

505-3-.69 EARLY CHILDHOOD SCIENCE ENDORSEMENT PROGRAM

(1) Purpose. This rule states field-specific content standards for approving endorsement programs that prepare science specialists for P-5 students and supplements requirements in Rule 505-3-.01, Requirements and Standards for Approving Professional Education Units and Educator Preparation Programs.

(2) Requirements.

(a) A state-approved professional education unit shall offer this field as an endorsement to a level 4 or higher professional teaching certificate in Early Childhood (P-5).

(b) The preparation program described in program planning forms, catalogs, and syllabi shall require a minimum of twelve (12) semester hours in science content and pedagogical content knowledge that address the following standards:

1. The program shall prepare candidates who structure and interpret concepts, ideas and relationships in science at a level appropriate to P-5 students.

(i) The program shall prepare candidates who know and understand the major concepts and principles of the science disciplines (life, physical, and earth and space science) and interdisciplinary science perspectives appropriate for grades P-5, as defined by the National Science Teachers' Association.

(I) In relation to biology, candidates shall understand

I. Factors governing the structures, functions, and behaviors of living systems.

II. Multiple systems of classification of organisms.

III. Cycles of matter, and flow of energy, through living and nonliving pathways.

IV. Natural selection, adaptation, diversity, and speciation.

V. Structure, function, and reproduction of cells, including microorganisms.

VI. Levels of organization from cells to biomes.

VII. Reproduction and heredity, including human reproduction and contraception.

VIII. Behavior of living systems and the role of feedback on their regulation.

IX. Hazards related to living things including allergies, poisons, disease, and aggressions.

(II) In relation to the physical sciences, candidates shall understand

I. Properties of light, electricity, sound, magnetism, and electricity.

II. Types of energy, energy sources, and simple transformations of energy.

III. Potential and kinetic energies and concepts of work.

- IV. Energy flow in physical and chemical systems, including simple machines.
- V. States of matter and bonding in relation to molecular behavior and energy.
- VI. Conservation of matter and energy.
- VII. Classifications of elements and compounds.
- VIII. Solvents (especially water) and solutions.
- IX. Chemical nature of the Earth and its living organisms.
- X. Nature of radioactive substances.
- XI. Chemical, electrical, and radiation hazards.

(III) In relation to the Earth and space sciences, candidates shall understand:

- I. Structures of objects and systems in space.
- II. Earth's structure, evolution, history, and place in the solar system.
- III. Characteristics and importance of oceans, lakes, rivers, and the water cycle.
- IV. Characteristics of the atmosphere including weather and climate.
- V. Changes in the Earth caused by chemical, physical, and biological forces.
- VI. Causes and occurrences of hazards such as tornadoes, hurricanes, and earthquakes.
- VII. Characteristics and importance of cycles of matter such as oxygen, carbon, and nitrogen.
- VIII. Characteristics of renewable and nonrenewable natural resources and implications for their use.
- IX. Interactions among populations, resources, and environments.

(IV) In relation to interdisciplinary perspectives, candidates shall understand

- I. Interrelationships of pure and applied sciences and technology.
- II. Applications of science to local and regional problems and the relationship of science to one's personal health, well-being, and safety.
- III. Historical development and perspectives on science including contributions of underrepresented groups and the evolution of major ideas and theories.
- IV. Applications of science to the investigation of individual and community problems.
- V. Use of technological tools in science, including calculators and computers.

VI. Applications of basic statistics and statistical interpretation to the analysis of data.

(ii) The program shall prepare candidates who know and understand the major concepts and principles unifying the science disciplines including:

(I) Multiple ways we organize our perceptions of the world and how systems organize the studies and knowledge of science.

(II) Nature of scientific evidence and the use of models for explanation.

(III) Measurement as a way of knowing and organizing observations of constancy and change.

(IV) Evolution of natural systems and factors that result in evolution or equilibrium.

(V) Interrelationships of form, function, and behaviors in living and nonliving systems.

2. The program shall prepare candidates who are able to engage P-5 students in activities to define the values, beliefs and assumptions inherent to the creation of scientific knowledge within the scientific community, and to contrast science to other ways of knowing.

(i) The program shall prepare candidates who know and understand the philosophical nature of science and the conventions of scientific explanation.

(ii) The program shall prepare candidates who know and understand how to engage P-5 students effectively in studies of the nature of science and conventions of scientific explanations.

3. The program shall prepare candidates who are able to engage P-5 students regularly and effectively in science inquiry and who understand the role inquiry plays in the development of scientific knowledge.

(i) The program shall prepare candidates who know and understand scientific inquiry and its relationship to the development of scientific knowledge.

(ii) The program shall prepare candidates who engage P-5 students effectively in scientific inquiry appropriate for their grade level and abilities.

4. The program shall prepare candidates who relate science to the daily lives and interests of students and to a larger framework of human endeavor and understanding.

(i) The program shall prepare candidates who know and understand the relationship of science to other human values and endeavors.

(ii) The program shall prepare candidates who engage P-5 students effectively in the study of the relationship of science to other human values and endeavors.

(iii) The program shall prepare candidates who relate science to the personal lives, needs and interests of P-5 students.

5. The program shall prepare candidates who create a community of diverse student learners who can construct meaning from science experiences and possess a disposition for further inquiry and learning.

(i) The program shall prepare candidates who use diverse and effective actions, strategies and methodologies to teach science.

(ii) The program shall prepare candidates who interact effectively with P-5 students to promote learning and demonstrate student achievement.

(iii) The program shall prepare candidates who organize and manage science activities effectively in different student groupings.

(iv) The program shall prepare candidates who use appropriate technology to teach P-5 students science.

(v) The program shall prepare candidates who use prior conceptions and P-5 student interests to promote learning.

6. The program shall prepare candidates who develop and apply a coherent, focused science curriculum that is consistent with state and national standards for science education and appropriate for addressing the needs, abilities and interests of students.

(i) The program shall prepare candidates who develop coherent, meaningful goals, plans and materials, and find resources.

(ii) The program shall prepare candidates who relate plans and resources to professionally developed state and national standards, including the National Science Education Standards.

(iii) The program shall prepare candidates who plan and develop science curriculum addressing the needs, interests and abilities of all P-5 students.

7. The program shall prepare candidates who relate science to the community and use human and institutional resources in the community to advance the education of their students in science.

(i) The program shall prepare candidates who know and understand the values and needs of the community and their effect on the teaching and learning of science.

(ii) The program shall prepare candidates who use community human and institutional resources to advance the learning of science in the classroom and field.

8. The program shall prepare candidates who use a variety of contemporary assessment strategies to evaluate the intellectual, social, and personal development of the learner in all aspects of science.

(i) The program shall prepare candidates who align science goals, instruction and outcomes.

(ii) The program shall prepare candidates who know and use a variety of contemporary science assessment strategies to determine P-5 student needs and levels of learning and development.

(iii) The program shall prepare candidates who use assessment appropriately to determine, guide and change science instruction.

9. The program shall prepare candidates who design and manage safe and supportive learning environments reflecting high expectations of the success of all students.

(i) The program shall prepare candidates who create and maintain a psychologically and socially safe and supportive learning environment.

(ii) The program shall prepare candidates who manage the activities and materials of science safely in storage areas, labs, and field.

(iii) The program shall prepare candidates who keep and use living organisms in the classroom, in a safe, ethical, and appropriate manner.

10. The program shall prepare candidates to participate in the professional community, improving practice through their personal actions, education and development.

(i) The program shall prepare candidates who know and participate in professional organizations and activities of the science education community beyond the classroom.

(ii) The program shall prepare candidates who behave ethically and in the best interests of P-5 students and community.

(iii) The program shall prepare candidates who engage in reflective practices and make continuous efforts to improve in practice.

(iv) The program shall prepare candidates who work willingly with peers, supervisors and others in a professional manner.

Authority O.C.G.A. § 20-2-200