SUBJECT AREA: Science Research
GRADE LEVEL: 10

Note: This curriculum uses resources from two different educational programs. The climate change materials are pulled from the Resilient Schools Consortium (RiSC) curriculum which we have been using for 3 years, and the Hydroponics lab curriculum provided by NYSunworks, who help maintain our hydroponics laboratory.

UNIT TITLE/ESSENTIAL QUESTION(S)	UNIT SKILLS AND CONTENT	CORE TEXTS AND MATERIALS	FORMATIVE & SUMMATIVE ASSESSMENTS	COMMON CORE/CONTENT STANDARDS
RiSC Module 1 How do we know the climate has changed in our city and planet? How are we at risk because of climate change? How can we connect, educate, and engage the people in our communities to prepare our city for the impacts of climate change?	**Key Terms:** weather, climate, climate change, mitigation/mitigative, adaptation/adaptive, greenhouse gases, greenhouse effect, fossil fuels, coal, oil, natural gas, methan carbon dioxide, resilience, impact From NGSS ▪ Asking questions (for science) and defining problems (for engineering) ▪ Developing and using models ▪ Planning and carrying out investigations ▪ Analyzing and interpreting data ▪ Using mathematics and computationa thinking ▪ Constructing explanations (for science) and designing solutions (for engineering) ▪ Engaging in argument from evidence ▪ Obtaining, evaluating, and communicating information	See Lesson Framework	Formative: - Climate Change Myth Busters Activity - Projecting Future Impacts of Climate Change -Advanced Climate Change Evidence Summative: Humans of (Coastal) NY Community Outreach Project	NGSS ▪ ESS1.B: Earth and the Solar System ▪ ESS2.A: Earth's Materials and Systems ▪ ESS2.C: The Roles of Water in Earth's Surface Processes ▪ ESS2.D: Weather and Climate ▪ ESS3.A: Natural Resources ▪ ESS3.B: Natural Hazards ▪ ESS3.C: Human Impacts on Ea Systems ▪ ESS3.D: Global Climate Chang ▪ LS2.B: Cycles of Matter and Energy Transfer in Ecosystems ▪ LS2.C: Ecosystem Dynamics, Functioning, and Resilience ▪ LS4.D: Biodiversity and Human ▪ PS1.A: Structure and Properties of Matter: ▪ PS1.B: Chemical Reactions ▪ PS3.A:Definitions of Energy ▪ PS3.B: Conservation of Energy and Energy Transfer ▪ PS4.B: Electromagnetic Radiation ▪ PS3.D: Energy in Chemical Processes and Everyday Life ▪ ETS1.B. Developing Possible Solutions
Independent Research - Food How do scientists find out more about the world around them?	- Evaluate the resource requirements and limitations of different farming methods. - Analyze graphs about population growth and arable land use before proposing solutions to sustainability challenges.	See Hydroponics Lesson Framework	Lesson 1: Outside In Lesson 2: Hydroponics and the Urban Landscape Lesson 3: Take a Tour Hydroponic Systems Poster Project	CCSS.ELA-Literacy.RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

How can we represent our work so that it can be shared with and understood by other scientists? How does our society interact with food? How is it grown? Are consumers well informed about what goes into their food?	- Explain links and trends in global population growth and the urbanization movement, while using creative problem-solving skills to design ways to reduce human impact on the environment. - Evaluate the efficiency of hydroponics and compare/contrast the benefits of conventional and hydroponic farming. - Virtually explore the different hydroponic systems in Greenhouse Classrooms and teach peers about how the systems work and how they efficiently use resources. - Design and begin a multi-week investigation to explore what substrates can be used to replace soil when growing plants hydroponically. - Explore current research in hydroponics and how it is being implemented at the commercial/industrial scale. - Discuss the variables students can manipulate and control using the Home Hydroponic Kits. Design an at-home hydroponic investigation and list the required materials.Analyze the differences between active and passive hydroponic systems.		Summative: Home Hydroponics Investigation	RST.11-12.1: Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. RST.11-12.7 Integrate and evaluate multiple sources of information in diverse media to address a question or solve a problemRST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible WHST.11-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. WHST.9-10.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. HS-LS2-6 Evaluate the claims, evidence, and reasoning behind currently accepted explanations or solutions to determine the merits of arguments. HS-LS2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. HS-LS4-6 Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity. Engineering Design:

				HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.HS-ETS1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. HS-ETS1-3 Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.
RiSC Module 3 How can we make our school and NYC more resilient to climate change impacts such as coastal flooding and extreme heat events?	**Key Terms:** resilience, vulnerable, resilient design, design process, urbanization, stormwater management, urban heat island effect, cool roof, green infrastructure, gray infrastructure From NGSS ▪ Asking questions (for science) and defining problems (for engineering) ▪ Developing and using models ▪ Planning and carrying out investigations ▪ Analyzing and interpreting data ▪ Using mathematics and computational thinking ▪ Constructing explanations (for science) and designing solutions (for engineering) ▪ Engaging in argument from evidence ▪ Obtaining, evaluating, and communicating information	See Lesson Framework	Work Session I, II: Help NYC Be Resilient to Extreme Heat Lesson 2: Brainstorm Resilient Solutions Lesson 3: Plan Resilient Solutions Coastline Redesign Redesign Materials	▪ ESS1.B: Earth and the Solar System ▪ ESS2.A: Earth's Materials and Systems ▪ ESS2.C: The Roles of Water in Earth's Surface Processes ▪ ESS2.D: Weather and Climate ▪ ESS3.A: Natural Resources ▪ ESS3.B: Natural Hazards ▪ ESS3.C: Human Impacts on Ea Systems ▪ ESS3.D: Global Climate Chang ▪ LS2.B: Cycles of Matter and Energy Transfer in Ecosystems ▪ LS2.C: Ecosystem Dynamics, Functioning, and Resilience ▪ LS4.D: Biodiversity and Human ▪ PS1.A: Structure and Properties of Matter: ▪ PS1.B: Chemical Reactions ▪ PS3.A: Definitions of Energy ▪ PS3.B: Conservation of Energy and Energy Transfer ▪ PS4.B: Electromagnetic Radiation ▪ PS3.D: Energy in Chemical Processes and Everyday Life ▪ ETS1.B. Developing Possible Solutions
