

I. Teacher Preparation

A. Elementary School Licensure Requirements

1. Licensure Grade Levels¹

a. Does the state offer an Early Elementary Education credential (Preschool/Kindergarten to Grade 2/3)?	Yes	Early Childhood Education
b. Does the state offer an Elementary Education credential (Kindergarten/Grade 1 to Grade 5/6)?	Yes	Elementary Education

2. Early Elementary²

a. Is an educational practice examination required for licensure?	No
b. Is an examination in reading and writing or language arts required for licensure?	Yes
c. Is a mathematics examination required for licensure?	Yes
d. Is a science examination required for licensure?	Yes

3. Elementary Education²

a. Is an educational practice examination required for licensure?	No
b. Is an examination in reading and writing or language arts required for licensure?	Yes
c. Is a mathematics examination required for licensure?	Yes
d. Is a science examination required for licensure?	Yes

4. Licensure Renewal

a. What is the period of validity for an educator's license?	Less than 5 years	
	5 years	X ³
	Greater than 5 years	

b. Can in-service teachers receive certification credit for professional development courses/programs in Earth and Space Sciences?	Yes	X ⁴	
	No		
	Local issue		
	Unknown		

B. Elementary School Curriculum Support

1. Guidelines for Curriculum Development

a. Does the SEA provide guidelines for curriculum development, beyond the state's science standards?	Yes
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b. If yes, which of the following does the state provide?	1. Science frameworks		
	2. Curriculum maps	X	Alaska's Science Curriculum Initiative (AKSCI) ⁵
	3. Learning progressions		
	4. Benchmark maps		
	5. Templates for unit design		
	6. Curriculum development guides		
	7. Model units		
	8. Lesson plan templates/guides		
	9. Web-based lesson plan portals	X	Alaska's Science Curriculum Initiative (AKSCI) ⁵ Alaska Department of Fish and Game (ADF&G) ⁶ Alaska Resource Education (ARE) ⁷
	10. Model lesson plans		
	11. Assessment guidelines		

2. Instructional Materials⁴

a. At what level does adoption of instructional materials occur?	State level	
	Local level	X
b. If the state is an adoption state, do adopted materials in science include those that address topics specific to the geosciences?	N/A	

3. Support for New Standards⁴

a. Does that state provide resources to school systems to effectively implement the standards as they change?	Yes		Alaska is implementing English Language Arts and Math standards currently. It is up to local districts to implement/introduce the science standards and curriculum to new teachers. The approach is to integrate science into math and language arts.
	No		
	Local issue	X	
	Unknown		

4. Professional Development⁴

a. Does the SEA provide professional development that is, at least in part, specific to the geosciences?	Yes, provided by SEA		State sponsored professional development programs are provided, but none that are geoscience related. The professional development offered at the state level demonstrates how science can be integrated into language arts and math.
	Yes, but independent of SEA		
	No	X	
	Local issue		
	Unknown		

II. Curriculum

A. Elementary School State Science Standards

1. Organization⁸

a. What is the name of the state's elementary school science standards?		Alaska Standards, Fourth Edition, Content and Performance Standards for Alaska Students, Revised March 2006	
b. What is the grade-level arrangement of the standards?		Grade specific	X
		Grade-level bands	
		Benchmark grade levels	
c. How are the standards outlined?	Overarching standard statements (level one)	X	d. What terms are used to identify each level?
	Sub-standard statements that provide more detail to the overarching standards (level two)	X	
		Content Standards	
		Performance Standards (Grade Level Expectations)	

2. Content⁸

a. Are the science standards subdivided according to scientific discipline (Physical Science, Life Science, and Earth and Space Science)?	Yes	Performance Standards/Grade Level Expectations (PSGLEs) are presented according to seven science discipline and nature of science strands. Three of those strands are Physical Science, Life Science, and Earth Science.
b. Are the Earth and Space Science standards identified by core ideas in the geosciences?	Yes	There are four core ideas that sub-divide the PSGLEs. 1) Geochemical cycles 2) Earth origins, processes, and forces that shape the structure, composition, and physical history of the Earth 3) Cyclical changes controlled by energy from the sun and by Earth's position and motion in our solar system 4) Origin and evolution of the universe
c. Do the state's standards include current issues in the geosciences? Current issues in the geosciences can be described as Earth science processes altered by human activities or Earth science processes that affect human well-being.	No	
d. Do the state's standards include career exploration in the geosciences?	No	

3. Development

a. When were the standards adopted or last revised?	Within the last two years (2014-2015)		Adopted June 2005 and then revised in March, 2006. ⁸
	Between 3-6 years ago (2010-2014)		
	Between 7-10 years ago (2006-2009)	X	
	More than 10 years ago (before 2006)		

b. Does the state have plans to review/revise its science standards?	Currently under review		There is no plan to change the standards in the next three years because of the implementation of the English Language Arts and Math Standards. ⁴
	Within the next 5 years (2015-2020)		
	Between 5 and 10 years from now (2020-2025)		
	No plan or timeline exists	X	
	Unknown		

B. Middle School State Science Standards

1. Content⁸

a. What is the name of the state's middle school science standards?	Alaska Standards, Fourth Edition, Content and Performance Standards for Alaska Students, Revised March 2006
b. Are Earth and Space Science topics included in the standards?	Yes
c. Is Life Science and Physical Science content included in the standards?	Yes

C. High School State Science Standards

1. Content⁸

a. What is the name of the state's high school science standards?	Alaska Standards, Fourth Edition, Content and Performance Standards for Alaska Students, Revised March 2006
b. Are Earth and Space Science topics included in the standards?	Yes
c. Is Life Science and Physical Science content included in the standards?	Yes

D. High School Course Requirements

1. Credits Required for Graduation⁹

a. What is the total number of credits required for graduation?	21
b. What is the number of science credits required for graduation?	2

2. Course Content⁹

a. Is Life Science required?	No
b. Is Physical Science required?	No
c. Is Earth Science required?	No

d. Is Environmental Science required?	No
e. Is Earth Science accepted?	Not stated
f. Does Earth Science have to be lab-based?	Not stated

III. Instruction

A. Elementary School Approaches to Instruction

1. State Science Standards⁸

a. Do the state's science standards provide guidelines regarding any specific approach to be used for science teaching?	Yes
b. If so, what is the term used to identify this approach?	Science as Inquiry and Process
c. Do the state's science standards provide a rationale for this approach?	No
d. If so, what is the rationale?	N/A

2. Guidelines for Curriculum Planning⁵

a. If the state offers guidelines for curriculum planning, do these advocate more specific strategies for science instruction?	Yes	The AKSCI website provides a curriculum map for elementary school outlining lessons to implement in the life, physical and Earth sciences. Lesson plans are provided on the site and are aligned to the Alaska Standards. One section of the site provides a document titled, "The Learning Cycle Model for Science Teaching" that explains the use of the Learning Cycle model in teaching science. The document refers to the 5Es Learning Cycle. AKSCI promotes a version of the 5Es (they do not give it a name), which is essentially the same. For example, instead of "engage" they use the term "gear up" and instead of "explain" they call this stage "generalize."
b. If so, what are the strategies?	5E Learning Cycle	

3. Technology⁴

a. Are decisions regarding the use of technology in elementary science classrooms made at the state level or local level?	Local level
b. What kinds of technology are being used by elementary school science teachers in the state?	Varies widely. One district works with NASA to record weather data; others have basic technology. Depends on local resources and grant funding.

IV. Learning Contexts

A. Elementary School Classrooms

1. Class Size⁴

a. What is the average number of students in an elementary classroom?	Unknown
b. What is the maximum allowable number of students in an elementary classroom?	The maximum class size is 30. Some schools have a total school population of 8. There is a high teacher turn over at the remote locations.

2. Instructional Time⁴

a. At the elementary level, are teachers recommended or required to dedicate a certain amount of instructional time to science?	There is no time requirement		
	Local decision	X	
	Teachers must spend a certain amount of time teaching science.		

B. Elementary School Support Services

1. Specialized Support⁴

a. Are there specific policies in place regarding English as a Second Language (ESL) and Special Education services that could impact science instruction (e.g. pull-out or push-in models)?	Local level decision	X	
	Depends on the specifications of a student's IEP or ILP		
	Teachers must follow specific practices regarding science		
	Unknown		

V. Extra-Curricular Programs

A. Elementary School Geosciences Enrichment Opportunities

1. After-School and Informal Education⁴

a. Are opportunities to engage in geoscience-related topics outside of school being offered to students in the state (e.g. after-school programs and informal education programs)?	Yes
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b. If so, what are they?	<p>It varies by district. There are robotics clubs, NASA data weather collection, and another club that measures coastal erosion.</p> <p>The SEA has partnered with/funded three programs to support elementary teachers and the development of their science curricula (these programs are mentioned in Section A, sub-question a):</p> <p>1) Alaska Department of Fish and Game (ADF&G) – develops wildlife education resources, provides in-class support, and provides outdoor skills courses and camps. 2) Alaska’s Science Curriculum Initiative (AKSCI) – Offers life science, physical science, and Earth science lesson plans that are aligned to the Alaska Standards. 3) Alaska Resource Education (ARE) – Provides a collection of Alaska Standards-based K-8 lessons on energy, mineral, and forestry resources.</p>
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2. Remedial Education⁴

a. What remedial supports are in place for geosciences topics with which students are struggling?	Local level decision	X	
	Remediation services are being provided to students in science		
	No remediation support in science		
	Unknown		

VI. Monitoring Systems

A. Elementary School Statewide Science Assessment

1. Structure and Content¹⁰

a. What is the name of the statewide standardized test in science at the elementary level?	Alaska Science Standards Based Assessment (Science ABA)		
b. At what grade(s) is the assessment implemented?	4		
c. Does the statewide science assessment measure achievement of the state's standards, i.e. is the assessment aligned with state standards?	Yes		
d. Is the content of the statewide science assessment sub-divided by discipline, namely Physical Science, Life Science, Earth and Space Science?	Yes		
e. Are there any plans for revising or changing the current elementary level science assessment?	No plans for revision	Assessment is under revision. New assessment planned for 2015-2016.	
	Revision is planned, but timeline is unknown		
	Revision is planned with implementation date set		X
	Unknown		

2. Results¹¹

a. Is student achievement measured by Performance Level Descriptors?	Yes
b. If yes, how many performance levels are there?	4

3. District Level Reporting¹²

a. At the district level, are the percentages of students performing at each PLD reported to the public?	Yes	Results provided to the public are aggregated. The SEA publishes School Student Rosters, School Summary Reports, and District School Roster Reports which subdivide results according to: 1) Inquiry, Technology, and Nature of Science 2) Concepts of Physical Science 3) Concepts of Life Science 4) Concepts of Earth Science
b. At the district level, is student achievement reported according to scientific discipline (Life Sciences, Physical Sciences, Earth and Space Sciences)?	Yes	
c. If yes, is this data available to the public?	No	

4. State Level Reporting¹²

a. At the state level, are the percentages of students performing at each PLD reported to the public?	Yes	Not results provided to the public. The SEA publishes School Student Rosters, School Summary Reports, and District School Roster Reports which subdivide State results according to: 1) Inquiry, Technology, and Nature of Science
b. At the state level, is student achievement reported according to scientific discipline (Life Sciences, Physical Sciences, Earth and	Yes	

Space Sciences)?		2) Concepts of Physical Science
c. If yes, is this data available to the public?	No	3) Concepts of Life Science 4) Concepts of Earth Science

B. Elementary School International Assessments in Science

1. TIMSS¹³

a. Has the state participated in the Trends in International Mathematics and Science Study (TIMSS)?	No
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b. If yes, in which years did the state participate?	1995	
	2003	
	2007	
	2011	

C. Middle School Statewide Science Assessment

1. Structure and Content¹⁴

a. What is the name of the statewide standardized test in science at the middle school level?	Alaska Standards Based Assessment
b. At what grade(s) is the assessment implemented?	8
c. Does the assessment address Life Science concepts?	Yes
d. Does the assessment address Life Science concepts?	Yes
e. Does the assessment address Earth Science concepts?	Yes

C. High School Statewide Science Assessment(s)

1. Structure and Content¹⁴

a. What is the name of the state's standardized science assessment(s)?	Alaska Standards Based Assessment
b. At what grade level is the assessment implemented?	10
c. Does the assessment address Life Science concepts?	Yes
d. Does the assessment address Physical Science concepts?	Yes
e. Does the assessment address Earth Science concepts?	Yes

VII. Accountability

A. School Level

1. Individual Student¹⁵

a. Does the state produce an Individual Student Report (ISR) that describes a student’s performance on the state’s science assessment?	Yes	The SEA provides a Student Report to the parents and teachers of individual students reporting details of his/her performance on the Science Standards Based Assessment (SBA). The report provides scores on 4 Subjects/Standards: 1) Inquiry, Technology, and Nature of Science 2) Concepts of Physical Science 3) Concepts of Life Science 4) Concepts of Earth Science
b. Is the ISR made available to a student’s parents or guardians?	Yes	
c. Is the ISR made available to a student’s teacher?	Yes ¹⁶	
d. Does the ISR report student’s performance in terms of scale score and achievement level?	Yes	
e. Does the ISR subdivide results by science discipline (Physical Science, Life Science, Earth and Space Science)?	Yes	

2. Teacher Appraisal¹⁷

a. Are students’ results on the statewide science assessment a component of teacher evaluation?	They can be	Student Learning is the 8th standard and is quantitative. Information for this standard includes two to four valid, reliable measures of student growth including statewide assessments. Teacher evaluations are used to develop professional growth plans and plans of improvement.
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B. District Level

1. District Accreditation⁴

a. Are student outcomes in statewide science assessments at the elementary level part of accreditation of public schools at the district level?	Yes		
	No	X	
	At a future point		
	Local decision		
	Unknown		

C. State Level

1. Statewide Monitoring⁴

a. Are student outcomes in statewide science assessments at the elementary level used in monitoring the adequacy of state educational systems?	Yes	Districts are required to report the overall performance of teachers to the SEA.
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2. Trends in Student Outcomes¹²

a. Does the SEA report to the public performance results on the state science assessment over time?	Yes
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b. If yes, how many years of achievement data are available?	3 years (2011-2012 to 2013-2014)		14 years of data (2000-2014)
	4-7 years (2007-2008 to 2013-2014)		
	8 to 10 years (2004-2005 to 2013-2014)		
	11 or more years (before 2004-2005)	X	

c. Are the results also subdivided by science discipline (Life Sciences, Physical Sciences, Earth and Space Sciences)?	No
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¹ Alaska Department of Education and Early Development, Teacher Certification, Applications for Teaching Certificates, Initial Teacher Certification, PDF: <http://www.eed.state.ak.us/teachercertification/teach02.html>

² Educational Testing Service, The PRAXIS Series, State Testing Requirements: <http://www.ets.org/praxis>

³ Alaska Department of Education and Early Development, Teacher Certification, Applications for Teaching Certificates, Renewal/Reinstatement Application, PDF: <http://www.eed.state.ak.us/teachercertification/teach02.html>

⁴ Alaska Department of Education and Early Development (personal communication)

⁵ Alaska K-12 Science Curricular Initiative (AKSCI): <http://www2.gi.alaska.edu/STEP/index.html>

⁶ Alaska Department of Fish and Game, Education and Outreach:
<http://www.adfg.alaska.gov/index.cfm?adfg=education.main>

⁷ Alaska Resource Education (ARE): <https://akresource.org/are/who-we-are>

⁸ Alaska Department of Education and Early Development, Alaska Standards, Alaska Content and Performance Standards, 4th Edition, PDF: <http://www.eed.state.ak.us/akstandards/#c3gtabs-science>

⁹ Alaska Department of Education and Early Development, High school graduation requirements:
http://www.eed.state.ak.us/regs/filed/4aac_06.075.pdf

¹⁰ Alaska Department of Education and Early Development, Division of Teaching and Learning Support, Assessment, Accountability and Student Information: <http://www.eed.state.ak.us/tls/assessment/sba.html>

¹¹ Alaska Department of Education and Early Development, Division of Teaching and Learning Support, Assessment, Accountability and Student Information, Alaska Science Standards Based Assessment (Science SBA), Proficiency Level Descriptors for Science, Grade 4, PDF: <http://www.eed.state.ak.us/tls/assessment/sba.html>

¹² Alaska Department of Education and Early Development, Division of Teaching and Learning Support, Assessment, Accountability and Student Information, Assessment Results: <http://www.eed.state.ak.us/tls/assessment/results.html>

¹³ U.S. Dept. of Education, Institute of Education Sciences, National Center for Education Statistics, Trends in International Mathematics and Science Study (TIMSS), State and District Participation in TIMSS: <https://nces.ed.gov/TIMSS/benchmark.asp>

¹⁴ Alaska Department of Education and Early Development, Division of Teaching and Learning Support, Assessment, Accountability and Student Information, Standards Based Assessments (SBAS), Assessment and Accountability: <http://www.eed.state.ak.us/tls/assessment/sba.html>

¹⁵ Alaska Department of Education and Early Development, Division of Teaching and Learning Support, Assessment, Accountability and Student Information, Interpretive Guides for Parents and Students, Science, Grade 4: http://www.eed.state.ak.us/tls/assessment/SBA_GTIsPS.html

¹⁶ Alaska Department of Education and Early Development, Division of Teaching and Learning Support, Assessment, Accountability and Student Information, SBA, Interpretive Guides for Teachers and Staff, Grade 4, PDF: http://www.eed.state.ak.us/tls/assessment/SBA_GTIsTS.html

¹⁷ Alaska Department of Education and Early Development, Accountability, Alaska Educator Evaluation System Overview, PPT: <http://www.eed.state.ak.us/akaccountability/>