: Learners who successfully complete BIOL 251 satisfy the general education learning outcomes by demonstrating that they: Can</p>	<p>General Education Mission: CHEM 121 is a general education course that provides learners who complete degrees and certificates with critical life skills that will benefit them in their personal and professional endeavors.</p> <p>General Education Student Learning Outcome[s]: See Above (General Education Course Goals, Outcomes and/or Objectives) Section</p>	<p>General Education Mission: CHEM 122 is a general education course that provides students who complete degrees and certificates with critical life skills that will benefit them in their personal and professional endeavors.</p> <p>General Education Student Learning Outcome[s]: See Above (General Education Course Goals/Outcomes/Objectives) Section</p>

	<p>of science and the role of science and technology in the modern world; have problem solving, creative, and critical thinking skills; have effective and efficient learning skills.</p> <p>Program Mission for AA/AS Degree: BIOL 190 satisfies the A.A./A.S. degree mission by providing academic knowledge and skills for successful transfer to meet higher educational goals.</p> <p>Program Student Learning Outcomes for AA/AS Degree: Learners who successfully complete BIOL 190 will know the subject matter appropriate to the emphasis of the degree.</p>	<p>use college-level mathematics skills; Possess an understanding of scientific inquiry and the role of science and technology in the modern world; Possess adequate problem solving, creative reasoning, and critical thinking skills.</p> <p>Program Mission for AA/AS Degree: BIOL 223 satisfies the A.A./A.S. degree mission by providing academic knowledge and skills for successful transfer learners to meet a limited number of higher educational goals and are listed under the AA degree requirements.</p> <p>Program Student Learning Outcomes for AA/AS Degree: Learners who successfully complete BIOL 223 will know the subject matter appropriate to the emphasis of the degree.</p>	<p>Can use college-level mathematics skills; Possess an understanding of scientific inquiry and the role of science and technology in the modern world; Possess adequate problem solving, creative reasoning, and critical thinking skills.</p> <p>Program Mission for AA/AS Degree: BIOL 224 satisfies the A.A./A.S. degree mission by providing academic knowledge and skills for successful transfer of learners to meet a limited number of higher educational goals and are listed under the AA degree requirements.</p> <p>Program Student Learning Outcomes for AA/AS Degree: Learners who successfully complete BIOL 224 will know the subject matter appropriate to the emphasis of the degree.</p>	<p>use college-level mathematics skills; Possess an understanding of scientific inquiry and the role of science and technology in the modern world; Possess adequate problem solving, creative reasoning, and critical thinking skills.</p> <p>Program Mission for AA/AS Degree: BIOL 251 satisfies the A.A./A.S. degree mission by providing academic knowledge and skills for successful transfer of learners to meet a limited number of higher educational goals and are listed under the AA degree requirements.</p> <p>Program Student Learning Outcomes for AA/AS Degree: Learners who successfully complete BIOL 251 will know the subject matter appropriate to the emphasis of the degree.</p>	<p>Program Mission for AA/AS Degree: CHEM 121 satisfies the A.A./A.S. degree mission by providing academic knowledge and skills for successful transfer of learners to meet higher educational goals.</p> <p>Program Student Learning Outcomes for AA/AS Degree: Learners who successfully complete CHEM 121 will know the subject matter appropriate to the emphasis of the degree.</p>	<p>Program Mission for AA/AS Degree: CHEM 122 satisfies the A.A./A.S. degree mission by providing academic knowledge and skills for successful transfer students to meet higher educational goals.</p> <p>Program Student Learning Outcomes for AA/AS Degree: Learners who successfully complete CHEM 122 will know the subject matter appropriate to the emphasis of the degree.</p>
<p>This Document is Subject to Change at any Time throughout the Semester in Order to Keep Up with Changes Developed and/or Implemented by WNC BIOL/CHEM Faculty and/or by Nevada Public Health Authorities.</p>						