

OXFORD HIGH SCHOOL SCIENCE DEPARTMENT
APPLIED SCIENCE RESEARCH CURRICULUM

#337 Applied Research - Honors (9-12) By Permission Only Full Year 1.0 Credit

This course is intended for freshman, sophomore, junior or senior students who have demonstrated interest in pursuing research in biological, physical, medical, and/or engineering sciences. Students will conduct a year-long or multi-year independent science experimental research project under the mentorship of the instructor and field scientist(s). Students are expected to present the results of their research at local, state, or national fairs, symposia, or competitions. The course is designed to provide students with the opportunity to: 1. Interact with practicing scientists; 2. Participate in a significant research experience; 3. Select, develop and conduct an independent research project; and 4. Develop the skills of reporting and presenting research results. The course may be repeated with a change in content or continuation of project. **This course can be used to meet the science OR technology graduation requirements.*

ENDURING UNDERSTANDINGS (BROAD IDEAS, USUALLY GROUNDED IN THE DISCIPLINE):

Science is a creative endeavor that uses logical, analytical processes.

SCIENTIFIC INQUIRY

- Scientific inquiry is a thoughtful and coordinated attempt to search out, describe, explain and predict natural phenomena.
- Scientific inquiry progresses through a continuous process of questioning, data collection, analysis and interpretation.
- Scientific inquiry requires the sharing of findings and ideas for critical review by colleagues and other scientists

SCIENTIFIC LITERACY

- Scientific literacy includes the ability to read, write, discuss and present coherent ideas about science.
- Scientific literacy also includes the ability to search for and assess the relevance and credibility of scientific information found in various print and electronic media.

SCIENTIFIC NUMERACY

- Scientific numeracy includes the ability to use mathematical operations and procedures to calculate, analyze and present scientific data and ideas.

COURSE SPECIFIC GOALS:

KNOWLEDGE

Students will know:

- The important scientific questions of our time
- The important components of a poster presentation
- The key aspects of an oral presentation
- The structure of a research paper
- How to identify and contact scientists working in the student's field

SKILLS

Students will be able to:

- Maintain and organize information
- Prepare a PowerPoint presentation
- Present data from research papers via PowerPoint presentations
- Obtain scientific articles from various sources
- Prepare a scientific poster presentation
- Plan long-term projects and using timelines
- Use the Internet to obtain information about scientific issues
- Evaluate the validity and credibility of Internet sources
- Communicate with professional scientists

ASSESSMENT CRITERIA

- Portfolio
- Self-assessment sheets
- Peer-based poster and oral evaluations
- Oral presentations
- Poster presentations
- Research reports
- Journal Articles
- Blog Responses
- Competition and symposium participation

COMMON UNIT EXPECTED PERFORMANCES (ALIGNED WITH STATE EXPECTED PERFORMANCES):

Standard #	Standard/Expected Performance
C-1	Identify questions that can be answered through scientific investigation.
C-2	Read, interpret and examine the credibility and validity of scientific claims in different sources of information.
C-3	Design and conduct appropriate types of scientific investigations to answer different questions.
C-4	Identify independent variables, dependent variables, constants and controls in an experiment.
C-5	Use appropriate tools and techniques to make observations and gather data.
C-6	Use mathematical operations to analyze and interpret data, and present relationships between variables in appropriate forms.
C-7	Articulate conclusions and explanations based on research data, and assess results based on the design of the investigation.
C-7	Assess the reliability and validity of the data that was generated in an investigation and justify confidence in results.
C-8	Communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic.
C-9	Identify an issue and its implications completely.
C-10	Develop an action plan that addresses all aspects of the issue in detail.
C-11	Use a variety of reliable sources of relevant information, data, knowledge, or experiences to take and support a critical stance.

COURSE EXPECTED PERFORMANCES:

Timeline	Learning Concepts
September	Problem finding journal reading
October	Instrumentation Forming and designing a project Intel Science Talent Search (seniors) Siemens-Westinghouse Science Math and Technology Competition (seniors) Experimentation
November	ISEF Applications Scientific review: SRC or IRB, as appropriate Experimentation
December	Introductions and Review of Literature Research Reports Holiday Symposium Experimentation
January	Experimentation
February	Poster Construction Oxford High School Science Symposium Experimentation
March	Connecticut Junior Science and Humanities Symposium Connecticut Science Fair Science Horizons Science Fair
April	The Research Report National Junior Science and Humanities Symposium
May	Oxford Journal of Science Research International Science and Engineering Fair Connecticut Student Innovation Expo
June	Oxford Science Expo