

DEPARTMENT OF EDUCATION
PROFESSIONAL STANDARDS BOARD
Statutory Authority: 14 Delaware Code, Section 122(d) (14 Del.C. §122(d))
14 DE Admin. Code 1540

Educational Impact Analysis Pursuant To 14 Del.C. Section 122(d)

1540 Standard Certificate Science Teacher

PROPOSED

A. Type Of Regulatory Action Requested

Amendment to Existing Regulation

B. Synopsis Of Subject Matter Of Regulation

The Professional Standards Board, acting in cooperation and collaboration with the Department of Education, seeks the consent of the State Board of Education to amend 14 **DE Admin. Code** 1540 Certification Science Teacher. It is necessary to amend this regulation to clarify some of the requirements for a standard certificate and to add an additional category of certification for integrated science, which is aligned with the Delaware content standards in Science.

C. Impact Criteria

1. Will the amended regulation help improve student achievement as measured against state achievement standards? The amended regulation addresses student achievement by establishing standards for the issuance of a standard certificate to educators who have acquired the prescribed knowledge, skill and/or education to practice in a particular area, to teach a particular subject or to instruct a particular category of students to help ensure that students are instructed by educators who are highly qualified.

2. Will the amended regulation help ensure that all students receive an equitable education? The amended regulation helps to ensure that all teachers employed to teach students meet high standards and have acquired the prescribed knowledge, skill and/or education to practice in a particular area, to teach a particular subject or to instruct a particular category of students.

3. Will the amended regulation help to ensure that all students' health and safety are adequately protected? The amended regulation addresses educator certification, not students' health and safety.

4. Will the amended regulation help to ensure that all students' legal rights are respected? The amended regulation addresses educator certification, not students' legal rights.

5. Will the amended regulation preserve the necessary authority and flexibility of decision makers at the local board and school level? The amended regulation will preserve the necessary authority and flexibility of decision makers at the local board and school level.

6. Will the amended regulation place unnecessary reporting or administrative requirements or mandates upon decision makers at the local board and school levels? The amended regulation will not place unnecessary reporting or administrative requirements or mandates upon decision makers at the local board and school levels.

7. Will decision making authority and accountability for addressing the subject to be regulated be placed in the same entity? The decision-making authority and accountability for addressing the subject to be regulated rests with the Professional Standards Board, in collaboration with the Department of Education, and with the consent of the State Board of Education.

8. Will the amended regulation be consistent with and not an impediment to the implementation of other state educational policies, in particular to state educational policies addressing achievement in the core academic subjects of mathematics, science, language arts and social studies? The amended regulation will be consistent with, and not an impediment to, the implementation of other state educational policies, in particular to state educational policies addressing achievement in the core academic subjects of mathematics, science, language arts and social studies.

9. Is there a less burdensome method for addressing the purpose of the new regulation? 14 **Del. C.** requires that we promulgate this regulation.

10. What is the cost to the state and to the local school boards of compliance with the amended regulation? There is no additional cost to local school boards for compliance with the regulation.

1540 Standard Certificate Science Teacher

1.0 Content: This regulation shall apply to the requirements for a Standard Certificate, pursuant to 14 ~~Del. C.~~ §1220 (a), for Science Teacher (required for grades 9-12, and valid in a middle level school, grades 5-8). Certificates issued include chemistry, physics, earth science, biology, general science, and physical science.

2.0 Definitions: The following words and terms, when used in this regulation, shall have the following meaning unless the context clearly indicates otherwise:

~~“Department”~~ means the Delaware Department of Education.

~~“License”~~ means a credential which authorizes the holder to engage in the practice for which the license is issued.

~~“Standard Certificate”~~ means a credential issued to certify that an educator has the prescribed knowledge, skill, and/or education to practice in a particular area, teach a particular subject, or teach a category of students.

3.0 In accordance with 14 ~~Del. C.~~ §1220 (a), the Department shall issue a Standard Certificate as a Science Teacher to an applicant who holds a valid Delaware Initial, Continuing, or Advanced License; or Standard or Professional Status Certificate issued by the Department prior to August 31, 2003, and who meets the following requirements:

3.1 Bachelor's degree from a regionally accredited college or university and;

3.2 Professional Education

3.2.1 Completion of an approved teacher education program in Science; or

3.3 Specific Teaching Field

3.3.1 Major in the area of the certificate sought; or,

3.3.2 Completion of an approved teacher education program in the area of the certificate sought; or,

3.3.3 Completion of (at least) the semester hours indicated below for the area of the certificate sought:

3.3.3.1 Chemistry:

3.3.3.1.1 45 semester hours (Required 9-12, valid Chemistry only) Courses should include at least 24 semester hours of Inorganic Chemistry and one course chosen from each of the following pairs: Advanced Inorganic or Physical Chemistry, Organic Chemistry or Biochemistry, Quantitative Analysis or Instrumental Analysis; Laboratory Safety 3 semester hours; Biology 3 semester hours; Physics 3 semester hours; Mathematics 6 semester hours of college algebra or above; Earth Sciences 3 semester hours; Environmental Education 3 semester hours

3.3.3.2 Physics:

3.3.3.2.1 45 semester hours (Required 9-12, valid Physics only) Courses should include at least 24 semester hours with at least 3 semester hours in each of the following areas: Classical Thermodynamics, Electronics, Atomic Physics, and Nuclear Physics; Laboratory Safety 3 semester hours; Biology 3 semester hours; Chemistry 3 semester hours; Mathematics (6 semester hours of college algebra or above); Earth Sciences 3 semester hours; Environmental Education 3 semester hours.

3.3.3.3 Earth Science:

3.3.3.3.1 42 semester hours (Required 7-12, valid Earth Science only) Courses should include at least 24 semester hours with at least 3 semester hours in each of the following areas: Geology, Geography, Climatology, Meteorology, Oceanography, Astronomy; Laboratory Safety 3 semester hours; Biology 3 semester hours; Chemistry 3 semester hours; Mathematics 3 semester hours of college algebra or above; Physics/Physical Science 3 semester hours; Environmental Education 3 semester hours.

3.3.3.4 Biology:

3.3.3.4.1 42 semester hours (Required 9-12, valid Biology and Life Science only) Courses should include at least 24 semester hours with at least 3 semester hours in each of the following areas: Botany; Zoology; Ecology, Genetics, Biochemistry, Physiology and, Laboratory Safety 3 semester hours; Chemistry 3 semester hours; Physics/Physical Science 3 semester hours; Mathematics 3 semester hours of college algebra or above; Earth Sciences 3 semester hours; Environmental Education 3 semester hours.

3.3.3.5 Physical Science:

3.3.3.5.1 42 semester hours (Required 9-12, Physical Science only, not Physics) Chemistry — coursework to include 12 semester hours including content in structure of matter, bonding acids and bases, chemical reactions, equations, periodicity metals, non-metals and thermodynamics; Physics — coursework to include 12 semester hours content in heat, light, waves electricity, mechanics, sound, and simple machines; Laboratory Safety 3 semester hours; Biology 3 semester hours; Mathematics 6 semester hours of college algebra or above; Earth Science

~~3 semester hours; Environmental Education 3 semester hours.~~

~~3.4 A bachelor's degree with a major in the science discipline for which a Standard Certificate is sought; and a minimum of 24 semester hours Human Development, Methods of Teaching Secondary Science, Teaching of Reading in Science or Identifying/Treating Exceptionalities, Effective Teaching Strategies, Multicultural Education, and~~

~~4.0 This regulation shall be effective through June 30, 2006 only. Applicants who apply for a standard certificate as a science teacher after that date must comply with the requirements set forth in 14 DE Admin. Code 1516.~~

1.0 Content

This regulation shall apply to the requirements for a Standard Certificate, pursuant to 14 Del.C. §1220 (a), for Science Teacher (required for grades 9-12, and valid in a middle level school, grades 5-8). Certificates issued include Chemistry, Physics, Earth Science, Biology, Physical Science, and Integrated Science.

2.0 Definitions

The following words and terms, when used in this regulation, shall have the following meaning unless the context clearly indicates otherwise:

“Department” means the Delaware Department of Education.

“License” means a credential which authorizes the holder to engage in the practice for which the license is issued.

“Standard Certificate” means a credential issued to certify that an educator has the prescribed knowledge, skill, and/or education to practice in a particular area, teach a particular subject, or teach a category of students.

“Standards Board” means the Professional Standards Board established pursuant to 14 Del.C. §1201.

“State Board” means the State Board of Education of the State pursuant to 14 Del.C. §104.

3.0 In accordance with 14 Del.C. §1220 (a), the Department shall issue a Standard Certificate as a Science Teacher to an applicant who holds a valid Delaware Initial, Continuing, or Advanced License; or Standard or Professional Status Certificate issued by the Department prior to August 31, 2003, and who meets the following requirements:

3.1 A bachelor's degree from an NCATE specialty organization recognized educator preparation program offered by a regionally accredited college or university, with a major in the science discipline for which a Standard Certificate is sought; or

3.2 A bachelor's degree from a state approved educator preparation program offered by a regionally accredited college or university, with a major in the science discipline for which a Standard Certificate is sought, where the state approval body employed the appropriate NASDTEC standards or NCATE specialty organization standards; or

3.3 Passage of the appropriate PRAXIS™ II test approved by the Standards Board and the State Board in the science discipline for which a Standard Certificate is sought; or

3.4 A bachelor's degree from a regionally accredited college or university with a major in the science discipline for which a Standard Certificate is sought; and

3.4.1 A minimum of twenty-four (24) semester hours of pedagogy courses from a regionally accredited college or university to include at least three (3) credits in each of the following:

3.4.1.1 Human Development;

3.4.1.2 Methods of Teaching Secondary Science;

3.4.1.3 Teaching of Reading in the Content Areas or Identifying/Treating Exceptionalities;

3.4.1.4 Effective Teaching Strategies; and

3.4.1.5 Multicultural Education; or

3.5 A bachelor's degree and completion of the semester hours indicated below from a regionally accredited college or university for the science discipline for which the Standard Certificate is sought, and completion of the course work set forth in 3.4.1:

3.5.1 Chemistry (Required grades 9-12; valid for Middle Level Science):

3.5.1.1 Forty-two (42) semester hours, including:

3.5.1.1.1 At least twenty-four (24) semester hours in Chemistry with at least three (3) semester hours in each of the following, unless otherwise indicated:

3.5.1.1.1.1 Inorganic Chemistry (6 semester hours)

3.5.1.1.1.2 Advanced Inorganic or Physical Chemistry;

3.5.1.1.1.3 Organic Chemistry or Biochemistry;

3.5.1.1.1.4 Quantitative Analysis or Instrumental Analysis; and

3.5.1.1.2 At least three (3) semester hours in each of the following, unless otherwise indicated:

- 3.5.1.1.2.1 Biology
 - 3.5.1.1.2.2 Physics;
 - 3.5.1.1.2.3 Mathematics (6 semester hours of college algebra or above);
 - 3.5.1.1.2.4 Earth Sciences; and
 - 3.5.1.1.2.5 Environmental Education.
 - 3.5.2 Physics (Required grades 9-12; valid for Middle Level Science):
 - 3.5.2.1 Forty-two (42) semester hours, including:
 - 3.5.2.1.1 At least twenty-four (24) semester hours in physics with at least three (3) semester hours in each of the following:
 - 3.5.2.1.1.1 Classical Thermodynamics;
 - 3.5.2.1.1.2 Atomic Physics;
 - 3.5.2.1.1.3 Nuclear Physics; and
 - 3.5.2.1.2 At least three (3) semester hours in each of the following, unless otherwise indicated:
 - 3.5.2.1.2.1 Biology;
 - 3.5.2.1.2.2 Chemistry;
 - 3.5.2.1.2.3 Mathematics (6 semester hours of college algebra or above);
 - 3.5.2.1.2.4 Earth Science; and
 - 3.5.2.1.2.5 Environmental Education.
 - 3.5.3 Earth Science (Required grades 9-12; valid for Middle Level Science):
 - 3.5.3.1 Thirty-nine (39) semester hours, including:
 - 3.5.3.1.1 At least twenty-four (24) semester hours in earth science with at least three (3) semester hours in each of the following:
 - 3.5.3.1.1.1 Geology;
 - 3.5.3.1.1.2 Geography;
 - 3.5.3.1.1.3 Climatology;
 - 3.5.3.1.1.4 Meteorology;
 - 3.5.3.1.1.5 Oceanography;
 - 3.5.3.1.1.6 Astronomy; and
 - 3.5.3.1.2 At least three (3) semester hours in each of the following:
 - 3.5.3.1.2.1 Biology;
 - 3.5.3.1.2.2 Chemistry;
 - 3.5.3.1.2.3 Mathematics (college algebra or above);
 - 3.5.3.1.2.4 Physics/Physical Science ; and
 - 3.5.3.1.2.5 Environmental Education.
 - 3.5.4 Biology (Required grades 9-12; valid for Middle Level Science):
 - 3.5.4.1 Thirty-nine (39) semester hours, including:
 - 3.5.4.1.1 At least twenty-four (24) semester hours in biology, with at least three (3) semesters hours in each of the following:
 - 3.5.4.1.1.1 Botany;
 - 3.5.4.1.1.2 Zoology;
 - 3.5.4.1.1.3 Ecology;
 - 3.5.4.1.1.4 Genetics;
 - 3.5.4.1.1.5 Biochemistry;
 - 3.5.4.1.1.6 Physiology; and
 - 3.5.4.1.2 At least three (3) semester hours in each of the following:
 - 3.5.4.1.2.1 Chemistry;
 - 3.5.4.1.2.2 Physics/Physical Science;
 - 3.5.4.1.2.3 Mathematics (college algebra or above);
 - 3.5.4.1.2.4 Earth Sciences; and
 - 3.5.4.1.2.5 Environmental Education.
 - 3.5.5 Physical Science (Required grades 9-12; valid for Middle Level Science):
 - 3.5.5.1 Thirty-nine (39) semester hours in science, with at least three (3) semester hours in each of the following, unless otherwise indicated:
 - 3.5.5.1.1 Chemistry (3 semester hours);

- 3.5.5.1.2 Physics (3 semester hours);
- 3.5.5.1.3 Biology (3 semester hours) ;
- 3.5.5.1.4 Mathematics (6 semester hours of college algebra or above);
- 3.5.5.1.5 Earth Science (3 semester hours); and
- 3.5.5.1.6 Environmental Science (3 semester hours).

3.5.6 Integrated Science (Required grades 9-12; valid for Middle Level Science);

3.5.6.1 A degree in biology, chemistry, physics, earth science, agriscience, or biochemistry or a major in one science discipline; and

3.5.6.2 Twenty-seven (27) semester hours of course work, taken either as part of a degree program or in addition to it, as follows:

3.5.6.2.1 At least nine (9) semester hours of credit in biology, with at least three (3) semester hours in each of the following:

3.5.6.2.1.1 Organismic or Macro Biology;

3.5.6.2.1.2 Molecular or Micro Biology; and

3.5.6.2.1.3 Systems/Environmental Biology; and

3.5.6.2.2 At least three (3) semester hours of credit in earth science, with courses from among the following:

3.5.6.2.2.1 Introductory geology;

3.5.6.2.2.2 Geological processes;

3.5.6.2.2.3 Air/land/water processes;

3.5.6.2.2.4 Weather systems;

3.5.6.2.2.5 Oceanography;

3.5.6.2.2.6 Coastal processes; or

3.5.6.2.2.7 Geophysics; and

3.5.6.2.3 At least six (6) semester hours in chemistry, which may include biochemistry; and

3.5.6.2.4 At least three (3) semester hours in physics, including Newtonian physics or Physics

I; and

3.5.6.2.5 At least three (3) semester hours in astronomy.

4.0 This regulation shall be effective through June 30, 2006 only. Applicants who apply for a standard certificate as a science teacher after that date must comply with the requirements set forth in 14 DE Admin. Code 1516.

8 DE Reg. 834 (12/01/04)