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N.J.A.C. 6A:8-3.1 Curriculum and instruction

(a) District boards of education shall ensure that curriculum and instruction are designed and delivered in such a way that all students are able to demonstrate the knowledge and skills specified by the CCCS and shall ensure that appropriate instructional adaptations are designed and delivered for students with disabilities, for ELLs, for students enrolled in alternative education programs, and for students who are gifted and talented.

District boards of education shall be responsible for developing for all students with disabilities educational programs aligned with the CCCS with appropriate accommodations, instructional adaptations, and/or modifications as determined by the IEP or 504 team.

District boards of education shall develop appropriate curricular and instructional modifications used for gifted and talented students indicating content, process, products, and learning environment.

District boards of education shall be responsible for developing for ELLs English language assistance programs that are aligned to the CCCS and the English language development standards.

District boards of education shall provide the time and resources to develop, review, and enhance interdisciplinary connections, supportive curricula, and instructional tools for helping students acquire required knowledge and skills. The tools include, but are not limited to:

i. A pacing guide;

ii. A list of core instructional materials, including various levels of texts at each grade level;

iii. Benchmark assessments; and

iv. Modifications for special education students, for ELLs in accordance with N.J.A.C. 6A:15, for students at risk of school failure, and for gifted students.

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Content Area Unit Name	**K-8 Science:** This curricular addendum provides educators with clarifications, connections, resources, and adaptations to meet the needs of varied learners, K-8. The New Jersey Core Curriculum Content Standards provide educators with identification of required content, skills, values and dispositions essential to build curricula. This document is an extension to the current curriculum and NJCCCS, ensuring dynamic, rigorous, and diverse instructional approaches distinct to science are enacted in the Hillsdale Schools.
Interdisciplinary Connections (including WIDA standards if applicable)	Science encompasses a broad multidisciplinary field within its own academic area, including experiences in the eight scientific practices, disciplinary core ideas and crosscutting concepts throughout the year at each grade level. The Next Generation Science Standards (NGSS) are designed to integrate four core science disciplines: physical sciences, life sciences, Earth and space sciences, and engineering technology and applications. These interdisciplinary connections, as a result, are present within the current standards. Interdisciplinary connections in this document expand outside of the distinct field of science to: moral/ethical education; mathematics and technology; and literacy/language arts. Interdisciplinary connections are framed through essential questions to highlight the integration of content/skills inherent to student inquiries in science. Literacy/Language Arts: Language Arts skills are critical to building knowledge in science. To ensure the CCSS literacy standards work in tandem with the specific content demands outlined in the NGSS, the NGSS development team worked with the CCSS writing team to identify key literacy connections to the specific content demands outlined in the NGSS. As the CCSS affirms, reading in science requires an appreciation of the norms and conventions of the discipline of science, including understanding the nature of evidence used, an attention to precision and detail, and the capacity to make and assess intricate arguments, synthesize complex information, and follow detailed procedures and accounts of events and concepts. Students also need to be able to gain knowledge from elaborate diagrams and data that convey information and illustrate scientific concepts. Likewise, writing and presenting information orally are key means for students to assert and defend claims in science, demonstrate what they know about a concept, and convey what they have experienced, imagined, thought, and learned. Connections to the English/language arts (ELA) CCSS are included across all disciplines and grade bands in the final version of the NGSS. (from www.nextgenscience.org) ● Scienceliteracycenters

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	● leveledNonfictionScienceTexts ● Nonfiction writing - Teacher'sCollegeReadingandWritingProjectUnitsofStudy ● BenchmarkEducationleveledbooks: information texts to build nonfiction comprehension and content knowledge ● suggested nonfiction books/mentor texts as outlined in district curriculum **Moral/social studies education:** What are universal ideas and problems shared across humanity? What are the responsibilities and opportunities for responsible scientists and engineers? What ideals and actions will enhance my personal development and the development of society ● TheInfluenceofEngineering,Technology,andScienceonSocietyandtheNaturalWorld ● Global citizenship education -, Character.org, TeachingTomorrow'sCitizens, Campaignforthe CivicMissionofSchools, ● Social participation projects - 150 ServiceLearning Projects, Sci/SSService Connections. **Mathematics:** Science is a quantitative discipline, so it is important for educators to ensure that students' science learning coheres well with their learning in mathematics. To achieve this alignment, the NGSS development team worked with the CCSSM writing team to ensure the NGSS do not outpace or otherwise misalign to the grade-by-grade standards in the CCSSM. It is essential that the NGSS always be interpreted, and implemented, in such a way that the math does not outpace or misalign to the grade-by-grade standards in the CCSSM (this includes the development of NGSS-aligned instructional materials and assessments). During the middle school years, students develop a number of powerful quantitative tools, from rates and proportional relationships, to basic algebra and functions, to basic statistics and probability. Such tools are applicable far beyond the mathematics classroom. Such tools can also be better understood, and more securely mastered, by applying them in a variety of contexts. Fortunately, the NRC Framework makes clear in its Science and Engineering Practices (Analyzing and Interpreting Data, Using Mathematics and Computational Thinking) that statistics and mathematics have a prominent role in science. NGSS aims to give middle school and high school science educators a clear road map for how they can prepare their students for the quantitative demands of college and careers, where students need to apply quantitative tools in an applied or scientific context. ● Math textbooks as resource for supporting interdisciplinary activities ● MathskillsareoutlinedinNGSSbygradeandunit General Interdisciplinary Resources connections totheCCSSarewrittenintheNGSS

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	WIDAStandards2012
Core Instructional Materials including digital tools	Myriad instructional resources are available to educators to teach science with students' diverse interests and needs in mind. Several resources are already cited in this curriculum addendum. The below list represents current and prominent instructional resources that are referenced often in classrooms. Digital sources are hyperlinked. NextGenerationScienceStandards SafariMontage Brainpop Resourcesonengineeringdesign Resourcesonscienceintheelementaryandmiddleschoolclassroom NYTimesLearningNetwork
21st Century Themes and Skills	The following content statements can be integrated into any of the adopted Science strands (A. Physical Science B. Life Science C. Earth and Space Science D. Engineering Technology and Applications.) • CRP1. Act as a responsible and contributing citizen and employee. • CRP2. Apply appropriate academic and technical skills. • CRP3. Attend to personal health and financial well-being. • CRP4. Communicate clearly and effectively and with reason. • CRP5. Consider the environmental, social and economic impacts of decisions. • CRP6. Demonstrate creativity and innovation. • CRP7. Employ valid and reliable research strategies. • CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. • CRP9. Model integrity, ethical leadership and effective management. • CRP10. Plan education and career paths aligned to personal goals. • CRP11. Use technology to enhance productivity. • CRP12. Work productively in teams while using cultural global competence
8.1 Educational Technology **8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming**	Science and Technology K-12 Indicators As teaching, learning and curriculum across New Jersey evolves to better meet student needs, teachers when addressing science topics are expected to integrate the adopted 8.1 Educational Technology, 8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming, and 21st

	Century Skills into their classroom practice. To that end, teachers will be expected to apply the following anchor standards into their classroom practice. These anchor standards can be integrated into any of the adopted Science strands (A. Physical Science B. Life Science C. Earth and Space Science D. Engineering Technology and Applications.) 8.1 Educational Technology • Understand and use technology systems. • Select and use applications effectively and productively. • Apply existing knowledge to generate new ideas, products, or processes • Create original works as a means of personal or group expression. • Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media. • Communicate information and ideas to multiple audiences using a variety of media and formats. • Develop cultural understanding and global awareness by engaging with learners of other cultures. • Contribute to project teams to produce original works or solve problems. • Advocate and practice safe, legal, and responsible use of information and technology. • Demonstrate personal responsibility for lifelong learning. • Exhibit leadership for digital citizenship. • Plan strategies to guide inquiry. • Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media. • Evaluate and select information sources and digital tools based on the appropriateness for specific tasks. • Process data and report results. • Identify and define authentic problems and significant questions for investigation. • Plan and manage activities to develop a solution or complete a project. • Collect and analyze data to identify solutions and/or make informed decisions. • Use multiple processes and diverse perspectives to explore alternative solutions. 8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming • The characteristics and scope of technology. • The core concepts of technology. • The relationships among technologies and the connections between technology and other fields of study.

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	• The cultural, social, economic and political effects of technology. • The effects of technology on the environment. • The role of society in the development and use of technology. • The influence of technology on history. • The attributes of design. • The application of engineering design. • The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving. • Apply the design process. • Use and maintain technological products and systems • Assess the impact of products and systems • Computational thinking and computer programming as tools used in design and engineering
Pacing Guide	See attached sheets for pacing guide

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Assessments	Science assessments like other content area assessments should be a natural and ongoing part of the teaching and learning process. The more authentic the assessment process is, the better the chance that students will see the interdisciplinary connections between science and other areas of study, as well as the role of science in their lives as citizens. 1. What factors should be considered in planning for assessment? ● Content mastery (which standards are being assessed) ● Analysis of content ● Skills development ● Connections between and among essential learnings ● Connections between the past, present, and the future ● Interdisciplinary connections ● Diversity in student learning styles and needs ● Opportunities for democratic participation 2. How are goals of instruction and assessment related? ● Are the goals for learning actually being assessed? ● To what degree are we asking students to extend learning? ● Can students transfer their learning to a new situation? ● Does the assessment reflect what is valued instructionally? ● Does the assessment benefit the learner by informing teaching practices? ● Does the assessment allow for a variety of learners to demonstrate their understanding? 3. What should you consider as you develop criteria for scoring? ● How many ways can students demonstrate they have learned the material? ● How will students be scored? ● How will the needs of a variety of learners be addressed with this assessment? ● Does the scoring tool reflect the learning goals? 4. What are the most constructive assessment designs and methods for science educators? ● Performance assessment ● Authentic assessment ● Authentic instruction ● Portfolio assessment

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	Helpful links: AuthenticAssessments: WorkingdefinitionsofAA, Muller Toolbox, NEAToolbox, 21stCentury Assessments, The assessment section of the attached district science curriculum contains at least one sample performance task for each unit in each grade level, which incorporates the scientific practices and aligns to the performance expectations for the unit. Other ongoing assessments are required and can be in the form of: teacher observations, journal entries, class discussion, additional performance assessments and written test.

Differentiation/Modifications

Curriculum Differentiation is a process teachers use to increase achievement by improving the match between the learner's unique characteristics: prior knowledge, cognitive level, learning style, motivation, strength or interest and various curriculum components: Nature of the objective, teaching activities, learning activities, resources and products. This broad notion applies to learners from a diverse range of abilities, including: Gifted and Talented, English Language Learners, Students with Disabilities, and Students at Risk of School Failure. Science is a field of education that provides educators with a wealth of

opportunities for differentiation, but also real challenges of meeting the needs of diverse learners. This addendum reveals pathways for science differentiation specific to four distinct student populations.

Teachers can differentiate:

- Content: What we teach and how we give students access to the information and ideas that matter
- Process: How students come to understand and "own" the knowledge, understanding, and skills essential to a topic
- Product: How a student demonstrates what he or she has come to know, understand and be able to do as a result of a segment of study

According to students'

- Readiness-The current knowledge, understanding, and skill level a student has related to a particular sequence of learning
- Interest-What a student enjoys learning about, thinking about, and doing
- Learning Style-A student's preferred mode of learning. It is influenced by learning style, intelligence preference, gender and culture The NextGenerationScienceStandards contain an in-depth overview for meeting the needs of diverse learners in Science. Many of these content specific suggestions are classroom ready.

Gifted and Talented (content, process, product and learning environment)	**English Language Learners**	**Students with Disabilities (appropriate accommodations, instructional adaptations, and/or modifications as determined by the IEP or 504 team)**	**Students at Risk of School Failure**
N.J.A.C. 6A:8-3.1 Curriculum and instruction District boards of education shall develop appropriate curricular and instructional modifications used for gifted and talented students indicating content, process, products, and learning environment. Sample Differentiation Strategies and Techniques that apply to Science. ● Learning Agendas/Contracts	The purpose of adapting content lessons for LEP students is to lower the language barrier and make the English used in such lessons as comprehensible as possible. In science, LEP students' capacity to learn can be greatly inhibited by the academic vocabulary and, sometimes, lack of cultural experience living in the United States for short periods of time. Every student deserves an education that is culturally relevant and meaningful to his/her present and future lives.	Instructional adaptations for students with disabilities include, but are not limited to, the below approaches. These general suggestions are particularly resonant with students in science classroom settings, grades K-8. The primary aim of science education is preparation for careers in science, technology, engineering and mathematics, which are wellsprings of innovation in our economy. For students with disabilities, gaining science skills are essential to	Districts are required to administer grade level benchmark and/or interim assessments in science.. After each administration, districts should analyze the data to identify which students are at-risk in this content area. Any of the strategies outlined in the other differentiation/modification categories may be used to address the needs of these students who are at-risk.

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A learning contract is an agreement established between a student and the teacher; it sometimes involves the student's parents. The contract specifies concrete learning and/or defining the goals and outcomes of a particular unit or segment of instruction, (2) determining and documenting which students have already mastered most or all of a specified set of learning outcomes, and (3) providing replacement strategies for material already mastered through the use of instructional options that enable a more challenging and productive use of the student's time. Sample resource: http://www.gifted.uconn.edu/sem/semart08.html RAFT Assignments-RAFT is an acronym for a structured technique used to guide student written behavioral objectives for the student that all parties agree need to be achieved. The contract also specifies: • the goals of the contract • the obligations of each party to the contract • the time frame within which the terms of	Educators provide various grouping strategies such as flexible grouping and/or paired learning being sensitive to the language proficiency level of the LEP students. A student's capacity 4.Concept Development-Students will be learning about different science strands and many new concepts. Enduring understanding requires thorough and contextualized study of these subjects across grades and courses in science. 5. Giving Directions-Stated clearly and distinctly and delivered in both written and oral forms to ensure that LEP students understand the task. In addition, students should be provided with/or have access to directional words such as: circle, write, draw, cut, underline, etc. Presenting the Lesson: -Use multiple strategies and varied instructional tools to increase the opportunities for students to develop meaningful connections between content and the language used in instruction. -Provide students with opportunities to express new knowledge and learning using written, verbal, and non-verbal communication. -Provide students with opportunities to participate in numerous science discussions to increase ELLs	becoming contributing members of society. Student Motivation – Expanding student motivation to learn content in science can occur through: activity choice, appeal to diverse learning styles, choice to work with others or alone, hands-on activities, and multimodal activities. Instructional Presentations - The primary purpose of these adaptations is to provide special education students with teacher-initiated and teacher-directed interventions that prepare students for learning and engage students in the learning process (Instructional Preparation); structure and organize information to aid comprehension and recall (Instructional Prompts); and foster understanding of new concepts and processes (Instructional Application) e.g. relating to personal experiences, advance organizers, pre-teaching vocabulary and/or strategies; visual demonstrations, illustrations, models. Instructional Monitoring – Science instruction should include opportunities for students to engage in goal setting, work with rubrics and	

the learning contract are to be fulfilled • the basis on which it will be determined that the conditions of the contract were met Sample Resource http://www.educ.ualberta.ca/staff/olenka.bilash/best%20of%20bilash/learning%20contracts.html • Anchor Activities-Self-directed specified ongoing activities in which students work independently Sample Resource http://www.rec4.com/filestore/REC4_AnchorActivityPacket_080513.pdf • Curriculum Compacting-Curriculum Compacting is an instructional technique that is specifically designed to make appropriate curricular adjustments for students in any curricular area and at any grade level. Essentially, the procedure involves (1) g. RAFT assignments are used to demonstrate a student's knowledge using a defined point of view. This strategy requires students to write using an assigned format to	competency and confidence in verbal discourse; frame classroom to become fluent in English will be greatly enhanced by activities in oral and written language that connect one's own life in meaningful and engaging ways. Instructional Supports: Hands-on materials -bilingual dictionaries -visual aids -teacher made adaptations, outlines, study guides -varied leveled texts of the same content Please refer to the following link-http://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf as mentioned on the NJDOE website. Preparing students for the lesson: 1. Building Background Information through brainstorming, semantic webbing, use of visual aids and other comprehension strategies. 2. Simplifying Language for Presentation by using speech that is appropriate to students' language proficiency level. Avoid jargon and idiomatic speech. 3. Developing Content Area Vocabulary through the use of word walls and labeling classroom objects.	checklists, reward systems, conferences. Classroom Organization - The primary purpose of these classroom organization adaptations is to maximize student attention, participation, independence, mobility, and comfort; to promote peer and adult communication and interaction; and to provide accessibility to information, materials, and equipment. Student Response - The primary purpose of student performance responses is to provide students with disabilities a means of demonstrating progress toward the lesson objectives related to the Next Generation Science Standards.	

an audience other than the teacher. Sample resource: http://www.michigan.gov/documents/mde/SSWAC_225020_7.pdf p. 18 ● Flexible grouping Flexible grouping is a range of grouping students together for delivering instruction. This can be as a whole class, a small group, or with a partner. Flexible grouping creates temporary groups that can last an hour, a week, or even a month. Sample resource: http://www.teachhub.com/flexible-grouping-differentiated-instruction-strategy ● Jigsaw Activities Jigsaw is a strategy that emphasizes cooperative learning by providing students an opportunity to actively help each other build comprehension. Use this technique to assign students to reading groups composed of varying skill levels. Each group member is responsible for becoming an "expert" on one section of the assigned material and then "teaching" it to the other members of the team. Sample resource: http://www.adlit.org/strategies/22371/	Students encounter new academic vocabulary in science conversations on subjects of interest. Sample Resources: CanDo Descriptors - https://www.wida.us/standards/CAN_DOs/ Colorin Colorado - http://www.colorincolorado.org/educators/ WIDA - https://www.wida.us/		

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• Depth and Complexity of Curriculum-Dr. Sandra Kaplan Sample resource: http://img.docstoccdn.com/thumb/orig/119636316.png • Graphic Organizers • Extension Menus Students select from a set of possible assignments (3 to 9 choices is common). Students may be required to select more than one choice. Choices offer differentiated objectives. Choices are often grouped by complexity of thinking skill. Activities are independent so students have freedom as well as responsibility. A variety of options enable students to work in the mode that most interests them. Sample resource: K-5 http://gilbertps.schoolwires.net/cms/lib3/AZ01001722/Centricity/Domain/809/Teaching%20Gifted%20Book%20of%20Forms.pdf Sample See p. 13 Gr 6-12 http://www.chatt.hdsb.ca/~pattersonka/FOV1-000D4965/FOV1-000FF699/DCGL.pdf Sample p. 43 • Advanced Discussion Techniques • Questioning Strategies			

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Pacing Guides

Kindergarten

Unit	***Time Frame***
Motion and Stability: Push/Pull	4 weeks
Energy: Sun and Sunlight	6 weeks
Molecules to Organisms: Needs of Living Things	6 weeks
Earth's Systems: Weather	4 weeks
Earth and Human Activity: Human Effect on environment	8 weeks
Engineering Design	8 weeks

1st Grade

Unit	***Time Frame***
Waves (Light and Sound)	10 weeks
Molecules to Organisms: animal adaptations	6 weeks
Heredity: inheritance and variation of traits	5 weeks
Earth's Place in the Universe: Sun and Moon	5 weeks
Engineering Design	10 weeks
Waves (Light and Sound)	10 weeks

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2nd Grade

Unit	***Time Frame***
Matter and Its Interactions	8 weeks
Ecosystems: Interactions, Energy, and Dynamics	6 weeks
Biological Evolution: Unity and Diversity	10 weeks
Earth's Systems and Changes	12 weeks

3rd Grade

Unit	***Time Frame***
Motion and Stability: Forces and Interactions	8 weeks
Animals: Life cycles, Interactions, and Survival	8 weeks
Heredity and Diversity	8 weeks
Earth's Systems and Human Activity & Engineering Design	12 weeks

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4th Grade

Unit	***Time Frame***
Energy and Motion	6 weeks
Waves	8 weeks
Molecules to Organisms	8 weeks
Earth's Place in the Universe/Earth's Systems	6 weeks
Earth and Human Activity: Natural Resources	8 weeks

5th Grade

Unit	***Time Frame***
Matter and Its Interactions	12 weeks
Ecosystems: Interactions, Energy, and Dynamics	12 weeks
Earth's Place in the Universe	12 weeks

6th Grade

Unit	***Time Frame***
Earth's Place in the Universe	12 weeks
Earth's Systems	12 weeks
Earth and Human Activity	12 weeks

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7th Grade

Unit	***Time Frame***
From Molecules to Organisms: Structures and Processes	9 weeks
Ecosystems: Interactions, Energy, and Dynamics	9 weeks
Heredity: Inheritance and the Variation Traits	9 weeks
Biological Evolution: Unity and Diversity	9 weeks

8th Grade

Unit	***Time Frame***
Matter and Its Interactions	9 weeks
Motion and Stability: Forces and Interactions	9 weeks
Energy	9 weeks
Waves and Electromagnetic Radiation	9 weeks