

# APS DISTRICT HIGH SCHOOL SCIENCE CURRICULUM FRAMEWORK

Course Title: Veterinary Medicine Mentorship Course Number: 443C3

Department: Science ADS Number: 17144944

Prerequisites: Successful completion of an A and B science course and take a Course C concurrently with Veterinary Medicine

Length of Course: One Year Credit/PRI Area: 1.5 per Sem/Elective Grade Level(s): 11 - 12

### *Important Notes:*

*A course that provides 1.5 credits per semester allows the student additional opportunities for in-depth study and application of the course content. The student's time is divided into approximately 40% time in mentorship activities and 60% class time. The student must provide his/her own transportation to the mentorship site and have a signed parent permission form to participate in this program. A typical schedule for this class is five hours a week (e.g., Tuesday, Thursday mornings) at the mentorship site and classroom time on Monday, Wednesday and Friday mornings.*

**COURSE DESCRIPTION:** Veterinary Medicine is a mentorship and lab course designed to provide the student with the necessary skills to pursue a career in Veterinary Medicine. The clinic which the student is assigned to provides all aspects of the operation of the clinic including exams, diagnosis, treatment, and surgeries. In the classroom, the student studies animal anatomy, cardiology, case studies unique to animals, and research and presentation of animal diseases. The student integrates literacy strategies (e.g., reading, writing, research) throughout the curriculum. The student's instructor and workplace mentor take an active role in facilitating the student's mentorship work experience.

References in parentheses following each performance standard align with the State of New Mexico Science Standards (NM), the New Mexico Career Readiness Standards (NM – CR), and the Albuquerque Public Schools Language Arts Standards (APS - LA).

**STRATEGIES:**

The “Illustrations” column in the *Program of Studies* provides exemplars of the performance standards, strategies, and best practices suggested by science teachers in the Albuquerque Public Schools (APS).

**ASSESSMENTS:**

Assessments may include: authentic and performance-based assessment, cooperative learning, teacher observations, checklists, tests and exams, formal and informal writing, small group and full class discussions, oral and multimedia presentations, projects, demonstrations, and portfolios. Assessments are based on appropriate rubrics.

**SUGGESTED TEXTBOOKS AND INSTRUCTIONAL MATERIALS:**

- *Merck Manual of Diagnosis and Therapy* – Beers, mark and Berkow, Robert – Merck Research Laboratories – 1999
- *Grays Anatomy* – Clemente, Carmine – Lea Febiger, Publisher
- *Medical Physiology* – Guyton, Arthur C., M. D. – W. B. Saunders Company – 1991
- *Human Anatomy & Physiology* – Marieb, Elaine – Addison Wesley - 1999

**SUGGESTED TITLES/AUTHORS WEB SITES:**

- [www.merck.com](http://www.merck.com)
- [www.gratefulmed.com](http://www.gratefulmed.com)

Approved by HSCA: Dec 2004

**STRAND I: SCIENTIFIC THINKING AND PRACTICE**

**CONTENT STANDARD:** The student understands the processes of scientific investigations and uses inquiry and scientific ways of observing, experimenting, predicting, and validating to think critically.

- BENCHMARKS:**
- A. The student uses accepted scientific methods to collect, analyze, and interpret data and observations and to design and conduct scientific investigations and communicates results.
  - B. The student understands that scientific processes produce scientific knowledge that is continually evaluated, validated, revised, or rejected.
  - C. The student uses mathematical concepts, principles, and expressions to analyze data, develop models, understand patterns and relationships, evaluate findings, and draw conclusions.

<b>GRADE 11 - 12</b>	<b>PERFORMANCE STANDARDS</b>	<b>ILLUSTRATIONS</b>
	<ul style="list-style-type: none"><li>1. Describes the essential components of an investigation, including appropriate methodologies, proper equipment, and safety precautions (NM - I.I.I.1).</li><li>2. Designs and conducts scientific investigations that include (NM - I.I.I.2):<ul style="list-style-type: none"><li>• testable hypotheses</li><li>• controls and variables</li><li>• methods to collect, analyze, and interpret data</li><li>• results that address hypotheses being investigated</li><li>• predictions based on results</li><li>• re-evaluation of hypotheses and additional experimentation as necessary</li><li>• error analysis.</li></ul></li><li>3. Uses appropriate technologies to collect, analyze, and communicate scientific data (e.g., computers, calculators, balances, microscopes) (NM - I.I.I.3).</li><li>4. Conveys results of investigations using scientific concepts, methodologies, and expressions, including (NM - I.I.I.4):<ul style="list-style-type: none"><li>• scientific language and symbols</li><li>• diagrams, charts, and other data displays</li><li>• mathematical expressions and processes (e.g., mean, median, slope, proportionality)</li><li>• clear, logical, and concise communication</li><li>• reasoned arguments.</li></ul></li></ul>	<p><b>NOTE: Illustrations include suggested activities for attaining each performance standard. A check for (✓) refers to a key feature to look for while assessing student performance.</b></p> <p>1 – 16. As an introduction to experimentation, the student observes a demonstration of blood pressure readings to understand the scientific method process. In the experiment, five different blood pressure readings are taken of males and females. As practice, the student records the readings and analyzes the results. The student then designs his/her own experiment related to blood pressure (e.g., raising or lowering the blood pressure after exercise). He/She writes a hypothesis, conducts the experiment, collects the data, does a statistical analysis of the data, and records the data graphically using a spreadsheet format (e.g., Excel), and states his/her conclusion. Using the information, the student writes a research paper presenting the results with support for the hypothesis.</p> <ul style="list-style-type: none"><li>✓ thorough research</li><li>✓ all required components</li><li>✓ support for argument</li><li>✓ effective writing elements</li><li>✓ use of technology</li><li>✓ graphs/charts</li><li>✓ analysis</li></ul>

	<p>5. Understands how scientific theories are used to explain and predict natural phenomena (e.g., plate tectonics, ocean currents, structure of atom) (NM - I.I.I.5).</p> <p>6. Understands how scientific processes produce valid, reliable results, including (NM - I.I.II.1):</p> <ul style="list-style-type: none"> <li>• consistency of explanations with data and observations</li> <li>• openness to peer review</li> <li>• full disclosure and examination of assumptions</li> <li>• testability of hypotheses</li> <li>• repeatability of experiments and reproducibility of results.</li> </ul> <p>7. Uses scientific reasoning and valid logic to recognize (NM - I.I.II.2):</p> <ul style="list-style-type: none"> <li>• faulty logic</li> <li>• cause and effect</li> <li>• the difference between observation and unsubstantiated inferences and conclusions</li> <li>• potential bias.</li> </ul> <p>8. Understands how new data and observations can result in new scientific knowledge (NM - I.I.II.3).</p> <p>9. Critically analyzes an accepted explanation by reviewing current scientific knowledge (NM - I.I.II.4).</p> <p>10. Examines investigations of current interest in science (e.g., superconductivity, molecular machines, age of the universe) (NM - I.I.II.5).</p> <p>11. Examines the scientific processes and logic used in investigations of past events (e.g., using data from crime scenes, fossils), investigations that can be planned in advance but are only done once (e.g., expensive or time-consuming experiments such as medical clinical trials), and investigations of phenomena that can be repeated easily and frequently (NM - I.I.II.6).</p> <ul style="list-style-type: none"> <li>• Creates multiple displays of data to analyze and explain the relationships in scientific investigations (NM - I.I.III.1).</li> </ul> <p>12. Uses mathematical models to describe, explain, and predict natural phenomena (NM - I.I.III.2).</p> <p>13. Uses technologies to quantify relationships in scientific hypotheses (e.g., calculators, computer spreadsheets and databases, graphing software, simulations, modeling) (NM - I.I.III.3).</p>	
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	<p>14. Identifies and applies measurement techniques and consider possible effects of measurement errors (NM - I.I.III.4).</p> <p>15. Uses mathematics to express and establish scientific relationships (e.g., scientific notation, vectors, dimensional analysis) (NM - I.I.III.5).</p>	
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**STRAND II: CONTENT OF SCIENCE – PHYSICAL SCIENCE****CONTENT STANDARD:** The student understands the structure and properties of matter, the characteristics of energy, and the interactions between matter and energy.**BENCHMARKS:** A. The student understands the transformation and transmission of energy and how energy and matter interact.  
B. The student understands the motion of objects and waves, and the forces that cause them.

<b>GRADE 11 - 12</b>	<b>PERFORMANCE STANDARDS</b>	<b>ILLUSTRATIONS</b>
	<ol style="list-style-type: none"> <li>1. Understands how heat can be transferred by conduction, convection, and radiation, and how heat conduction differs in conductors and insulators (NM - II.I.II.4).</li> <li>2. Understands that the ability of energy to do something useful (work) tends to decrease (and never increases) as energy is converted from one form to another (NM - II.I.II.6).</li> <li>3. Understands that electromagnetic waves carry energy that can be transferred when they interact with matter (NM - II.I.II.7).</li> <li>4. Understands the concept of equilibrium (i.e., thermal, mechanical, and chemical) (NM - II.I.II.11).</li> <li>5. Knows that there are four fundamental forces in nature: gravitation, electromagnetism, weak nuclear force, and strong nuclear force (NM - II.I.III.1).</li> </ol>	<p>1, 2, 4. Through text readings, lectures, and labs, the student grasps the theoretical concepts of a variety of topics (e.g., conduction, convection). Early in the year as a means for the students to get to know each other and to learn to interact with each other as lab partners, the students do a variety of tests (e.g., heat/cold, blind spot, map the tongue) on one another. In the heat/cold test, the student has a grid stamped on his/her arm and a grid stamped on paper. The student takes a probe, sticks it in hot water, and touches it on a corner of the grid of his/her partner. The student records the heat receptor with a "+" if felt and with a "-" if not felt. The same test is repeated using ice. When all of the tests have been done, the student has a "map of the body" that shows the blind spots, nerve endings, etc.</p> <ul style="list-style-type: none"> <li>✓ individual participation</li> <li>✓ cooperation</li> <li>✓ completion of all tests</li> <li>✓ accurate recordings</li> <li>✓ analysis</li> <li>✓ understanding of the theoretical concepts</li> </ul> <p>3, 5, 9. The student uses an electromagnetic flow meter device to show that ions cause an electrical current. He/She builds motor using magnets to demonstrate that electricity can be produced using magnets.</p> <ul style="list-style-type: none"> <li>✓ connections</li> <li>✓ understanding of forces and energy</li> <li>✓ clear explanations</li> </ul> <p>4, 6, 10, 11. The student performs simple experiments using class 1, 2, and 3 levers (e.g., put pressure on the arm to demonstrate contraction of muscles). From here the student advances to a cat dissection to study the muscles to understand optimum length of muscles and to see that the length produces different forces against gravity. In a class discussion, the student talks about the muscles, how they tie in with gravity and gives specific example to illustrate that concept (e.g., pushing against a force,</p>

GRADE 11 - 12	PERFORMANCE STANDARDS	ILLUSTRATIONS
	<p>6. Knows that every object exerts gravitational force on every other object, and how this force depends on the masses of the objects and the distance between them (NM - II.I.III.2).</p> <p>7. Knows that materials containing equal amounts of positive and negative charges are electrically neutral, but that a small excess or deficit of negative charges produces significant electrical forces (NM - II.I.III.3).</p> <p>8. Understands the relationship between force and pressure, and how the pressure of a volume of gas depends on the temperature and the amount of gas (NM - II.I.III.4).</p> <p>9. Explains how electric currents cause magnetism and how changing magnetic fields produce electricity (e.g., electric motors, generators) (NM - II.I.III.5).</p> <p>10. Represents the magnitude and direction of forces by vector diagrams (NM - II.I.III.6).</p> <p>11. Knows that when one object exerts a force on a second object, the second object exerts a force of equal magnitude and in the opposite direction on the first object (i.e., Newton's Third Law) (NM - II.I.III.7).</p> <p>12. Applies Newton's Laws to describe and analyze the behavior of moving objects, including (NM - II.I.III.8):</p> <ul style="list-style-type: none"> <li>• displacement, velocity, and acceleration of a moving object</li> </ul>	<p>putting pressure on the floor). He/She draws vector diagrams of the forces on a joint.</p> <ul style="list-style-type: none"> <li>✓ understanding the relationship between force and gravity</li> <li>✓ involvement in all experiments</li> <li>✓ skilled dissection</li> <li>✓ active participation in discussion</li> <li>✓ specific examples</li> <li>✓ visual aids</li> </ul> <p>4, 7, 14 - 16. The student learns during the cardiology unit about waves through looking at an EKG. The diagram produced in an EKG allows the student to measure the charges, the amplitude, wavelength, and frequency of the waves. The results come out on graph paper where each box represents a time frame that is different for each person. The student determines the heart beats, the amplitude (e.g., height of wave), and faults. The EKG can tell the student what is wrong with the heart allowing the student to examine causes.</p> <ul style="list-style-type: none"> <li>✓ individual participation</li> <li>✓ ability to perform the required measurements</li> <li>✓ accuracy (e.g., readings, measurements)</li> <li>✓ analysis</li> </ul> <p>Extension: The student dissects a sheep's heart to study the heart valves.</p> <p>8. The student continues to use the cat dissection activity to look at the diaphragm and lungs. Through the examination the student explains how the lungs inflate. The temperature inside the lungs is 98.6° and 72° outside. The student describes what needs to happen between the two to get to 98.6°. He/She is able to explain in either oral or written format that all this happens in the nasal cavity and, therefore, that is why it is harder to breath in cold weather and why that hurts the lungs.</p> <ul style="list-style-type: none"> <li>✓ engagement in the dissection activity</li> <li>✓ connections</li> <li>✓ effective communication</li> </ul> <p>12, 13. By this time, the student has studied the muscular skeletal system. With this prior knowledge and work done in the cardiology unit, the student designs a motion (e.g., dance, throwing a ball) showing the</p>

GRADE 11 - 12	PERFORMANCE STANDARDS	ILLUSTRATIONS
	<ul style="list-style-type: none"> <li>• Newton's Second Law, <math>F = ma</math> (e.g., momentum and its conservation, the motion of an object falling under gravity, the independence of a falling object's motion on mass)</li> <li>• circular motion and centripetal force.</li> </ul> <p>13. Describes relative motion using frames of reference (NM - II.I.III.9).</p> <p>14. Describes wave propagation using amplitude, wavelength, frequency, and speed (NM - II.I.III.10).</p> <p>15. Explains how the interactions of waves can result in interference, reflection, and refraction (NM - II.I.III.11).</p> <p>16. Describes how waves are used for practical purposes (e.g., seismic data, acoustic effects, Doppler effect) (NM - II.I.III.12).</p> <p>17. Understands atomic structure, including (NM – II.I.I.6):</p> <ul style="list-style-type: none"> <li>• most space occupied by electrons</li> <li>• nucleus made of protons and neutrons</li> <li>• isotopes of an element</li> <li>• masses of proton and neutron 2000 times greater than mass of electron</li> <li>• atom held together by proton-electron electrical forces.</li> </ul> <p>18. Explains how electrons determine the properties of substances by (NM – II.I.I.7):</p> <ul style="list-style-type: none"> <li>• interactions between atoms through transferring or sharing valence electrons</li> <li>• ionic and covalent bonds</li> <li>• the ability of carbon to form a diverse array of organic structures.</li> </ul> <p>19. Makes predictions about elements using the periodic table (e.g., number of valence electrons, metallic character, reactivity, conductivity, type of bond between elements) (NM – II.I.I.8).</p>	<p>starting point to the ending point. The design includes all the muscles used, which contracted, how force acts on that joint, the action of the muscles, and the direction that the muscle produces on the skeletal system.</p> <ul style="list-style-type: none"> <li>✓ all the required components</li> <li>✓ completion of design</li> <li>✓ effective design</li> <li>✓ accuracy</li> </ul> <p>The student looks at a variety of examples to understand relative motion and frame of reference (e.g., throwing a ball at 60 mph; if a car moves 20 mph towards you the force is 60 + 20, and 60 – 20 if going away from you).</p> <ul style="list-style-type: none"> <li>✓ comprehension</li> </ul> <p>17 – 19. See the 4<sup>th</sup> illustration in this stand, the one dealing with EKG. Using a given reading, the student explains why the ion is positively charged.</p> <p style="text-align: center;">OR</p> <p>The student builds an atomic model to demonstrate different types of bonds.</p> <ul style="list-style-type: none"> <li>✓ clear communication</li> <li>✓ model design</li> <li>✓ accuracy</li> <li>✓ connections/relationships</li> </ul>

**STRAND III: CONTENT OF SCIENCE – LIFE SCIENCE****CONTENT STANDARD:** The student understands the properties, structures, and processes of living things and the interdependence of living things and their environments.

- BENCHMARKS:**
- A. The student understands how the survival of species depends on biodiversity and on complex interactions, including the cycling of matter and the flow of energy.
  - B. The student understands the genetic basis for inheritance and the basic concepts of biological evolution.
  - C. The student understands the characteristics, structures, and functions of cells.

GRADE 11 - 12	PERFORMANCE STANDARDS	ILLUSTRATIONS
	<ol style="list-style-type: none"> <li>1. Critically analyzes how humans modify and change ecosystems (e.g., harvesting, pollution, population growth, technology) (NM – II.II.4).</li> <li>2. Explains how matter and energy flow through biological systems (e.g., organisms, communities, ecosystems), and how the total amount of matter and energy is conserved but some energy is always released as heat to the environment (NM – II.II.5).</li> <li>3. Understands and explains the hierarchical classification scheme (i.e., domain, kingdom, phylum, class, order, family, genus, species), including (NM – II.II.8): <ul style="list-style-type: none"> <li>• classification of an organism into a category</li> <li>• similarity inferred from molecular structure (DNA) closely matching classification based on anatomical similarities</li> <li>• similarities of organisms reflecting evolutionary relationships.</li> </ul> </li> <li>4. Knows that an ecosystem is complex and may exhibit fluctuations around a steady state or may evolve over time (NM – II.II.1).</li> <li>5. Knows how DNA carries all genetic information in the units of heredity called genes, including (NM – II.II.1): <ul style="list-style-type: none"> <li>• the structure of DNA (e.g., subunits A, G, C, T)</li> <li>• information-preserving replication of DNA</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>1. The student examines a case study that deals with toxins in the environment that lead to health problems. Following the procedure outlined in the Science and Society Strand, the illustration for performance standard #12, the student looks at the symptoms, diagnoses the problem and prescribes treatment. <ul style="list-style-type: none"> <li>✓ accurate diagnosis and treatment</li> </ul> </li> <li>2. The student completes a kineosiology (e.g., movement) experiment. In this experiment the student goes through the muscles, names them, determines where the energy comes from for muscle contraction and makes the connection with exercise (e.g., a person perspires because the body is releasing heat). <ul style="list-style-type: none"> <li>✓ all required components</li> <li>✓ accuracy</li> <li>✓ connections</li> </ul> </li> <li>3. During the cat dissection the student compares the anatomy of the cat and humans and writes a summary of his/her findings. <ul style="list-style-type: none"> <li>✓ active participation in dissection</li> <li>✓ accurate comparisons</li> <li>✓ effective writing elements</li> </ul> </li> <li>4 – 11, 16. The student reads two case studies on genetic disorders (e.g., PKU, cystic fibrosis). He/She reads about the DNA carrying the genetic information. With the information provided, the student draws the family tree going all the way down to the gene itself that is causing the genetic disorder. <ul style="list-style-type: none"> <li>✓ thorough representation of family tree</li> <li>✓ accuracy</li> </ul> </li> </ol>

GRADE 11 - 12	PERFORMANCE STANDARDS	ILLUSTRATIONS
	<ul style="list-style-type: none"> <li>• alteration of genes by inserting, deleting, or substituting parts of DNA.</li> </ul> <p>6. Uses appropriate vocabulary to describe inheritable traits (i.e., genotype, phenotype) (NM – II.II.II.2).</p> <p>7. Explains the concepts of segregation, independent assortment, and dominant/recessive alleles (NM – II.II.II.3).</p> <p>8. Identifies traits that can and cannot be inherited (NM – II.II.II.4).</p> <p>9. Knows how genetic variability results from the recombination and mutation of genes, including (NM – II.II.II.5):</p> <ul style="list-style-type: none"> <li>• sorting and recombination of genes in sexual reproduction result in a change in DNA that is passed on to offspring</li> <li>• radiation or chemical substances can cause mutations in cells, resulting in a permanent change in DNA.</li> </ul> <p>10. Knows that most cells in the human body contain 23 pairs of chromosomes including one pair that determines sex, and that human females have two X chromosomes and human males have an X and a Y chromosome (NM – II.II.II.7).</p> <p>11. Knows that DNA directs protein building (e.g., role of RNA) (NM – II.II.III.6).</p> <p>12. Knows that cells are made of proteins composed of combinations of amino acids (NM – II.II.III.1).</p>	<p>12. The student refers back to the EKG exercise. It is given that the starting point of the wave is –90 mv. The student answers the following questions to gain an understanding of where that –90 comes from (e.g., negative charge on amino acids).</p> <ul style="list-style-type: none"> <li>• What happens to resting membrane potential if intracellular Na<sup>+</sup> is increased?</li> <li>• What happens to resting membrane potential if intracellular K<sup>+</sup> is increased?</li> <li>• What happens to the flow of Na<sup>+</sup> across the membrane during depolarization of a cardiac cell if intracellular Na<sup>+</sup> is increased before depolarization ever happened?</li> <li>• What happens to the flow of K<sup>+</sup> during repolarization of a cardiac cell if extracellular K<sup>+</sup> is increased before repolarization ever happened?</li> </ul>

GRADE 11 - 12	PERFORMANCE STANDARDS	ILLUSTRATIONS
	<p>13. Knows that specialized structures inside cells in most organisms carry out different functions, including (NM – II.II.III.2):</p> <ul style="list-style-type: none"> <li>• parts of a cell and their functions (e.g., nucleus, chromosomes, plasma, and mitochondria)</li> <li>• storage of genetic material in DNA</li> <li>• similarities and differences between plant and animal cells</li> <li>• prokaryotic and eukaryotic cells.</li> </ul> <p>14. Describes the mechanisms for cellular processes (e.g., energy production and storage, transport of molecules, waste disposal, synthesis of new molecules) (NM – II.II.III.3).</p> <p>15. Knows how the cell membrane controls which ions and molecules enter and leave the cell based on membrane permeability and transport (i.e., osmosis, diffusion, active transport, passive transport) (NM – II.II.III.4).</p> <p>16. Knows that DNA directs protein building (e.g., role of RNA) (NM – II.II.III.6).</p> <p>17. Describes how most cell functions involve chemical reactions, including (NM – II.II.III.7):</p> <ul style="list-style-type: none"> <li>• promotion or inhibition of biochemical reactions by enzymes</li> <li>• processes of respiration (e.g., energy production, ATP)</li> <li>• communication from cell to cell by secretion of a variety of chemicals (e.g., hormones).</li> </ul>	<ul style="list-style-type: none"> <li>• What happens to the flow of Na<sup>+</sup> across the membrane during depolarization of a cardiac cell if extracellular Na<sup>+</sup> is increased before depolarization ever happened?</li> <li>• What happens to the flow of K<sup>+</sup> during repolarization of a cardiac cell if intracellular K<sup>+</sup> is increased before repolarization ever happened? <ul style="list-style-type: none"> <li>✓ reasonable responses to questions</li> <li>✓ effective communication</li> </ul> </li> </ul> <p>13 - 15, 17. The student dissects the cat's muscles, looks at muscle slides under the microscope, and identifies the organelles and their functions.</p> <ul style="list-style-type: none"> <li>✓ correct identification of organelles and their functions</li> <li>✓ skillful use of equipment</li> </ul>

**STRAND IV: MENTORSHIP****CONTENT STANDARD:** The student explores all aspects of veterinary clinic operations.**BENCHMARK:** The student experiences various aspects of diagnosis, treatment, and care of animals.

GRADE 11 - 12	PERFORMANCE STANDARDS	ILLUSTRATIONS
	<ol style="list-style-type: none"> <li>1. Analyzes and integrates positive behavior, conduct, and social manners within the school, workplace, and community (NM – CR 4A).</li> <li>2. Demonstrates ability to work cooperatively to accomplish objectives set by student mentor and instructor (NM – CR 4B).</li> <li>3. Demonstrates appropriate and legal behaviors necessary to obtain and maintain employment (NM – CR 4C).</li> <li>4. Applies safety standards related to the school, community, and workplace (NM – CR 4D).</li> <li>5. Demonstrates responsible behavior related to environmental concerns (NM – CR 4E).</li> <li>6. Exhibits ability to work with others from diverse backgrounds (NM – CR 5C).</li> <li>7. Conforms to established rules and regulations (NM – CR 4C, 4D).</li> <li>8. Maintains appropriate appearance and punctuality (NM – CR 4A).</li> <li>9. Completes assigned tasks in a timely manner (NM – CR 4B, 4C).</li> <li>10. Communicates effectively in both oral and written format (NM – CR 5D).</li> </ol>	<p>1, 3 – 5, 7 – 11. The student keeps a journal and makes daily entries relating to his/her mentorship experience. The entry represents the date, what was learned, the duties and responsibilities of that day, time spent on task, and a personal reflection of that day’s experience (positive and negative). At the end of the course, each student presents orally to the class highlights of his/her experience.</p> <ul style="list-style-type: none"> <li>✓ regular entries</li> <li>✓ all required components</li> <li>✓ assessment of the experience</li> <li>✓ personal reflection</li> <li>✓ effective communication</li> </ul> <p>2, 6, 7, 9, 11. The student meets with the instructor and on-site mentor on a regular basis (e.g., weekly, monthly) to talk about the progress of the student and to assess if any changes or adjustments need to be made. The student also produces weekly time sheets and other documents that account for the student’s investment of time, energy, and task responsibilities. The student is evaluated by the use of a rubric.</p> <ul style="list-style-type: none"> <li>✓ cooperation/collaboration</li> <li>✓ adherence to rubric</li> <li>✓ submission of proper documents</li> </ul> <p><b>Note:</b> In addition to the on-site visits by the instructor, he/she also makes periodic telephone calls to the mentor as part of the supervisory responsibilities of participation in this mentorship program. Close supervision ensures that the placement is a good fit, that both mentor and student are working together to meet goals, and that adjustments and/or changes can be made, if necessary, for the student to be successful.</p>

<b>GRADE 11 - 12</b>	<b>PERFORMANCE STANDARDS</b>	<b>ILLUSTRATIONS</b>
	11. Follows directions (NM – CR 1D).	

**STRAND V: SCIENCE AND SOCIETY****CONTENT STANDARD:** The student understands how scientific discoveries, inventions, practices, and knowledge influence, and are influenced by, individuals and societies.**BENCHMARK:** The student examines and analyzes how scientific discoveries and their applications affect the world, and explains how societies influence scientific investigations and applications.

GRADE 11 - 12	PERFORMANCE STANDARDS	ILLUSTRATIONS
	<ol style="list-style-type: none"> <li>1. Knows how science enables technology but also constrains it, and recognizes the difference between real technology and science fiction (e.g., rockets vs. antigravity machines; nuclear reactors vs. perpetual-motion machines; medical X-rays vs. Star-Trek tricorders) (NM - III.I.1.1).</li> <li>2. Understands how advances in technology enable further advances in science (e.g., microscopes and cellular structure; telescopes and understanding of the universe) (NM - III.I.1.2).</li> <li>3. Evaluates the influences of technology on society (e.g., communications, petroleum, transportation, nuclear energy, computers, medicine, genetic engineering) including both desired and undesired effects, and including some historical examples (e.g., the wheel, the plow, the printing press, the lightning rod) (NM - III.I.1.3).</li> <li>4. Understands the scientific foundations of common technologies (e.g., kitchen appliances, radio, television, aircraft, rockets, computers, medical X-rays, selective breeding, fertilizers and pesticides, agricultural equipment) (NM - III.I.1.4).</li> <li>5. Understands that applications of genetics can meet human needs and can create new problems (e.g., agriculture, medicine, cloning) (NM - III.I.1.5).</li> <li>6. Analyzes the impact of digital technologies on the availability, creation, and dissemination of information (NM - III.I.1.6).</li> </ol>	<p>1 – 5, 9, 11, 16. The student writes a paper on a controversial topic (e.g., cloning) stating the advantages and disadvantages of the current concepts with an emphasis on the latest technological advances.</p> <ul style="list-style-type: none"> <li>✓ support for argument</li> <li>✓ both sides of the issue</li> <li>✓ technological influences</li> </ul> <p>6. The <i>Journal of the American Medical Association</i>(JAMA) and the <i>New England Journal of Medicine</i> are the two most prominent journals where medicine is reported and where others can find out what is going on in the medical field. Every nine weeks the student reads three original research articles from these journals and writes a critique and abstract of the articles.</p> <ul style="list-style-type: none"> <li>✓ reading analysis</li> <li>✓ task completion</li> <li>✓ organization and sharing of information</li> </ul>

GRADE 11 - 12	PERFORMANCE STANDARDS	ILLUSTRATIONS
	<p>7. Describes how human activities have affected ozone in the upper atmosphere and how it affects health and the environment.</p> <p>8. Describes uses of radioactivity (e.g., nuclear power, nuclear medicine, radiometric dating) (NM - III.I.8).</p> <p>9. Describes how scientific knowledge helps decision makers with local, national, and global challenges (e.g., Waste Isolation Pilot Project [WIPP], mining, drought, population growth, alternative energy, climate change) (NM - III.I.9).</p> <p>10. Describes major historical changes in scientific perspectives (e.g., atomic theory, germs, cosmology, relativity, plate tectonics, evolution) and the experimental observations that triggered them (NM - III.I.10).</p> <p>11. Knows that societal factors can promote or constrain scientific discovery (e.g., government funding, laws and regulations about human cloning and genetically modified organisms, gender and ethnic bias, AIDS research, alternative-energy research) (NM - III.I.11).</p>	<p>7, 8, 15. The student works on projects throughout the semester. One such project that is ongoing at all times – five a semester – is the case study. The student assumes the role of a vet where he/she diagnoses the symptoms of an animal, gives a prognosis, and prescribes treatment. The case studies vary in nature. One example may be the case of the one year old male golden retriever named Rio. Rio is smaller and weighs less than other golden retrievers his age. The owner, while playing Frisbee with Rio, noticed that he was coughing and lost interest due to being tired. After observation, you give him a physical exam and note that he is exhibiting the following symptoms: syncope, dyspnea, ascites, peripheral edema, and cyanosis. Describe the diagnosis, the justification of the diagnosis, the prognosis, the treatment of the disease, and treatment of the animal.</p> <ul style="list-style-type: none"> <li>✓ proper diagnosis and treatment</li> <li>✓ reasoning and problem solving</li> <li>✓ thoroughness</li> <li>✓ clarity of expression</li> </ul> <p>10. The student views a video on the history of anesthesia (e.g., 1700 – 1800s) taking the student from the most elementary forms (e.g., whiskey, nitrous oxide, chloroform, morphine) to current forms. The student learns that “the father of anesthesia” experimented on himself until he became addicted. The student takes notes during the viewing noting every drug mentioned, its effect, the outcome, when it was used, for what it was used, how the drug was used, and if the drug is still used. At the end of the video, the student selects one that most impressed him/her and writes a paper stating why he/she chose that particular drug.</p> <ul style="list-style-type: none"> <li>✓ listening skills</li> <li>✓ note taking</li> <li>✓ personal response</li> <li>✓ support for argument</li> <li>✓ effective communication</li> </ul> <p>11, 17. The student listens to a guest speaker (e.g., someone from the AIDS Society, technical person) talk about the epidemiology of AIDS (e.g., how it spreads, who gets it). After the lecture on this disease, the student listens to a person who has AIDS and/or a person who is living with it. That individual explains what it is like to live with it and the impact it has had on him/her. The student is free to ask questions. Afterwards, a discussion follows where the student talks about personal responsibilities.</p>

GRADE 11 - 12	PERFORMANCE STANDARDS	ILLUSTRATIONS
	<p>12. Explains how societies can change ecosystems and how these changes can be reversible or irreversible (NM - III.I.I.12).</p> <p>13. Describes how environmental, economic, and political interests impact resource management and use in New Mexico (NM - III.I.I.13).</p> <p>14. Describes New Mexico's role in nuclear science (e.g., Manhattan Project, WIPP, national laboratories) (NM - III.I.I.14).</p> <p>15. Identifies how science has produced knowledge that is relevant to individual health and material prosperity (NM - III.I.I.15).</p> <p>16. Understands that reasonable people may disagree about some issues that are of interest to both science and religion (e.g., the origin of life on Earth, the cause of the Big Bang, the future of Earth) (NM - III.I.I.16).</p> <p>17. Identifies important questions that science cannot answer (e.g., questions that are beyond today's science, decisions that science can only help to make, questions that are inherently outside of the realm of science) (NM - III.I.I.17).</p> <p>18. Understands that scientists have characteristics in common with other individuals (e.g., employment and career needs, curiosity, desire to perform public service, greed, preconceptions and biases, temptation to be unethical, core values including honesty and openness) (NM - III.I.I.18).</p> <p>19. Knows that science plays a role in many different kinds of careers and activities (e.g., public service, volunteers, public office holders, researchers, teachers, doctors, nurses, technicians, farmers, ranchers) (NM - III.I.I.19).</p>	<ul style="list-style-type: none"> <li>✓ listening skills</li> <li>✓ appropriate behavior (e.g., questions)</li> <li>✓ individual participation in discussion</li> <li>✓ prevention theories</li> </ul> <p>Note: A common thread throughout the course is the examination of diseases that have no cure.</p> <p>12, 13. Through lectures and text readings the student learns that society in some way has caused certain diseases to thrive (e.g., West Nile virus, hauntavirus). The student researches one such disease, preferably one that is predominant in New Mexico (e.g., poverty, diabetes in hispanics) and reports on its health affects in either an oral or written format.</p> <ul style="list-style-type: none"> <li>✓ thorough research</li> <li>✓ effective presentation</li> <li>✓ clarity in communication</li> <li>✓ relevant information</li> </ul> <p>14. The student participates in a discussion about New Mexico's role in nuclear science. Main ideas to come out of this are Los Alamos role in the creation of the bomb, its role in WWII, and the labs (e.g., Sandia Labs).</p> <ul style="list-style-type: none"> <li>✓ active participation in discussion</li> <li>✓ understanding of New Mexico's role in nuclear science development</li> </ul> <p>18, 19. The student takes a field trip to one of the local hospitals, listens to a variety of guest speakers (e.g., physicians lecture series) where different people involved in the medical field (e.g., cardiologist, pediatician, physical therapist, internist) come in and talk about their fields and topics of interest (e.g., ethics). For each visit made or speaker that comes in, the student takes notes and turns them in with a personal reflection.</p> <ul style="list-style-type: none"> <li>✓ note taking</li> <li>✓ personal reflection</li> <li>✓ attention to detail</li> </ul>

<b>GRADE 11 - 12</b>	<b>PERFORMANCE STANDARDS</b>	<b>ILLUSTRATIONS</b>
		✓ awareness of medical career opportunities

**STRAND VI: LITERACY****CONTENT STANDARD:** The student communicates biological principles through reading, writing, and speaking opportunities.**BENCHMARK:** The student demonstrates proficiency in reading comprehension, specialized vocabulary, and a variety of writing and speaking requirements.

<b>GRADE 11 - 12</b>	<b>PERFORMANCE STANDARDS</b>	<b>ILLUSTRATIONS</b>
	<ol style="list-style-type: none"> <li>1. Develops and demonstrates proficiency with the following strategies to approach reading for information across content areas: (APS – LA I.1): <ul style="list-style-type: none"> <li>• scans reading selection to determine whether a text contains relevant information,</li> <li>• uses the headings and subheadings of the material to make predictions and to validate comprehension of text,</li> <li>• reads and rereads to decode meaning, and</li> <li>• reviews and summarizes essential elements of text for overview.</li> </ul> </li> <li>2. Identifies and uses roots, prefixes, and suffixes to determine meaning of words (APS – LA I.4).</li> <li>3. Uses textual evidence to develop and support an interpretation of a scientific process or concept (APS – LA II.2).</li> <li>4. Develops increased competence in using the writing process to create a final product (APS – LA III.1).</li> <li>5. Develops increased competence in using elements of effective writing (APS – LA III.2).</li> <li>6. Supports an informed opinion: (APS – LA III.6): <ul style="list-style-type: none"> <li>• uses appropriate language, reasoning, and organizational structure for the audience and purpose,</li> <li>• provides relevant and convincing reasons, uses various types of evidence, and</li> <li>• demonstrates an awareness of possible questions, concerns, or counterarguments.</li> </ul> </li> <li>7. Responds to a variety of written, electronic, and other media (APS – LA III.7).</li> <li>8. Develops increased competence with speaking and language conventions (APS – LA IV.3).</li> </ol>	<p>1 – 16. The student, working alone or with a partner, researches a disease or syndrome of his/her choice and prepares a presentation (e.g., PowerPoint) for the class. The content includes the etiology of the disease or syndrome; all the signs and symptoms of the disease or syndrome; the biochemistry, microbiology, histology, and cellular processes of the disease or syndrome; normal prognosis of the disease; lab tests used to diagnose the disease or syndrome, including how the tests were performed, the normal values and the values observed in the case; and treatment of the animal, including how and why the treatment is given and the effectiveness of the treatment. The research is presented in a three-page paper that covers all the required content section. The paper must be double spaced, in New Times Roman font, 12-point font, normal margins, and include a bibliography that is in proper format (e.g., MLA). The presentation must be at least 20 minutes long and include at least 20 different slides which are used as a catalyst for the content and not be the sum of the project. In addition, the student submits five multiple-choice questions electronically which are included on the instructor’s final exam.</p> <ul style="list-style-type: none"> <li>✓ all required components</li> <li>✓ proper format</li> <li>✓ use of technology</li> <li>✓ teamwork/collaboration</li> <li>✓ thoroughness of research</li> <li>✓ synthesis and analysis of research</li> <li>✓ support for argument</li> <li>✓ effective writing elements and conventions</li> <li>✓ documentation of resources</li> <li>✓ quality presentation</li> </ul> <p>Although the above illustration is representative of a culminating project that meets all of the indicated performance standards, multiple opportunities are provided throughout the course for the student to demonstrate literacy skills and are evident in every strand.</p>

<b>GRADE 11 - 12</b>	<b>PERFORMANCE STANDARDS</b>	<b>ILLUSTRATIONS</b>
	<ul style="list-style-type: none"> <li>9. Listens to and analyzes a presentation or discussion (APS – LA V.1).</li> <li>10. Conducts research and collects data from in-depth field studies (APS – LA VI.1).</li> <li>11. Obtains and sends information electronically to support advanced research (APS – LA VI.2).</li> <li>12. Uses a variety of technology (APS – LA VI.5).</li> <li>13. Recognizes and continues to use the elements of formal citations to document sources (APS – LA VI.6).</li> <li>14. Accesses appropriate style manuals as research guides (APS – LA VI.7).</li> <li>15. Synthesizes information from multiple research studies to draw conclusions and inferences that go beyond those found in any of the individual studies (APS – LA VI.9).</li> <li>16. Synthesizes and organizes information from a variety of sources to inform and persuade an audience (APS – LA VI.9).</li> </ul>	