Course Alignment to the Competencies for Elementary K-6 Teachers: Science																							
Course	Fundamental understanding of the integration of STEM								Fundamental understanding of the vision for K-6 science education:							Life Sciences	Physical Sciences	Earth Space Sciences	EDTA of Science				
	1.1	1.2	1. 3	1. 4	1. 5	1. 6	1. 7	1. 8	1. 9	1.1 0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.1	4.1	5.1	6.1
EDUC 2233																							
Instructional	х	х	х				х	х															Х
Technology																							
EDUC 3023 Scientific																							
Concepts and	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х				Х
Methods																							
BIOL 1063/1071																							
Introduction to																x				x			
Biological																~				~			
Sciences/Lab																							
ESCI 1073/1081 Earth																x						x	
and Atmosphere/Lab																^						~	
PHYS 1003 Elements																x					x		
of Physics																^					~		

SCIENCE

ACEI = Association for Childhood Education International ATS (InTASC) = Arkansas Teaching Standards (Interstate Teacher Assessment and Support Consortium) CCSS = Common Core State Standards NGSS = Next Generation Science Standards Praxis II (5035) = Praxis II Elementary Education: Science Subtest In addition to the Arkansas Teacher Standards, the Elementary Education K-6 teacher will demonstrate knowledge and/or competencies in the following science areas:

1. Fundamental understanding	1.1 Understands and models key concepts of science, technology,					
of the integration of STEM (science, technology, engineering, and mathematics) ACEI: 2.2	 1.2 Develops and delivers STEM-integrated, student-centered lessons and lab investigations taking into account factors such as safety measures, K-6 classroom dynamics, problem solving, and project-based learning strategies, etc. which integrate grade-appropriate standards and practices. 					
ATS (InTASC): Standard 4	1.3 Understands and applies the engineering design process used					
NGSS: K-6	to solve real-world problems in K-6 lessons					
CCSS: English Language Arts &	1.4 Collects, evaluates, synthesizes, and shares real world data					
Literacy in Science, and Technical Subjects, grades K-6	1.5 Applies STEM principles toward solving human and environmental problems; works in collaborative design teams to most given criteria to solve design problems					
CCSS: Mathematics, grades K-6	 1.6 Utilizes vocabulary, primary concepts, definitions, and models applicable to scientific investigations and engineering and design challenges 					
	1.7 Develops and delivers STEM lesson assessments (formative and summative)					
	1.8 Recognizes how an integrated approach can enrich the learning environment and build connections between STEM content areas					
	1.9 Understands and appreciates the nature of science and scientific inquiry through solving real-world problems					
	1.10 Shares, models, and practices strategies to support the integration of STEM areas with the emphasis in the K-6 classroom					
2. Fundamental understanding of the vision for K-6 science education: scientific and engineering practices, cross cutting concepts, and core ideas	Demonstrates a command of the three dimensional <u>vision</u> for K-12 science education- " students, over multiple years of school, actively engage in scientific and engineering practices and apply crosscutting concepts to deepen their understanding of the core ideas in these fields." Demonstrates a command of the eight scientific and anginaging practices in STEM. Dimension 1:					
ACEI: 2.2	• Asking questions (for science) and defining problems					
ATS (InTASC): Standard 4	(for engineering)					
NGSS: K-6	• Developing and using models					
CCSS: English Language Arts & Literacy in Science, and Technical Subjects, grades K-6	 Planning and carrying out investigations Analyzing and interpreting data Using mathematics and computational thinking Constructing explanations (for science) and designing 					
CCSS: Mathematics, grades K-6	 Constructing explanations (for science) and designing solutions (for engineering) Engaging in argument from evidence 					

 ACEI = Association for Childhood Education Internationaling in argument from evidence

 ATS (InTASC) = Arkansas Teaching Standards (Interstate Teacher Assessment and Support Consortium)

 CCSS = Common Core State Standards

 NGSS = Next Generation Science Standards

 Praxis II (5035) = Praxis II Elementary Education: Science Subtest

Obtaining, evaluating, and communicating information
 2.3 Demonstrate understanding through the application of the 7 crosscutting concepts (Dimension 2) that should be reinforced by repeated use in instruction across the disciplinary core ideas (Dimension 3): Patterns Cause and effect: Mechanism and explanation Scale, proportion, and quantity Systems and system models Energy and matter: Flows, cycles, and conservation Structure and function Stability and change 2.4 Demonstrate understanding of the disciplinary core ideas in physical sciences, life sciences, and earth and space sciences
in the Framework for K-12 Science Education (NRC 2011)
2.5 Identify and implement lessons/units that integrate the scientific and engineering practices and crosscutting concepts with each of the core ideas as specified in the performance expectations of the NGSS
2.6 Demonstrate content and science investigation teaching methods for K-6 in the particular the core ideas of:
 <u>Physical Sciences;</u> PS 1: Matter and its interactions PS 2: Motion and stability: Forces and interactions PS 3: Energy PS4: Waves and their applications in technologies for information transfer
Life Sciences
LS 1: From molecules to organisms: Structures and processes
LS 2: Ecosystems: Interactions, energy, and dynamics LS 3: Heredity: Inheritance and variation of traits LS 4: Biological evolution: Unity and diversity
Earth and Space Sciences ESS 1: Earth's place in the universe
ESS 2: Earth's systems
ESS 3: Earth and human activity
Engineering, Technology, and the Applications of Science
ETS 1: Engineering design
ETS 2: Links among engineering, technology, science, and society
2.7 Demonstrate a command of the implementation of the Common Core State Standards for math and

	English/language arts and ISTE Technology Standards for Teachers as it supports Next generation Science Standards
	2.8 Design and conduct science investigations in at least one if not all of the disciplinary core ideas with attention to gathering and interpreting scientific data
	2.9 Demonstrate a command of diverse teaching strategies for reading and writing informational texts like those read and written by scientists
3. Principles of Life Sciences	3.1 Demonstrate a deep understanding following active
ACEI: 2.2	investigations in the principles of life sciences
ATS (InTASC): Standard 4	Core Idea LS1: From Molecules to Organisms: Structures and Processes
NGSS: K-6	LS1.A: Structure and Function
CCSS: English Language Arts &	LS1.B: Growth and Development of Organisms
Literacy in Science, and Technical Subjects, grades K-6	LS1.C: Organization for Matter and Energy Flow in Organisms
CCSS: Mathematics, grades K-6	LS1.D: Information Processing
Praxis II (5035): IIA1, IIA2, IIA3, IIA4, IIA5, IIA6, IIA7, IIA8, IIA9,	Core Idea LS2: Ecosystems: Interactions, Energy, and Dynamics
	LS2.A: Interdependent Relationships in Ecosystems LS2.B: Cycles of Matter and Energy Transfer in Ecosystems
	LS2.C: Ecosystem Dynamics, Functioning, and Resilience
	LS2.D: Social Interactions and Group Behavior
	Core Idea LS3: Heredity: Inheritance and Variation of Traits LS3.A: Inheritance of Traits
	Core Idea LS4: Biological Evolution: Unity and Diversity
	LS4.A: Evidence of Common Ancestry and Diversity
	LS4.C: Adaptation
	LS4.C: Reaptation LS4.D: Biodiversity and Humans
4. Principles of Physical	4.1 Demonstrate a deep understanding following active
Sciences	investigations in the principles of physical sciences
ACEI: 2.2	Core Idea PS1: Matter and Its Interactions
ATS (InTASC): Standard 4	PS1.A: Structure and Properties of Matter
NGSS: K-6	PS1.B: Chemical Reactions
CCSS: English Language Arts &	PS1.C: Nuclear Processes
Literacy in Science, and Technical Subjects, grades K-6	Core Idea PS2: Motion and Stability: Forces and Interactions PS2.A: Forces and Motion

ACEI = Association for Childhood Education International ATS (InTASC) = Arkansas Teaching Standards (Interstate Teacher Assessment and Support Consortium) CCSS = Common Core State Standards NGSS = Next Generation Science Standards Praxis II (5035) = Praxis II Elementary Education: Science Subtest

CCSS: Mathematics grades K-6	PS2 B: Types of Interactions							
	PS2.C: Stability and Instability in Physical Systems							
$\begin{array}{c} \text{Praxis II (5035): IIIA1, IIIA2, IIIA3,} \\ \text{IIIA4 IIIA5 IIIA6 IIIA7 IIIA8} \end{array}$	1 52.C. Stability and instability in Thysical Systems							
	Core Idea PS3: Energy							
	PS3.A: Definitions of Energy							
	PS3.B: Conservation of Energy and Energy Transfer							
	PS3.C: Relationship Between Energy and Forces							
	PS3.D: Energy in Chemical Processes and Everyday Life							
	Core Idea PS4: Waves and Their Applications in							
	PS4 A: Wave Properties							
	PS4. R: Electromagnetic Padiation							
	PS4.C: Information Technologies and Instrumentation							
	FS4.C. Information Technologies and Instrumentation							
5. Principles of Earth and	5.1 Demonstrate a deep understanding following active investigations in the principles of earth and space sciences							
space sciences	Core Idea ESS1: Earth's Place in the Universe							
ACEI: 2.2	ESS1 A: The Universe and Its Store							
ATS (InTASC): Standard 4	ESSIA: The Universe and Its Stars							
NGSS: K-6	ESS1.B. Earth and the Solar System ESS1 C: The History of Planet Earth							
CCSS: English Language Arts &								
Literacy in Science, and Technical	Core Idea ESS2: Earth's Systems							
Subjects, grades K-6	ESS2.A: Earth Materials and Systems							
CCSS: Mathematics, grades K-6	ESS2.B: Plate Tectonics and Large-Scale System							
Praxis II (5035): IA1, IA2, IA3, IA4,	ESS2 C. The Deleg of Weter in Fouth's Surface Drocesson							
IA5, IA6, IA7, IA8, IA9	ESS2.C: The Roles of Water in Earth's Surface Processes							
	ESS2.D: weather and Chimate							
	ESS2.E: Biogeology							
	Core Idea ESS3: Earth and Human Activity							
	ESS3.A: Natural Resources							
	ESS3.B: Natural Hazards							
	ESS3.C: Human Impacts on Earth Systems							
	ESS3.D: Global Climate Change							
6. Principles of Engineering	6.1 Demonstrate a deep understanding following active							
Design, Technology, and	investigations in the principles of the engineering design cycle							
Applications of Science	in the context of K-6 science							
ACEI: 2.2	Core Idea ETS1: Engineering Design							
ATS (InTASC): Standard 4	ETS1.A: Defining and Delimiting an Engineering Problem							
NGSS: K-6	ETS1.B: Developing Possible Solutions							
CCSS: English Language Arts &	ETS1.C: Optimizing the Design Solution							
Literacy in Science, and Technical	Core Idea ETS2: Links Among Engineering, Technology,							
Subjects, grades K-6	Science, and Society							
	ETS2.A: Interdependence of Science, Engineering, and							

ACEI = Association for Childhood Education International ATS (InTASC) = Arkansas Teaching Standards (Interstate Teacher Assessment and Support Consortium) CCSS = Common Core State Standards NGSS = Next Generation Science Standards Praxis II (5035) = Praxis II Elementary Education: Science Subtest

CCSS: Mathematics, grades K-6	Technology
Praxis II (5035):	ETS2.B: Influence of Engineering, Technology, and Science on Society and the Natural World

Additional Reference Materials for Developing Grades K-6 Science Competencies

- 1. A Framework for K-12 Science Education (NRC 2011)
- 2. Monitoring Progress toward Successful K-12 STEM Education: A Nation Advancing? (NRC 2012)