Curriculum Planning Document –Science			
Content Area/Grade Level: Science/High School - Biology			
Course Description: Students develop a clear understanding of the sometimes complex concepts at the root of life science. Course units cover genetics and evolution, cell structure, multiple units on the diversity of life and on plant structure and function. For example, the unit on cell structure and specialization drills down into mitosis, meiosis, and cancer and carcinogens.			
	Educational Delivery Methodologies	**Evidence of Mastery**	**Comments**
Strand 1: Inquiry Process			
Concept 1: Observations, Questions, and Hypotheses Formulate predictions, questions, or hypotheses based on observations. Evaluate appropriate resources. PO 1. Evaluate scientific information for relevance to a given problem. (See R09-S3C1, R10-S3C1, R11-S3C1, and R12-S3C1) PO 2. Develop questions from observations that transition into testable hypotheses. PO 3. Formulate a testable hypothesis. PO 4. Predict the outcome of an investigation based on prior evidence, probability, and/or modeling (not guessing or inferring)	The Edmentum LMS (PLATO Courseware) as detailed in the narrative, includes a diverse set of instructional methodologies integrated into each course. These instructional methods include: computer assisted learning systems, virtual classrooms, virtual labs, electronic field trips, electronic mail and messaging, virtual tutoring, online help desk, a wide array of formative assessments and non-computer activities. The common design elements and activities combined with a thorough initial orientation video lecture support a student's quick understanding of the delivery system. This immediate understanding enables a student to focus on the content right from the beginning of the	Mastery for each course will be based on the student meeting the prescribed Performance, Participation, and Progress requirements. The Program is designed to foster high expectations for staff and students. The goal for all students is to meet 100% of the expected progress and 100% of the expected weekly participation. The desired performance goal for all students is to attain a score of 100% on all assignments. The minimum that will be accepted on each assignment and assessment is 70%. ***Assessment and Testing*** Best practices in assessment and testing call for a variety of activities to	Continues Throughout Course

	first lesson. Each course utilizes a variety of methods and has the flexibility to allow teachers to modify the program to suit individual student learning needs. The Edmentum LMS (PLATO Courseware) enables the teacher to employ numerous educational delivery options for each online course. The ability to modify delivery methods empowers teachers to efficiently and effectively support differentiation of instruction, customized assessments, and supplementation of course material for different learning styles. Providing online students a choice in how they absorb content is considered a key to supporting different learning styles. The primary delivery method for the Program's content, is web-based online delivery. Based on needs identified by teacher monitoring, formative and summative assessment, or student request, the delivery method can be modified in numerous ways.	evaluate student learning. Multiple data points present a more accurate evaluation of student strengths and needs. **Formative and Summative Assessments** contained in the web-delivered content, which include authentic learning and objective assessments are used to show mastery: • Unit pretests (typically designed for credit recovery use) • Mastery tests • Lesson Activities • Unit Activities • Online Threaded Discussions • Unit Post-Tests • End-of-Semester Exam **<u>Authentic Learning Assessments</u>**: Of the assessment tools available in this course, three are designed specifically to address higher-level thinking skills and operations: Lesson activities, unit activities, and	

	<u>Flexible deliverability</u> **All online materials are printable.** The interface and font of the content can be adjusted to minimize the amount of ink used in printing. **eNotes**: In lieu of paper notes, the students have the option to take eNotes while listening to & interacting with the tutorials or while studying the online readings and content. These notes can be made available at the end of lesson or course assessment at the discretion of the teacher and the individual student. **Secure internal messaging system:** provides the option for synchronous or asynchronous support of student learning. **Teacher online office hours:** Teachers provide four hours of online synchronous office hours. Additional synchronous time can be requested by students as needed. **Phone communication as required.** Teachers will have access to phone numbers and	discussions. These authentic learning activities allow students to develop deep understanding and provide data for the teacher to assess knowledge development. They also provide a tool for assessing identified Common Core mathematical practices, inquiry skills, STEM skills, and 21st century skills. The following comments address their use for assessment. • **Lesson Activities** immerse the student into one or more in-depth problems that center on developing a deep understanding of the learning objective. All Lesson Activities in this course are self-checked by the student; however, it is possible to submit this work for teacher grading on paper, by email, or by	

	refer students and parents to a phone conference as required. **Supplemental assignments:** The content can be delivered by all lessons or one lesson at a time. Teachers may determine that an alternative assignment that covers the same objective may be appropriate. These alternative assignments will be approved by the Administration and delivered electronically to the student. **Supplemental resource links:** Students may seek out additional information or guidance about a lesson objective by utilizing a personal search engine such as Google. Teachers will also collect and send out additional resource links as the need arises. All links will be submitted for approval by the administrator. **Practice exercises:** The teacher may assign practice exercises in addition to the online content. The teacher would have the opportunity to weight these additional assignments as part of the lesson performance	creating a drop box activity in the course learning path. • **Unit Activities** are similar to Lesson Activities, but more time intensive and require a more integrative understanding of the unit's objectives. Unit activities are teacher graded and submitted through the drop box. These activities allow the instructor to score work on a scale of 0 to 100. A 10-point suggested rubric is provided to both the student and the teacher for this purpose. A minimum score of 70% is required. • **Discussions** encourage students to reflect on concepts,	

	score, as part of the participation grade, or as extra credit. Any editing or adjustment of the student's score requires a full justification in the notes section at the time the teacher makes the change. **Universal access:** The content is available at all times and on all days. Students will be able to access their online content as long as they have access to the Internet. Those that seek help from someone that may not have a computer or Internet may print the material and seek help while working on the paper version. **Learning Aids:** Learning aids within the courseware that are designed to assist students include: • eNotes • Resource Folder • Dictionary • Text to Speech (content reader) • Translator (16 languages) • Scientific Calculator • Math tools (graphing tool, histogram, scatter plot,	articulate their thoughts, and respond to the views of others. Thus, discussions help teachers assess students' critical-thinking skills, communicatio n skills, and overall facility with the unit concepts. Each unit in this course has one predefined discussion topic. Instructors can customize the course, however, to include additional discussion topics. Online discussions may use whatever rubric the instructor sets. A minimum score of 70% is required. **<u>Objective Assessments.</u>** There is a specific learning objective associated with each lesson, which is assessed through objective assessments at	

	stem &leaf) Students will be guided to these tools at the time of enrollment, during the video orientation, and as the need is identified by the teacher.	multiple points during the course: at the end of the specific lesson, at the end of the unit, and at the end of the semester. Additionally, there are optional unit pretests. • **Unit pretests** are optional multiple-choice assessments, typically designed for credit recovery use. If a student shows mastery of a lesson's objective (70% proficiency), the student will be automatically exempted from that module in the upcoming unit. • **Mastery tests** at the end of each lesson provide the instructor and the student with clear indicators of areas of strength and weakness. These multiple-choice tests	

		are taken online and contain randomly generated questions. A minimum score of 70% is required and a student may retake the mastery tests as many times as needed to demonstrate at least a 70% proficiency. • **Unit posttests** help instructors track how well students have mastered the unit's content. The tests are multiple-choice and are provided online. A minimum score of 70% is required. • **End-of-semester tests** assess the major objectives covered in the course. The End-of-Semester Test will be proctored	

		(required) and a minimum score of 70% is required. Remediation assignment will be provided if a student does not meet the 70% requirement, and then a new End-of-Semester test will be administered. By combining the unit pretest (if applicable) and unit posttest information with the end-of-semester test results, the instructor will gain a clear picture of student progress. The tests are multiple-choice (randomly generated questions) and are provided online. **Remediation:** Students that attain less than 70% on assignments will be required to complete a remediation assignment and make corrections to the assignments and eNotes. Teachers will work with the student to assist and reteach as needed.	

		Instructional Feedback: Teachers will provide instructional feedback in teacher-graded assignments. Students will email the teacher with confirmation that the teacher's comments and instructional was read and understood. **A midterm project** is required. Examples include: • Virtual field trip • Group or individual service learning activities • Video presentation • Web portfolio • Book Report • Research Project **A final research paper** is required. • It relates to or enriches course content • Students will have multiple topic options • Students may request an alternate subject (in a timely manner & appropriately) • MLA format is required • Six traits rubric used	

		<u>Scoring Rubric will vary based on type of activities in each course. Example:</u> • Participation and Progress = 10% • Discussions = 10% • Drop Box (Unit/ Lesson Activities) = 20% • Post Unit Tests = 20% • Midterm Project = 10% • End-of-Semester Test = 20% • Final Research Paper = 10% Total=100% **<u>Curriculum Reports:</u>** Edmentum LMS (PLATO Courseware) provides a wide array of reports that provide useable data concerning mastery of each lesson and assignment. Reports include: • Learner Progress Report by Learner • Learner Progress Report by Class • Learner Daily Usage by Learner • Learner Daily Usage by Class and Assignment	

		• Curriculum Items Response Report Curriculum Strengths and Needs by Class	
Concept 2: Scientific Testing (Investigating and Modeling) Design and conduct controlled investigations. PO 1. Demonstrate safe and ethical procedures (e.g., use and care of technology, materials, organisms) and behavior in all science inquiry. PO 2. Identify the resources needed to conduct an investigation. PO 3. Design an appropriate protocol (written plan of action) for testing a hypothesis: • Identify dependent and independent variables in a controlled investigation. • Determine an appropriate method for data collection (e.g., using balances, thermometers, microscopes, spectrophotometer, using qualitative changes). • Determine an appropriate method for recording data (e.g., notes, sketches, photographs, videos, journals (logs), charts,	**(same as above)** **All online materials are printable** **Secure internal messaging system** **Teacher's provide online office hours** **Phone communication as required** **Supplemental assignments available** **Supplemental resource links provided** **Tutorials** **Pre-tests** **Universal Access** **Learning Aids** • eNotes • Resource Folder • Dictionary • Text to Speech (content reader) • Translator (16 languages)	(Same as above) Module Mastery Tests Discussion Activities Dropbox Activities Unit Post Tests End of Semester Exam	Continues Throughout Course

computers/calculators). PO 4. Conduct a scientific investigation that is based on a research design. PO 5. Record observations, notes, sketches, questions, and ideas using tools such as journals, charts, graphs, and computers.			
Concept 3: Analysis, Conclusions, and Refinements Evaluate experimental design, analyze data to explain results and propose further investigations. Design models. PO 1. Interpret data that show a variety of possible relationships between variables, including: • positive relationship • negative relationship • no relationship PO 2. Evaluate whether investigational data support or do not support the proposed hypothesis. PO 3. Critique reports of scientific studies (e.g., published papers, student reports). PO 4. Evaluate the design of an investigation to identify possible sources of procedural error, including:	**(Same as above)** **All online materials are printable** **Secure internal messaging system** **Teacher's provide online office hours** **Phone communication as required** **Supplemental assignments available** **Supplemental resource links provided** **Tutorials** **Pre-tests** **Universal Access Learning Aids** • eNotes • Resource Folder • Dictionary • Text to Speech (content reader) • Translator (16 languages)	(Same as above) Module Mastery Tests Discussion Activities Dropbox Activities Unit Post Tests End of Semester Exam	Continues Throughout Course

• sample size • trials • controls • analyses PO 5. Design models (conceptual or physical) of the following to represent "real world" scenarios: • carbon cycle • water cycle • phase change • collisions PO 6. Use descriptive statistics to analyze data, including: • mean • frequency • range (See MHS-S2C1-10) PO 7. Propose further investigations based on the findings of a conducted investigation.			
Concept 4: Communication Communicate results of investigations. PO 1. For a specific investigation, choose an appropriate method for communicating the results. (See W09-S3C2-01 and W10-S3C3-01) PO 2. Produce graphs that communicate data. (See MHS-S2C1-02)	**(Same as above)** **All online materials are printable** **Secure internal messaging system** **Teacher's provide online office hours** **Phone communication as required** **Supplemental assignments available** **Supplemental resource links provided** **Tutorials** **Pre-tests** **Universal Access** **Learning Aids**	(Same as above) Module Mastery Tests Discussion Activities Dropbox Activities Unit Post Tests End of Semester Exam	Continues Throughout Course

PO 3. Communicate results clearly and logically. PO 4. Support conclusions with logical scientific arguments.	• eNotes • Resource Folder • Dictionary • Text to Speech (content reader) • Translator (16 languages)		
Strand 2: History and Nature of Science			
Concept 1: History of Science as a Human Endeavor Scientific investigation grows from the contributions of many people. History and Nature of Science emphasizes the importance of the inclusion of historical perspectives and the advances that each new development brings to technology and human knowledge. This strand focuses on the human aspects of science and the role that scientists play in the development of various cultures. Identify individual, cultural, and technological contributions to scientific knowledge. PO 1. Describe how human curiosity and needs have influenced science, impacting the quality of life worldwide. PO 2. Describe how diverse people and/or cultures, past and present, have made important contributions to scientific innovations.	**(Same as above)** **All online materials are printable** **Secure internal messaging system** **Teacher's provide online office hours** **Phone communication as required** **Supplemental assignments available** **Supplemental resource links provided** **Tutorials** **Pre-tests** **Universal Access Learning Aids** • eNotes • Resource Folder • Dictionary • Text to Speech (content reader) • Translator (16 languages)	(Same as above) Module Mastery Tests Discussion Activities Dropbox Activities Unit Post Tests End of Semester Exam	Continues Throughout Course

PO 3. Analyze how specific changes in science have affected society. PO 4. Analyze how specific cultural and/or societal issues promote or hinder scientific advancements.			
Concept 2: Nature of Scientific Knowledge Understand how science is a process for generating knowledge. PO 1. Specify the requirements of a valid, scientific explanation (theory), including that it be: • logical • subject to peer review • public • respectful of rules of evidence PO 2. Explain the process by which accepted ideas are challenged or extended by scientific innovation. PO 3. Distinguish between pure and applied science. PO 4. Describe how scientists continue to investigate and critically analyze aspects of theories	**(Same as above)** **All online materials are printable** **Secure internal messaging system** **Teacher's provide online office hours** **Phone communication as required** **Supplemental assignments available** **Supplemental resource links provided** **Tutorials** **Pre-tests** **Universal Access Learning Aids** • eNotes • Resource Folder • Dictionary • Text to Speech (content reader) • Translator (16 languages)	(Same as above) Module Mastery Tests Discussion Activities Dropbox Activities Unit Post Tests End of Semester Exam	Continues Throughout Course
Concept 3: Human Population Characteristics Analyze factors that affect human populations. PO 1. Analyze social factors	**(Same as above)** **All online materials are printable** **Secure internal messaging system** **Teacher's provide online office hours**	(Same as above) Module Mastery Tests Discussion Activities Dropbox Activities Unit Post Tests End of Semester Exam	Continues Throughout Course

that limit the growth of a human population, including: • affluence • education • access to health care • cultural influences PO 2. Describe biotic (living) and abiotic (nonliving) factors that affect human populations. PO 3. Predict the effect of a change in a specific factor on a human population.	**Phone communication as required** **Supplemental assignments available** **Supplemental resource links provided** **Tutorials** **Pre-tests** **Universal Access** **Learning Aids** • eNotes • Resource Folder • Dictionary • Text to Speech (content reader) • Translator (16 languages)		
Strand 3: Science in Personal and Social Perspectives			
Concept 1: Changes in Environments Science in Personal and Social Perspectives emphasizes developing the ability to design a solution to a problem, to understand the relationship between science and technology, and the ways people are involved in both. Students understand the impact of science and technology on human activity and the environment. This strand affords students the opportunity to understand their place in the world – as living creatures, consumers, decision makers, problem solvers, managers, and planners. **Concept 1: Changes in**	**(Same as above)** **All online materials are printable** **Secure internal messaging system** **Teacher's provide online office hours** **Phone communication as required** **Supplemental assignments available** **Supplemental resource links provided** **Tutorials** **Pre-tests** **Universal Access** **Learning Aids** • eNotes • Resource Folder • Dictionary • Text to Speech (content reader) • Translator (16 languages)	(Same as above) Module Mastery Tests Discussion Activities Dropbox Activities Unit Post Tests End of Semester Exam	Continues Throughout Course

Environments Describe the interactions between human populations, natural hazards, and the environment. PO 1. Evaluate how the processes of natural ecosystems affect, and are affected by, humans. PO 2. Describe the environmental effects of the following natural and/or human-caused hazards: • flooding • drought • earthquakes • fires • pollution • extreme weather PO 3. Assess how human activities (e.g., clear cutting, water management, tree thinning) can affect the potential for hazards. PO 4. Evaluate the following factors that affect the quality of the environment: • urban development • smoke • volcanic dust PO 5. Evaluate the effectiveness of conservation practices and preservation techniques on environmental quality and biodiversity.			
Concept 2: Science and	**(Same as above)**	(Same as above)	Continues

Technology in Society Develop viable solutions to a need or problem. PO 1. Analyze the costs, benefits, and risks of various ways of dealing with the following needs or problems: • various forms of alternative energy • storage of nuclear waste • abandoned mines • greenhouse gases • hazardous wastes PO 2. Recognize the importance of basing arguments on a thorough understanding of the core concepts and principles of science and technology. PO 3. Support a position on a science or technology issue. PO 4. Analyze the use of renewable and nonrenewable resources in Arizona: • water • land • soil • minerals • air PO 5. Evaluate methods used to manage natural resources (e.g., reintroduction of wildlife, fire ecology).	**All online materials are printable** **Secure internal messaging system** **Teacher's provide online office hours** **Phone communication as required** **Supplemental assignments available** **Supplemental resource links provided** **Tutorials** **Pre-tests** **Universal Access Learning Aids** • eNotes • Resource Folder • Dictionary • Text to Speech (content reader) • Translator (16 languages)	Module Mastery Tests Discussion Activities Dropbox Activities Unit Post Tests End of Semester Exam	Throughout Course
Strand 4: Life Science			
	(Same as above)	(Same as above)	Continues

Life Science expands students' biological understanding of life by focusing on the characteristics of living things, the diversity of life, and how organisms and populations change over time in terms of biological adaptation and genetics. This understanding includes the relationship of structures to their functions and life cycles, interrelationships of matter and energy in living organisms, and the interactions of living organisms with their environment. **Concept 1: The Cell** Understand the role of the cell and cellular processes. PO 1. Describe the role of energy in cellular growth, development, and repair. PO 2. Compare the form and function of prokaryotic and eukaryotic cells and their cellular components. PO 3. Explain the importance of water to cells. PO 4. Analyze mechanisms of transport of materials (e.g., water, ions, macromolecules) into and out of cells: • passive transport • active transport PO 5. Describe the purposes	**All online materials are printable** **Secure internal messaging system** **Teacher's provide online office hours** **Phone communication as required** **Supplemental assignments available** **Supplemental resource links provided** **Tutorials** **Pre-tests** **Universal Access Learning Aids** • eNotes • Resource Folder • Dictionary • Text to Speech (content reader) • Translator (16 languages)	Module Mastery Tests Discussion Activities Dropbox Activities Unit Post Tests End of Semester Exam	Throughout Course

and processes of cellular reproduction.			
Concept 2: Molecular Basis of Heredity Understand the molecular basis of heredity and resulting genetic diversity. PO 1. Analyze the relationships among nucleic acids (DNA, RNA), genes, and chromosomes. PO 2. Describe the molecular basis of heredity, in viruses and living things, including DNA replication and protein synthesis. PO 3. Explain how genotypic variation occurs and results in phenotypic diversity. PO 4. Describe how meiosis and fertilization maintain genetic variation.	**(Same as above)** **All online materials are printable** **Secure internal messaging system** **Teacher's provide online office hours** **Phone communication as required** **Supplemental assignments available** **Supplemental resource links provided** **Tutorials** **Pre-tests** **Universal Access Learning Aids** • eNotes • Resource Folder • Dictionary • Text to Speech (content reader) • Translator (16 languages)	(Same as above) Module Mastery Tests Discussion Activities Dropbox Activities Unit Post Tests End of Semester Exam	Continues Throughout Course
Concept 3: Interdependence of Organisms Analyze the relationships among various organisms and their environment. PO 1. Identify the relationships among organisms within populations, communities, ecosystems, and biomes. PO 2. Describe how organisms are influenced by a particular combination of	**(Same as above)** **All online materials are printable** **Secure internal messaging system** **Teacher's provide online office hours** **Phone communication as required** **Supplemental assignments available** **Supplemental resource links provided** **Tutorials** **Pre-tests** **Universal Access**	(Same as above) Module Mastery Tests Discussion Activities Dropbox Activities Unit Post Tests End of Semester Exam	Continues Throughout Course

biotic (living) and abiotic (nonliving) factors in an environment. PO 3. Assess how the size and the rate of growth of a population are determined by birth rate, death rate, immigration, emigration, and carrying capacity of the environment.	**Learning Aids** • eNotes • Resource Folder • Dictionary • Text to Speech (content reader) • Translator (16 languages)		
Concept 4: Biological Evolution Understand the scientific principles and processes involved in biological evolution. PO 1. Identify the following components of natural selection, which can lead to speciation: • potential for a species to increase its numbers • genetic variability and inheritance of offspring due to mutation and recombination of genes • finite supply of resources required for life • selection by the environment of those offspring better able to survive and produce offspring PO 2. Explain how genotypic and phenotypic variation can result in adaptations that influence an organism's	**(Same as above)** **All online materials are printable** **Secure internal messaging system** **Teacher's provide online office hours** **Phone communication as required** **Supplemental assignments available** **Supplemental resource links provided** **Tutorials** **Pre-tests** **Universal Access** **Learning Aids** • eNotes • Resource Folder • Dictionary • Text to Speech (content reader) • Translator (16 languages)	(Same as above) Module Mastery Tests Discussion Activities Dropbox Activities Unit Post Tests End of Semester Exam	Continues Throughout Course

success in an environment. PO 3. Describe how the continuing operation of natural selection underlies a population's ability to adapt to changes in the environment and leads to biodiversity and the origin of new species. PO 4. Predict how a change in an environmental factor (e.g., rainfall, habitat loss, non-native species) can affect the number and diversity of species in an ecosystem. PO 5. Analyze how patterns in the fossil record, nuclear chemistry, geology, molecular biology, and geographical distribution give support to the theory of organic evolution through natural selection over billions of years and the resulting present day biodiversity. PO 6. Analyze, using a biological classification system (i.e., cladistics, phylogeny, morphology, DNA analysis), the degree of relatedness among various species.			
Concept 5: Matter, Energy, and Organization in Living Systems (Including Human Systems) Understand the organization	**(Same as above)** **All online materials are printable** **Secure internal messaging system** **Teacher's provide online office hours**	(Same as above) Module Mastery Tests Discussion Activities Dropbox Activities Unit Post Tests End of Semester Exam	Continues Throughout Course

of living systems, and the role of energy within those systems. PO 1. Compare the processes of photosynthesis and cellular respiration in terms of energy flow, reactants, and products. PO 2. Describe the role of organic and inorganic chemicals (e.g., carbohydrates, proteins, lipids, nucleic acids, water, ATP) important to living things. PO 3. Diagram the following biogeochemical cycles in an ecosystem: • water • carbon • nitrogen PO 4. Diagram the energy flow in an ecosystem through a food chain. PO 5. Describe the levels of organization of living things from cells, through tissues, organs, organ systems, organisms, populations, and communities to ecosystems.	**Phone communication as required** **Supplemental assignments available** **Supplemental resource links provided** **Tutorials** **Pre-tests** **Universal Access Learning Aids** • eNotes • Resource Folder • Dictionary • Text to Speech (content reader) • Translator (16 languages)		
Strand 5: Physical Science			
Concept 1: Structure and Properties of Matter Physical Science affords students the opportunity to increase their understanding of the characteristics of objects and materials they	(Same as above) **All online materials are printable** **Secure internal messaging system** **Teacher's provide online office hours** **Phone communication**	(Same as above) Module Mastery Tests Discussion Activities Dropbox Activities Unit Post Tests End of Semester Exam	Continues Throughout Course

encounter daily. Students gain an understanding of the nature of matter and energy, including their forms, the changes they undergo, and their interactions. By studying objects and the forces that act upon them, students develop an understanding of the fundamental laws of motion, knowledge of the various ways energy is stored in a system, and the processes by which energy is transferred between systems and surroundings. **Concept 1: Structure and Properties of Matter** Understand physical, chemical, and atomic properties of matter. PO 1. Describe substances based on their physical properties. PO 2. Describe substances based on their chemical properties. PO 3. Predict properties of elements and compounds using trends of the periodic table (e.g., metals, non-metals, bonding – ionic/covalent). PO 4. Separate mixtures of substances based on their physical properties. PO 5. Describe the properties of electric charge and the conservation of electric charge.	**as required** **Supplemental assignments available** **Supplemental resource links provided** **Tutorials** **Pre-tests** **Universal Access Learning Aids** • eNotes • Resource Folder • Dictionary • Text to Speech (content reader) • Translator (16 languages)		

PO 6. Describe the following features and components of the atom: • protons • neutrons • electrons • mass • number and type of particles • structure • organization PO 7. Describe the historical development of models of the atom. PO 8. Explain the details of atomic structure (e.g., electron configuration, energy levels, isotopes).			
Concept 2: Motions and Forces Analyze relationships between forces and motion. PO 1. Determine the rate of change of a quantity (e.g., rate of erosion, rate of reaction, rate of growth, velocity). PO 2. Analyze the relationships among position, velocity, acceleration, and time: • graphically • mathematically	**(Same as above)** **All online materials are printable** **Secure internal messaging system** **Teacher's provide online office hours** **Phone communication as required** **Supplemental assignments available** **Supplemental resource links provided** **Tutorials** **Pre-tests** **Universal Access Learning Aids** • eNotes • Resource Folder • Dictionary • Text to Speech (content reader) • Translator (16 languages)	(Same as above) Module Mastery Tests Discussion Activities Dropbox Activities Unit Post Tests End of Semester Exam	Continues Throughout Course

Concept 3: Conservation of Energy and Increase in Disorder Understand ways that energy is conserved, stored, and transferred. PO 1. Describe the following ways in which energy is stored in a system: • mechanical • electrical • chemical • nuclear PO 2. Describe various ways in which energy is transferred from one system to another (e.g., mechanical contact, thermal conduction, electromagnetic radiation.) PO 3. Recognize that energy is conserved in a closed system. PO 4. Calculate quantitative relationships associated with the conservation of energy. PO 5. Analyze the relationship between energy transfer and disorder in the universe (2nd Law of Thermodynamics). PO 6. Distinguish between heat and temperature.	**(Same as above)** **All online materials are printable** **Secure internal messaging system** **Teacher's provide online office hours** **Phone communication as required** **Supplemental assignments available** **Supplemental resource links provided** **Tutorials** **Pre-tests** **Universal Access Learning Aids** • eNotes • Resource Folder • Dictionary • Text to Speech (content reader) • Translator (16 languages)	(Same as above) Module Mastery Tests Discussion Activities Dropbox Activities Unit Post Tests End of Semester Exam	Continues Throughout Course
Concept 4: Chemical Reactions Investigate relationships between reactants and products in chemical	**(Same as above)** **All online materials are printable** **Secure internal messaging system** **Teacher's provide online office hours**	(Same as above) Module Mastery Tests Discussion Activities Dropbox Activities Unit Post Tests End of Semester Exam	Continues Throughout Course

reactions. PO 1. Apply the law of conservation of matter to changes in a system. PO 2. Identify the indicators of chemical change, including formation of a precipitate, evolution of a gas, color change, absorption or release of heat energy. PO 3. Represent a chemical reaction by using a balanced equation. PO 4. Distinguish among the types of bonds (i.e., ionic, covalent, metallic, hydrogen bonding). PO 5. Describe the mole concept and its relationship to Avogadro's number. PO 6. Solve problems involving such quantities as moles, mass, molecules, volume of a gas, and molarity using the mole concept and Avogadro's number. PO 7. Predict the properties (e.g., melting point, boiling point, conductivity) of substances based upon bond type. PO 8. Quantify the relationships between reactants and products in chemical reactions (e.g., stoichiometry, equilibrium, energy transfers). PO 9. Predict the products of	**Phone communication as required** **Supplemental assignments available** **Supplemental resource links provided** **Tutorials** **Pre-tests** **Universal Access Learning Aids** • eNotes • Resource Folder • Dictionary • Text to Speech (content reader) • Translator (16 languages)		

a chemical reaction using types of reactions (e.g., synthesis, decomposition, replacement, combustion). PO 10. Explain the energy transfers within chemical reactions using the law of conservation of energy. PO 11. Predict the effect of various factors (e.g., temperature, concentration, pressure, catalyst) on the equilibrium state and on the rates of chemical reaction. PO 12. Compare the nature, behavior, concentration, and strengths of acids and bases. PO 13. Determine the transfer of electrons in oxidation/reduction reactions.			
Concept 5: Interactions of Energy and Matter Understand the interactions of energy and matter. PO 1. Describe various ways in which matter and energy interact (e.g., photosynthesis, phase change). PO 2. Describe the following characteristics of waves: • wavelength • frequency • period • amplitude	**(Same as above)** **All online materials are printable** **Secure internal messaging system** **Teacher's provide online office hours** **Phone communication as required** **Supplemental assignments available** **Supplemental resource links provided** **Tutorials** **Pre-tests** **Universal Access Learning Aids**	(Same as above) Module Mastery Tests Discussion Activities Dropbox Activities Unit Post Tests End of Semester Exam	Continues Throughout Course

PO 3. Quantify the relationships among the frequency, wavelength, and the speed of light.	• eNotes • Resource Folder • Dictionary • Text to Speech (content reader) • Translator (16 languages)		
Strand 6: Earth and Space Science			
Earth and Space Science provides the foundation for students to develop an understanding of the Earth, its history, composition, and formative processes, and an understanding of the solar system and the universe. Students study the regularities of the interrelated systems of the natural world. In doing so, they develop understandings of the basic laws, theories, and models that explain the world (NSES, 1995). By studying the Earth from both a historical and current time frame, students can make informed decisions about issues affecting the planet on which they live. **Concept 1: Geochemical Cycles** Analyze the interactions between the Earth's structures, atmosphere, and geochemical cycles. PO 1. Identify ways materials are cycled within the Earth system (i.e., carbon	**(Same as above)** **All online materials are printable** **Secure internal messaging system** **Teacher's provide online office hours** **Phone communication as required** **Supplemental assignments available** **Supplemental resource links provided** **Tutorials** **Pre-tests** **Universal Access Learning Aids** • eNotes • Resource Folder • Dictionary • Text to Speech (content reader) • Translator (16 languages)	(Same as above) Module Mastery Tests Discussion Activities Dropbox Activities Unit Post Tests End of Semester Exam	Continues Throughout Course

cycle, water cycle, rock cycle). PO 2. Demonstrate how dynamic processes such as weathering, erosion, sedimentation, metamorphism, and orogenesis relate to redistribution of materials within the Earth system. PO 3. Explain how the rock cycle is related to plate tectonics.			
Concept 2: Energy in the Earth System (Both Internal and External) Understand the relationships between the Earth's land masses, oceans, and atmosphere. PO 1. Describe the flow of energy to and from the Earth. PO 2. Explain the mechanisms of heat transfer (convection, conduction, radiation) among the atmosphere, land masses, and oceans. PO 3. Distinguish between weather and climate. Internal Energy: PO 4. Demonstrate the relationship between the Earth's internal convective heat flow and plate tectonics. PO 5. Demonstrate the relationships among	**(Same as above)** **All online materials are printable** **Secure internal messaging system** **Teacher's provide online office hours** **Phone communication as required** **Supplemental assignments available** **Supplemental resource links provided** **Tutorials** **Pre-tests** **Universal Access Learning Aids** • eNotes • Resource Folder • Dictionary • Text to Speech (content reader) • Translator (16 languages)	(Same as above) Module Mastery Tests Discussion Activities Dropbox Activities Unit Post Tests End of Semester Exam	Continues Throughout Course

earthquakes, volcanoes, mountain ranges, mid-oceanic ridges, deep sea trenches, and tectonic plates. PO 6. Distinguish among seismic S, P, and surface waves. PO 7. Analyze the seismic evidence (S and P waves) used to determine the structure of the Earth. PO 8. Describe how radioactive decay maintains the Earth's internal temperature. External Energy: PO 9. Explain the effect of heat transfer on climate and weather. PO 10. Demonstrate the effect of the Earth's rotation (i.e., Coriolis effect) on the movement of water and air. PO 11. Describe the origin, life cycle, and behavior of weather systems (i.e., air mass, front, high and low systems, pressure gradients). PO 12. Describe the conditions that cause severe weather (e.g., hurricanes, tornadoes, thunderstorms). PO 13. Propose appropriate safety measures that can be taken in preparation for severe weather. PO 14. Analyze how weather			

is influenced by both natural and artificial Earth features (e.g., mountain ranges, bodies of water, cities, air pollution). PO 15. List the factors that determine climate (e.g., altitude, latitude, water bodies, precipitation, prevailing winds, topography). PO 16. Explain the causes and/or effects of climate changes over long periods of time (e.g., glaciation, desertification, solar activity, greenhouse effect). PO 17. Investigate the effects of acid rain, smoke, volcanic dust, urban development, and greenhouse gases, on climate change over various periods of time.			
Concept 3: Origin and Evolution of the Earth System Analyze the factors used to explain the history and evolution of the Earth. Earth Origin/System: PO 1. Describe the scientific theory of the origin of the solar system (solar nebular hypothesis). PO 2. Describe the characteristics, location, and motions of the various kinds of objects in our solar system, including the Sun, planets,	**(Same as above)** **All online materials are printable** **Secure internal messaging system** **Teacher's provide online office hours** **Phone communication as required** **Supplemental assignments available** **Supplemental resource links provided** **Tutorials** **Pre-tests** **Universal Access Learning Aids** • eNotes	(Same as above) Module Mastery Tests Discussion Activities Dropbox Activities Unit Post Tests End of Semester Exam	Continues Throughout Course

satellites, comets, meteors, and asteroids. PO 3. Explain the phases of the Moon, eclipses (lunar and solar), and the interaction of the Sun, Moon, and Earth (tidal effect). Earth History/Evolution: PO 4. Interpret a geologic time scale. PO 5. Distinguish between relative and absolute geologic dating techniques. PO 6. Investigate scientific theories of how life originated on Earth (high temperature, low oxygen, clay catalyst model). PO 7. Describe how life on Earth has influenced the evolution of the Earth's systems. PO 8. Sequence major events in the Earth's evolution (e.g., mass extinctions, glacial episodes) using relative and absolute dating data. PO 9. Analyze patterns in the fossil record related to the theory of organic evolution.	• Resource Folder • Dictionary • Text to Speech (content reader) • Translator (16 languages)		
Concept 4: Origin and Evolution of the Universe Analyze the factors used to explain the origin and evolution of the universe. PO 1. Describe the Big Bang	**(Same as above)** **All online materials are printable** **Secure internal messaging system** **Teacher's provide online office hours**	(Same as above) Module Mastery Tests Discussion Activities Dropbox Activities Unit Post Tests End of Semester Exam	Continues Throughout Course

Theory as an explanation for the origin of the universe. PO 2. Describe the fusion process that takes place in stars. PO 3. Analyze the evolution of various types of stars using the Hertzsprung-Russell (HR) diagram. PO 4. Compare the evolution (life cycles) of stars of different masses (low and high mass). PO 5. Explain the formation of the light elements in stars and the heavier elements (what astronomers call "metals") in supernova explosions. PO 6. Explain the evolution and life cycles of galaxies.	**Phone communication as required** **Supplemental assignments available** **Supplemental resource links provided** **Tutorials** **Pre-tests** **Universal Access Learning Aids** • eNotes • Resource Folder • Dictionary • Text to Speech (content reader) • Translator (16 languages)		