

## Endorsement Competencies for Middle Level Science 4-9

2007 standards for Middle Level Science
<b>1.0 Common Core- Life Science Content:</b> <i>Middle level teacher candidates demonstrate an understanding of the characteristics of and interactions between and among living systems. As a result, candidates:</i>
<b>1.1</b> Distinguish features of living from nonliving systems.
<b>1.2</b> Identify similarities and differences among animals, plants, fungi, protists and bacteria, and viruses.
<b>1.3</b> Demonstrate understanding of principles and practices of biological classification.
<b>1.4</b> Demonstrate understanding of ecological systems including the interrelationships and dependencies of organisms with each other and their environments.
<b>1.5</b> Demonstrate understanding of the ways organisms are interdependent.
<b>1.6</b> Identify the reproductive patterns and life cycles of cells and organisms.
<b>1.7</b> Demonstrate understanding of growth, change, and interactions of populations to form communities.
<b>1.8</b> Recognize factors governing the structures and functions of living systems.
<b>1.9</b> Classify organisms using multiple systems.
<b>1.10</b> Explain cycles of matter and flow of matter and energy through living and nonliving pathways.
<b>1.11</b> Explain scientific theory and principles of biological evolution.
<b>1.12</b> Demonstrate understanding of the organization and functions of cells and multicellular systems.
<b>1.13</b> Demonstrate understanding of basic concepts of genetics and heredity, including human reproduction.
<b>1.14</b> Analyze the regulation of biological systems including homeostatic mechanisms.
<b>1.15</b> Demonstrate understanding of the applications of biology in environmental quality and in personal and community health.
<b>1.16</b> Describe population dynamics and the impact of population on its environment.
<b>2.0 Common Core- Physical Science Content:</b> <i>Middle level teacher candidates demonstrate an understanding of the characteristics of and interactions of matter and energy between and among physical systems. As a result, candidates:</i>
<b>2.1</b> Identify properties of matter such as mass, solubility, and density.
<b>2.2</b> Understand how combinations of matter form solutions, mixtures, and compounds with different properties.
<b>2.3</b> Describe the physical and chemical changes of matter.
<b>2.4</b> Demonstrate understanding of Newtonian principles and laws.
<b>2.5</b> Analyze the factors affecting the position, motion and behavior of objects.
<b>2.6</b> Analyze forces in simple machines such as levers and screws.
<b>2.7</b> Identify major forces working in a system.
<b>2.8</b> Identify properties of light, electricity, sound, and magnetism.
<b>2.9</b> Identify types of simple energy transfers and transformations.
<b>2.10</b> Apply wave theory to sound, light, the electromagnetic spectrum and optics.
<b>2.11</b> Analyze potential and kinetic energies and concepts of work and power.

2.12 Describe energy flow in physical and chemical systems, including simple machines.
2.13 Apply kinetic-molecular theory to change of state and bonding.
2.14 Explain conservation of matter, energy, momentum and charge.
2.15 Demonstrate understanding of classification of elements and compounds.
2.16 Distinguish physical and chemical properties and classification of elements including periodicity and transition elements.
2.17 Demonstrate understanding of the nature of acids and bases, oxidation-reduction chemistry, solutions and solvents.
2.18 Demonstrate understanding of the application of chemistry and physics in personal and community health and in environmental quality.
2.19 Demonstrate understanding of fundamental biochemistry including photosynthesis and respiration.
2.20 Demonstrate understanding of and apply accepted models of the fundamental structures of atoms and molecules.
2.21 Demonstrate understanding of the basic principles of ionic, covalent, and metallic bonding.
2.22 Demonstrate understanding of mole concept, stoichiometry, and laws of composition.
2.23 Demonstrate understanding of radioactivity, nuclear reactors, fission, and fusion.
<b>3.0 Common Core- Earth and Space Science Content: <i>Middle level teacher demonstrate an understanding of the characteristics of and interactions between and among earth and space systems. As a result, candidates:</i></b>
3.1 Identify natural objects in the sky and explain why they change in position and appearance.
3.2 Explain the cause of the seasons and impact on living and physical systems.
3.3 Identify the role of oceans, lakes, rivers, and atmosphere in the water cycle.
3.4 Identify characteristics of the atmosphere and explain how changes in the atmosphere result in weather and climate.
3.5 Identify basic properties of rocks, minerals, water, air, and energy.
3.6 Identify structures of objects and systems in the universe.
3.7 Describe Earth's structure, evolution, history, and place in the solar system.
3.8 Explain how the changes in and on the Earth are caused by chemical, physical, and biological factors.
3.9 Describe the energy flow and transformation in Earth systems.
3.10 Apply Earth and space sciences to environmental quality and to personal and community health and welfare.
3.11 Explain geochemical cycles including biotic and abiotic systems including the cycles of matter such as oxygen, carbon, and nitrogen.
3.12 Describe renewable and nonrenewable natural resources and implications for their use.
<b>4.0 Common Core – Inquiry, Issues, and Nature of Science: <i>Middle level teacher candidates are prepared to teach inquiry, issues, and nature of science. As a result, candidates:</i></b>
4.1 Demonstrate understanding of the impact of science and technology on themselves

and their community, and on personal and community health.
<b>4.2</b> Engage in inquiry, including scientific discourse, to develop concepts and identify relationships from their observations, data, and inferences in a scientific manner.
<b>4.3</b> Use international (metric) measurement and mathematics for estimating and calculating, collecting and transforming data, modeling, and presenting results.
<b>4.3.1</b> Demonstrate understanding of accuracy and precision in measurement.
<b>4.4</b> Use measurement as a way of knowing and organizing observations of constancy and change.
<b>4.5</b> Apply the principles of science to design solutions to local and regional problems and the relationship of science to one's personal health, well-being, and safety.
<b>4.6</b> Demonstrate understanding of the historical development and perspectives on science including contributions of underrepresented groups and the evolution of major ideas and theories.
<b>4.7</b> Use technological tools in science, including calculators, probes and computers.
<b>4.8</b> Apply descriptive and inferential statistics to the analysis of data.
<b>4.9</b> Demonstrate understanding of the multiple ways to organize our perceptions of the world and how systems organize the studies and knowledge of science.
<b>4.10</b> Use and refine observation, investigation, data collection, and inference to test ideas and construct scientific concepts and models consistent with evidence.
<b>4.11</b> Demonstrate understanding of the evolution of natural systems and factors that result in evolution or equilibrium.
<b>4.12</b> Demonstrate understanding of the interrelationships of form, function, and behaviors in living and nonliving systems.
<b>4.13</b> Demonstrate understanding of the processes, tenets, and assumptions of multiple methods of inquiry leading to scientific knowledge.
<b>5.0 Common Core – Integrating Technology with Science: <i>Middle level teacher candidates embrace technology as an essential tool for teaching and learning science. As a result, candidates:</i></b>
<b>5.1</b> Demonstrate understanding of the appropriate use of technology to experiment, visualize, and make/explore conjectures.
<b>5.2</b> Demonstrate an ability to use instructional support strategies to promote academic achievement for those students with significant gaps in their scientific knowledge.
<b>5.3</b> Use technological tools, including but not limited to computer technology, to access resources, collect and process data, and facilitate learning.
<b>5.4</b> Use appropriate technology to help students acquire concepts and skills.
<b>6.0 Common Core – Science Instructional Methodology: <i>Middle level teacher candidates of science create a community of diverse learners who engage in scientific discourse to construct meaning from their science experiences and possess a disposition for further exploration and learning. They use, and can justify, a variety of classroom arrangements, groupings, actions, strategies, and methodologies. They encourage students, individually and collaboratively, to observe, ask questions, design inquiries, and collect and interpret data in order to develop concepts and relationships from empirical experiences. As a result, candidates:</i></b>
<b>6.1.</b> Use content knowledge to make interdisciplinary connections.

6.2 Integrate literacy skills into the teaching of science.
6.3 Organize and engage students in collaborative learning using different student group learning strategies.
6.4 Demonstrate understanding of and build effectively upon the prior beliefs, knowledge, experiences, and interests of students.
6.5 Engage students in studies of the nature of science including, when possible, the critical analysis of false or doubtful assertions made in the name of science.
6.6 Engage students in developmentally appropriate inquiries that require them to develop concepts and relationships from their observations, data, and inferences in a scientific manner.
6.7 Engage students in the analysis of problems, including considerations of risks, costs, and benefits of alternative solutions; relating these to the knowledge, goals and values of the students.
6.8 Engage students in inquiries, including scientific discourse, to develop concepts and relationships from their observations, data, and inferences in a scientific manner.
6.9 Ensure that students understand the processes, tenets, and assumptions of multiple methods of inquiry including field investigations leading to scientific knowledge.
6.10 Engage students to conduct inquiries into the factual basis of such issues and to assess possible actions and outcomes based upon their goals and values.
6.11 Facilitate student understanding of the influence of science and technology on society.
<b>7.0 Common Core – Safety and Welfare: <i>Middle level teacher candidates of science organize safe and effective learning environments that promote the success of students and the welfare of all living things. They require and promote knowledge and respect for safety, and oversee the welfare of all living things used in the classroom or found in the field. As a result, candidates:</i></b>
7.1 Demonstrate understanding of the legal and ethical responsibilities of science teachers for the welfare of their students, the proper treatment of animals, and the maintenance and disposal of materials.
7.2 Know and practice safe and proper techniques for the preparation, storage, dispensing, supervision, and disposal of all materials used in science instruction.
7.3 Know and follow emergency procedures, maintain safety equipment, and ensure safety procedures appropriate for the activities and the abilities of students.
7.4 Treat all living organisms used in the classroom or found in the field in a safe, humane, and ethical manner and respect legal restrictions on their collection, keeping, and use.
<b>8.0 Common Core – Middle Level Development: <i>Middle level teacher candidates understand the major concepts, principles, theories, and research related to middle level development, and they provide opportunities that support student development and learning. As a result, candidates:</i></b>
8.1 Understand that teaching all young adolescents includes students of diverse ethnicity, race, language, religion, socioeconomic status, gender, sexual orientation, regional or geographic origin, and those with exceptional learning needs.
8.2 Understand the major concepts, principles, and theories of young adolescent

development – intellectual, physical, social, emotional, and moral- in the context of classrooms, families, peer groups, communities and society.
<b>8.3</b> Understand the range of individual differences of all young adolescents and the implications of these differences for teaching and learning.
<b>8.4</b> Understand the importance of mutually respectful relationships with and among all young adolescents that support their intellectual, ethical, and social growth.
<b>9.0 Common Core - Middle Level Philosophy and School Organization:</b> <i>Middle level teacher candidates understand the major concepts, principles, theories, and research underlying the philosophical foundations of developmentally responsive middle level programs and schools, and they work successfully within these organizational components. As a result, candidates:</i>
<b>9.1</b> Understand the philosophical foundations of developmentally responsive middle level programs and schools.
<b>9.2</b> Understand the rationale and characteristic components of developmentally responsive middle level schools.
<b>10.0 Common Core - Family and Community Involvement:</b> <i>Middle level teacher candidates understand the major concepts, principles, theories, and research related to working collaboratively with family and community members, and they use that knowledge to maximize the learning of all middle level learners. As a result, candidates:</i>
<b>10.1</b> Understand how prior learning, differing experiences, and family/language/cultural backgrounds influence middle level learning.
<b>10.2</b> Understand the challenges that families may encounter in contemporary society, and are knowledgeable about support services and other resources that are available to assist them.
<b>10.3</b> Understand reciprocal relationships between schools and community organizations.
<b>10.4</b> Understand the roles of families and community members and strategies to involve them in improving the education of all middle level learners.
<b>11.0 Common Core - Middle Level Professional Roles:</b> <i>Middle level teacher candidates understand the complexity of teaching middle level learners, and they engage in practices and behaviors that develop their competence as professionals. As a result, candidates:</i>
<b>11.1</b> Understand the interrelationships and interdependencies among various professionals who serve middle level learners (e.g., school counselors, social service workers, home-school coordinators).
<b>11.2</b> Understand the need for continual reflection on middle level development, the instructional process, and professional and collaborative relationships.
<b>12.0 Common Core - Middle Level Instructional Methodology:</b> <i>Middle level teacher candidates create environments that enable students to develop and apply essential concepts and skills. As a result, candidates:</i>
<b>12.1</b> Plan lessons, units and courses that target Washington Essential Academic Learning Requirements (EALRs), Grade-Level Expectations (GLEs), Washington Assessment of

Student Learning (WASL) Test and Item Specifications, and additional WASL resources.
<b>12.2</b> Design, facilitate, and assess differentiated learning experiences that reflect an understanding of the development of all middle level learners.
<b>12.3</b> Use understanding of students' cognitive and social development to present concepts in multiple and meaningful ways.
<b>12.4</b> Select, adapt and implement middle level instructional materials that are relevant, rigorous, challenging, integrative, and exploratory.
<b>12.5</b> Design and facilitate a positive, productive learning environment where developmental differences are respected and supported, and individual potential is encouraged.
<b>12.6</b> Create and maintain a psychologically and socially safe and supportive learning environment.
<b>12.7</b> Use continuous observation, assessment, and reflection on student learning and development to guide instruction.
<b>12.8</b> Engage middle level learners in activities related to their interpersonal, community, and societal responsibilities.
<b>12.9</b> Design and implement learning experiences requiring students to locate, acquire, and evaluate information from a variety of sources.
<b>12.10</b> Use skillful questioning strategies to support student learning and develop critical thinking.
<b>12.11</b> Know effective, developmentally responsive classroom management techniques.
<b>12.12</b> Understand a variety of strategies to motivate middle level learners
<b>13.0 Common Core – Middle Level Curriculum: <i>Middle level teacher candidates understand the major concepts, principles, theories, standards, and research related to middle level curriculum and they use this knowledge in their practice. As a result, candidates:</i></b>
<b>13.1</b> Understand the interdisciplinary nature of knowledge and how to make connections among subject areas when planning curriculum.
<b>13.2</b> Facilitate student learning through the use of developmentally responsive materials and resources (e.g., technological resources, manipulative materials).