

## ***2006-2007 Curriculum Guide West Carroll High School (Grades 9-12)***

# **Illinois Learning Standards**

## **Science**

The *Illinois Learning Standards for Science* were developed using the 1985 State Goals for Science, the National Science Education Standards, various other state and national works, and local education standards contributed by team members.

Science is a creative endeavor of the human mind. It offers a special perspective of the natural world in terms of understanding and interaction. The aim of science education is to develop in learners a rich and full understanding of the inquiry process; the key concepts and principles of life sciences, physical science, and earth and space sciences; and issues of science, technology, and society in historical and contemporary contexts. The National Science Education Standards present these understandings and their interactions with the natural world as eight science content standard categories. The *Illinois Learning Standards for Science* integrate these categories into a powerful resource for the design and evaluation of science curricula taught in Illinois schools.



Goal 11 - Inquiry and Design 📄 🗑️

Goal 12 - Concepts and Principles 📄 🗑️

Goal 13 - Science, Technology and Society 📄 🗑️

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Course: Living Science

Instructor: Mrs. Kathleen Gehant

State Goal 11: Understand the processes of scientific inquiry and technological design to investigate questions, conduct experiments and solve problems.

State Learning Standards	Benchmark Level – EARLY High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
11A. Know and apply the concepts, principles, and processes of scientific inquiry	11.A.4a Formulate hypotheses referencing prior research and knowledge.	Through various experiments the student will practice using scientific inquiry by using IF and THEN statements based on their research	Plant-Plant Adaptation Experiment  Predicting plant growth  Weather Reports	December
	11.A.4b Conduct controlled experiments or simulations to test hypotheses.	The student will make a prediction in given simulations and then test hypothesis	Experiments:  Testing PH of rain water and city water samples in your geographic area  Local Home Extension  Local water works Superintendent  Scientific Method	August-September
	11.A.4c Collect, organize and analyze data accurately and precisely	Through various experiments, the learner will practice conducting controlled experiments	Experiments:  Predict/compare reactions times with partners	
	11.A.4d Apply statistical methods to the data to reach and support	Student will classify and sort data and then graph	Owl Pellet Project  Classify and sort any	

	conclusions.		collection of items	
	11.A.4e Formulate alternative hypotheses to explain unexpected results.	Not applicable to this level in Living Science  Taught in General Science		
	11.A.4f Using available technology, report, display and defend to an audience conclusions drawn from investigations.	Student will investigate and research human or animal disease and present in Power Point Form	Internet Site: <a href="http://www.awf.org">www.awf.org</a>  Library Sources <u>National Geographic</u>  <u>Ranger Rick</u>	

11B. Know and apply the concepts, principles and processes of technological design.	11.B.4a Identify a technological design problem inherent in a commonly used product.	Student will choose a common household tool of their choice and list design benefits	Tools Car parts Non motorized devices  Tweezers Hinge	
	11.B.4b Propose and compare different solution designs to the design problem based upon given constraints including available tools, materials and time.	Not applicable to this level in Living Science  Taught in General Science		
	11.B.4c Develop working visualizations of			

	the proposed solution designs (e.g., blueprints, schematics, flowcharts, cad-cam, animations).			
	11.B.4d Determine the criteria upon which the designs will be judged, identify advantages and disadvantages of the designs and select the most promising design.	Student will design blue print to scale of their bedroom or classroom using proper scale	Bedroom drawing  Blueprint Examples  Classroom drawing  Measuring to scale lesson  Calulator	
	11.B.4e Develop and test a prototype or simulation of the solution design using available materials, instruments and technology.	Student will take their blueprint and build a scale model from their blueprint	Cardboard Design books  Glue, Ruler, Calculator Scissors	
	11.B.4f Evaluate the test results based on established criteria, note sources of error and recommend improvements.	Not applicable to this level in Living Science  Not being taught at this level		
	11.B.4g Using available technology, report to an audience the relative success of the design based on the test results and criteria.	Student will present room model to class using criteria set for evaluation and determine success of project	Model Written Report	

Course: Living Science

Instructor: Mrs. Kathleen Gehant

State Goal 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences

State Learning Standards	Benchmark Level- EARLY High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
12 A. Know and apply concepts that explain how living things function, adapt and change.	12.A.4a Explain how genetic combinations produce visible effects and variations among physical features and cellular functions of organisms.	Students will demonstrate the effects of genetic combinations using Punnet Squares.	Punnet Squares  Dice Game	September
	12.A.4b Describe the structures and organization of cells and tissues that underlie basic life functions including nutrition, respiration, cellular transport, biosynthesis and reproduction.	Student will define cellular respiration and explain the process of how the cells breaks down food and releases energy	Text: General Science/  Library: Cells the Basic Unit of Life	September
	12.A.4c Describe processes by which organisms change over time using evidence from comparative anatomy and physiology, embryology, the fossil record, genetics and biochemistry.	Not applicable to Living Science  Taught in General Biology, Biology I, Anatomy and Physiology		

Course: Living Science

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State Goal 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences

12B. Know and apply concepts that describe how living things interact with each other and with their environment.	12.B.4a Compare physical, ecological and behavioral factors that influence interactions and interdependence of organisms.	Students will address factors that influence animal behavior as well as system behavior.	Kingdom Booklet Internet research Animal habitats Animal reproduction	November
	12.B.4b Simulate and analyze factors that influence the size and stability of populations within ecosystems (e.g., birth rate, death rate, predation, migration patterns).	Not applicable to Living/Basic Science		
12C. Know and apply concepts that describe properties of matter and energy and the interactions between them.	12.C.4a Use kinetic theory, wave theory, quantum theory and the laws of thermodynamics to explain energy transformations.	Not applicable to Living/Basic Science		
	12.C.4b Analyze and explain the atomic and nuclear structure of matter.	Not applicable to Living/Basic Science Chemistry		
12D. Know and apply concepts that describe force and motion and the principles that explain them.	12.D.4a Explain and predict motions in inertial and accelerated frames of reference.	Not applicable to Living/Basic Science Taught in Physical Science and Physics		

	12.D.4b Describe the effects of electromagnetic and nuclear forces including atomic and molecular bonding, capacitance and nuclear reactions.	Not applicable to Living/Basic Science  Chemistry		
12E. Know and apply concepts that describe the features and processes of the Earth and its resources.	12.E.4a Explain how external and internal energy sources drive Earth processes (e.g., solar energy drives weather patterns; internal heat drives plate tectonics).	Not applicable to Living/Basic Science  Environmental Science and Earth Science		
	12.E.4b Describe how rock sequences and fossil remains are used to interpret the age and changes in the Earth.	Not applicable to Living/Basic Science  Taught in General Science, Environmental Science, Earth Science		
	12.F.4a Explain theories, past and present, for changes observed in the universe	Students will discuss changes that have occurred on earth through the ages.	Current Events  Newspaper Discussion and reflection	March
	12.F.4b Describe and compare the chemical and physical characteristics of galaxies and objects within galaxies (e.g., pulsars, nebulae, black holes, dark matter, stars).	Not applicable to Living Science	Taught in Earth Science	

Course: Living Science

Instructor: Mrs. Kathleen Gehant

State Goal 13: Understand the relationships among science, technology and society in historical and contemporary contexts.

State Learning Standards	Benchmark Level- EARLY High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
13A. Know and apply the accepted practices of science.	13.A.4a Estimate and suggest ways to reduce the degree of risk involved in science activities.	Student will identify possible hazards and list ways to avoid hazards	Class discussion  Lab Safety Posters	
	13.A.4b Assess the validity of scientific data by analyzing the results, sample set, sample size, similar previous experimentation, possible misrepresentation of data presented and potential sources of error.	Student will given a written lab report which yielded unexpected results	Printed Lab Report	
	13.A.4c Describe how scientific knowledge, explanations and technological designs may change with new information over time (e.g., the understanding of DNA, the design of computers).	Student will state the importance of DNA in criminal investigations and real life situations	News articles  Magazine articles	
	13.A.4d Explain how peer review helps to assure the accurate use of data and improves the scientific process.	Student will share experimental findings using comparisons with classmates	Breathing Lab	

B. Know and apply concepts that describe the interaction between science, technology and society.	13.B.4a Compare and contrast scientific inquiry and technological design as pure and applied sciences.	Not applicable at this level in Living Science		
	13.B.4b Analyze a particular occupation to identify decisions that may be influenced by a knowledge of science.	Student will research famous scientists and the contributions that have made life easier.	Internet Sites Famous Scientists	
	13.B.4c Analyze ways that resource management and technology can be used to accommodate population trends.	Students will describe a wetland and its importance to the survival of many species	Guest Speaker: Department of Natural Resources and local Duck's Unlimited representative	
	13.B.4d Analyze local examples of resource use, technology use or conservation programs; document findings; and make recommendations for improvements.	Students will be introduced to local, state and federal agencies that are responsible for resource management in their local area	Guest Speaker: Department of Natural Resources	
	13.B.4e Evaluate claims derived from purported scientific studies used in advertising and marketing strategies.	Not applicable to this level of Living Science		

Course: General Science

Instructor: Anita Hollewell

STATE GOAL 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.

State Learning Standards	Benchmark Level-Early High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
A. Know and apply concepts that explain how living things function, adapt and change.	12.A.4a Explain how genetic combinations produce visible effects and variations among physical features and cellular functions of organisms.	N/A		
	12.A.4b Describe the structures and organization of cells and tissues that underlie basic life functions including nutrition, respiration, cellular transport, biosynthesis and reproduction.	N/A		
	12.A.4c Describe processes by which organisms change over time using evidence from comparative anatomy and physiology, embryology, the fossil record, genetics and biochemistry.	N/A		

Course: General Science

Instructor: Mrs. Anita Hollewell

STATE GOAL 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.

State Learning Standards	Benchmark Level-Early High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
B. Know and apply concepts that describe how living things interact with each other and with their environment.	12.B.4a Compare physical, ecological and behavioral factors that influence interactions and interdependence of organisms.	Students will learn about ecosystems and relationships between members.	Students will make a poster of an ecosystem and identify biotic and abiotic factors, and interactive relationships.	November
	12.B.4b Simulate and analyze factors that influence the size and stability of populations within ecosystems (e.g., birth rate, death rate, predation, migration patterns).	Students will learn about population size changes and identify the effecting factors.	Students will analyze the hare/lynx predation pair and other factors that affect population size.	November

Course: General Science

Instructor: Anita Hollewell

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State Learning Standards	Benchmark Level-Early High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
C. Know and apply concepts	12.C.4a Use kinetic theory, wave theory, quantum theory and the laws of thermo-	Students will determine energy needed	Students will chart energy changes in	October

that describe properties of matter and energy and the interactions between them.	dynamics to explain energy transformations.	or given up during changes of state.	calories and temperature changes in degrees.	
	12.C.4b Analyze and explain the atomic and nuclear structure of matter.	Students will study the structure of the periodic table and understand its relationship to atomic structure.	Students will determine numbers of subatomic particles necessary to account for mass and charge of an atom.	October

Course: General Science

Instructor: Anita Hollewell

STATE GOAL 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.

State Learning Standards	Benchmark Level- Early High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
D. Know and apply concepts that describe force and motion and the principles	12D.4a Explain and predict motions in inertial and accelerated frames of reference.	N/A		

that explain them.				
	12D.4b Describe the effects of electromagnetic and nuclear forces including atomic and molecular bonding, capacitance and nuclear reactions.	N/A		

Course: General Science

Instructor: Anita Hollewell

STATE GOAL 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.

State Learning Standards	Benchmark Level- Early High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
E. Know and apply concepts that describe the features and processes of the Earth and its resources.	12.E.4a Explain how external and internal energy sources drive Earth processes (e.g., solar energy drives weather patterns; internal heat drives plate tectonics).	Students will use models to show changes in the position of plates.	Students will start with Pangaea and draw the different positions of tectonic plates over the years.	November
	12.E.4b Describe how rock sequences and fossil remains are used to interpret the age and changes in the Earth.	N/A		

Course: General Science

Instructor: Anita Hollewell

STATE GOAL 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.

State Learning Standards	Benchmark Level-Early High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
F. Know and apply concepts that explain the composition and structure of the universe and Earth's place in it.	12.F.4a Explain theories, past and present, for changes observed in the universe.	N/A		
	12.F.4b Describe and compare the chemical and physical characteristics of galaxies and objects within galaxies (e.g., pulsars, nebulae, black holes, dark matter, stars).	N/A		

Course: General Science

Instructor: Anita Hollewell

STATE GOAL 13: Understand the relationships among science, technology and society in historical and contemporary contexts.

State Learning Standards	Benchmark Level-Early High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
A. Know and apply the accepted practices of science.	13.A.4a Estimate and suggest ways to reduce the degree of risk involved in science activities.	N/A		

	13.A.4b Assess the validity of scientific data by analyzing the results, sample set, sample size, similar previous experimentation, possible misrepresentation of data presented and potential sources of error.	N/A		
	13.A.4c Describe how scientific knowledge, explanations and technological designs may change with new information over time (e.g., the understanding of DNA, the design of computers).	N/A		

Course: General Science

Instructor: Mrs. Anita Hollewell

State Goal 13: Understand the relationships among science, technology and society in historical and contemporary contexts.

State Learning Standards	Benchmark Level-Early High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
B. Know and apply concepts that describe the interaction between science, technology and society.	13.B.4a Compare and contrast scientific inquiry and technological design as pure and applied sciences.	N/A		
	13.B.4b Analyze a particular occupation to identify decisions that may be influenced by a knowledge of science.	Students will examine changes in building materials over the years.	Students will list new building materials and their uses.	February

	13.B.4c Analyze ways that resource management and technology can be used to accommodate population trends.	Students will explore new ways to recycle and reuse materials.	Students will analyze their own garbage for items that can be reused.	February
	13.B.4d Analyze local examples of resource use, technology use or conservation programs; document findings; and make recommendations for improvements.	N/A		
	13.B.4e Evaluate claims derived from purported scientific studies used in advertising and marketing strategies.	N/A		

Course: General Biology

Instructor: Mrs. Michelle Konrardy

STATE GOAL 11: Understand the processes of scientific inquiry and technological design to investigate questions, conduct experiments and solve problems.

State Learning Standards	Benchmark Level – EARLY High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
11A. Know and apply the concepts, principles, and processes of scientific inquiry	11.A.4a Formulate hypotheses referencing prior research and knowledge.	Through various experiments, the learner will practice using scientific inquiry in the form of If and Then statements based upon his/her research	Experiments: Blood Typing  Heart Rate  Etc.	September thru May
	11.A.4b Conduct controlled experiments or simulations to test hypotheses.	Through various experiments, the learner will practice designing procedures to test their hypotheses.	Experiments:  Heart Rate  Breathing Rate  Nutritional Diet	September thru December
	11.A.4c Collect, organize and analyze data accurately and precisely	Through various experiments, the learner will practice conducting controlled experiments.	Experiments: Blood Typing  Heart Rate  Etc.	September thru May
	11.A.4d Apply statistical methods to the data to reach and support conclusions.	Through various experiments, the learner will practice using statistical methods and posing predictions.	Experiments: Blood Typing  Heart Rate  Etc.	September thru May
	11.A.4e Formulate alternative hypotheses to explain unexpected results.	The learner will practice through experimentation alternative hypotheses and discuss unexpected results.	Experiments:  Heart Rate  Breathing Rate	September thru December

			Nutritional Diet	
	11.A.4f Using available technology, report, display and defend to an audience conclusions drawn from investigations.	Through a detailed professional Lab Report, the learner will prove their process and results to a professional	Experiments: Blood Typing  Heart Rate  Etc.	September thru May
11B. Know and apply the concepts, principles and processes of technological design.	11.B.4a Identify a technological design problem inherent in a commonly used product.	Students will report and discuss design issues of tools.	Discussion: ergonomic tools (Skeletal and Muscular)	November
	11.B.4b Propose and compare different solution designs to the design problem based upon given constraints including available tools, materials and time.	Students will report and discuss design issues of tools.	Discussion: ergonomic tools (Skeletal and Muscular)	November
	11.B.4c Develop working visualizations of the proposed solution designs (e.g., blueprints, schematics, flowcharts, cad-cam, animations).	Not Applicable to General Science  Taught in: Physical Science, Physics		
	11.B.4d Determine the	Not Applicable to General Science		

	criteria upon which the designs will be judged, identify advantages and disadvantages of the designs and select the most promising design.	Taught in: Physical Science, Physics		
	11.B.4e Develop and test a prototype or simulation of the solution design using available materials, instruments and technology.	Not Applicable to General Science  Taught in: Physical Science, Physics		
	11.B.4f Evaluate the test results based on established criteria, note sources of error and recommend improvements.	Not Applicable to General Science  Taught in: Physical Science, Physics		
	11.B.4g Using available technology, report to an audience the relative success of the design based on the test results and criteria.	Not Applicable to General Science  Taught in: Physical Science, Physics		

Course: General Biology

Instructor: Mrs. Michelle Konrardy

State Goal 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.

State Learning Standards	Benchmark Level- EARLY High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
12 A. Know and apply concepts that explain how living things function, adapt and change.	12.A.4a Explain how genetic combinations produce visible effects and variations among physical features and cellular functions of organisms.	Students will demonstrate the effects of genetic combinations using Punnet Squares.	Punnet Squares “Super heroes” Etc.	April & May
	12.A.4b Describe the structures and organization of cells and tissues that underlie basic life functions including nutrition, respiration, cellular transport, biosynthesis and reproduction.	Students will be able to describe and build a model of a cell and tissue organization, indicating all parts involved in basic life functions.	Cell Model Human Tissue Model Etc.	September & October
	12.A.4c Describe processes by which organisms change over time using evidence from comparative anatomy and physiology, embryology, the fossil record, genetics and biochemistry.	Students will develop a phylogenic tree and trace a fossil history.	Phylogenic Tree Lab Trilobyte Lab Etc.	May

<p>12B. Know and apply concepts that describe how living things interact with each other and with their environment.</p>	<p>12.B.4a Compare physical, ecological and behavioral factors that influence interactions and interdependence of organisms.</p>	<p>Students will address factors that influence animal behavior as well as system behavior.</p>	<p>Nutritional behavior of organisms  Animal reproduction  Kingdom Booklet  Etc.</p>	<p>September thru May</p>
	<p>12.B.4b Simulate and analyze factors that influence the size and stability of populations within ecosystems (e.g., birth rate, death rate, predation, migration patterns).</p>	<p>Students will discuss and reflect on Population stability</p>	<p>Research: China population control  Movie “The Lost Daughters of China”  Etc.</p>	<p>May</p>
<p>12C. Know and apply concepts that describe properties of matter and energy and the interactions between them.</p>	<p>12.C.4a Use kinetic theory, wave theory, quantum theory and the laws of thermodynamics to explain energy transformations.</p>	<p>Not Applicable to General Science  Taught in: Physical Science, Physics</p>		
	<p>12.C.4b Analyze and explain the atomic and nuclear structure of matter.</p>	<p>Not Applicable to General Science  Taught in: Chemistry, Physics</p>		

12D. Know and apply concepts that describe force and motion and the principles that explain them.	12.D.4a Explain and predict motions in inertial and accelerated frames of reference.	Not Applicable to General Science  Taught in: Physical Science, Physics		
	12.D.4b Describe the effects of electromagnetic and nuclear forces including atomic and molecular bonding, capacitance and nuclear reactions.	Not Applicable to General Science  Taught in: Physical Science, Chemistry, Physics		
12E. Know and apply concepts that describe the features and processes of the Earth and its resources.	12.E.4a Explain how external and internal energy sources drive Earth processes (e.g., solar energy drives weather patterns; internal heat drives plate tectonics).	Not Applicable to General Science  Taught in: Environmental Science, Earth Science		
	12.E.4b Describe how rock sequences and fossil remains are used to interpret the age and changes in the Earth.	Not Applicable to General Science  Taught in: General Science, Environmental Science, Earth Science		
12F. Know and apply concepts that explain the composition and structure	12.F.4a Explain theories, past and present, for changes observed in the universe.	Not Applicable to General Science  Taught in: Physics		

of the universe and Earth's place in it.				
	12.F.4b Describe and compare the chemical and physical characteristics of galaxies and objects within galaxies (e.g., pulsars, nebulae, black holes, dark matter, stars).	Not Applicable to General Science  Taught in: Earth Science		

Course: General Biology

Instructor: Mrs. Michelle Konrardy

State Goal 13: Understand the relationships among science, technology and society in historical and contemporary contexts.

State Learning Standards	Benchmark Level- EARLY High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
13A. Know and apply the accepted practices of science.	13.A.4a Estimate and suggest ways to reduce the degree of risk involved in science activities.	Students will discuss and analyze possible hazards and brainstorm solutions	Class Discussion & Various posters (ex. Matching hazards worksheet, etc.)	September
	13.A.4b Assess the validity of scientific data by analyzing the results, sample set, sample size, similar previous experimentation, possible misrepresentation of	Students will use the scientific method to validate scientific data.	Class Experiments (ex. Blood Lab)  Class Lab Reports over various labs	September thru May

	data presented and potential sources of error.			
	13.A.4c Describe how scientific knowledge, explanations and technological designs may change with new information over time (e.g., the understanding of DNA, the design of computers).	Students will discuss and reflect on the changes science has made to technology.	Critical Thinking exercises in Muscle and Skeletal systems, Nerve design, Genetic Engineering  Additional textbook reading inserts on Technology,  Etc.	September thru February
	13.A.4d Explain how peer review helps to assure the accurate use of data and improves the scientific process.	Students will share experimental findings, comparing processes.	Blood Lab, Breath Lab, Bothead Lab,  Etc.	September thru February
B. Know and apply concepts that describe the interaction between science, technology and society.	13.B.4a Compare and contrast scientific inquiry and technological design as pure and applied sciences.	Not Applicable to General Science  Taught in: Environmental Science, College Biology		
	13.B.4b Analyze a particular occupation to identify decisions that may be influenced by the knowledge of	Students will ongoing study, discuss, and reflect on jobs that require a use of science.	Biology in Life  Medical Identification Internet	September thru May

	science.		Activity Etc.	
	13.B.4c Analyze ways that resource management and technology can be used to accommodate population trends.	Not Applicable to General Science  Taught in: Environmental Science		
	13.B.4d Analyze local examples of resource use, technology use or conservation programs; document findings; and make recommendations for improvements.	Not Applicable to General Science  Taught in: Environmental Science		
	13.B.4e Evaluate claims derived from purported scientific studies used in advertising and marketing strategies.	Not Applicable to General Science  Taught in: Environmental Science, College Biology, River & Prairie Ecology		

Course: Chemistry I

Instructor: Mrs. Michelle Konrardy

STATE GOAL 11: Understand the processes of scientific inquiry and technological design to investigate questions, conduct experiments and solve problems.

State Learning Standards	Benchmark Level – LATE High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
11A. Know and apply the concepts, principles, and	11.A.5a Formulate hypotheses referencing prior	Through various experiments, the learner will practice using scientific	Experiment: Flame Test	Mid - November

processes of scientific inquiry	research and knowledge.	inquiry in the form of If and Then statements based upon his/her research.		
	11.A.5b Design procedures to test the selected hypotheses.	Through various experiments, the learner will practice designing procedures to test their hypotheses.	Experiment: Flame Test	Mid - November
	11.A.5c Conduct systematic controlled experiments to test the selected hypotheses.	Through various experiments, the learner will practice conducting controlled experiments.	Experiment: Bean Bag Isotopes; Flame Test; etc.	October; November
	11.A.5d Apply statistical methods to make predictions and to test the accuracy of results.	Through various experiments, the learner will practice using statistical methods and posing predictions.	Experiment: Bean Bag Isotopes	Mid October
	11.A.5e Report, display and defend the results of investigations to audiences that may include professionals and technical experts.	Through a detailed professional Lab Report, the learner will prove their process and results to a professional.	Experiment: Flame Test	Early November
11B. Know and apply the concepts, principles and	11.B.5a Identify a design problem that has practical	Through a detailed professional Lab Report, the learner	Experiment: Identification of Unknowns	May

processes of technological design.	applications and propose possible solutions, considering such constraints as available tools, materials, time and costs.	will prove their process and results to a professional		
	11.B.5b Select criteria for a successful design solution to the identified problem.	Through a detailed professional Lab Report, the learner will prove their process and results to a professional	Experiment: Identification of Unknowns	May
	11.B.5c Build and test different models or simulations of the design solution using suitable materials, tools and technology.	Through a detailed experiment, the learner will build a model using suitable materials.	Experiment: Plotting Periodic Trends	December
	11.B.5d Choose a model and refine its design based on the test results.	Through a detailed experiment, the learner will make needed modifications of the experiments design.	Experiment: Plotting Periodic Trends	December
	11.B.5e Apply established criteria to evaluate the suitability, acceptability, benefits, drawbacks and consequences for the tested	Through a detailed experiment, the learner will evaluate the drawbacks and consequences for the experiment and make needed modifications.	Experiment: Plotting Periodic Trends	December

	design solution and recommend modifications and refinements.			
	11.B.5f Using available technology, prepare and present findings of the tested design solution to an audience that may include professional and technical experts.	Through a detailed experiment, the learner will prove their process and results to a professional.	Experiment:  Plotting Periodic Trends	December

Course: Chemistry I

Instructor: Mrs. Michelle Konrardy

STATE GOAL 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.

State Learning Standards	Benchmark Level-Late High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
12 A. Know and apply concepts that explain how living things function, adapt and change.	12.A.5a Explain changes within cells and organisms in response to stimuli and changing environmental conditions (e.g., homeostasis, dormancy).	Not Applicable to Chemistry  Taught in: Biology, College Biology		
	12.A.5b Analyze the transmission of genetic traits, diseases and defects.	Not Applicable to Chemistry  Taught in: Biology, College Biology		
12B.	12.B.5a			

<p>Know and apply concepts that describe how living things interact with each other and with their environment.</p>	<p>Analyze and explain biodiversity issues and the causes and effects of extinction.</p>	<p>Not Applicable to Chemistry</p> <p>Taught in: Biology, College Biology, Environmental Science, General Biology, River &amp; Prairie Ecology</p>		
	<p>12.B.5b Compare and predict how life forms can adapt to changes in the environment by applying concepts of change and constancy (e.g., variations within a population increase the likelihood of survival under new conditions).</p>	<p>Not Applicable to Chemistry</p> <p>Taught in: Biology, College Biology, Environmental Science, General Biology, River &amp; Prairie Ecology</p>		
<p>12C. Know and apply concepts that describe properties of matter and energy and the interactions between them.</p>	<p>12.C.5a Analyze reactions (e.g., nuclear reactions, burning of fuel, and decomposition of waste) in natural and man-made energy systems.</p>	<p>Students will complete nuclear reaction equations, compare decomposition reactions, and indicate the transfer of energies.</p>	<p>Chapter 3 – 2 review sheet on nuclear forces</p> <p>Chapter 8 – Reaction prediction problems</p>	<p>October</p> <p>Late – February</p> <p>Early - March</p>
	<p>12.C.5b Analyze the properties of materials (e.g., mass, boiling point, melting point, hardness) in</p>	<p>Students will perform experimentation on various properties of matter.</p>	<p>Experiment: Observation and Experiment</p> <p>Properties of Solids</p>	<p>September &amp; November / December</p>

	relation to their physical and/or chemical structures.			
12D. Know and apply concepts that describe force and motion and the principles that explain them.	12.D.5a Analyze factors that influence the relative motion of an object (e.g., friction, wind shear, cross currents, potential differences).	Not Applicable to Chemistry  Taught in: Physical Science, Physics		
	12.D.5b Analyze the effects of gravitational, electromagnetic and nuclear forces on a physical system.	Not Applicable to Chemistry  Taught in: Physical Science, Physics		
12E. Know and apply concepts that describe the features and processes of the Earth and its resources.	12.E.5 Analyze the processes involved in naturally occurring short-term and long-term Earth events (e.g., floods, ice ages, temperature, sea-level fluctuations).	Not Applicable to Chemistry  Taught in: Environmental Science, Earth Science		
12F. Know and apply concepts that explain the composition and structure of the universe and Earth's place in it.	12.F.5a Compare the processes involved in the life cycle of stars (e.g., gravitational collapse, thermonuclear fusion, nova) and evaluate the supporting evidence.	Not Applicable to Chemistry  Taught in: Earth Science		

	12.F.5b Describe the size and age of the universe and evaluate the supporting evidence (e.g., red-shift, Hubble's constant).	Not Applicable to Chemistry  Taught in: Earth Science		

Course: Chemistry I

Instructor: Mrs. Michelle Konrardy

STATE GOAL 13: Understand the relationships among science, technology and society in historical and contemporary contexts.

State Learning Standards	Benchmark Level-Late High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
13A. Know and apply the accepted practices of science.	13.A.5a Design procedures and policies to eliminate or reduce risk in potentially hazardous science activities.	Students will discuss and analyze possible hazards and brainstorm solutions	Class Discussion & Various posters	September
	13.A.5b Explain criteria that scientists use to evaluate the validity of scientific claims and theories.	Students will use the scientific method to validate theories	Class Experiments (ex. Halogens, Flames Test)  Class Lab Reports	September thru May
	13.A.5c Explain the strengths, weaknesses and uses of research methodologies including observational	Students will use Lab Reports to explain research and experimentation.	Class Experiments (ex. Identification of an Unknown)	September thru May

	studies, controlled laboratory experiments, computer modeling and statistical studies.		Class Lab Reports	
	13.A.5d Explain, using a practical example (e.g., cold fusion), why experimental replication and peer review are essential to scientific claims.	Students will discuss peer review.  Students will demonstrate the necessity of experimental replication.	Class Experiments (ex. Identification of an Unknown)  Class Lab Reports	September thru May
13B. Know and apply concepts that describe the interaction between science, technology and society.	13.B.5a Analyze challenges created by international competition for increases in scientific knowledge and technological capabilities (e.g., patent issues, industrial espionage, technology obsolescence).	Not Applicable to Chemistry  Taught in: Physics		
	13.B.5b Analyze and describe the processes and effects of scientific and technological breakthroughs.	Students will, through class discussion, independent reading, and research, describe tech. breakthroughs	Book Reports on Non-fiction (ex. Stiff)	March – May
	13.B.5c Design and conduct an environmental	Not Applicable to Chemistry		

	impact study, analyze findings and justify recommendations.	Taught in: River & Prairie Ecology		
	13.B.5d Analyze the costs, benefits and effects of scientific and technological policies at the local, state, national and global levels (e.g., genetic research, Internet access).	Not Applicable to Chemistry  Taught in: Physics, College Biology, Environmental Science		
	13.B.5e Assess how scientific and technological progress has affected other fields of study, careers and job markets and aspects of everyday life.	Students will, through class discussion and research, describe scientific progress. Students will research possible job applications.	Class discussion and research	January thru May

Course: Anatomy & Physiology

Instructor: Mrs. Anita Hollewell

STATE GOAL 11: Understand the processes of scientific inquiry and technological design to investigate questions, conduct experiments and solve problems.

State Learning Standards	Benchmark Level-Late High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
A. Know and apply the concepts, principles and processes of scientific inquiry.	11.A.4a Formulate hypotheses referencing prior research and knowledge.	N/A		
	11.A.4b Conduct	N/A		

	controlled experiments or simulations to test hypotheses.			
	11.A.4c Collect, organize and analyze data accurately and precisely.	N/A		
	11.A.4d Apply statistical methods to the data to reach and support conclusions.	N/A		
	11.A.4e Formulate alternative hypotheses to explain unexpected results.	N/A		
	11.A.4f Using available technology, report, display and defend to an audience conclusions drawn from investigations.	N/A		

Course: Anatomy &amp; Physiology

Instructor: Mrs. Anita Hollewell

STATE GOAL 11: Understand the processes of scientific inquiry and technological design to investigate questions, conduct experiments and solve problems.

State Learning Standards	Benchmark Level- Late High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
B. Know and apply the concepts, principles and processes of technological design.	11.B.4a Identify a technological design problem inherent in a commonly used product.	N/A		
	11.B.4b Propose and compare different solution designs to the design problem based upon given constraints including available tools, materials and time.	N/A		
	11.B.4c Develop working visualizations of the proposed solution designs (e.g., blueprints, schematics, flowcharts, cad-cam, animations).	N/A		
	11.B.4d Determine the criteria upon which the			

	designs will be judged, identify advantages and disadvantages of the designs and select the most promising design.	N/A		
	11.B.4e Develop and test a prototype or simulation of the solution design using available materials, instruments and technology.	N/A		
	11.B.4f Evaluate the test results based on established criteria, note sources of error and recommend improvements.	N/A		
	11.B.4g Using available technology, report to an audience the relative success of the design based on the test results and criteria.	N/A		

Course: Anatomy &amp; Physiology

Instructor: Mrs. Anita Hollewell

STATE GOAL 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.

State Learning Standards	Benchmark Level-Late High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
A. Know and apply concepts that explain how living things function, adapt and change.	12.A.4a Explain how genetic combinations produce visible effects and variations among physical features and cellular functions of organisms.	N/A		
	12.A.4b Describe the structures and organization of cells and tissues that underlie basic life functions including nutrition, respiration, cellular transport, biosynthesis and reproduction.	Students will study all systems as they are built from cells.	Students will be able to identify tissues and organs and where they are located.	October
	12.A.4c Describe processes by which organisms change over time using evidence from comparative anatomy and physiology, embryology, the fossil record, genetics and biochemistry.	Students will identify structural differences in systems between phyla.	Students will dissect a shark head and a cat and note similarities and differences.	December and March

Course: Anatomy and Physiology

Instructor: Mrs. Anita Hollewell

STATE GOAL 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.

State Learning Standards	Benchmark Level-Late High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
B. Know and apply concepts that describe how living things interact with each other and with their environment.	12.B.4a Compare physical, ecological and behavioral factors that influence interactions and interdependence of organisms.	N/A		
	12.B.4b Simulate and analyze factors that influence the size and stability of populations within ecosystems (e.g., birth rate, death rate, predation, migration patterns).	N/A		

Course: Anatomy and Physiology

Instructor: Mrs. Anita Hollewell

STATE GOAL 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.

State Learning Standards	Benchmark Level- High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
C. Know and apply concepts that describe	12.C.4a Use kinetic theory, wave theory, quantum theory and the laws of thermodynamics to explain energy transformations.	N/A		

properties of matter and energy and the interactions between them.				
	12.C.4b Analyze and explain the atomic and nuclear structure of matter.	N/A		

Course: Anatomy and Physiology

Instructor: Mrs. Anita Hollewell

STATE GOAL 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.

State Learning Standards	Benchmark Level- Late High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
D. Know and apply concepts that describe force and motion and the principles that explain them.	12.D.4a Explain and predict motions in inertial and accelerated frames of reference..	N/A		
	12.D.4b Describe the effects of electromagnetic and nuclear forces including atomic and molecular bonding, capacitance and nuclear reactions.	N/A		

Course: Anatomy and Physiology

Instructor: Mrs. Anita Hollewell

STATE GOAL 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.

State Learning Standards	Benchmark Level- Late High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
E. Know and apply concepts that describe the features and processes of the Earth and its resources.	12.E.4a Explain how external and internal energy sources drive Earth processes (e.g., solar energy drives weather patterns; internal heat drives plate tectonics).	N/A		
	12.E.4b Describe how rock sequences and fossil remains are used to interpret the age and changes in the Earth.	N/A		

Course: Anatomy and Physiology

Instructor: Mrs. Anita Hollewell

STATE GOAL 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.

State Learning Standards	Benchmark Level- Late High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
F. Know and apply concepts that explain the composition	12.F.4a Explain theories, past and present, for changes observed in the universe.	N/A		

and structure of the universe and Earth's place in it.				
	12.F.4b Describe and compare the chemical and physical characteristics of galaxies and objects within galaxies (e.g., pulsars, nebulae, black holes, dark matter, stars).	N/A		

Course: Anatomy and Physiology

Instructor: Mrs. Anita Hollewell

STATE GOAL 13: Understand the relationships among science, technology and society in historical and contemporary contexts.

State Learning Standards	Benchmark Level-Late High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
A. Know and apply the accepted practices of science.	13.A.4a Estimate and suggest ways to reduce the degree of risk involved in science activities.	The learner will examine safety equipment in the lab and for their personal use, and discuss why it is important for dissection	* gloves * dissection tools * goggles * aprons * clean-up procedures Proper methods will be demonstrated.	October
	13.A.4b Assess the validity of scientific data by analyzing the results, sample set, sample size,	N/A		

	similar previous experimentation, possible misrepresentation of data presented and potential sources of error.			
	13.A.4c Describe how scientific knowledge, explanations and technological designs may change with new information over time (e.g., the understanding of DNA, the design of computers).	N/A		

Course: Anatomy & Physiology

Instructor: Mrs. Anita Hollewell

STATE GOAL 13: Understand the relationships among science, technology and society in historical and contemporary contexts.

State Learning Standards	Benchmark Level-Late High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
B. Know and apply concepts that describe the interaction between science, technology and society.	13.B.4a Compare and contrast scientific inquiry and technological design as pure and applied sciences.	N/A		
	13.B.4b Analyze a particular occupation to identify decisions that may be influenced by a knowledge of science.	N/A		
	13.B.4c Analyze ways that resource management and	N/A		

	technology can be used to accommodate population trends.			
	13.B.4d Analyze local examples of resource use, technology use or conservation programs; document findings; and make recommendations for improvements.	N/A		
	13.B.4e Evaluate claims derived from purported scientific studies used in advertising and marketing strategies.	N/A		

Course: Earth Science

Instructor: Mrs. Anita Hollewell

STATE GOAL 11: Understand the processes of scientific inquiry and technological design to investigate questions, conduct experiments and solve problems.

State Learning Standards	Benchmark Level-Early High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
A. Know and apply the concepts, principles and processes of scientific inquiry.	11.A.4a Formulate hypotheses referencing prior research and knowledge.	N/A		
	11.A.4b Conduct controlled experiments or	N/A		

	simulations to test hypotheses.			
	11.A.4c Collect, organize and analyze data accurately and precisely.	N/A		
	11.A.4d Apply statistical methods to the data to reach and support conclusions.	N/A		
	11.A.4e Formulate alternative hypotheses to explain unexpected results.	N/A		
	11.A.4f Using available technology, report, display and defend to an audience conclusions drawn from investigations.	N/A		

Course: Earth Science

Instructor: Mrs. Anita Hollewell

STATE GOAL 11: Understand the processes of scientific inquiry and technological design to investigate questions, conduct experiments and solve problems.

State Learning Standards	Benchmark Level-Early High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
B. Know and apply the concepts, principles and processes of technological design.	11.B.4a Identify a technological design problem inherent in a commonly used product.	N/A		
	11.B.4b Propose and compare different solution designs to the design problem based upon given constraints including available tools, materials and time.	N/A		
	11.B.4c Develop working visualizations of the proposed solution designs (e.g., blueprints, schematics, flowcharts, cad-cam, animations).	N/A		
	11.B.4d Determine the criteria upon which the			

	designs will be judged, identify advantages and disadvantages of the designs and select the most promising design.	N/A		
	11.B.4e Develop and test a prototype or simulation of the solution design using available materials, instruments and technology.	N/A		
	11.B.4f Evaluate the test results based on established criteria, note sources of error and recommend improvements.	N/A		
	11.B.4g Using available technology, report to an audience the relative success of the design based on the test results and criteria.	N/A		

Course: Earth Science

Instructor: Mrs. Anita Hollewell

STATE GOAL 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.

State Learning Standards	Benchmark Level-Early High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
A. Know and apply concepts that explain how living things function, adapt and change.	12.A.4a Explain how genetic combinations produce visible effects and variations among physical features and cellular functions of organisms.	N/A		
	12.A.4b Describe the structures and organization of cells and tissues that underlie basic life functions including nutrition, respiration, cellular transport, biosynthesis and reproduction.	N/A		
	12.A.4c Describe processes by which organisms change over time using evidence from comparative anatomy and physiology, embryology, the fossil record, genetics and biochemistry.	N/A		

Course: College Biology

Instructor: Mr. Sam Howard

STATE GOAL 11: Understand the processes of scientific inquiry and technological design to investigate questions, conduct experiments and solve problems.

State Learning Standards	Benchmark Level-Late High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
11A. Know and apply the concepts, principles, and processes of scientific inquiry	LATE HIGH SCHOOL	Students who meet the standard know and apply the concepts, principles, and processes of scientific inquiry.		
	11.A.5a Formulate hypotheses referencing prior research and knowledge.	Formulate issue-hypothesis, reviewing literature as primary reading sources, differentiating between subjective/objective data and their usefulness to the issue, or examining applicable existent surveys, impact studies, or models.	Laboratory experiments	Sept.—May
	11.A.5b Design procedures to test the selected hypotheses.	Design an issue investigation, proposing applicable survey and interview instruments and methodologies, selecting appropriate simulations, or projecting possible viewpoints, variables, applicable data sets and formats for consideration.	Enzyme lab	Sept. / Oct.
	11.A.5c	Conduct issue	Laboratory	Sept.—May

	Conduct systematic controlled experiments to test the selected hypotheses.	investigation (following all procedural and safety precautions), using appropriate technologies, interviewing associated entities or experts, testing applicable simulation models, or completing all data collection requirements.	experiments and examinations	
	11.A.5d Apply statistical methods to make predictions and to test the accuracy of results.	Interpret and analyze results to produce findings and issue resolution options, evaluating data sets and trends to explore unexpected responses and data distractors, evaluating validity and reliability, or substantiating basis of inferences, deductions, and perceptions.	Laboratory experiments and examinations	Sept.—May
	11.A.5e Report, display and defend the results of investigations to audiences that may include professionals and technical experts.	Report, display and defend the process and findings of issue investigation, critiquing findings by self and peer review, generating further questions or issues for consideration, evaluating comparable issue resolutions or responses for action, or generalizing public opinion responses.	Laboratory experiments and examinations	Sept.—May

Course: College Biology

Instructor: Mr. Sam Howard

STATE GOAL 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.

State Learning Standards	Benchmark Level-Late High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
12 A. Know and apply concepts that explain how living things function, adapt and change.	LATE HIGH SCHOOL	Students who meet the standard know and apply concepts that explain how living things function, adapt, and change.		
	12.A.5a Explain changes within cells and organisms in response to stimuli and changing environmental conditions (e.g., homeostasis, dormancy).	Apply scientific inquiries or technological designs to explain biochemical reactions, diagramming metabolic, hormonal, regulatory, feedback or transport molecular models in and between organ systems, explaining homeostasis, or tracing the balance of cellular ATP.	Text, Lecture, Notes, Assignments, Assessments, Laboratory experiments	Nov.-Dec.
	12.A.5b Analyze the transmission of genetic traits, diseases and defects.	Apply scientific inquiries or technological designs to explain new biological technologies, projecting possible implications of current research (e.g., Human Genome Project, immune system responses).	Text, Lecture, Notes, Assignments, Assessments	Jan.—Feb.
12 B. Know and apply concepts that	LATE HIGH SCHOOL	Students who meet the standard know and apply concepts that		

describe how living things interact with each other and with their environment.		describe how living things interact with each other and with their environment.		
	12.B.5a Analyze and explain biodiversity issues and the causes and effects of extinction.	<input type="checkbox"/> Apply scientific inquiries or technological designs to research the sustainability of land resources, studying the role of biotic and abiotic soil components in decomposition and nutrient cycling, collecting data on soil composition, porosity, permeability, fertility etc., or quantifying the impact of topsoil and mineral preservation, erosion, and reclamation.	Text, Lecture, Notes, Assignments, Assessments	Feb.— March
	12.B.5b Compare and predict how life forms can adapt to changes in the environment by applying concepts of change and constancy (e.g., variations within a population increase the likelihood of survival under new conditions).	<input type="checkbox"/> Apply scientific inquiries or technological designs to research the sustainability of air resources, modeling the atmospheric layers with their currents and temperature inversions, or explaining the percentage chemical compositions and conversions at varying levels as associated with the greenhouse effect and ozone depletion or acid-rain concentrations.	Text, Lecture, Notes, Assignments, Assessments	March— April

12 C. Know and apply concepts that describe properties of matter and energy and the interactions between them.	LATE HIGH SCHOOL	Students who meet the standard know and apply concepts that describe properties of matter and energy and the interactions between them.		
	12.C.5a Analyze reactions (e.g., nuclear reactions, burning of fuel, decomposition of waste) in natural and man-made energy systems.	Apply scientific inquiries or technological designs to explain chemical bonding and reactions, balancing chemical reactions using formulas and equations to quantify reaction masses, volumes and ratios, examining factors that affect capacity to react or rates (concentrations, pH, catalysts, molarity, temperature, etc.), or referencing the bonding potential and strengths within and between atoms and molecules.	Text, Lecture, Notes, Assignments, Assessments	April— May

Course: College Biology

Instructor: Mr. Sam Howard

STATE GOAL 13: Understand the relationships among science, technology and society in historical and contemporary contexts.

State Learning Standards	Benchmark Level-Late High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
13 A. Know and apply the accepted	LATE HIGH SCHOOL	Students who meet the standard know and apply accepted		

practices of science.		practices of science.		
	13.A.5a Design procedures and policies to eliminate or reduce risk in potentially hazardous science activities.	Apply appropriate principles of safety in pure and applied research studies, examining animal care precautions for adherence to safety standards, referencing applicable chemical storage, handling, and disposal procedure regulations, researching procedures and policies to eliminate or reduce risk in potentially hazardous activities, or citing federal or state agency requirements for employees for safety regulations in science research settings.	Text, Lecture, Notes, Assignments, Assessments, Laboratory experiments	Sept.—May
	13.A.5b Explain criteria that scientists use to evaluate the validity of scientific claims and theories.	Apply scientific habits of mind to current pure and applied research studies in life, environmental, physical, earth, and space sciences, interviewing scientists about how they address validity of scientific claims and theories and/or their understanding of scientific habits of mind (including	Text, Lecture, Notes, Assignments, Assessments	Sept.—May

		sheer luck) and how they have been integral to their own research, recognizing limitations of investigation methods, sample sets, technologies, or procedures, questioning sources of information and representation of data, recognizing selective or distorted use of data, discrepancies and poor argument, distinguishing opinion from supported theory, tracing citations from research studies for validity and reliability, or reporting on peer review and juried panel review in research approval and scientific community acceptance.		
B. Know and apply concepts that describe the interaction between science, technology and society.	LATE HIGH SCHOOL	Students who meet the standard know and apply concepts that describe the interaction between science, technology, and society.		
	13.B.5a Analyze challenges created by international competition for	Analyze challenges created by international cooperation and	Text, Lecture, Notes, Assignments,	Sept.—May

	increases in scientific knowledge and technological capabilities (e.g., patent issues, industrial espionage, technology obsolescence).	competition in scientific knowledge and technological advances, explaining multinational corporations' challenges or impact for resource acquisition, or researching the cooperative efforts and dilemmas associated with global partnerships	Assessments	
	13.B.5b Analyze and describe the processes and effects of scientific and technological breakthroughs.	Analyze scientific breakthroughs in terms of societal and technological effects, citing how beliefs and attitudes influence advances, examining global distribution of energy, natural or fiscal resources, or evaluating how scientific advances from different cultures are received.	Text, Lecture, Notes, Assignments, Assessments	Sept.—May
	13.B.5c Design and conduct an environmental impact study, analyze findings and justify recommendations.	Analyze environmental impact studies, describing the design and procedures, synthesizing the findings and justifying the recommendations, or comparing methods for minimizing pollution or procedures for	Text, Lecture, Notes, Assignments, Assessments	March—April

		monitoring environmental quality.		
	13.B.5d Analyze the costs, benefits and effects of scientific and technological policies at the local, state, national and global levels (e.g., genetic research, Internet access).	Analyze local, state, national, global scientific policies in terms of costs, benefits, and effects, identifying policies which have affected local needs, costs, or products, assessing national or global costs of policies from American or non-American perspectives, or evaluating data used in media explanations of resource, technology, or policy impact.	Text, Lecture, Notes, Assignments, Assessments	Sept.—May
	13.B.5e Assess how scientific and technological progress has affected other fields of study, careers and job markets and aspects of life.	Analyze how scientific and technological progress have affected job markets and everyday life, investigating projected trends over 2-3 decades, or assessing costs for technological progress on personal, governmental, economic and ecosystem impact in the sciences.	Text, Lecture, Notes, Assignments, Assessments	Sept.—May

Course: River and Prairie Ecology

Instructor: Mr. Sam Howard

STATE GOAL 11: Understand the processes of scientific inquiry and technological design to investigate questions, conduct experiments and solve problems.

State Learning Standards	Benchmark Level- Late High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
11A. Know and apply the concepts, principles, and processes of scientific inquiry	LATE HIGH SCHOOL	Students who meet the standard know and apply the concepts, principles, and processes of scientific inquiry		
	11.A.5a Formulate hypotheses referencing prior research and knowledge.	Formulate independent content-specific hypothesis referencing pertinent reliable prior research, or proposing options for appropriate questions, procedural steps, and necessary resources.	Laboratory experiments	Sept.—May
	11.A.5b Design procedures to test the selected hypotheses.	Design an inquiry investigation which addresses proposed hypothesis, determining variables and control groups, incorporating all procedural and safety precautions, materials and equipment handling directions and data-collection formatting preparations, or securing approval	Benthic Macroinvertebrate Lab	Sept. / Oct.

		for all procedures, equipment use and safety concerns.		
	11.A.5c Conduct systematic controlled experiments to test the selected hypotheses.	Conduct inquiry investigation, using technologies for observing and measuring directly, indirectly, or remotely, completing multiple, statistically-valid trials, or accurately and precisely recording all data.	Laboratory experiments and examinations	Sept.—May
	11.A.5d Apply statistical methods to make predictions and to test the accuracy of results.	Conduct inquiry investigation, using technologies for observing and measuring directly, indirectly, or remotely, completing multiple, statistically-valid trials, or accurately and precisely recording all data.	Laboratory experiments and examinations	Sept.—May
	11.A.5e Report, display and defend the results of investigations to audiences that may include professionals and technical experts.	Interpret and represent analysis of results to produce findings that support or refute inquiry hypothesis, evaluating data sets to explore explanations of outliers or sources of error and trends, or applying statistical methods to compare mode, mean, percent error and frequency functions.	Laboratory experiments and examinations	Sept.—May
		Present and defend process and findings	Laboratory experiments and	Sept.—May

		in open forum, generating further questions, explaining impact of possible sources of error, or reflecting on and evaluating peer critiques and comparable inquiry investigations for consolidation or refinement of procedures.	examinations	
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Course: River and Prairie Ecology

Instructor: Mr. Sam Howard

STATE GOAL 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.

State Learning Standards	Benchmark Level-High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
12 A. Know and apply concepts that explain how living things function, adapt and change.	LATE HIGH SCHOOL			
	12.A.5a Explain changes within cells and organisms in response to stimuli and changing environmental conditions (e.g., homeostasis, dormancy).	Taught in College Biology		
	12.A.5b Analyze the transmission of genetic traits,	Taught in College Biology		

	diseases and defects.			
12B. Know and apply concepts that describe how living things interact with each other and with their environment	LATE HIGH SCHOOL	Students who meet the standard know and apply concepts that explain how living things function, adapt, and change.		
	12.B.5a Analyze and explain biodiversity issues and the causes and effects of extinction.	Apply scientific inquiries or technological designs to analyze the cellular organelles and functions, using different microscopic techniques, explaining functional processes chemically and structurally (e.g., osmotic, active and facilitated transport, enzyme action and protein/lipid/carbohydrate metabolism).	Lecture, Notes, Assignments, Assessments	Sept.-May
	12.B.5b Compare and predict how life forms can adapt to changes in the environment by applying concepts of change and constancy (e.g., variations within a population increase the likelihood of survival under new conditions).	Apply scientific inquiries or technological designs to explain metabolic processes within cells and between organisms and their environment, explaining gas exchange, food processing, transport, excretion, locomotion, body regulation, and nervous control, investigating enzyme actions in various reactions, or describing the applications of the polar nature of water and the pH index in biochemical reactions	Lecture, Notes, Assignments, Assessments	Sept., Oct., Nov.
C. Know	LATE HIGH	Students who meet the		

and apply concepts that describe properties of matter and energy and the interactions between them.	SCHOOL	standard know and apply concepts that describe how living things interact with each other and with their environment		
	12.C.5a Analyze reactions (e.g., nuclear reactions, burning of fuel, decomposition of waste) in natural and man-made energy systems.	Taught in Physics		
	12.C.5b Analyze the properties of materials (e.g., mass, boiling point, melting point, hardness) in relation to their physical and/or chemical structures.			
	EARLY HIGH SCHOOL			
	12.D.4a Explain and predict motions in inertial and accelerated frames of reference.			
	12.D.4b Describe the effects of electromagnetic and nuclear forces including atomic and molecular			

	bonding, capacitance and nuclear reactions.			
D. Know and apply concepts that describe force and motion and the principles that explain them.	LATE HIGH SCHOOL			
	12.D.5a Analyze factors that influence the relative motion of an object (e.g., friction, wind shear, cross currents, potential differences).			
	12.D.5b Analyze the effects of gravitational, electromagnetic and nuclear forces on a physical system.			
E. Know and apply concepts that describe the features and processes of the Earth and its resources.	LATE HIGH SCHOOL			
	12.E.5 Analyze the processes involved in naturally			

	occurring short-term and long-term Earth events (e.g., floods, ice ages, temperature, sea-level fluctuations).			
F. Know and apply concepts that explain the composition and structure of the universe and Earth's place in it.	LATE HIGH SCHOOL			
	12.F.5a Compare the processes involved in the life cycle of stars (e.g., gravitational collapse, thermonuclear fusion, nova) and evaluate the supporting evidence.			
	12.F.5b Describe the size and age of the universe and evaluate the supporting evidence (e.g., red-shift, Hubble's constant).			

Course: River and Prairie Ecology

Instructor: Mr. Sam Howard

STATE GOAL 13: Understand the relationships among science, technology and society in historical and contemporary contexts.

State Learning Standards	Benchmark Level-Late High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
A. Know and apply the accepted practices of science.	LATE HIGH SCHOOL	Students who meet the standard know and apply accepted practices of science.		
	13.A.5a Design procedures and policies to eliminate or reduce risk in potentially hazardous science activities.			
	13.A.5b Explain criteria that scientists use to evaluate the validity of scientific claims and theories.	Apply scientific habits of mind to curricular investigations in life, environmental, physical, earth, and space sciences, identifying instances of how scientific reasoning, insight, creativity, skill, intellectual honesty, tolerance of ambiguity, skepticism, persistence, openness to new ideas, and sheer luck have been integral to discoveries, identifying specific studies which demonstrate how scientific conclusions are	Laboratory experiments and examinations	Sept.— May

		open to modification as new data are collected, or researching classroom and real-world standards for peer review.		
	13.A.5c Explain the strengths, weaknesses and uses of research methodologies including observational studies, controlled laboratory experiments, computer modeling and statistical studies.	Apply scientific habits of mind to curricular investigations in life, environmental, physical, earth, and space sciences, identifying instances of how scientific reasoning, insight, creativity, skill, intellectual honesty, tolerance of ambiguity, skepticism, persistence, openness to new ideas, and sheer luck have been integral to discoveries, identifying specific studies which demonstrate how scientific conclusions are open to modification as new data are collected, or researching classroom and real-world standards for peer review.	Lecture, Notes, Assignments, Assessments	Sept.— May
	13.A.5d Explain, using a practical example (e.g., cold fusion), why experimental replication and peer review are	Apply scientific habits of mind to curricular investigations in life, environmental, physical, earth, and space sciences,	Text, Lecture, Notes, Assignments, Assessments	Sept.— May

	essential to scientific claims.	identifying instances of how scientific reasoning, insight, creativity, skill, intellectual honesty, tolerance of ambiguity, skepticism, persistence, openness to new ideas, and sheer luck have been integral to discoveries, identifying specific studies which demonstrate how scientific conclusions are open to modification as new data are collected, or researching classroom and real-world standards for peer review.		
B. Know and apply concepts that describe the interaction between science, technology and society.	13.B.5a Analyze challenges created by international competition for increases in scientific knowledge and technological capabilities (e.g., patent issues, industrial espionage, technology obsolescence).	Analyze the pure and applied research nature of science, evaluating public perceptions of value of scientific research, or assessing short- and long-term risks/benefits of specific pure research which directly led, or may lead, to direct applications.	Lecture, Notes, Assignments, Assessments	Sept.— May
	13.B.5b Analyze and describe the processes and effects of scientific and technological breakthroughs.	Analyze career and occupational decisions that are affected by a knowledge of science, associating	Lecture, Notes, Assignments, Assessments	Sept.— May

		scientific concepts considered in career-specific decisions (e.g., use of pesticides by farmers, choosing ink for printing), or explaining chemical/physical interactions in occupational settings (e.g., insect abatement programs, waste water treatment).		
	13.B.5c Design and conduct an environmental impact study, analyze findings and justify recommendations.	Analyze how resource management and technologies accommodate population trends, explaining factors needed to sustain and enhance the quality of Earth's water, quantifying benefits, costs, limitations and consequences involved in using scientific technologies or resources, or assessing global consequences of ecosystem modifications.	Text, Lecture, Notes, Assignments, Assessments	Sept.— May
	13.B.5d Analyze the costs, benefits and effects of scientific and technological policies at the local, state, national and global levels (e.g., genetic	Analyze claims used in advertising and marketing strategies for scientific validity, collecting statements of purported scientific studies to evaluate mathematical	Lecture, Notes, Assignments, Assessments	Sept.-May

	research, Internet access).	validity, or researching scientific foundations use (or manipulation) in marketing and advertising strategies for target populations		
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Course: Physics

Instructor: Mr. Ron Henze

State Goal 11: Understand the processes of scientific inquiry and technological design to investigate questions, conduct experiments and solve problems.

State Learning Standards	Benchmark Level, Late High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
11A. Know and apply the concepts, principles, and processes of scientific inquiry	11.A.5a Formulate hypotheses referencing prior research and knowledge	Through various experiments, the learner will practice using scientific inquiry in the form of If and Then statements based upon his/her research	Experiment: Projectile Motion	October
	11.A.5b Design procedures to test the selected hypotheses.	Through various experiments, the learner will practice designing procedures to test his/her hypotheses.	Experiment: Projectile Motion	October
	11.A.5c Conduct systematic controlled experiments to test the selected hypotheses.	Through various experiments, the learner will practice conducting controlled experiments.	Experiment: Newton's 2 <sup>nd</sup> Law	October/November
	11.A.5d Apply statistical methods to made	Through various experiments, the learner will practice using statistical methods and posing	Experiment: Gravity Drop	September

	predictions and to test the accuracy of results.	predictions.		
	11.A.5e Report, display and defend the results of investigations to audiences that may include professionals and technical experts.	Through a detailed Lab Report, the learner will prove his/her results to his/her physics teacher.	Experiment: Centripetal Force (students prove $F_c = mv^2/r$ )	November
11B. Know and apply the concepts, principles and processes of technological design.	11.B.5a Identify a design problem that has practical applications and propose possible solutions, considering such constraints as available tools, materials, time and costs.	As part of an experiment, students will identify a design problem and suggest ways to improve the design that would improve experimental results.	Experiment: Projectile motion	October
	11.B.5b Select criteria for a successful design solution to the identified problem	See above block.	Experiment: Projectile Motion	October

	11.B.5c Build and test different models or simulations of the design solution using suitable materials, tools and technology.	By use of an experiment, students will test a model of a molecule.	Experiment: Molecular size and the Avogadro Number	March
	11.B.5d Choose a model and refine its design based on the test results	By use of an experiment, students will modify the experiment to obtain improved results.	Experiment: Roller Coaster Lab	January
	11.B.5e Apply established criteria to evaluate the suitability, acceptability, benefits, drawbacks and consequences for the tested design solution and recommend modifications and refinements.	By use of an experiment, students will evaluate the acceptability of experimental modifications and refinements.	Experiment: Roller Coaster Lab	January

	11.B.5f Using available technology, prepare and present findings of the tested design solution to an audience that may include professional and technical experts.	By use of an experiment, students will write a detailed report that will show that the tested design is an improvement over the initial experimental design.	Experiment: Roller Coaster Lab	January
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Course: Physics

Instructor: Mr. Ron Henze

State Goal 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.

State Learning Standards	Benchmark Level, Late High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
12A. Know and apply concepts that explain how living things function, adapt and change.	12.A.5a Explain changes within cells and organisms in response to stimuli and changing environmental conditions (e.g., homeostasis, dormancy).	Not applicable to Physics		
	12.A.5b Analyze the transmission of genetic traits, diseases and defects	Not applicable to Physics		
12B. Know and apply	12.B.5a Analyze and explain	Not applicable to Physics		

<p>concepts that describe how living things interact with each other and with their environment.</p>	<p>biodiversity issues and the causes and effects of extinction.</p>			
	<p>12.B.5b Compare and predict how life forms can adapt to changes in the environment by applying concepts of change and constancy (e.g., variations within a population increase the likelihood of survival under new conditions).</p>	<p>Not applicable to Physics</p>		
<p>12C. Know and apply concepts that describe properties of matter and energy and the interactions between them.</p>	<p>12.C.5a Analyze reactions (e.g., nuclear reactions, burning of fuel, decomposition of waste) in natural and man-made energy systems.</p>	<p>Students will learn about a) energy and b) how matter and energy are related.</p>	<p>Physics is the study of energy and its changes, so students learn about energy during the entire course. Concepts about nuclear chemistry/physics will also be learned.</p>	<p>September through May</p>

	12.C.5b Analyze the properties of materials (e.g., mass, boiling point, melting point, hardness) in relation to their physical and/or chemical structures.	By doing several experiments, students will learn about the physical properties of matter and understand how these properties can be explained by the chemical and physical structures of the matter.	Heat experiments will be completed (specific heat, heat of fusion, heat of vaporization).	January, February, March
12D Know and apply concepts that describe force and motion and the principles that explain them.	12.D.5a Analyze factors that influence the relative motion of an object (e.g., friction, wind shear, cross currents, potential differences).	Students will learn about factors that affect the motion of an object by doing several experiments.	Examples of experiments performed about force and motion are a) centripetal force b) projectile motion c) Newton's 2 <sup>nd</sup> Law	October, November, December
	12.D.5b Analyze the effects of gravitational, electromagnetic and nuclear forces on a physical system.	Students will learn about the effects of gravitational forces between objects on earth and in the universe.	Students will study Newton's Law of Universal Gravitation	Chapter 2, <u><a href="#">Inquiry Into Physics</a></u>
12E. Know and apply concepts that describe the features and processes of the Earth and its resources.	12.E.5 Analyze the processes involved in naturally occurring short-term and long-term Earth events (e.g., floods, ice ages, temperature, sea level fluctuations).	Not applicable to Physics		

12F. Know and apply concepts that explain the composition and structure of the universe and Earth's place in it.	12.F.5a Compare the processes involved in the life cycle of stars (e.g., gravitation collapse, thermonuclear fusion, nova) and evaluate the supporting evidence.	Students will learn about thermonuclear fusion taking place on our sun and other stars by writing nuclear equations.	Chapter 11, <u>Inquiry Into Physics</u>	May
	12.F.5b Describe the size and age of the universe and evaluate the supporting evidence (e.g., red shift, Hubble's constant).	Students will briefly learn about the red shift when studying the Doppler Effect	Chapter 6, <u>Inquiry Into Physics</u>	March

Course: Physics

Instructor: Mr. Ron Henze

State Goal 13: Understand the relationships among science, technology and society in historical and contemporary contexts.

State Learning Standards	Benchmark Level, Late High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
13A. Know and apply the accepted practices of science.	13.A.5a Design procedures and policies to eliminate or reduce risk in potentially hazardous science activities.	Students and teacher will discuss possible laboratory hazards	Done as necessary during prelab discussions.	September through May
	13.A.5b Explain criteria that scientists use to evaluate the validity of	Students will use the scientific method by doing experiments to validate theories	Experiments and Lab Reports	September through May

	scientific claims and theories.			
	13.A.5c Explain the strengths, weaknesses and uses of research methodologies including observational studies, controlled laboratory experiments, computer modeling and statistical studies.	Students will use Lab Reports to explain their research and experimentation.	Experiments and Lab Reports	September through May
	13.A.5d Explain, using a practical example (e.g., cold fusion), why experimental replication and peer review are essential to scientific claims.	Students will learn and demonstrate the necessity of experimental replication.	Experiments: a) Gravity Drop b) Heat Experiments	October through February
13B. Know and apply concepts that describe the interaction between science, technology and society.	13.B.5a Analyze challenges created by international competition for increases in scientific knowledge and technological capabilities (e.g., patent issues, industrial espionage, technology obsolescence).	Not being taught.		
	13.B.5b Analyze and describe the processes and effects of scientific and	Students will, through class discussion, textbook reading, independent reading, describe	Topics about tech. breakthroughs will sometimes be part of a lab report.	September through May

	technological breakthroughs.	technological breakthroughs.		
	13.B.5c Design and conduct an environmental impact study, analyze findings and justify recommendations.	Not applicable to Physics.		
	13.B.5d Analyze the costs, benefits and effects of scientific and technological policies at the local, state, national and global levels (e.g., genetic research, Internet access).	Not being taught.		
	13.B.5e Assess how scientific and technological progress has affected other fields of study, careers and job markets and aspects of everyday life.	Not being taught.		

Course: Physical Science

Instructor: Mr. Ron Henze

State Goal 11: Understand the processes of scientific inquiry and technological design to investigate questions, conduct experiments and solve problems.

State Learning Standards	Benchmark Level, Late High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
11A. Know and apply the concepts, principles, and processes of scientific inquiry	11.A.5a Formulate hypotheses referencing prior research and knowledge	Through various experiments, the learner will practice using scientific inquiry in the form of If and Then statements based upon his/her research	Experiments: Phase change of paradichlorobenzene. Classroom work: Using a set of notes to predict products of chemical reactions.	September, January
	11.A.5b Design procedures to test the selected hypotheses.	Through various experiments, the learner will practice designing procedures to test hypotheses.	Experiment: Phase Changes of PDB	September
	11.A.5c Conduct systematic controlled experiments to test the selected hypotheses.	Through various experiments, the learner will practice conducting controlled experiments.	Experiments: Newton's 2 <sup>nd</sup> Law, The Pendulum, Projectile Motion	February, March, April
	11.A.5d Apply statistical methods to make predictions and to test the accuracy of results.	Through various experiments, the learner will practice using statistical methods and posing predictions.	Experiments: Gravity Drop, Density of CO <sub>2</sub>	February, October

	11.A.5e Report, display and defend the results of investigations to audiences that may include professionals and technical experts.	Through a detailed Lab Report, the learner will prove his/her results to his/her science teacher.	Experiment: Chemical Reactions (Students demo and discuss lab procedures)	December
11B. Know and apply the concepts, principles and processes of technological design.	11.B.5a Identify a design problem that has practical applications and propose possible solutions, considering such constraints as available tools, materials, time and costs.	As part of an experiment, students will identify a design problem and suggest ways to improve the design that would improve experimental results.	Experiment: Newton's 1 <sup>st</sup> Law	February
	11.B.5b Select criteria for a successful design solution to the identified problem	See above block.	Experiment: Gravity Drop	January

	11.B.5c Build and test different models or simulations of the design solution using suitable materials, tools and technology.	By use of an experiment, students will test a model of a molecule.	Experiment: Molecular Models	December
	11.B.5d Choose a model and refine its design based on the test results	By use of an experiment, students will modify the experiment to obtain improved results.	Experiment: Gravity Drop (Procedure often needs refining to improve results.)	January
	11.B.5e Apply established criteria to evaluate the suitability, acceptability, benefits, drawbacks and consequences for the tested design solution and recommend modifications and refinements.	By use of an experiment, students will evaluate the acceptability of experimental modifications and refinements.	Experiment: Gravity Drop	January

	11.B.5f Using available technology, prepare and present findings of the tested design solution to an audience that may include professional and technical experts.	By use of an experiment, students will write a detailed report that will show that the tested design is an improvement over the initial experimental design.	Experiments: Most of the labs will involve using computers to graphically analyze data as part of the student lab report.	September - May
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Course: Physical Science

Instructor: Mr. Ron Henze

State Goal 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.

State Learning Standards	Benchmark Level, Late High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
12A. Know and apply concepts that explain how living things function, adapt and change.	12.A.5a Explain changes within cells and organisms in response to stimuli and changing environmental conditions (e.g., homeostasis, dormancy).	Not applicable to Physical Science		
	12.A.5b Analyze the transmission of genetic traits, diseases and defects	Not applicable to Physical Science		
12B. Know and apply	12.B.5a Analyze and explain	Students will explore theories about causes of	Video: Fire From The Sky	October

concepts that describe how living things interact with each other and with their environment.	biodiversity issues and the causes and effects of extinction.	extinction.		
	12.B.5b Compare and predict how life forms can adapt to changes in the environment by applying concepts of change and constancy (e.g., variations within a population increase the likelihood of survival under new conditions).	Not applicable to Physical Science		
12C. Know and apply concepts that describe properties of matter and energy and the interactions between them.	12.C.5a Analyze reactions (e.g., nuclear reactions, burning of fuel, decomposition of waste) in natural and man-made energy systems.	Students will learn to write chemical and nuclear equations.	Several assignments and experiments, chapters 5, 6, 7.	October - December

	12.C.5b Analyze the properties of materials (e.g., mass, boiling point, melting point, hardness) in relation to their physical and/or chemical structures.	By doing several experiments, students will learn about the physical properties of matter and understand how these properties can be explained by the chemical and physical structures of the matter.	Experiments: a) Density b) Freezing point of PDB	September, October
12D Know and apply concepts that describe force and motion and the principles that explain them.	12.D.5a Analyze factors that influence the relative motion of an object (e.g., friction, wind shear, cross currents, potential differences).	Students will learn about factors that affect the motion of an object by doing several experiments.	Examples of experiments performed about force and motion are d) Gravity Drop e) Projectile motion f) Newton's 2 <sup>nd</sup> Law	January - March
	12.D.5b Analyze the effects of gravitational, electromagnetic and nuclear forces on a physical system.	Students will analyze the effects of gravity on falling objects.	Experiment: Gravity Drop Daily work: Solving problems using velocity and acceleration formulas.	January - March
12E. Know and apply concepts that describe the features and processes of the Earth and its resources.	12.E.5 Analyze the processes involved in naturally occurring short-term and long-term Earth events (e.g., floods, ice ages, temperature, sea level fluctuations).	Not applicable to Physical Science		

12F. Know and apply concepts that explain the composition and structure of the universe and Earth's place in it.	12.F.5a Compare the processes involved in the life cycle of stars (e.g., gravitation collapse, thermonuclear fusion, nova) and evaluate the supporting evidence.	Students will learn about thermonuclear fusion taking place on our sun and other stars by writing nuclear equations.	Class discussion and daily assignments, Chapter 7	March
	12.F.5b Describe the size and age of the universe and evaluate the supporting evidence (e.g., red shift, Hubble's constant).	Not applicable to Physical Science class		

Course: Physical Science

Instructor: Mr. Ron Henze

State Goal13: Understand the relationships among science, technology and society in historical and contemporary contexts.

State Learning Standards	Benchmark Level, Late High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
13A. Know and apply the accepted practices of science.	13.A.5a Design procedures and policies to eliminate or reduce risk in potentially hazardous science activities.	Students and teacher will discuss possible laboratory hazards	Done before doing most labs	September through May
	13.A.5b Explain criteria that scientists use to evaluate the validity of	Students will use the scientific method by doing experiments to validate theories	Experiments: Many experiments will demonstrate the	September through May

	scientific claims and theories.		validity of the “Kinetic Theory of Matter”.	
	13.A.5c Explain the strengths, weaknesses and uses of research methodologies including observational studies, controlled laboratory experiments, computer modeling and statistical studies.	Students will use Lab Reports to explain their research and experimentation.	All experiments require lab reports to indicate an understanding of the topics being studied.	September through May
	13.A.5d Explain, using a practical example (e.g., cold fusion), why experimental replication and peer review are essential to scientific claims.	Not being taught in physical science class.		
13B. Know and apply concepts that describe the interaction between science, technology and society.	13.B.5a Analyze challenges created by international competition for increases in scientific knowledge and technological capabilities (e.g., patent issues, industrial espionage,	Not being taught in Physical Science class.		

	technology obsolescence).			
	13.B.5b Analyze and describe the processes and effects of scientific and technological breakthroughs.	Students will, through class discussion, textbook reading, independent reading, describe technological breakthroughs.	Each chapter in the textbook has articles about technological breakthroughs, etc.	September through May
	13.B.5c Design and conduct an environmental impact study, analyze findings and justify recommendations.	Not applicable to Physical Science.		
	13.B.5d Analyze the costs, benefits and effects of scientific and technological policies at the local, state, national and global levels (e.g., genetic research, Internet access).	Not being taught.		
	13.B.5e Assess how scientific and technological progress has affected other fields of study, careers and job markets and aspects of everyday life.	Students will, through class discussion and reading learn about scientific progress.	Textbook articles and reading assignments.	September - May

Course: Biology I

Instructor: Mr. Sam Howard

STATE GOAL 11: Understand the processes of scientific inquiry and technological design to investigate questions, conduct experiments and solve problems.

State Learning Standards	Benchmark Level- Early High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
11A. Know and apply the concepts, principles, and processes of scientific inquiry		Students who meet the standard know and apply the concepts, principles, and processes of scientific inquiry.		
	11.A.4a Formulate hypotheses referencing prior research and knowledge.	Formulate independent content-specific hypothesis referencing pertinent reliable prior research, or proposing options for appropriate questions, procedural steps, and necessary resources.	Laboratory experiments	Sept.—May
	11.A.4b Conduct controlled experiments or simulations to test hypotheses.	Design an inquiry investigation which addresses proposed hypothesis, determining variables and control groups, incorporating all procedural and safety precautions, materials and equipment handling directions and data-collection formatting preparations, or securing approval for all procedures, equipment use and safety concerns.	Enzyme lab	Sept. / Oct.

	11.A.4c Collect, organize and analyze data accurately and precisely.	Conduct inquiry investigation, using technologies for observing and measuring directly, indirectly, or remotely, completing multiple, statistically-valid trials, or accurately and precisely recording all data.	Laboratory experiments and examinations	Sept.—May
	11.A.4d Apply statistical methods to the data to reach and support conclusions.	Conduct inquiry investigation, using technologies for observing and measuring directly, indirectly, or remotely, completing multiple, statistically-valid trials, or accurately and precisely recording all data.	Laboratory experiments and examinations	Sept.—May
	11.A.4e Formulate alternative hypotheses to explain unexpected results.	Interpret and represent analysis of results to produce findings that support or refute inquiry hypothesis, evaluating data sets to explore explanations of outliers or sources of error and trends, or applying statistical methods to compare mode, mean, percent error and frequency functions.	Laboratory experiments and examinations	Sept.—May
	11.A.4f Using available technology, report, display and defend to	Present and defend process and findings in open forum, generating further questions,	Laboratory experiments and examinations	Sept.—May

	an audience conclusions drawn from investigations.	explaining impact of possible sources of error, or reflecting on and evaluating peer critiques and comparable inquiry investigations for consolidation or refinement of procedures.		
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Course: Biology I

Instructor: Mr. Sam Howard

STATE GOAL 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.

State Learning Standards	Benchmark Level-Early High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
12 A. Know and apply concepts that explain how living things function, adapt and change.		Students who meet the standard know and apply concepts that explain how living things function, adapt, and change.		
	12.A.4a Explain how genetic combinations produce visible effects and variations among physical features and cellular functions of organisms.	Apply scientific inquiries or technological designs to analyze the cellular organelles and functions, using different microscopic techniques, explaining functional processes chemically and structurally (e.g., osmotic, active and facilitated transport, enzyme action and protein/lipid/carbohydrate metabolism).	Text, Lecture, Notes, Assignments, Assessments	Oct., Nov., Dec.
	12.A.4b Describe the structures and	Apply scientific inquiries or technological designs to explain metabolic	Text, Lecture, Notes,	Sept., Oct., Nov.

	organization of cells and tissues that underlie basic life functions including nutrition, respiration, cellular transport, biosynthesis and reproduction.	processes within cells and between organisms and their environment, explaining gas exchange, food processing, transport, excretion, locomotion, body regulation, and nervous control, investigating enzyme actions in various reactions, or describing the applications of the polar nature of water and the pH index in biochemical reactions	Assignments, Assessments	
	12.A.4c Describe processes by which organisms change over time using evidence from comparative anatomy and physiology, embryology, the fossil record, genetics and biochemistry.	Apply scientific inquiries or technological designs to explain tests of evolutionary evidence, analyzing acceptance of geologic and fossil records, researching comparative anatomy, embryology, biochemistry and cytology studies of analogous and homologous structures.	Text, Lecture, Notes, Assignments, Assessments	Jan. / Feb.
12B. Know and apply concepts that describe how living things interact with each other and with their environment.		Students who meet the standard know and apply concepts that describe how living things interact with each other and with their environment.		
	12.B.4a Compare physical, ecological and	Apply scientific inquiries or technological design to explain population growth, density factors in	Text, Lecture, Notes, Assignments,	March, April

	behavioral factors that influence interactions and interdependence of organisms.	ecosystem change and stability and biodiversity: researching population model studies to determine limiting factors and mathematical patterns of population growth in real-world situations, investigating biotic and abiotic factors of ecosystems, or identifying the roles and relationships of organisms in their community in terms of impact on populations and the ecosystem.	Assessments	
	12.B.4b Simulate and analyze factors that influence the size and stability of populations within ecosystems (e.g., birth rate, death rate, predation, migration patterns).	Apply scientific inquiries or technological design to explain population growth, density factors in ecosystem change and stability and biodiversity: researching population model studies to determine limiting factors and mathematical patterns of population growth in real-world situations, investigating biotic and abiotic factors of ecosystems, or identifying the roles and relationships of organisms in their community in terms of impact on populations and the ecosystem.	Text, Lecture, Notes, Assignments, Assessments	March— May
C. Know and apply concepts that describe properties of matter and energy and the	12.C.4a Use kinetic theory, wave theory, quantum theory and the laws of thermodynamics to explain energy transformations.	Taught in Physical Science		

interactions between them.				
	12.C.4b Analyze and explain the atomic and nuclear structure of matter.	Taught in Physical Science		
D. Know and apply concepts that describe force and motion and the principles that explain them.	12.D.4a Explain and predict motions in inertial and accelerated frames of reference.	Taught in Physical Science		
	12.D.4b Describe the effects of electromagnetic and nuclear forces including atomic and molecular bonding, capacitance and nuclear reactions.	Taught in Physical Science		
E. Know and apply concepts that describe the features and processes of the Earth and its resources.	12.E.4a Explain how external and internal energy sources drive Earth processes (e.g., solar energy drives weather patterns; internal heat drives plate tectonics).	Taught in Earth Science		
	12.E.4b Describe how rock sequences and fossil	Students will understand the concept and purposes of radiometric dating.	Text, Lecture, Notes, Assignments,	Feb., March

	remains are used to interpret the age and changes in the Earth.		Assessments	
F. Know and apply concepts that explain the composition and structure of the universe and Earth's place in it.	12.F.4a Explain theories, past and present, for changes observed in the universe.	Taught in Earth Science		
	12.F.4b Describe and compare the chemical and physical characteristics of galaxies and objects within galaxies (e.g., pulsars, nebulae, black holes, dark matter, stars).	Taught in Earth Science		

Course: Biology I

Instructor: Mr. Sam Howard

STATE GOAL 13: Understand the relationships among science, technology and society in historical and contemporary contexts.

State Learning Standards	Benchmark Level- Early High School	Curriculum Standard/Experience (Learner Objective)	Suggested Resources	Month(s) Taught
A. Know and apply the accepted practices of science.	EARLY HIGH SCHOOL	Students who meet the standard know and apply accepted practices of science.		
	13.A.4a Estimate and suggest ways to reduce the	Laboratory safety rules	Laboratory experiments and	Sept.—May

	degree of risk involved in science activities.		examinations	
	13.A.4b Assess the validity of scientific data by analyzing the results, sample set, sample size, similar previous experimentation, possible misrepresentation of data presented and potential sources of error.	Apply scientific habits of mind to curricular investigations in life, environmental, physical, earth, and space sciences, identifying instances of how scientific reasoning, insight, creativity, skill, intellectual honesty, tolerance of ambiguity, skepticism, persistence, openness to new ideas, and sheer luck have been integral to discoveries, identifying specific studies which demonstrate how scientific conclusions are open to modification as new data are collected, or researching classroom and real-world standards for peer review.	Laboratory experiments and examinations	Sept.—May
	13.A.4c Describe how scientific knowledge, explanations and technological designs may change with new information over time (e.g., the understanding of DNA, the design of	Apply scientific habits of mind to curricular investigations in life, environmental, physical, earth, and space sciences, identifying instances of how scientific reasoning, insight, creativity, skill,	Text, Lecture, Notes, Assignments, Assessments	Sept.—May

	computers).	intellectual honesty, tolerance of ambiguity, skepticism, persistence, openness to new ideas, and sheer luck have been integral to discoveries, identifying specific studies which demonstrate how scientific conclusions are open to modification as new data are collected, or researching classroom and real-world standards for peer review.		
	13.A.4d Explain how peer review helps to assure the accurate use of data and improves the scientific process.	Apply scientific habits of mind to curricular investigations in life, environmental, physical, earth, and space sciences, identifying instances of how scientific reasoning, insight, creativity, skill, intellectual honesty, tolerance of ambiguity, skepticism, persistence, openness to new ideas, and sheer luck have been integral to discoveries, identifying specific studies which demonstrate how scientific conclusions are	Text, Lecture, Notes, Assignments, Assessments	Sept.—May

		open to modification as new data are collected, or researching classroom and real-world standards for peer review.		
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