



K-12 SCIENCE in NEW HAVEN PUBLIC SCHOOLS



See www.newhavenscience.org for ALL materials: Grade resource pages have:

Goals/objectives/vision/mission/concept maps, **connections to Common Core.**

Science **grade level expectations**/standards www.newhavenscience.org/GLE.doc

Practice assessments/open ended rubrics, Embedded and new performance tasks!

-REQUIRED CT standards, 4 units each year K-6, state standards in place till **2019 (NHPS transition to NGSS to start in 2017)**

CMT Test in Science! 5th grade covers K-5 curriculum, 8th grade 6-8: for ALL students (ELL & SpecEd) **in place to 2019. Counts as 1/6 of academic section of K-8 School Performance Index.**

CAPT Test in Science, end of 10th. **Counts as 1/3 of academic section School Performance Index.**

-New Haven Time Guidelines: For ALL students! (including intervention students)

K-4 **hands on** science at least twice a week, **50 minX2 = 100 min/week** out of 1800 total

5-6 hands on science at least 2-4 times a week, 130 min/week

7-12 science every day with certified science teachers, curriculum, set pacing. Labs 1-2X week!

-NHPS Science Resource Center sends 3 kits a year K-5, 12-16 lessons per kit.

Some kits are shared, and we rent/share with other towns. Rotation is different for each school. **Sep 13-Nov 29, Dec 20-Mar 18, Apr 17-June 15** and the schedule is firm!

Kind: Weather, Wood/Properties, Trees

1st: Measurement, Sun/Shadows, Organisms

2nd: Solids/Liquids, Soil, Butterfly

3rd: Rocks, Chemical Tests, Plants ** Plus Soggy Paper embedded task

4th: Motion, Land/Water, Electric Circuits ** Plus Circuits embedded task

5th: Sound, Light/Color (dec), Senses, Sun/Earth/Moon (Jan/Feb) ** **Elem CMT Test**, Plus

CatchIt embedded task

6th: Ecosystems, Watersheds, Weather, Machines ** Plus DigIn embedded task

All kits have: goals, objectives, inquiry, non fiction reading, writing, **measurement** practice that can tie into math/reading/writing. Bilingual vocab and resources available as well. **DO KIT activities FIRST** before literacy/math/writing

7-12, science every day... 7 units per year, with significant tasks. All students take PhyChem, Bio, Chem and most should do Physics. (other options are Anatomy, Environmental, AP Bio, Chem, Physics, Env.) Many high schools offer other electives as well.

-Inquiry skills/Science Practices!! (50% of tests!)

Science Fair: each school decides, city wide fair is May 15-17, school fairs by April break.

-Key expectations. STUDENTS NEED TO FIGURE IT OUT, NOT JUST LEARN ABOUT

-Kids need experiences! Research shows long term learning takes place if experiences (labs) come **BEFORE** reading/vocab. (5 E model of teaching/learning).

-Elem science builds future success! Research shows the more engaging elementary science experiences, the more success in ALL subjects, and success in college and STEM careers.

-Inquiry: 50% of CMT/CAPT!, The CT model is for students to design and conduct experiments “fair tests” , and critique each other’s work.

-TALK: students learn science concepts/ skills by discussing/talking!! THEN writing, practice assessments.

-Fidelity and integration: Use science concepts in the CT standards/expectations, and integrate important reading (literacy common core), writing, math (measurement and data analysis) skills.

-Careers: **speak positively about science.** Use www.newhavenscience.org/STEM to investigate science careers.

Contact Richard Therrien Richard.therrien@new-haven.k12.ct.us, 946-7933 for curriculum, Science Resource Center 946-2818 for kits, Math/magnet coaches can also be a good resource to help.

COURSE DESCRIPTIONS FOR CORE SCIENCE COURSES NEW HAVEN PUBLIC SCHOOLS, JANUARY 2017

Phy-Chem (open to grade 9,10, 11) 1 cr Year

PhyChem is a required course for New Haven students. It focuses on science literacy; a combination of understanding major science concepts and theories, using scientific reasoning and inquiry, and recognizing the complex interactions between science, technology and society. It includes disciplinary core ideas, science and engineering practices, and cross-cutting concepts aligned to Connecticut's new Next Generation Science Standards as tested in grade 11 . The major topics include human impact on earth and in the environment, earth materials and global interdependence, energy sources and electricity, and a study of weather and climate change. This is a full year laboratory science course where students will use science inquiry, literacy and numeracy skills.

402 (College level)

406 (Honors level) PreReq: Teacher recommendation or score on placement test

Honors level requires more reading, more independent work, and deeper math analysis.

404 (Sheltered Content) PreReq: Teacher placement

405 Phy-Chem 21 (only at select schools)

70402, 70403 Phy-Chem A, B (semester only at select schools)

Biology (open to grade 9, 10, 11, 12) 1 cr Year (may be taken concurrently with PhyChem, Chemistry)

Biology is a required course for New Haven students, the study of living organisms. It focuses on science literacy; a combination of understanding major science concepts and theories, using scientific reasoning and inquiry, and recognizing the complex interactions between science, technology and society. It includes disciplinary core ideas, science and engineering practices, and cross-cutting concepts aligned to Connecticut's new Next Generation Science Standards as tested in grade 11 . The major topics include the chemistry of living things, bacteria and viruses, heredity and genetics, evolution, populations, and ecosystems and interactions.

410 (College level)

414 (Honors level) PreReq: Teacher recommendation and/or score on placement test or at least C in previous science course. Honors level requires more reading, more independent work, and deeper math analysis.

412 (Sheltered Content) PreReq: Teacher placement

416 Biology 21 (only at select schools)

70410, 70411 Phy-Chem A, B (semester only at select schools)

**Chemistry (open to grade 10, 11, 12) 1 cr Year
(may be taken concurrently with Biology or Physics)**

Chemistry **IS** a required course for New Haven students, the study of matter and energy and interactions. It focuses on science literacy; a combination of understanding major science concepts and theories, using scientific reasoning and inquiry, and recognizing the complex interactions between science, technology and society. It includes disciplinary core ideas, science and engineering practices, and cross-cutting concepts aligned to Connecticut's new Next Generation Science Standards as tested in grade 11. Chemistry includes extensive labwork and the use of math concepts as applied to chemical reactions. The major topics include the matter and energy, atomic structure and bonding, chemical reactions, kinetic molecular theory, heat and thermodynamics, atomic spectra, nuclear reactions, especially as applied to topics such as stars, and special topics such as gas laws, acids/bases and intro to organic chemistry.

418 (College level) PreReq: Algebra I, PhyChem

422 (Honors level) PreReq: Teacher recommendation and or at least C+ in PhyChem and Algebra I. Honors level requires more reading, more independent work, and deeper math analysis.

420 (Sheltered Content) PreReq: Teacher placement

421 Chemistry 21 (only at select schools)

70418, 70419 Chemistry A, B (semester only at select schools)

**Physics (open to grade 11,12) 1 cr Year
(may be taken concurrently with Chemistry or other electives)**

Physics is a recommended science elective for New Haven students especially those going onto STEM careers including engineering, science or health fields. It focuses on the study of matter and energy, science literacy; a combination of understanding major science concepts and theories, using scientific reasoning and inquiry, and recognizing the complex interactions between science, technology and society. Physics includes extensive labwork and the use of math concepts as applied to phenomena. The major topics include principles of motion, forces, energy, waves, electricity, magnetism, atomic physics, nuclear physics, relativity, and quantum mechanics. Students use algebra for analysis of laboratory data, development of physical laws and the applications of physics.

438 (College level) PreReq: C in Algebra I, PhyChem

441 (Honors level) PreReq: Teacher recommendation and or at least B in PhyChem and Algebra I, concurrent or past enrollment in Chemistry, AlgebraII. Honors level requires more reading, more independent work, and deeper math analysis.

420 (Sheltered Content) PreReq: Teacher placement

440 Physics 21 (only at select schools)

70438, 70439 Physics A, B (semester only at select schools)

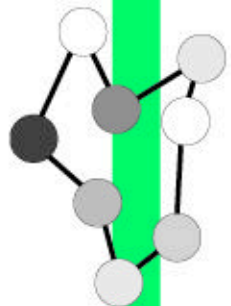
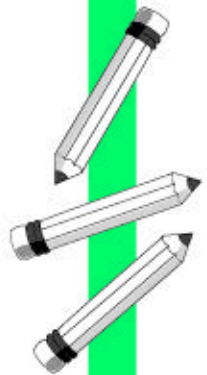
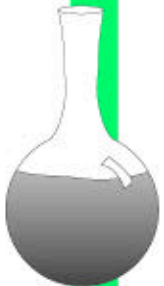
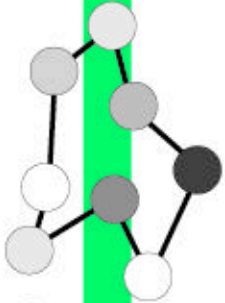
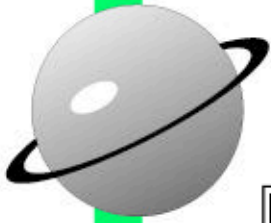
CONNECTICUT ACADEMY FOR EDUCATION IN MATHEMATICS, SCIENCE & TECHNOLOGY

10 Expectations Parents Should Have About Their Children's Science Programs

The study of science enriches people's lives.
Science lights the dark and frightening corners of the world.
It opens the human mind to new aesthetic and intellectual
pleasures and to a new appreciation of the beauty
and precision that surrounds them.
Science education empowers people to take greater control
of their lives and to face problems with courage and understanding.
It liberates them to imagine new questions
and to set about finding new answers.

— EdTalk

1. Parents should expect that their children are being taught science every year, beginning in kindergarten and continuing until high school graduation.
2. Parents should expect that in the effective science classroom, the process of investigation and explanation is just as important as knowing "the answer."
3. Parents should expect that their children's science instruction emphasizes critical thinking over memorization; and well-reasoned debate over recitation.
4. Parents should expect that their children's science classrooms are activity centered and use a mix of whole-class activities, large group presentations, cooperative learning, and individual projects with laboratory equipment utilizing information technologies such as computers, calculators and multi-media equipment.
5. Parents should expect that their children's science instruction teaches them to connect science concepts with the real world and explore how science and technology affect their lives and their society.
6. Parents should expect that their children can apply science knowledge and processes to weigh social issues, solve real problems and make decisions.
7. Parents should expect that their children's science teachers are using textbooks as references rather than as curriculum guides.
8. Parents should expect that their children's science achievement will be assessed and reported on the basis of projects and portfolios of work, student presentations and demonstration of skills (done individually or as part of a group), not on the basis of standardized tests alone.
9. Parents should expect that their children's science classes, activities and assignments include hands-on experiences that are likely to excite and encourage their children.
10. Parents should expect that, if or when these expectations are not being met, they (and their questions) will be welcomed by school personnel; and, that parents will be valued for caring enough to ask questions.



5E Model

5E's	Teacher	Student
Engage	<ul style="list-style-type: none"> • Creates curiosity • Raises questions • Elicits responses that uncover what the students know or think about the concepts 	<ul style="list-style-type: none"> • Asks questions such as " why did this happen? What do I already know about this? What can I find out about this?" • Shows interest in the topic
Explore	<ul style="list-style-type: none"> • Encourages students to work together without direct instruction • Observes and listens to students' interactions • Asks probing questions to redirect students' investigations when necessary • Acts as consultant for students 	<ul style="list-style-type: none"> • Thinks freely but within limits of the activity • Tests predictions and hypotheses • Forms new predictions and hypotheses • Tries alternatives and discusses them with others • Records observations and ideas • Suspends judgment
Explain	<ul style="list-style-type: none"> • Encourages students to explain concepts and definitions in their own words • Asks for justification (evidence) and clarification from students • Formally provides definitions, explanations, and new labels • Uses students' previous experiences as basis for explaining concepts 	<ul style="list-style-type: none"> • Explains possible solutions or answers to others • Listens critically to others' explanations • Questions others' explanations • Listens to and tries to comprehend explanations offered by teacher • Refers to previous activities • Uses recorded observations in explanations
Elaborate	<ul style="list-style-type: none"> • Expects students to use formal labels, definitions, and explanations provided previously • Encourages students to apply or extend concepts and skills in new situations • Refers students to existing data and evidence and asks questions such as "What do you already know? Why do you think so?" 	<ul style="list-style-type: none"> • Applies new labels, definitions, explanations and skills in a new but similar situation • Uses previous information to ask questions, propose solutions, make decisions and design experiments • Draws reasonable conclusions from evidence • Records observations and explanations • Checks for understanding among peers
Evaluate	<ul style="list-style-type: none"> • Observes students as they apply new concepts and skills • Assesses students' knowledge and skills • Provides students with formative feedback to enhance their thinking or behaviors • Allows students to assess their own learning and group-process skills • Asks open-ended questions such as "What do you know about x? How would you explain x? Based on what evidence?" 	<ul style="list-style-type: none"> • Answers open-ended questions by using observations, evidence, and previously accepted explanations • Demonstrates understanding or knowledge of concept or skill • Evaluates his or her own progress and knowledge • Asks related questions that would encourage future investigations

NHPS SCIENCE Curriculum At-A-Glance www.newhavenscience.org Aug 2016

Taught using learning cycle: Engage, Explore, Explain, Elaborate, Evaluate.

Key inquiry skills/practices with real-world experiences the majority of time:

Questioning, Modeling, Investigating, Analyzing/Math, Constructing Explanations, Argument from Evidence, Communicating/Discourse

(Note: K-5 kits order changes since they rotate among schools 3 times a year; should be at least 100 min/week hands-on science! + literacy/math)

	~Quarter One		~QuarterTwo	~Quarter	Three	~Quarter Four	
K	Weather		Object Properties		Seasons	Living Things: Characteristics	
1	Measurement		Motion (no kit)		Light Properties	Living Things: Structure	
2	Solids/Liquids		Soil		Nutrition (no kit)	Animal Life Cycles	
3	Rocks		Material Properties *ET		Recycling/ Conservation	Plant Life Cycles	
4	Force and Motion		Ecosystems (no kit)		Water	Electricity *ET	
5	Sound	Light and Color	Light and Uses (Lenses)	Senses (no kit) *ET	Sun, Earth, Moon (CMT TEST FOLLOWS)	Health Topics/Choice	
6	Ecosystem Populations		Weather Systems		Water Resources *ET	Simple Machine	
7	Properties of Matter	Chemical Properties	Cells	Genetics/ Reproduction	Life Systems Musculo-Skeletal	Life Systems Biochemical *ET	Microbe s/ Food Safety
8	Forces/Bridges	Forces/ Motion *ET	Solar System Motion	Landforms/Ea rth Forces	Tectonic Plates (CMT TEST FOLLOWS)	Rock Cycle	Natural Disasters
9 PhyChem	Heat/Phase Changes	Atoms/ Bonding *ET	Polymers *ET	Earth Chemical Cycles *ET	Earth Materials/ Environment Impact *ET	Energy/ Electricity *ET	Energy Sources/ Impacts *ET
10 Bio	BioChemistry *ET	Cells/ Bacteria/ Viruses *ET	Heredity/ Genetics *ET	Evolution	Diseases/ Populations *ET (CAPT TEST FOLLOWS)	Organism Interdependenc	Organis m Behavior / Structure
11 Chem	Chemical Properties	Atomic Structure	Nuclear	Compounds/ Bonding	Reactions/ Equations	Gas Behavior	Organic Chemistr y
12 Physics or other Elective s	Motion	ACCEL	2 D Motion	Forces/Work	Energy/Electric	Wave/Sound/Lig ht	Modern Physics

*ET = CT Embedded Task, NHPS District Unit Tasks & Quarterly Assessments Also Required Grades 7-12
New Haven City Wide Science Fair May 15,16,17