



GREAT NECK PUBLIC SCHOOLS

"Where Discovery Leads to Greatness"

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Course Profile: Science Research 10-11

<u>Department</u>	Science		
<u>Course Name</u>	Science Research 10,11		
<u>Course Length</u>	1 year		
<u>High School Credits</u>	1 credit		
<u>Description</u>	This course is designed for the student with special scientific interest. It will deal with all aspects of research and will help the student to create, develop, and produce short term and long-range experiments. A final research paper will be submitted at the end of this course.		
<u>Target/eligible students</u>	Science research for 10th and 11th grades follows after the prerequisite course, Science Research Methods/Research 9.		
<u>State Learning Standards Link(s)</u>	http://www.nysed.gov/common/nysed/files/programs/curriculum-instruction/hs-science-learning-standards.pdf		
<u>Primary texts and materials</u>	Students will have access to scientific literature through the following websites and resources: 1. Science News 2. PubMed 3. Science Direct 4. ERIC 5. Google Scholar 6. ProQuest		
<u>Scope/Sequence</u>			
<u>Identifying and problem/ Developing a Research Question</u>	HS-LS2-7	Students will identify a problem that is of interest to them, drawing inspiration from Science Daily or Nature.com They will draft up a research proposal outlining their idea and presumable hypothesis. They will indicate their independent and dependent variables.	pg. 67
	11-12.RST.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. (HS-PS4-2),(HS-PS4-3),(HS-PS4-4) "Design, evaluate, and refine a solution to a complex real- world problem, based on scientific knowledge, student- generated sources of evidence, prioritized criteria, and trade-off considerations." pg. 67	pg. 63
<u>Designing a Study</u>	HS-LS2-2	Students will design a novel* study, based on previous literature. The design of the study will include the development of an ISEF Research Plan. This research	pg. 67

	11-12.WHST.5	plan should include a rationale, some background information on their chosen topic, a statement of the research question/ research goals and an outline of the proposed methodology. They should read academic literature to inform their hypothesis/ expected outcomes. ————— <i>“Most scientific knowledge is quite durable, but is, in principle, subject to change based on new evidence and/or reinterpretation of existing evidence.” pg. 67</i> Conduct short as well as more sustained research projects to answer a question (including a self-generated question), analyze a topic, or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS-LS2-7),(HS-LS4-6)	pg.68
<u>Confirming Viability and Safety of Proposed Methods</u>	N/a. Here approval from any IRB committee might be obtained ETS1.B	Students will design their study, focusing on developing methods that are cost effective, reasonable given the constraints of the lab (Biosafety Level 1 lab). They will read the MSDS sheets, fill out the risk and safety assessment for their Research plan, and update their methods to be more detailed, and based in peer-reviewed studies When evaluating solutions, it is important to consider a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. (secondary to HSLS2-7)	pg. 68
<u>Conducting the Study and Gathering Data</u>	(HS-LS2- 7),(HS-LS2-8)	Students will methodically collect data, ensuring to implement the proper controls, and to address any possible confounding variables. <i>“Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.” pg. 67</i>	pg. 67
<u>Data Analyses</u>	HS-PS3-6 11-12.RST.8	Students will conduct statistical analyses in Microsoft Excel or IBM SPSS. They will then consider ways to visualize the data, including the appropriate types of graphs, which include error bars, and descriptive figure legends. <i>“Mathematical representations can be used to identify certain patterns.” pg. 60</i> Evaluate the data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. (HS-LS4-5)	pg. 60 pg. 72
<u>Results/Discussion</u>	AI-S.ID.1, HS-LS2-1	Students will outline their findings, including any trends/ patterns, any significant differences between groups observed, anything consistent or inconsistent with pre-	pg. 67, 68

	11-12.RST.9	existing literature. Then students will come up with an explanation for what they observed. <i>"Represent data with plots on the real number line (dot plots, histograms, and box plots). (HS-LS2-6)" pg. 68</i> <i>"Use mathematical and/or computational representations of phenomena or design solutions to support explanations." pg. 67</i> Compare and contrast findings presented in a source to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. (HS-LS3-1)	pg. 70
<u>Conclusion</u>	HS-LS2-6	Students will make claims about their findings, and outline future directions for their study.	pg. 67
	11-12.WST.7	<i>"Evaluate the claims, evidence, and reasoning behind currently accepted explanations or solutions to determine the merits of arguments." pg. 67</i> Draw evidence from informational texts to support analysis, reflection and research. (HS-LS1-1)	pg. 64
<u>Oral Presentation of Findings</u>	11-12.SL.5	Students will design a tri-board poster to visually display their work. This should include an Introduction, Methods, Results, Discussion, Conclusion and Bibliography. Additionally, students will create PowerPoints and oral presentations, which will be filmed for competitions and/or presented live at events such as the Symposium Dinner. <i>"Make strategic use of digital media and/or visual displays in presentations to enhance understanding of findings, reasoning, and evidence, and to add elements of interest to engage the audience. (HS-LS1-5),(HS-LS1-7)"</i>	pg. 66
<u>Written Presentation of Findings- Research Manuscript</u>	11-12.WHST.5	The research manuscript will be the culmination of the course. This is to be tailored to the field of science/ topic of interest and the customary primary paper format for papers within that field. It should be approximately 20 pages long and should be submitted to Turnitin.com to ensure academic integrity is upheld. <i>"Conduct short as well as more sustained research projects to answer a question (including a self-generated question), analyze a topic, or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS-LS2-7),(HS-LS4-6)" pg. 68</i>	pg. 68
<u>Additional Notes</u>	This course is intended to enable students to identify a problem that is of interest to them, and to design a novel solution to this problem. In order to do so, they will need to read academic (peer-review) literature to inform their rationale and the design of their study. They will then conduct the study, and be responsible for creating an intelligible poster presentation, PowerPoint presentation, and research manuscript. Multiple presentations in front of peers will be required for this class. Students electing the course will be prepared to enter competitions such as the Long Island Science Congress, the WAC Lighting Fair, and the NSPC Health Sciences Competition.		