

I. PROGRAM LEARNING OUTCOMES

1. The student will be able to demonstrate mastery of the content of the elementary school curriculum.
2. The student will be able to develop and demonstrate delivery of elementary school curriculum in English and the heritage language.
3. The student will be able to use (demonstrate) a variety of teaching strategies to meet the learning needs of bilingual elementary school students.
4. The student will be able to assess and evaluate elementary school student learning at both the formative and summative levels.
5. The student will be able to organize and manage a classroom environment for learning.
6. The student will be able to demonstrate and use background knowledge in the following areas: learning theories and principles, human development, language development, technology, educational foundations, sociocultural issues and individual and group motivation.
7. The student will be able to demonstrate professionalism.

II. COURSE OUTCOMES:

A. General

1. To introduce science. To explain differences between science and religion, and allow students to demonstrate the scientific method.
2. Demonstrate knowledge and use of common units of measure.
3. Identify the basic concepts and applications of forces and motions.
4. Distinguish between the structures and properties of matter.
5. Identify the interactions of matter.
6. Identify and describe the characteristics of energy.
7. To allow students to practice incorporating physical science teaching methods into the classroom.

B. Specific

1. To introduce science. To explain differences between science and religion, and allow students opportunities to demonstrate use of the scientific method.

Student Learning Outcomes	Suggested Assessment
1.1 Define science	Students will provide a correct definition science.
1.2 Examine differences between science and religion	Students will demonstrate in writing, differences between science and religion.
1.3 Identify the steps of the scientific method	Students will correctly outline the steps involved in the scientific method on a quiz.
1.4 Demonstrate use and understanding of the scientific method	Students will utilize the scientific method in practical application. Student will demonstrate scientific method techniques in at least three lab exercises. Evaluation of understanding will be reflected in written lab reports assigned following lab work.

2. Demonstrate knowledge and use of common units of measure.

2.1 Understand the International System of Units	Following classroom notes, students will demonstrate correct use of the following prefixes: <i>mega, kilo, hecto, deka, deci, centi, milli, and micro.</i>
2.2 Knowledge and appropriate use of common types of measurement.	<p>Students will define (in writing) length as the distance from one point to another and recognize the meter (m) as the base unit of measure.</p> <p>Students will define (in writing) volume as the amount of space an object takes up and recognize the liter (L) as the base unit of measure.</p> <p>Students will define (in writing) mass as the amount of matter in an object and recognize the gram (g) as the base unit of measure.</p> <p>Students will define (in writing) weight as a measure of gravitational force on an object and recognize the Newton (N) as the base unit of measure.</p> <p>Students will define (in writing) time as how long it takes an event to happen and recognize the second (s) as the base unit of measure.</p>

	<p>Students will define (in writing) temperature as the amount of kinetic energy an object has and recognize the Celsius degree (C) as the base unit of measure.</p> <p>Students will define (in writing) density (D) as how compacted the mass of a substance is and recognize D is calculated by dividing the mass by the volume.</p>
2.3 Knowledge and use of tools of measure	<p>In laboratory exercises, students will demonstrate proficiency in the use of the metric ruler for measuring length.</p> <p>In laboratory exercises, students will demonstrate proficiency in the use of the metric ruler (solids) and graduated cylinder (liquids) for measuring volume.</p> <p>In laboratory exercises, students will demonstrate proficiency in the use of a balance and scale for measuring mass.</p> <p>In laboratory exercises, students will demonstrate proficiency in the use of the scale for measuring weight.</p> <p>In laboratory exercises, students will demonstrate proficiency in the use of a clock and stopwatch for measuring time.</p> <p>In laboratory exercises, students will demonstrate proficiency in the use of the Celsius thermometer for measuring temperature.</p> <p>In laboratory exercises, students will demonstrate proficiency in the use of the balance, scale, metric ruler, and graduated cylinder for measuring density.</p>
2.4 Demonstrate use of significant figures	<p>On all tests, students will be deducted partial credit for answers not expressing proper significant figures (digits) reflecting precision of the instrument used plus one uncertain digit.</p>

3. Identify the basic concepts and applications of forces and motion

Student Learning Outcomes	Suggested Assessment
3.1 Realize the basic concept that forces can move objects.	Students will define the terms work and force.

	<p>Through class discussion and demonstration, students will recognize that objects can move in different directions and at different speeds.</p> <p>Students will observe and describe how the movement of an object can be changed (e.g. push/pull, fast slow).</p> <p>Students will see and describe that objects fall unless supported.</p> <p>Students will define gravity on a test.</p> <p>In-class demonstrations will allow students to recognize and identify materials that are attracted to magnets.</p> <p>Students will describe in writing the relationship between the amount of force applied to an object and the distance the object moves.</p> <p>Through classroom demonstration, students will recognize that objects move differently on different surfaces.</p> <p>Students will define magnetism on a test.</p> <p>On a test, students will explain how magnets can move objects without touching them.</p>
<p>3.2 Observe and predict how the weight of an object and its position affect balance</p>	<p>Through classroom demonstration, students will recognize objects that are balanced and unbalanced.</p> <p>Observe how changing the amount of weight affects a balanced system.</p>
<p>3.3 Recognize that gravity is the force that pulls objects toward the Earth</p>	<p>Describe how gravitational forces operate in nature.</p> <p>On a test, students will explain the effect that gravity has on objects found on Earth.</p>
<p>3.4 Recognize the relationship between force and motion</p>	<p>Explain how speed affects the distance traveled.</p> <p>Students will recognize, identify, and use simple machines (e.g. inclined plan, pulley, lever).</p> <p>Explain the relationships between mass,</p>

	<p>force, and distance traveled.</p> <p>Describe how slope affects the amount of force.</p> <p>Explore and explain the use of simple machines.</p>
3.5 Recognize that the motion of an object is affected by friction	<p>Students will define friction, slope, and inertia.</p> <p>Identify factors that affect the amount of friction.</p> <p>On a test, students will explain how friction affects motion.</p>
3.6 Distinguish between speed and velocity	<p>On a test, students will calculate the speed of an object based on the distance and amount of time traveled.</p> <p>Differentiate between speed and velocity.</p>
3.7 Demonstrate an understanding of Newton's three laws of motion	<p>Describe how Newton's three laws of motion explain the movement of objects.</p>
3.8 Identify factors that influence the amount of gravitation force between objects	<p>Distinguish between mass and weight.</p> <p>Describe the relationship among distance, size, mass, and gravitational force of an object.</p>
3.9 Identify simple machines and their uses	<p>In a lab report, students will differentiate among the six types of simple machines and their applications.</p>

4. Distinguish between the structures and properties of matter

Student Learning Outcomes	Suggested Assessment
4.1 Recognize that objects have observable properties that can change over time and under different conditions	<p>Describe an object according to its simple properties.</p> <p>In class discussions, students will compare objects according to weight, size, and length.</p> <p>On a quiz, students will define both solids and liquids.</p> <p>Identify physical properties that can be used to describe a material.</p> <p>Describe ways in which a material can be changed.</p>

	<p>Classify material according to their physical properties.</p> <p>Select and use appropriate tools to observe and measure the physical properties of materials.</p>
4.2 Recognize that matter has predictable properties and is composed of basic units, some too small to be seen with the naked eye	<p>Describe and compare observations made of objects using the naked eye, magnifying glass, and microscope.</p> <p>Describe matter by its observable physical properties (e.g. color, shape, texture, weight, volume, length).</p> <p>Explain the law of conservation of matter.</p>
4.3 Recognize conditions that are associated with the different states of matter	<p>Describe how various types of matter change their state.</p> <p>Describe how evaporation and condensation occur as a result of temperature change.</p>
4.4 Explain why different types of matter freeze, melt and/or evaporate at different rates	<p>On a quiz, students will define element, compound and mixture.</p>
4.5 Identify and measure the simple properties of common substances	<p>Describe the particle arrangement associated with different states of matter.</p> <p>Identify the mass, volume, density, boiling point, and solubility of a given substance.</p> <p>Measure and/or calculate the mass, volume, density, and temperature of a given substance.</p>
4.6 Recognize that the periodic table is used as a tool for grouping elements	<p>Students will be able to discern information about an element with the aid of a periodic table.</p>

5. Identify the interactions of matter

Student Learning Outcomes	Suggested Assessment
5.1 Investigate the kinds of changes that occur when different types of matter interact	<p>Observe and describe changes that occur when two materials interact.</p> <p>Recognize that when substances combine they may retain their individual properties (e.g. salt and pepper).</p> <p>Recognize that when two substances combine they may lose their individual properties (e.g. powder drink mix and water).</p>

	Explain how materials change their form, color, or texture when they are mixed, separated, or heated.
5.2 Describe the types of changes that result from interactions of matter	Identify conditions associated with a physical change. Identify conditions associated with a chemical change. Distinguish between physical and chemical change
5.3 Describe the difference between acids and bases and how indicators are used	Determine whether a substance is acid or base using an indicator.
5.4 Differentiate between physical and chemical change.	Determine whether and interaction between substances results in a physical or chemical change. Recognize that oxygen, in combination with another substance, results in a chemical change
5.5 Define what a chemical equation represents	Identify the reaction and/or products in a chemical reaction. Explain why the mass of the reactants is the same as the mass of the products during a chemical change. Describe how temperature and pH affects the rate of a reaction.

6. Identify and describe the characteristics of energy

Student Learning Outcomes	Suggested Assessment
6.1 Show that the sun is the main source of Earth's heat and light energy	Identify the sun as the source of Earth's heat and light energy. Describe the effect of the sun's energy on different materials. Compare the heating and cooling of land, air, and water. Analyze data to explain the heating and cooling of land, air and water.
6.2 Recognize that sound is produced when objects vibrate	Identify different sounds and their sources. Classify sounds according to their basic characteristics (e.g. loud/soft,

	<p>natural/manmade).</p> <p>Explain how sounds are produced.</p> <p>Differentiate between pitch and volume.</p>
6.3 Recognize that energy exists in many forms	Identify the different forms of energy (e.g., mechanical, heat).
6.4 Recognize the characteristics of light energy and sound energy	<p>Describe how light behaves when it strikes different surfaces.</p> <p>Explain how the volume and pitch of sound are controlled.</p> <p>Observe and describe how lenses affect the beam of light.</p>
6.5 Recognize the basic concept of electricity	<p>Construct and explain a simple electrical circuit.</p> <p>Categorize materials as conductors or insulators.</p>
6.6 Identify that energy exists in many forms	<p>Demonstrate and explain how energy can change form.</p> <p>Differentiate between potential energy and kinetic energy.</p>
6.7 Identify the properties and uses of magnets	<p>Explore and describe the uses of magnets.</p> <p>Demonstrate and describe a magnetic field.</p>
6.8 Recognize the basic concept of electricity	<p>Construct and explain a parallel circuit.</p> <p>Compare series and parallel circuits.</p> <p>Explain the use of a specific type of electrical circuit.</p>
6.9 Identify and describe the characteristics of waves	<p>Students will correctly label the basic parts of a wave.</p> <p>Distinguish among wavelength, frequency, and amplitude.</p> <p>Explain how the properties of a sound are related to wavelength, frequency, and amplitude.</p>
6.10 Describe the difference between heat and temperature	<p>Describe how heat flows between objects.</p> <p>Explain the difference between the Fahrenheit and Celsius temperature scales.</p>

7. To allow students to practice incorporating physical science teaching methods into the classroom.

Student Learning Outcomes	Suggested Assessment
7.1 Assist other students in learning	Students will be asked to explain various concepts throughout the semester and provide input on questions from their classmates.
7.2 Discuss methods of teaching various concepts	As part of each unit, classroom discussions will include brainstorming activities aimed at discerning different approaches to teaching each unit at the appropriate elementary grade level.
7.3 Construction of elementary school life science lessons.	Each student will be assigned a project to design a Physical Science lesson topic for a particular grade and submit supporting materials showing the objectives, rationale, and evaluation of each method. The lesson itself will be turned in as a Powerpoint presentation to be evaluated by the instructor and the class. This project may be done as group projects rather than individual projects.
7.4 Practicum application	Students will coordinate their learning in Life Science for Teachers with lessons they will deliver in the third year student practicum.

III. Text and Materials

Teaching Science

IV. Reference Materials

FSM Elementary School Science Standards

Creative, Hands-On Science Experiences, Jerry De Bruin, Good Apple Publishing

Invitations to Science Inquiry, T. L. Liem, Science Inquiry Enterprises

Science Snackbook, Exploratorium Teacher Institute

V. Methods of Instruction

Lecture and class discussion

Laboratory exercises and demonstrations

Required reading assignments

Content adaptation to elementary classroom use

VI. Course Content

Unit One

Science and the Scientific Method

Scientific Measurements

Forces that move objects

Force of gravity

Relationship between force and motion

Friction

Speed and velocity
Newton's laws
Gravitational force and objects
Simple machines

Unit Two

Properties of objects and change
Matter and its units
States of matter
Matter and its interactions
Properties of simple substance
Periodic table/elements

Unit Three

Interaction of matter and changes
Acids and bases
Physical and chemical change
Chemical equations

Unit Four

The sun's heat and light energy
Sound and vibration
Energy in different forms
Characteristics of light and sound energy
Electricity
Types of energy
Magnets and their properties
Characteristics of waves
Heat and temperature
Temperature scales
Energy transformation
Light/electromagnetic spectrum

VII. INSTRUCTIONAL COSTS

VIII. EVALUATION:

Students will be evaluated by 4 tests and 1 comprehensive final exam all worth 100 points. Additionally, student will have 1 project due at the end of the semester. This project is also worth 100 points. Periodic quizzes will be given at the instructor's discretion; these quizzes will not total more than 100 points.

IX. REQUIRED COURSE MATERIALS:

Required course materials include the following: laboratory balance, metric scale, diThe number of each item required will depend upon the class size and the discretion of the instructor.

X. ATTENDANCE POLICY:

The students' attendance in this class will strictly adhere to the College of Micronesia-FSM attendance policy.

XI. CREDIT BY EXAMINATION:

none