Curriculum at a Glance

Authentic Science Research

Level: 900

Grades 10, 11, and 12

Authentic Science Research is a three-year science elective for grades 10-12. Students apply for admittance into the course as freshmen. This course's focus is to allow students to access science content outside of the curriculum offered at DHS in a field of their own interest. Students enter the program as sophomores, conduct extensive bibliographic research in a science topic of their choosing, learn the intricacies of experimental design, deliver journal article presentations to their peers, and compete in science fairs around Connecticut. As students progress into their junior year they are tasked with furthering the understanding of their topic, as well as learning the detail of their field's experimental process through continued research, with the additional task of finding a mentor in a college or private research facility in order to either conduct original research or take part in ongoing works of their mentor for a six-week period over the summer between their junior and senior years. As seniors, students will compile and analyze the data collected from their summer research, present their findings to their peers and in science fairs and symposiums, all while completing a culminating research paper of publishing quality. This course has two forms of teacher-student interaction; students meet as a class every other day for full class lessons/presentations; students will also meet with a mentor teacher once every eight-day research cycle to discuss the work they have conducted independently, as well as formulating research goals for the next cycle.
*Juniors and seniors have the opportunity to earn up to twelve undergraduate credits through S.U.N.Y. Albany.

Year in Program	Course Content Students will:
9th-10th Grade Summer 1	● Read 10 articles in any field of science (no requirement for source of article), summarize the findings, and prepare a presentation of these articles in order of interest that will be delivered in the first weeks of 10th grade.
10th Grade	● Learn what comprises high- versus low-quality research material.

Semester 1	● Learn how to find, access, and read peer-reviewed journal articles. ● Create a research notebook that will contain chronologically organized documentation of all research, awards received, contact information, presentation feedback, and other course materials. ● Learn about the importance of research ethics. ● Conduct extensive bibliographic research in a field of their choosing. ● Refine which topic they wish to focus their research. ● Select a peer-reviewed journal article for presentation. ○ Learn how to design a high-quality research presentation. ○ Learn the skills essential to delivering an effective research presentation. ● Design and deliver 35-minute class presentation of selected article to their research class. ○ Critique presentations of peers and reflection on their presentation. ● Begin to design an original research proposal in their field for competition in Connecticut STEM Foundation's science fair.
10th Grade Semester 2	● Finalize CT STEM research proposal. ○ Compete in CT STEM Fair. ● Build research resume, and learn how to draft contact emails to researchers in field of choice. ● Begin to build contact with researchers in field of choice. ● Continue bibliographic research. ● Select journal article, design, and deliver 2nd journal article presentation. ● Plan, prepare, and collaboratively host Darien High School's Science Research Symposium for parents and community. ● Explore opportunities for research for the summer between sophomore and junior year.
10th-11th Grade Summer 2	● Conduct a total of 44-50 hours of work toward their research topic. ○ Activities may include taking e-platform courses, journal article readings, or research programs offered by colleges and universities. ○ All work must be meticulously documented to the standards set in their sophomore year. ● Design and prepare a summative presentation of their summer research for delivery to their research class.
11th Grade Semester 1	● Continue to refine research topic through continued bibliographic research. ● Continue to build research contacts in their field.

	○ Send emails to researchers with questions regarding their work, as well as any opportunities for research mentorship. ● Select a peer-reviewed journal article for presentation. ● Design and deliver 35-minute class presentation of selected article to their research class. ○ Critique presentations of peers and reflection on their presentation. ● Begin to design an original research proposal in their field for competition in Connecticut STEM Foundation's science fair.. ● Attempt to solidify a collegiate research mentor for the summer between 11th and 12th grade. ● Begin to act as upperclassmen mentors for incoming sophomore class.
11th Grade Semester 2	● Finalize CT STEM Fair research proposal. ○ Compete in CT STEM Fair. ● Finalize details of the research that will be conducted over the summer. ● Continue bibliographic research to prepare for lab skills, content knowledge, and experimental design needed for summer research. ● Design a research proposal that reflects the research experience they will participate in over the summer. ○ Prepare and deliver a presentation to their research class based on their summer research proposal. ● Plan, prepare, and collaboratively host Darien High School's Science Research Symposium for parents and community. ● Continue to help facilitate the research of sophomore class.
11th-12th Grade Summer 3	● Participate in six-week research experience at collegiate or private research facility or conduct an original self-generated experiment with collegiate mentor. ● Continue bibliographic research to further knowledge and data gathered during research experience. ● Keep meticulous records of all work and research in their research notebook. ● Design and prepare presentation to their research class summarizing their summer research.
12th Grade Semester 1	● Deliver presentation to research class summarizing their summer research. ● Compile and analyze data collected from summer research. ● Begin to write summative research article to the standards for peer review. ● Continue bibliographic research to strengthen findings and implications of their experimental results. ● Submit applications to the major Connecticut science fairs and symposiums, including, but not limited to:

	○ Connecticut Junior Science And Humanities Symposium -UConn Storrs ○ Connecticut Science Fair- Quinnipiac University ○ Regeneron International Science and Engineering Fair ○ Norwalk Community College Science Fair ○ Connecticut STEM Fair ● Expand upon summer research presentation for full class presentation. ● Act as upperclassmen advisors to all sophomore and junior research students to share experiences and advice on each year's work.
12th Grade Semester 2	● Compete in science fairs that each student has been accepted (number will vary), but at a minimum will participate in the following as competitors or attendees: ○ Norwalk Community College Science Fair ○ Connecticut STEM Fair ○ Connecticut Junior Science And Humanities Symposium -UConn Storrs ○ Connecticut Science Fair- Quinnipiac University ● Plan, prepare, and collaboratively host Darien High School's Science Research Symposium for parents and community. ○ Senior students are given the opportunity to give oral presentations to all parents and community in attendance highlighting the work of their previous three years. ● Act as upperclassmen advisors to all sophomore and junior A.S.R. students to share experiences and advice on each year's work.

Time Frame	**Expectations of work and materials that must be present for research cycle meeting. Students will:**
One Schedule Cycle (A-H) 10-12 days	● Complete a minimum of five hours of independent work outside of class time towards their individual research field. ● Maintain meticulous documentation in research notebook detailing what was done, what was learned, where information was obtained, and what goals they set for themselves for the next research cycle.