Escondido Union High School District

Veterinary Science

EUHSD Board Approval Date: 5/16/17

(Updated Instructional Materials 4/1/22)
The EUHSD Veterinary Science curriculum document identifies what students should be able to know and do in a comprehensive standards-based agricultural science course of study. The curriculum document is updated annually based on student academic achievement data, research and best practices, and input from stakeholders. The EUHSD curriculum document contains the following documents and/or information:

A. Course Description
B. Course Guidelines/Requirements - graduation credit information, transcript information, adopted materials, adopted technology, assessment outline
C. Instructional Materials References
D. Scope and Sequence Map with Essential Standards outlined by Unit
E. References to key essential design and implementation documents

The EUHSD Agriculture program is designed to meet both the California Content Standards for specific disciplines and to address key California Career Technical Education standards for specific industry sector pathways. The Animal Biological Science course was designed as a key course within the Agriculture and Natural Resources pathway, but also serves as a foundational "D" laboratory science course in the agriculture program. The curriculum document was written to address both pathway and overarching anchor standards as well as key Next Generation Science Standards.

Escondido Union High School District – Mission
Empowering every student to graduate prepared for college, career, and life through excellence in learning.

Escondido Union High School District – Vision
We relentlessly pursue, with optimism, equitable support for all students to navigate a changing world by providing rigorous and relevant learning experiences that strengthen their capacity as:

- Open-minded and invested collaborators;
- Effective and thoughtful communicators;
- Resourceful and creative problem solvers;
- Curious and analytical critical thinkers;
- Informed and compassionate community members.

Curriculum Design Resources
The curriculum document is aligned to the California Next Generation Science Standards and serves to support outcomes evidenced in the College and Career Readiness Standards for students in grades 9-12. A detailed list of resources around which the EUHSD curriculum is designed is as follows:

2. CA Next Generation Science Standards document: http://www.cde.ca.gov/pd/ca/sc/ngssintrod.asp
5. CTE Online: https://www.cteonline.org/outlines/qq5dxj/animal-science-cte-online-model
6. California Agricultural Education: https://www.calaged.org/

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Dr. Courtney Goode, Assistant Superintendent of Human Resources, Equity and Title IX Compliance Officer
302 N. Midway Drive, Escondido, CA 92027
Office: (760) 291-3281, Email: cgoode@euhsd.org
Veterinary Science Course Description

**Veterinary Science** is a course designed to provide students an applied scientific study in the area of animals and veterinary care. This course focuses on the application of animal anatomical and physiological knowledge to the maintenance and improvement of animal health to include; clinical diagnosis of disease and parasites, administration of medications, and common surgical procedures. Biological applications will include studies in cells, genetics, evolution, and ecology as they pertain to the animal/veterinary field. The feline dissection and various other livestock specimens will serve as a supplemental lab practicum throughout the duration of this course. Each unit includes a clinical practice component at the conclusion to put the knowledge learned into a real veterinary clinical situation. Additional emphasis will be placed on industry practices to include office procedures, public relations and communications, and laboratory skills. Veterinary Science courses impart information about the causes, diagnosis, and treatment of diseases and injuries of animals, typically emphasizing domestic and farm animals. Course topics focus on anatomy and physiology, nutrition, behavior, and reproduction, sanitation, and use of veterinary supplies and equipment.

The EUHSD agricultural education program is made up of three integrated parts: classroom instruction, FFA and a supervised agricultural experience (SAE). In this course students are provided opportunities for leadership development, personal growth and career success. Agricultural education instruction is delivered through three major components: Classroom/Laboratory instruction (contextual learning), Supervised Agricultural Experience programs (work-based learning), and student leadership organizations. The SAE is a required component of our agricultural education program and intended for every student. Through their involvement in the SAE program, students consider multiple careers and occupations, learn expected workplace behavior, develop specific skills within an industry, and are given opportunities to apply academic and occupational skills in the workplace or a simulated workplace environment. As part of students' agricultural coursework, they build and maintain a Record Book and Coursework Portfolio in which they will store artifacts and industry-related certificates, awards, etc. related to FFA leadership and Supervised Agricultural Experiences.

### Course Requirements

<table>
<thead>
<tr>
<th>Course Length:</th>
<th>Year Long</th>
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<tbody>
<tr>
<td>UC/CSU Requirement:</td>
<td>Meets UC/CSU “d” requirements</td>
</tr>
<tr>
<td>Course Number (Semester A):</td>
<td>4029</td>
</tr>
<tr>
<td>Course Number (Semester B):</td>
<td>4030</td>
</tr>
<tr>
<td>Required Prerequisite/s:</td>
<td>Biology &amp; Sustainable Agriculture or Biology &amp; Completion or Concurrent Enrollment in Algebra 1 or Math 1 (Integrated)</td>
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<tr>
<td>Recommended Prerequisite/s:</td>
<td></td>
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<tr>
<td>Industry Sector:</td>
<td>Agriculture and Natural Resources</td>
</tr>
<tr>
<td>Career Pathway:</td>
<td>Animal Science</td>
</tr>
<tr>
<td>Board Approval Date (Curriculum):</td>
<td>5/16/17</td>
</tr>
<tr>
<td>Board Approval Date (Materials):</td>
<td>8/31/04 (updated 4/1/22)</td>
</tr>
<tr>
<td>Core Instructional Material/s:</td>
<td>This course uses Open Educational Resources (OERs) in order to access current digital libraries that are pivoting rapidly to industry needs.</td>
</tr>
<tr>
<td>Technology Resource/s:</td>
<td>Chromebooks or other PC</td>
</tr>
<tr>
<td>Assessment/s:</td>
<td>Each unit of instruction outlines key performance-based tasks required in order to address specific CTE &amp; CA NGSS skills. Specific unit plans will be developed and will contain key unit formative and summative NGSS aligned assessments. Assessment is ‘science’ and three-dimensional learning must be assessed three dimensionally. To assess our students, we plan and conduct investigations about student learning and then analyze and interpret data to develop models of what students are thinking. These models allow us to predict the effect of additional teaching that addresses patterns we notice in student understanding and</td>
</tr>
</tbody>
</table>


misunderstanding. Assessment allows us to progressively improve our teaching practice, spiraling upward. Because of this strong link between assessment and instruction, this chapter is targeted to teachers and focuses on classroom assessment. It does not provide recommendations for district or state testing.

<table>
<thead>
<tr>
<th>Meeting the Needs of ELs:</th>
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<tbody>
<tr>
<td>• Utilize the student information system to acquire the language levels of EUHSD English Learners.</td>
</tr>
<tr>
<td>• In 2012, the CA Department of Education adopted new language level proficiency descriptors and new EL state standards. Visit the following website to learn more about those new descriptors and corresponding standards: <a href="http://www.cde.ca.gov/sp/el/er/documents/eldstndspublication14.pdf">http://www.cde.ca.gov/sp/el/er/documents/eldstndspublication14.pdf</a></td>
</tr>
<tr>
<td>• In 2014, the CA Department of Education adopted new ELA-ELD Framework, with specific strategies designed to meet the needs of EL students. Visit the following URL to learn more about the new frameworks: <a href="http://www.cde.ca.gov/ci/rl/cf/documents/elaeldfwchapter11.pdf">http://www.cde.ca.gov/ci/rl/cf/documents/elaeldfwchapter11.pdf</a></td>
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</table>
The Scope and Sequence Guide is a California standards-based document that delineates the standards-based skills students are expected to know and do in order to meet College and Career Readiness expectations. Each unit of study in the Scope and Sequence document is designed to build upon the previous unit and/or prerequisite coursework in support of student mastery of specific standards-based skills. The Scope and Sequence document provides the framework of understanding for key assignments, key assessments, and instructional resources and strategies that serve to assist students in meeting unit learning objectives. The document will be updated annually with input from all stakeholders.

In coursework requiring reading and writing, the following standards are not specifically stated in any one unit of study but are the result of implementation throughout the curriculum as students participate in reading, writing, and speaking/listening standards-based activities.

- **By the end of grade 11, students will read and comprehend literary nonfiction in the grades 11-CCR text completely and proficiently, with scaffolding as needed at the high range.** (Reading Informational Text Standard 10)
- **Students will write routinely over extending time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks and purposes.** (Writing Standard 10)
- “To be college and career ready, students must have ample opportunities to take part in a variety of rich and structured conversations – as part of a whole class, in small groups, and with a partner – build around important content in various domains. They must be able to contribute appropriately to conversations, make comparisons and contrasts, and analyze and synthesize a multitude of ideas according to the standards of evidence appropriate to a particular discipline.” (Standards for ELA Anchor Standards for Speaking/Listening)
Veterinary Science Scope and Sequence
Unit 1 – Introduction to Animal Anatomy, Physiology, and Veterinary Medicine

Unit Description: In Unit 1, students will learn the overall course objectives, grading procedures, and classroom procedures for safely working with animals. They will also discuss and compare the use of animals in society as pets, service animals and companion animals versus animals used for food production. Students will learn proper safety and regulations to include handling of animals, routine clinical procedures, surgical practices, and emergency situations. Students will also review the use of the microscope for routine testing as well as develop an understanding of prescription placement and the use of the autoclave machine. An overview of research and data collection procedures will be discussed as it pertains to veterinary medical cases. Students will begin to develop their foundation of medical terminology to include common abbreviations, suffixes, root words and measurements.

PE = Performance Expectations (White)
DCI = Disciplinary Core Ideas
SEP = Scientific & Engineering Practices
CCC = Cross Cutting Concepts

Agriscience Pathway Standards:
C4.1 Understand the evolution and roles of domesticated animals in society.
C4.4 Defend various points of view regarding the use of animals.
C4.5 Research unique and alternative uses of animals.

Animal Science Pathway Standards:
D1.3 Interpret animal behaviors and execute protocols for safe handling of animals.
D1.4 Defend the purpose and the safe and humane use of animal husbandry tools, such as hoof trimmers, electric shears, elastrators, dehorning tools, and scales.
D9.1 Evaluate the early warning signs of animal’s distress and how to rectify the problem.
D9.3 Summarize federal and state animal welfare laws and regulations, such as those dealing with abandoned and neglected animals, animal fighting, euthanasia, and medical research.

Cross Cutting Concepts:
• Systems and System Models

Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects:
9. Draw evidence from informational texts to support analysis, reflection, and research.
8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and

Learning Objectives:
Students will be able to…
• use appropriate industry vocabulary in oral and written presentations.
• identify and demonstrate the proper use of tools and supplies needed in the veterinary science field.
• explain the importance of hazards and safety when working with animals.
• demonstrate proper animal handling techniques to safely move and restrain animals.
• demonstrate routine clinical procedures and surgical practices.
• explain and defend the roles of various animals in society.
• analyze and summarize various print and digital source material.
• summarize key findings both orally and in writing.
• utilize the internet to conduct short and more sustained research tasks.
• create and maintain a digital portfolio.
• validate their findings and/or claims with research-based information.

Unit Assignments:
• Students will produce a computer-generated presentation of the importance of animals in society. They will work in pairs and present the information to the class.
• Students will be given practicum on routine restraints and be expected to demonstrate the common safety restraints specifically used for dogs and cats in a classroom setting. Students will take the role of assistant technician and veterinarian to work together for restraints such as lateral recumbency on a large dog, dorsal recumbency for a urine sample, and sternal recumbency for placement of x-rays.

Unit Assessments:
• Computer Generated Presentation
• Demonstration of Routine Restraints
• Unit Test (Teacher Designed)
• Explore and create a list and calendar of SAEs.
limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

**Reading Standards for Literacy in Science and Technical Subjects:**

9. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.

3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

2. Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

**Unit Resources:**

- [www.calagteachers.org](http://www.calagteachers.org) — Teacher Resource – Practicums on proper restraint
**Veterinary Science Scope and Sequence**

**Unit 2 – Cells and Tissues**

**Unit Description:** In Unit 2, students will review and explain the molecular makeup of cells. Students will identify the basic structures of the cell and their corresponding functions and differentiate between RNA and DNA. Students will be able to explain the basic structure and function of processes such as metabolism, anabolism, and catabolism. Students will discuss the stages of mitosis and its clinical significance in diseases such as cancer and be able to differentiate between benign and malignant cells. Meiosis of mammals will be discussed in detail.

**PE = Performance Expectations (White)**

**DCI = Disciplinary Core Ideas**

**SEP = Scientific & Engineering Practices**

**CCC = Cross Cutting Concepts**

Agriscience Pathway Standards:

C5.0 Compare the structure and function of plants, animals, bacteria, and viruses.
C5.1 Identify the function of cells.
C5.2 Analyze the anatomy and physiology of cells.
C5.3 Understand various cell actions, such as osmosis and cell division.
C5.4 Compare and contrast plant and animal cells, bacteria, and viruses.

Animal Science Pathway Standards:

D3.0 Apply principles of comparative anatomy and physiology to uses within various animal systems.
D3.1 Compare and contrast animal cells, tissues, organs, and body systems.

**PE HS-LS1-4**

Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

**DCI LS1-A: Structure and Function**

- Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)
- All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1) (Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)
- Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)

**Learning Objectives:**

**Students will be able to…**

- use industry vocabulary in conversation and in writing.
- explain the molecular makeup of cells.
- identify and explain the basic structures of the cell and their corresponding functions.
- discuss mitosis and its clinical significance in diseases such as cancer.
- detail meiosis in mammalian reproduction.
- connect cellular parts and function to clinical veterinary practice.
- describe the properties, locations, functions, and varieties of all tissue types.
- link knowledge of tissues to clinical practice.
- analyze and summarize various print and digital source material.
- summarize key findings both orally and in writing.
- utilize the internet to conduct short and more sustained research tasks.
- create and maintain a digital portfolio.
- complete a lab report.
- validate their findings and/or claims with research-based information.

**Unit Assignments:**

- Students will use a microscope to identify the cellular structures of a various animal cells. They will draw and label the organelles that they see and be expected to identify common cell samples under a microscope for assessment.
- Students will research a type of cancer common to the pet and livestock industries and prepare a short oral presentation for the class. Options for care, prognosis for the future and specific breeds known to be prone to cancer will be included in the presentation.

**Unit Assessments:**

- Unit Test (Teacher Designed)
- Cell Structure Lab Report
- Research Notes including annotated bibliography (APA citation)
- Oral Presentation
- Engage in FFA related SAEs and record experiences and artifacts in the Record Book and Career Portfolio.

- The sugar molecules thus formed contain carbon, hydrogen, and oxygen: their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (such as proteins or DNA), used for example to form new cells. (HS-LS1-6)
- As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another. Cellular respiration is a chemical process in which the bonds of food molecules and oxygen molecules are broken, and new compounds are formed that can transport energy to muscles. Cellular respiration also releases the energy needed to maintain body temperature despite ongoing energy transfer to the surrounding environment. (HS-LS1-7)

DCI LS1.B: Growth and Development of Organisms

- In multicellular organism’s individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism. (HS-LS1-4)

Science and Engineering Practices:

1. Asking Questions (for Science) and Defining Problems (for Engineering)
2. Developing and Using Models
3. Planning and Carrying out Investigations
4. Analyzing and Interpreting Data
5. Engaging in Argument from Evidence
6. Using Mathematics and Computational Thinking
7. Constructing Explanations (for Science) and Designing Solutions (for Engineering)
8. Obtaining, Evaluating, and Communicating Information
Cross Cutting Concepts:
4. Systems and System Models
6. Structure and Function

Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects:
9. Draw evidence from informational texts to support analysis, reflection, and research.
8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

Reading Standards for Literacy in Science and Technical Subjects:
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7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

2. Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

**Unit Resources:**
- Introduction to Veterinary Science textbook, Chapter 1 & 2
- [https://opentextbc.ca/anatomyandphysiology/chapter/4-1-types-of-tissues/](https://opentextbc.ca/anatomyandphysiology/chapter/4-1-types-of-tissues/) - Teacher Resource
- [https://www.biologycorner.com/category/worksheets/cell-biology/](https://www.biologycorner.com/category/worksheets/cell-biology/) Teacher or Student website resource on cell biology
**Veterinary Science Scope and Sequence**

**Unit 3 – Body Systems**


**Unit Description:** In Unit 3, students will examine all of the body systems including the components and functions of the organs within each system. Students will explain how the systems work in conjunction with one another and identify the basic structures; including their location within the body. Students will also explain the similarities and differences of organs and systems among species.

**Length:** ½ of Unit to be completed in Semester A – Remainder to be completed in Semester B

<table>
<thead>
<tr>
<th>Unit Assignments:</th>
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<tbody>
<tr>
<td>Muscle and Skeletal System:</td>
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<tr>
<td>• Begin Anatomical Overlay project: Students will draw and trace the anatomical parts of their selected specie of animal. This will include external parts, skeletal system, and eventually the organ system. Use of cardstock and transparencies to create overlay affect.</td>
</tr>
<tr>
<td>• Skeletal system painting lab. Students paint the appendicular and axial skeleton on live animals to include horse, cows, and sheep. Use washable paint and work in groups of 3-4. Must be able to name the bones as the teacher quizzes them afterward.</td>
</tr>
<tr>
<td>• Students will construct a long bone out of clay and create 'flags' to identify all the major parts. They will then transfer this knowledge to a real long bone and place tags on the major components using their clay model.</td>
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<tr>
<td>• Students will perform a dissection of the heart where they must identify the four major chambers of the heart and major blood vessels circulating blood throughout it.</td>
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<table>
<thead>
<tr>
<th>Learning Objectives: Students will be able to…</th>
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<tbody>
<tr>
<td>• use industry vocabulary in conversation and in writing.</td>
</tr>
<tr>
<td>• describe the functions of the musculoskeletal system.</td>
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<tr>
<td>• detail the structure of bone.</td>
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<tr>
<td>• name joint types and their accompanying role in movement.</td>
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<tr>
<td>• list the two major sections of the skeleton, name the corresponding bones, and compare species differentiation.</td>
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<tr>
<td>• explain how bone grows and remodels.</td>
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<tr>
<td>• relate bone and muscle groups to movement.</td>
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<tr>
<td>• connect the text materials pertaining to the musculoskeletal system to clinical practice.</td>
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<tr>
<td>• list blood components and explain the functions of blood.</td>
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<tr>
<td>• identify the basic structures of the mammalian heart.</td>
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<tr>
<td>• trace the flow of blood through the heart and body while detailing the parts of blood vessels and their structural significance. Use knowledge of heart function and control to explain the clinical significance of the</td>
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**Anatomical Overlay Project**

**Skeletal System Painting Lab**

**Skeletal Model**

**Heart Dissection Lab**

**Respiration Lab**

**Pig Carcass Dissection Lab**

**Kidney Dissection Lab**

**Urinalysis Lab**

**Digestive Track Lab**

**Ruminant Digestive System Lab**

**Breeding Writing Summary**

**Semen Viability Exam (Teacher Created)**

**FFA/SAE activities and**

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**Unit Assessments:**

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<th>Learning Objectives:</th>
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<tr>
<td>SEP = Scientific &amp; Engineering Practices</td>
<td>DCI = Disciplinary Core Ideas</td>
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DCI LS1.A: Structure and Function
- Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)
- All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1) (Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)
- Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)
- Feedback mechanisms maintain a living system’s internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

DCI LS3.B: Variation of Traits
- In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited. (HS-LS3-2)
- Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus, the variation and distribution of traits observed depends on both genetic and environmental factors. (HS-LS3-2), (HS-LS3-3)

Science and Engineering Practices:
1. Asking Questions (for Science) and Defining Problems (for Engineering)
2. Developing and Using Models
3. Planning and Carrying out Investigations
4. Analyzing and Interpreting Data
5. Using Mathematics and Computational Thinking

Respiratory System:
- Using a stethoscope, students will listen to lung sounds of various animals (dogs, cats, horses, sheep etc...) and practice taking respiratory rates and create a table illustrating different rates.
- The class will dissect a full-grown pig carcass and extract the respiratory system. Students will identify all major parts and learn how to inflate lungs.

Renal System:
- Students will dissect kidneys and identify all of the parts and functions. They must be able to label the kidneys on a diagram and discuss their functions.
- Students will learn how to perform a urinalysis and how to interpret lab results. This will help them to determine if a patient is in kidney failure. Having to interpret lab work will be a common procedure in the vet clinic.

Digestive System:
- Students will be put into groups to create models of either the monogastric or ruminant digestive system tracts. They will have to present their models to the class and also discuss step by step how food moves through the systems.
- Students will use a variety of online resources that will enable them to see a fistulated cow (has a hole in its side) to study the components of a ruminant animal. This will provide an overview of the ruminant digestive system and give students a direct view into the rumen of an animal. Write a 1-page summary of their findings.
- Students will add either the monogastric or ruminant digestive system to their anatomical overlay project. Which one they select depends upon the animal they choose at the beginning and its corresponding system.

Career Portfolio
- Maintenance of
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<th>Reproductive System:</th>
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<td>• Guest speakers from an Equine Center will discuss the stages of breeding horses beginning with their cycles. This will include all of the stages to include hormone therapy such as “short cycling” a mare to come into heat for breeding purposes. Stages of delivery and foal care will also be discussed. If possible, a trip to the breeding lab and equine center can also be arranged. Students will write a 1-page reflection summary of this experience.</td>
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• describe the neuron, the nerve impulse, and the synapse, and explain the components of a reflex arc. |
• identify the major structures of the brain and name associated functions. |
• discuss the anatomy and function of the spinal cord. |
• compare and contrast the function of the sensory somatic system to the autonomic nervous system and differentiate between the two branches of the autonomic system. |
• analyze and summarize various print and digital source material. |
• summarize key findings both orally and in writing. |
• utilize the internet to conduct short and more sustained research tasks. |
• create and maintain a digital portfolio. |
• complete a lab report. |
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9. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

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4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.

3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

2. Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

**Unit Resources:**

- Introduction to Veterinary Science textbook chapters 3, 4, 5, 6, 7, 8, 9
- [https://owl.english.purdue.edu/owl/](https://owl.english.purdue.edu/owl/) - Teacher or Student resource – Purdue Writing Lab
- [http://www.biology4kids.com/files/systems_main.html](http://www.biology4kids.com/files/systems_main.html) - Teacher or Student resource website on Body Systems
Veterinary Science Scope and Sequence  
Unit 4 – Animal Health & Nutrition

**Unit Description:** In Unit 4, students will be able to identify signs of a healthy or sick animal. Students will be able to identify the macronutrients needed in order to grow and maintain companion and livestock animals. Students will explain the general principles in animal nutrition and discuss the differences in nutritional requirements between species.

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**Learning Objectives:**

- Students will be able to:
  - use industry vocabulary in conversation and in writing.
  - list the six major components of animal diets and discuss their structure and significance in nutrition.
  - explain the general principles in animal nutrition.
  - describe the important features found on pet food labels and compare and contrast the nutritional requirements for dogs and cats.
  - discuss the horse's ability to digest fiber and the role in equine nutrition.
  - detail the ruminant's ability to digest fiber and its role in ruminant nutrition.
  - analyze and summarize various print and digital source material.
  - summarize key findings both orally and in writing.
  - utilize the internet to conduct short and more sustained research tasks.
  - create and maintain a digital portfolio.
  - complete a lab report.
  - validate their findings and/or claims with research-based information.

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**Unit Assessments:**

- Students will analyze feed samples, discussing the feed stuffs and learn how different feeds are processed. The teacher may introduce a guest speaker or utilize a variety of online resources to discuss feed options for raising livestock as market animals. Students will focus on identifying the different stages of growth and the components of the feed that will help the animal produce quality market products. Students summarize their findings in a report on a specific animal species.

- Students will conduct a macromolecule lab. The teacher may use the following resource [http://www.epcc.edu/Biology/Documents/Macromolecules/Macromolecules_Lab.pdf](http://www.epcc.edu/Biology/Documents/Macromolecules/Macromolecules_Lab.pdf) or other teacher generated resource in order to assist students in identifying the key characteristic structure and function in living organisms.

- Research project on Feed Options paper
- Oral Presentations on Research Project
- Macromolecule Lab Report
- FFA/SAE activities and maintenance of Career Portfolio

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**PE = Performance Expectations (White)**

**DCI = Disciplinary Core Ideas**

**SEP = Scientific & Engineering Practices**

**CCC= Cross Cutting Concepts**

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**Agriscience Pathway Standards:**

- C8.0 Understand fundamental animal nutrition and feeding.
  - C8.1 Identify types of nutrients required by farm animals (e.g., proteins, minerals, vitamins, carbohydrates, fats/oils, water).
  - C8.2 Analyze suitable common feed ingredients, including forages, roughages, concentrates, and supplements for ruminant, monogastric, equine, and avian digestive systems.
  - C8.3 Understand basic animal feeding guidelines and evaluate sample feeding programs for various species, including space requirements and economic considerations.
  - C9.0 Evaluate basic animal health.

**Animal Science Pathway Standards:**

- D2.0 Apply principles of animal nutrition to ensure the proper growth, development, reproduction, and economic production of animals.
  - D2.1 Assess the flow of nutrients from the soil, through the animal, and back to the soil.
  - D2.2 Explore the principles for providing proper, balanced rations for a variety of production stages in ruminants and monogastrics.
  - D2.3 Compare the digestive processes of the ruminant, monogastric, avian, and equine digestive systems.
  - D2.4 Distinguish how animal nutrition is affected by the digestive, endocrine, and circulatory systems.
  - D6.0 Prescribe and implement a prevention treatment program for animal diseases, parasites, and other disorders.
  - D6.1 Evaluate the signs of normal health in contrast to illness and disease.
  - D6.2 Analyze the importance of animal behavior in diagnosing animal sickness and disease.
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Unit Resources:
- Introduction to Veterinary Science textbook chapters 12 & 13
- http://www.alltech.com/ - Teacher Resource website on animal health and nutrition
- http://extensionpublications.unl.edu/assets/pdf/g1892.pdf – Teacher Resource – University of Nebraska – Article on Understanding and Using a Feed Analysis Report
- http://www.sustainabletable.org/260/animal-feed – Teacher or Student website resource Grace Communications Foundation
- https://owl.english.purdue.edu/owl/ - Teacher or Student Resource Writing Lab
Unit Description: In Unit 5, students will be able to identify signs of a healthy or sick animal. Students will be able to make observations to determine symptoms and diagnose diseases. Using knowledge of the animal’s immune system, students will develop an animal health plan to meet the needs of a growing animal both nutritionally and in order to prevent disease.

Learning Objectives: Students will be able to...
- use industry vocabulary in conversation and in writing.
- describe the indications that an animal is sick.
- define the term antigen and explain its significance in immunity.
- distinguish between passive and active immunity, differentiate between humoral and cellular immunity and their relationship in immunity, and explain primary and secondary immune response.
- describe Koch's postulates.
- list the important distinguishing features and give examples of major disease agents and discuss the resulting diseases.
- name the basic components of disease prevention.
- describe the types of vaccines available and their roles in disease prevention.
- classify diseases, match them with the domestic species in which they occur, and discuss their clinical significance.
- list and describe several diseases common in domestic animals that are contagious to humans.
- list the major methods used to diagnose disease and cite examples of disease diagnosis with each testing method.
- analyze and summarize various print and digital source material.

Unit Assignments:
- Students will create a parasite “catalog” with color pictures, life cycle and diagnosis/treatment. Explain the specific steps to diagnosis diseases and disorders by creating a visual chart to present to the class. Create a scenario to share with the class of an animal brought to the vet clinic for diagnosis; have class solve scenario.
- Disease Research Report. Students will be assigned a disease that they have to research and develop a presentation with information regarding this topic. Information should include viral, bacterial, fungal category, symptoms / signs, species affected, treatment, and long-term prognosis. Photos should be presented and / or videos of animals infected if possible. Possible methods of presenting include Power Point, Prezi, Google slides, or videos.
- Students will create a drug label for 5 different but common prescriptions given to animals. They will use 5 case studies with recommendations and prescriptions given from the veterinarian. They will use a prescription label sheet to write out the information needed using proper medical abbreviations. Students will be given a prescription amount and have to demonstrate their knowledge of how to use a pill counter and use knowledge of medical math to physically count the proper number of pills to administer. Students will use candy (skittles or M&Ms) to pretend they are pills with set dosages.

Unit Assessments:
- Parasite catalog
- Disease Research Report & Presentation
- Prescription Drug Label Report
- Prescription Dosage Demonstration Lab
- Unit Test (Teacher Created)
- FFA/SAE activities and maintenance of Career Portfolio
limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem. (HS-LS2-1), (HS-LS2-2)

**DCI LS4.C: Adaptation**

- Evolution is a consequence of the interaction of four factors: (1) the potential for a species to increase in number, (2) the genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for an environment’s limited supply of the resources that individuals need in order to survive and reproduce, and (4) the ensuing proliferation of those organisms that are better able to survive and reproduce in that environment. (HS-LS4-2)
- Natural selection leads to adaptation, that is, to a population dominated by organisms that are anatomically, behaviorally, and physiologically well suited to survive and reproduce in a specific environment. That is, the differential survival and reproduction of organisms in a population that have an advantageous heritable trait leads to an increase in the proportion of individuals in future generations that have the trait and to a decrease in the proportion of individuals that do not. (HS-LS4-3), (HS-LS4-4)
- Adaptation also means that the distribution of traits in a population can change when conditions change. (HS-LS4-3)
- Changes in the physical environment, whether naturally occurring or human induced, have thus contributed to the expansion of some species, the emergence of new distinct species as populations diverge under different conditions, and the decline—and sometimes the extinction—of some species. (HS-LS4-5)
- Species become extinct because they can no longer survive and reproduce in their altered environment. If members cannot adjust to change that is too fast or drastic, the opportunity for the species’ evolution is lost. (HS-LS4-5)

- summarize key findings both orally and in writing.
- utilize the internet to conduct short and more sustained research tasks.
- create and maintain a digital portfolio.
- complete a lab report.
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**Unit Resources:**
- Introduction to Veterinary Science textbook chapters 14, 15, 16, 17, 18
- [http://www.petdoc.ws/Pet_Health_Information.htm](http://www.petdoc.ws/Pet_Health_Information.htm) - Teacher Resource website of Pet Health Information Center
- [https://www.cdc.gov/healthypets/pets/farm-animals.html](https://www.cdc.gov/healthypets/pets/farm-animals.html) - Teacher Resource - Centers for Disease Control and Prevention
- [https://owl.english.purdue.edu/owl/](https://owl.english.purdue.edu/owl/) - Teacher or Student Resource – How to Write a Research Paper
Veterinary Science Scope and Sequence
Unit 6 – Animal Genetics

Unit Description: In Unit 6, students will utilize the information that they learned in Unit 2 on DNA and meiosis and relate those principles to genetics. Students will use the concepts of heritability to select desirable animals to keep in a breeding program. Students will need to differentiate between phenotypic and genotypic characteristics that will be passed on to their offspring. Students will describe how computers are used in order to effectively select animals with the best performance data to keep in a breeding program.

PE = Performance Expectations (White)
DCI = Disciplinary Core Ideas
SEP = Scientific & Engineering Practices
CCC = Cross Cutting Concepts

Agriscience Pathway Standards:
C7.0 Comprehend basic animal genetics.
C7.1 Differentiate between genotype and phenotype and describe how dominant and recessive genes function.
C7.2 Compare genetic characteristics among cattle, sheep, swine, and horse breeds.
C7.3 Predict phenotype and genotype ratios by using a Punnett Square.
C7.4 Explain the fertilization process.
C7.5 Distinguish between the purpose and processes of mitosis and meiosis.

Animal Science Pathway Standards:
D5.0 Discuss animal inheritance and selection principles, including the structure and role of deoxyribonucleic acid (DNA).
D5.1 Evaluate a group of animals for desired qualities and discern among them for breeding selection.
D5.2 Select animals, based on quantitative breeding values, for specific characteristics.
D5.3 Research and discuss current technology used to measure desirable traits.
D5.4 Predict phenotypic and genotypic results of a dominant and recessive gene pair.
D5.5 Research the role of mutations, both naturally occurring and artificially induced, and hybrids in animal genetics.

DCI LS3.A: Inheritance of Traits
- Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA. The instructions for forming species’ characteristics are carried in DNA. All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. Not all DNA codes for a protein; some segments

Learning Objectives:
Students will be able to...
- use industry vocabulary in conversation and in writing.
- discuss how producers use the laws of genetics to produce the type of livestock they want.
- describe how the concept of heritability is used in the selection of livestock.
- tell how phenotypic and genotypic characteristics differ.
- explain how performance data are used in the selection process.
- describe how computers are used in the modern selection process.
- analyze and summarize various print and digital source material.
- summarize key findings both orally and in writing.
- utilize the internet to conduct short and more sustained research tasks.
- create and maintain a digital portfolio.
- complete a lab report.
- validate their findings and/or claims with research-based information.

Unit Assignments:
- Students will construct a set of reasons on a breeding livestock class. They will evaluate the set of 4 animals for desired qualities of structure and muscling to determine which animals would be best suited to keep as breeding animals. Students will then present their set of reasons to the class. Students will submit their notes along with their presentation.
- Students will be assigned a genetic disorder common to a specific species. They will research information about the disorder as it pertains to the species and create an informational flyer using a computer program. Students will then participate in a gallery walk to learn about other genetic disorders.
- An AKC (American Kennel Club) dog breeder may come in as a guest speaker to discuss common genetic disorders associated with breeding the incorrect combination of dogs in relation to their color and what common outcomes (blind, deaf, all white, etc.) that occur. If the speaker is not available, the teacher will have students conduct research on the internet and/or provide links to online resources designed to meet the objectives of the task. Students will outline the various genetic tests that can be done prior to getting breeding dogs “certified” by a veterinarian.

Unit Assessments:
- Unit Test (Teacher Created)
- Breeding Livestock Oral Presentation & Notes
- Disorder Information Flyer
- Research paper on common genetic disorders
- FFA/SAE activities and maintenance of Career Portfolio
of DNA are involved in regulatory or structural functions, and some have no as-yet known function. (HS-LS3-1)

**DCI LS3.B: Variation of Traits**

- In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited. (HS-LS3-2)

**Science and Engineering Practices:**

1. Asking Questions (for Science) and Defining Problems (for Engineering)
2. Developing and Using Models
3. Planning and Carrying out Investigations
4. Analyzing and Interpreting Data
6. Using Mathematics and Computational Thinking
7. Constructing Explanations (for Science) and Designing Solutions (for Engineering)
8. Obtaining, Evaluating, and Communicating Information

**Cross Cutting Concepts:**

2. Cause and Effect: Mechanisms and Explanation
4. Systems and System Models

**Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects:**

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**Unit Resources:**
- [http://www.animalgenetics.us/Equine/Genetic_Disease/Index.asp](http://www.animalgenetics.us/Equine/Genetic_Disease/Index.asp) - Teacher or Student resource – Animal Genetics Inc. website
- [http://www.animalsdna.com/index.html](http://www.animalsdna.com/index.html) – Teacher or Student Resource website Orivet Genetic Pet Care
### Unit Description:
Unit 7 culminates with an extensive career search project. Students will conduct research on college education and career planning, work ethics and employability skills, write a resume and cover letter, practice interview techniques, and develop a professional portfolio.

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### CTE Anchor Standard:
- 3.0 Career Planning and Management
- 11.0 Demonstration and Application

### Science and Engineering Practices:
- 3. Planning and Carrying out Investigations
- 4. Analyzing and Interpreting Data
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### Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects:
- 9. Draw evidence from informational texts to support analysis, reflection, and research.
- 8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
- 7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
- 6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

### Learning Objectives:
**Students will be able to…**
- use industry vocabulary in conversation and in writing.
- research career opportunities available in the field of animal science and include the requirements for education, training, certification and licensure.
- develop a career plan that reflects career interest and postsecondary options.
- create a portfolio that includes resume, letters of recommendation and evaluation of skills and knowledge competency of pathway standards.
- analyze and summarize various print and digital source material.
- utilize the internet to conduct short and more sustained research tasks.
- validate their findings and/or claims with research-based information.

### Unit Assignments:
- Students will participate in mock phone conversations with common veterinary clinic/client interactions. Each student will take a turn playing the receptionist role and the client role. After the situation is completed, the class will discuss how each person reacted and what you as the client or receptionist should do in the situation.
- Students will develop a professional portfolio for a designated job opportunity in the veterinary science field. It will include a cover letter, resume, job application, a letter of recommendation and 4 pages to demonstrate skills with photos and descriptions.
- Each student will participate in a mock job interview situation to get practice with real job opportunities. Guest interviewers will be invited to come in to the class to conduct the interviews. They will all be asked to demonstrate a basic veterinary technical skill in front of the panel. Feedback and score sheets will be filled out for each student.

### Unit Assessments:
- Mock Veterinary Clinic demonstration
- Professional Portfolio & Research Paper
- Mock Interview
5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

**Reading Standards for Literacy in Science and Technical Subjects:**

9. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.

3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

2. Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

<table>
<thead>
<tr>
<th>Unit Resources:</th>
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<tbody>
<tr>
<td>Career Cruising Program – Teacher and/or student resource identifying educational requirements, schools/universities, etc.</td>
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<tr>
<td><a href="https://www.ageexplorer.com/">https://www.ageexplorer.com/</a> - Teacher or Student website on Future Careers in Agriculture</td>
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<td><a href="https://www.avma.org/ProfessionalDevelopment/Education/Accreditation/Colleges/Pages/colleges-accredited.aspx">https://www.avma.org/ProfessionalDevelopment/Education/Accreditation/Colleges/Pages/colleges-accredited.aspx</a> - Teacher or Student resource, list of accredited veterinary colleges</td>
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<tr>
<td><a href="https://resumegenius.com/cover-letters-the-how-to-guide">https://resumegenius.com/cover-letters-the-how-to-guide</a> - Teacher or Student resource, Resume Genius, how to write a resume</td>
</tr>
<tr>
<td><a href="https://owl.english.purdue.edu/owl/">https://owl.english.purdue.edu/owl/</a> - Purdue Online Writing Lab – Teacher or Student resource</td>
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<tr>
<td><a href="http://csb.uncw.edu/cen/documents/mockinterviewRubric-2.pdf">http://csb.uncw.edu/cen/documents/mockinterviewRubric-2.pdf</a> - Teacher Resource (Mock Interview Rubric)</td>
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<tr>
<td><a href="http://sciencepreps.iupui.edu/veterinary-school-interview-questions">http://sciencepreps.iupui.edu/veterinary-school-interview-questions</a> - Teacher Resource (Indiana University Mock Interview Questions Veterinary School Interview Questions)</td>
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