AP Biology Curriculum (SCI 315/ 316)

Date		Hobbs Science Standards 11th- 12th Grade	NM Standards & Benchmarks	Resources Basic text is Campbell: Biology
		By being embedded throughout the curriculum, these Processing Skills will be addressed throughout the year.		
		Students will be able to:	Strand, Standards, Benchmarks, & Performance Standards	Supplemental books, labs, videos, projects, digital curriculum
_____	**1**	1. Describe the essential components of an investigation, including appropriate methodologies, proper equipment, and safety precautions.	I, I, I, 1	Characteristics of Life Lab Measurement Lab
_____		2. Design and conduct scientific investigations that include: • Testable hypotheses • Controls and variables • Methods to collect, analyze, and interpret data • Results that address hypotheses being investigated • Predictions based on results • Re-evaluation of hypotheses and additional experimentation as necessary • Error analysis.	I, I, I, 2	Using a Microscope Lab Scientific Method- Optional Variable Lab Insecticide Lab Worm Lab Blood Flow Lab Genetics Lab
_____		3. Use appropriate technologies to collect, analyze, and communicate scientific data (e.g., computers, calculators, balances, microscopes).	I, I, I, 3	
_____		4. Convey results of investigations using scientific concepts, methodologies, and expressions, including: • Scientific language and symbols • Diagrams, charts, and other data displays • Mathematical expressions and processes (e.g., mean, median, slope, proportionality) • Clear, logical, and concise communication	I, I, I, 4	

_____		• Reasoned arguments. 5. Understand how scientific theories are used to explain and predict natural phenomena (e.g., plate tectonics, ocean currents, structure of atom).	I, I, I, 5	
_____	**2**	1. Understand how scientific processes produce valid, reliable results, including: • Consistency of explanations with data and observations • Openness to peer review • Full disclosure and examination of assumptions • Testability of hypotheses • Repeatability of experiments and reproducibility of results.	I, I, II, 1	
_____		2. Use scientific reasoning and valid logic to recognize: • Faulty logic • Cause and effect • The difference between observation and unsubstantiated inferences and conclusion • Potential bias	I, I, II, 2	
_____		3. Understand how new data and observations can result in new scientific knowledge.	I, I, II, 3	
_____		4. Critically analyze an accepted explanation by reviewing current scientific knowledge.	I, I, II, 4	
_____		5. Examine investigations of current interest in science (e.g., superconductivity, molecular machines, age of the universe).	I, I, II, 5	
_____		6. Examine 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.	I, I, II, 6	
_____	**3**	1. Create multiple displays of data to analyze and explain the relationships in scientific investigations.	I, I, III, 1	
_____		2. Use mathematical models to describe, explain, and predict natural phenomena.	I, I, III, 2	

_____		3. Use technologies to quantify relationships in scientific hypotheses (e.g., calculators, computer spreadsheets and databases, graphing software, simulations, modeling).	I, I, III, 3	
_____		4. *Identify and apply measurement techniques and consider possible effects of measurement errors.*	I, I, III, 4	
_____		5. *Use mathematics to express and establish scientific relationships (e.g., scientific notation, vectors, dimensional analysis*).	I, I, III, 5	
		Science and Technology		
_____	**4**	1. Know how science enables technology but also constrains it, and recognize 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).	III, I, I, 1	
_____		2. Understand how advances in technology enable further advances in science (e.g., microscopes and cellular structure; telescopes and understanding of the universe).	III, I, I, 2	
_____		3. Evaluate 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).	III, I, I, 3	
_____		4. Understand 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).	III, I, I, 4	
_____		5. Analyze the impact of digital technologies on the availability, creation, and dissemination of information.	III, I, I, 6	
_____		6. *Examine the role that New Mexico research facilities play in current space exploration (e.g., Very Large Array, Goddard Space Center*).	III, I, I, 7	

_____		7. Describe uses of radioactivity (e.g. nuclear power, nuclear medicine, radiometric dating).	III, I, I, 8	
_____		8. Understand how knowledge about the universe comes from evidence collected from advanced technology (e.g., telescopes, satellites, images, computer models).	II, III, I, 3	
_____		9. *Describe the key observations that led to the acceptance of the Big Bang theory and that the age of the universe is over 10 billion years*.	II, III, I, 4	
		Science and Society		
_____	**5**	1. Describe how human activities have affected ozone in the upper atmosphere and how it affects health and the environment.	III, I, I, 7	
_____		2. Describe 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).	III, I, I, 9	
_____		3. Describe major historical changes in scientific perspectives (e.g., atomic theory, germs, cosmology, relativity, plate tectonics, evolution) and the experimental observations that triggered them.	III, I, I, 10	
_____		4. Know 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).	III, I, I, 11	
_____		5. Describe how environmental, economic, and political interests impact resource management and use in New Mexico.	III, I, I, 13	
		Science and Individuals		
_____	**6**	1. *Describe New Mexico's role in nuclear science (e.g., Manhattan Project, WIPP, national laboratories*).	III, I, I, 14	
_____		2. Identify how science has produced knowledge that is relevant to individual health and material prosperity.	III, I, I, 15	

_____		3. Understand 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).	III, I, I, 16	
_____		4. Identify 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 the realm of science).	III, I, I, 17	
_____		5. Understand 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).	III, I, I, 18	
_____		6. Know 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).	III, I, I, 19	

AP Biology Curriculum (SCI 315/ 316)

(1st 9 weeks- 1st 4 ½ weeks)

Date		Hobbs Science Standards 11th- 12th Grade	NM Standards & Benchmarks	Resources Basic text is Campbell: Biology
		Students will be able to:	Strand, Standards, Benchmarks, & Performance Standards	Supplemental books, labs, videos, projects, digital curriculum
	7	**Molecules and Cells** **Biological Molecules and Metabolism**	 II, II, III, 1 II, II, III, 2 II, II, III, 3 II, II, III, 4	**APEX** Honors Biology Sem. 1- Unit 2 AP Biology Sem. 1- Unit 1
_____		1. Describe the structure of water.		
_____		2. Explain the process of hydrogen bonding in the different states and configurations of water.		Diffusion and Osmosis Enzyme Catalyzed Reactions
_____		3. Explain the "tempering" effect of water and its transitional states in the seasonal changes of environments.		
_____		4. Explain the bonding properties of carbon.		
_____		5. Name and describe the functional groups based on carbon.		
_____		6. Name and describe the molecular structure of the four classes of biological molecules.		
_____		7. Describe the processes involved in the synthesis of each of the biological molecules.		
_____		8. Explain the function of each of the biological molecules.		
_____		9. Describe the properties of enzymes.		

_____		10. Explain the role of enzymes in living organisms. 11. Differentiate between exergonic and endergonic reactions. 12. Describe the processes of competitive and non-competitive inhibition. 13. Explain the processes involved in the regulation of enzymatic activity.		
	8	**Cells** 1. Differentiate between prokaryotic and eukaryotic cells. 2. Postulate theories on the development/evolution of eurkaryotic cells. 3. Name and describe the functions of eukaryotic organelles. 4. Differentiate plant and animal cells based on their organelles and functions. 5. Describe interactions between organelles as part of the endomembrane system. 6. Describe the structure of the cell membrane and explain how its structure is matched to its function. 7. Describe the events of the cell cycle. 8. Explain the factors which determine the progress of a cell through the cell cycle. 9. Differentiate the cell cycle in plants and animal cells. 10. Describe the events of meiosis and the formation of gametes.	II, II, II, 1-7 II, II, III, 1-7	**APEX** Honors Biology Sem. 1- Unit 3 AP Biology Sem. 1- Unit 2 Mitosis and Meiosis

AP Biology Curriculum (SCI 315/ 316)

(1st 9 weeks- 2nd 4 ½ weeks)

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		Students will be able to:	Strand, Standards, Benchmarks, & Performance Standards	Supplemental books, labs, videos, projects, digital curriculum
	9	**Molecules and Cells** **Energy Transformations**	II, II, I, 1-5	**APEX** Honors Biology Sem. 1- Unit 4 AP Biology Sem. 2- Unit 1
_____		1. Explain the need for ATP in living organisms.		
_____		2. Describe the molecular structure of ATP.		Plant Pigments and Photosynthesis
_____		3. Explain the molecular changes which occur during phosphorylation.		Cellular Respiration
_____		4. Describe the structure of chloroplasts.		
_____		5. Name the events that occur in the light and dark reactions of photosynthesis.		
_____		6. Describe the role of enzymes in photosynthesis.		
_____		7. Explain the response of the photopigments to different wavelengths of light.		
_____		8. Design an experiment to test the effects of temperature and light on photosynthesis.		
_____		9. Design an experiment to differentiate photopigments utilizing paper chromatography.		
_____		10. Name the events that occur in each of the three reaction phases of cellular		

		respiration.		
_____		11. Describe the role of enzymes in cellular respiration.		
_____		12. Differentiate aerobic and anaerobic respiration in terms of location, requirements, and products.		
_____		13. Design an experiment to test the effect of temperature on cellular respiration in germinating and non-germinating seeds.		

AP Biology Curriculum (SCI 315/ 316)

(2nd 9 weeks- 3rd 4 ½ weeks)

Date		Hobbs Science Standards 11th- 12th Grade	NM Standards & Benchmarks	Resources Basic text is Campbell: Biology
		Students will be able to:	Strand, Standards, Benchmarks, & Performance Standards	Supplemental books, labs, videos, projects, digital curriculum
	10	**Genetics and Evolution** **Molecular Genetics**	II, II, II, 1-7 II, II, III, 1-7	**APEX** Honors Biology Sem. 2- Units 1 & 2 AP Biology Sem. 1- Unit 3
_____		1. Name and describe the molecular structure of DNA.		
_____		2. Explain the process for the replication of DNA.		Restriction Cleavage of DNA with Gel Electrophoresis
_____		3. Explain the roles of the enzymes involved in DNA replication.		
_____		4. Describe the process of DNA compacting which results in the formation of chromosomes.		
_____		5. Explain the theory of gel electrophoresis.		
_____		6. Interpret the results of a gel electrophoresis experiment.		
_____		7. Describe the molecular structure of RNA.		
_____		8. Differentiate DNA and RNA based on their molecular structures, functions, and locations.		
_____		9. Explain the processes of transcription and translation in the synthesis of proteins.		

_____ _____ _____		10. Correlate the structure and function of DNA with the synthesis of protein, using RNA as an intermediate. 11. Explain how mutations can occur in DNA replication, RNA transcription/translation, and protein synthesis. 12. Hypothesize the result of mutations which occur at the molecular level.		

AP Biology Curriculum (SCI 315/ 316)

(2nd 9 weeks- 4th 4 ½ weeks)

Date		Hobbs Science Standards 11th- 12th Grade	NM Standards & Benchmarks	Resources Basic text is Campbell: Biology
		Students will be able to:	Strand, Standards, Benchmarks, & Performance Standards	Supplemental books, labs, videos, projects, digital curriculum
	11	**Genetics and Evolution** **Molecular Genetics** 1. Explain the molecular basis for gene splicing. 2. Describe the role of enzymes in bacterial transformation. 3. Design an experiment which permits transformation of bacteria.	II, II, II, 1-7 II, II, III, 1-7	**APEX** Honors Biology Sem. 2- Units 1 & 2 AP Biology Sem. 1- Unit 3
	12	**Heredity** 1. Describe the processes by which the traits of living organisms are determined. 2. Explain how meiosis leads to the formation of haploid gametes. 3. Describe the principles of Mendelian genetics. 4. Predict the outcomes of genetic crosses. 5. Explain the interactions among genes and chromosomes which can alter genetic outcomes. 6. Interpret pedigrees and predict offspring based on pedigree analysis.	II, II, II, 1-7 II, II, III, 1-7	**APEX** Honors Biology Sem. 2- Units 1 & 2 AP Biology Sem. 1- Unit 4 Bacterial Transformation Genetics of Drosophila

_____		7. Describe some typical human genetic defects and the chromosomal alterations which cause them.		

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(3rd 9 weeks- 5th 4 ½ weeks)

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		Students will be able to:	Strand, Standards, Benchmarks, & Performance Standards	Supplemental books, labs, videos, projects, digital curriculum
	13	**Genetics and Evolution** **Evolution**	II, II, I, 8-9 II, II, II, 1-7 II, II, III, 1-7	**APEX** Honors Biology Sem. 2- Units 3 & 4 AP Biology Sem. 1- Unit 5 Population Genetics Lab
_____		1. Describe concepts relating to the origin of life, including biogeneis, abiogenesis.		
_____		2. Explain the theory of natural selection.		
_____		3. Use the Hardy-Weinberg equation to predict the genotypes of populations.		
_____		4. Describe processes which result in speciation.		
_____		5. Explain the events which can lead to the evolution/development of organisms as their environments change.		
	14	**Organisms and Populations** **Taxonomy**	II, II, I, 8-9	**APEX** Honors Biology Sem. 2- Unit 4 AP Biology Sem. 1- Unit 6
_____		1. Explain the need and processes for the classification of living organisms.		
	15	**Survey Phyla**	II, II, I, 8	**APEX** AP Biology Sem. 1- Unit 6
_____		1. Describe the structure of bacteria.		

_____ _____ _____ _____ _____ _____ _____		2. Describe the methods of reproduction in bacteria. 3. Differentiate bacteria based on their organization and response to environments. 4. Explain the roles of bacteria in the environment. 5. Describe the classification of protists based on structure and movement. 6. Explain the role of protists in the environment. 7. Hypothesize the evolution/development of protists as the first eukaryotic organisms. 8. Describe the structure and reproduction of fungi. 9. Explain the role of fungi in the environment.		Environmental Cultures of Bacteria Gram Staining Bacteria Microscopic Examination of Pond Water

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(3rd 9 weeks- 6th 4 ½ weeks)

Date		Hobbs Science Standards 11th- 12th Grade	NM Standards & Benchmarks	Resources Basic text is Campbell: Biology
		Students will be able to:	Strand, Standards, Benchmarks, & Performance Standards	Supplemental books, labs, videos, projects, digital curriculum
	16	**Organisms and Populations** **Plants**	II, II, I, 8	**APEX** Honors Biology Sem. 2- Unit 4 AP Biology Sem. 2- Unit 5
_____		1. Explain the diversity and classification of plants.		
_____		2. Hypothesize a process for the evolution/development of plants from fungi.		Transpiration Lab
_____		3. Describe the tissues of vascular plants.		
_____		4. Describe the processes of vascular plants which allow them to adapt to changes in environmental conditions.		
_____		5. Explain the importance of water in vascular plants.		
_____		6. Describe the movement of water through vascular plants.		
_____		7. Describe the reproductive processes and structures of plants.		
_____		8. Explain seed formation.		
_____		9. Describe the role of plant hormones in plant growth and survival.		

AP Biology Curriculum (SCI 315/ 316)

(4th 9 weeks- 7th 4 ½ weeks)

Date		Hobbs Science Standards 11th- 12th Grade	NM Standards & Benchmarks	Resources Basic text is Campbell: Biology
		Students will be able to:	Strand, Standards, Benchmarks, & Performance Standards	Supplemental books, labs, videos, projects, digital curriculum
	17	**Organisms and Populations** **Animals**	II, II, I, 8	**APEX** Honors Biology Sem. 2- Unit 5 AP Biology Sem. 2- Unit 2
_____		1. Describe the diversity and classification of animals.		
_____		2. Explain the characteristics of invertebrates.		Circulation Lab
_____		3. List the invertebrate phyla, giving an example of each invertebrate and the emergent properties it embodies.		
_____		4. Describe the tissues which comprise all animals.		
_____		5. Explain the organization of tissues into organs and systems.		
_____		6. Explain the role and importance of homeostasis in animals.		

AP Biology Curriculum (SCI 315/ 316)

(4th 9 weeks- 8th 4 ½ weeks)

Date		Hobbs Science Standards 11th- 12th Grade	NM Standards & Benchmarks	Resources Basic text is Campbell: Biology
		Students will be able to:	Strand, Standards, Benchmarks, & Performance Standards	Supplemental books, labs, videos, projects, digital curriculum
	18	**Organisms and Populations** **Animals** 1. Describe the characteristics of vertebrates. 2. Describe the structures and functions of the systems of vertebrates. 3. Explain the increasing complexity of organ systems in vertebrates. 4. Describe the adaptive qualities of vertebrates. 5. Identify and justify the emergent properties which distinguish each vertebrate phylum/class from the others. 6. Describe the developmental sequence of vertebrates.	II, II, I, 8	**APEX** Honors Biology Sem. 2- Unit 5 AP Biology Sem. 2- Unit 2 Basal Metabolic Rate Lab Behavior: Habitat Selection Dissolved Oxygen Lab
	19	**Ecology** 1. Describe the interactions of members of populations. 2. Define an ecosystem. 3. Describe the different ecosystems of the Earth.	II ,II, I, 1-4	**APEX** Honors Biology Sem. 2- Unit 3 AP Biology Sem. 2- Unit 6

_____ _____		4. Describe the cycles which provide a constant supply of water, nitrogen, carbon, and phosphorus to living organisms. 5. Explain the importance of balance within ecosystems in the maintenance of populations and species.		