

## DFSR Course Overview

The science research course is designed to provide students with a chance to pursue scientific research at a **college graduate level** for 3 years. Motivation, enthusiasm and dedication are essential pre-requisites for success in pursuing an **in depth research project of the student's choosing**.

1. Students choose and explore a topic of interest related to: physical science, life science, computer science, mathematics, or social science. (See other panel for more complete listing.)
2. Students are taught the process of **online bibliographic researching** and are able to access many **professional scientific databases**. Initially, students use **library and Internet research tools** to identify specific subjects currently being studied within their chosen area.
3. Students prepare a list of **advanced questions** regarding their chosen area, based on their bibliographic research, and then proceed to find the answers to those questions. This helps them to significantly advance their knowledge as well as motivates them to analyze their topic on a professional level.
4. Students find and study several **scientific journal articles** then present the information from some of their articles to the class. Their presentation to the class **emphasizes how the research described in the articles was conducted as well as the significance of the findings**. This highlights the **scientific method**, which is an essential part of the entire research course.
5. Once a significant amount of background material is acquired and a

strong sense of understanding is gained, the **student makes contact with a research scientist within their field of interest**. Often this is one of the authors of the articles they have read. At that time, the student asks the scientist to serve as a **mentor**, or to help in finding an appropriate scientist, in assisting them in **carrying out a research project in their area of interest over the upcoming summers and following school years**.

6. Students then engage in an **original piece of research that they design and conduct under the supervision of their mentor**. Most often this occurs at the lab where the mentor does their research.
7. Due to the extensive amount of time many of the research projects demand, and the continuity required, the majority of the research takes place over the next two summers with some work being done to maintain the project during the Junior year of school. Students therefore must schedule their summers appropriately
8. The classroom teacher meets with each student individually as well as the entire research class on a regular basis.
9. As a Junior and Senior the student will not only actively continue their research but they will write a final research paper and enter all possible symposia and science competitions to present their research:

*Intel Science Talent Search (Intel STS), Siemens Science Competition, Junior Science & Humanities Symposium (JSHS), Tri-County Science Fair, Westchester Science & Engineering Fair (WESEF), Intel International Science and Engineering Fair (ISEF), International Sustainable World Project Olympiad (ISWEEEP)*

## DFSR and College Credit

Dobbs Ferry Science Research students qualify for up to 12 college credits through the **University in High School Program at SUNY Albany** for successfully completing the three years and two summers of research as prescribed.

**They can earn:**

2 credits for the research work during the **summer** between **sophomore and junior year**

4 credits for **junior year**

2 credits for the research work during the **summer** between **junior and senior year**

4 credits for **senior year**

## SR and the IB Diploma Program

The **21st Century skills** and approaches to learning that are emphasized in the International Baccalaureate Diploma Program align very clearly with the skills and goals developed in the Dobbs Ferry Science Research Program.

While both programs are competitive and rigorous, there are significant areas where they intersect. One example is the Extended Essay requirement for Full IB candidates. This can be met through the reformatting of the research paper written for Science Research.

The efforts and commitment by the Science Research Program and The IB program to work together to align their goals and concepts make both of these two programs very accessible to high-achieving students.

## Areas of Research

### Animal Science

Animal genetics, ornithology, ichthyology, herpetology, entomology, paleontology, cellular physiology, circadian rhythms, cytology, physiology, studies of invertebrates.

### Behavioral and Social Sciences

Human + animal behavior, psychology, sociology, anthropology, archaeology, linguistics, learning, perception.

### Biochemistry

Chemistry of life processes, molecular biology, molecular genetics, enzymes, photosynthesis, blood chemistry, protein chemistry, hormones.

### Botany

Agriculture, agronomy, horticulture, forestry, taxonomy, physiology, pathology, genetics, hydroponics, algae.

### Chemistry

Study of nature and composition of matter and laws governing it—physical chemistry, organic chemistry, inorganic chemistry, materials, plastics, fuels, pesticides, metallurgy, soil chemistry.

### Computer Science

Hardware + software engineering, graphics, data structures, encryption.

### Earth and Space Sciences

Geology, mineralogy, oceanography, meteorology, climatology, astronomy, seismology, geography.

### Engineering

Civil, mechanical, aeronautical, chemical, electrical, photographic, sound, automotive, marine, heating and refrigerating, transportation, environmental.

### Environmental Science

Ecology, pollution studies.

### Mathematics

Calculus, geometry, abstract algebra, number theory, statistics, complex analysis, probability.

### Medicine and Health

Diseases/health, dentistry, pharmacology, pathology, ophthalmology, nutrition, dermatology, allergies, speech + hearing.

### Microbiology

Bacteriology, virology, protozoology, fungi, bacterial genetics, yeast.

### Physics

Music, optics, acoustics, atomic, particle, superconductivity, thermodynamics, semiconductors, magnetism, quantum, mechanics, biophysics.

## Examples of research experiments designed and conducted by students

The effects of a high fat diet on the occurrence of prostate cancer

Identification of the Genes involved In Muscle Atrophy and Hypertrophy

The importance of Glial Growth Hormone on the developing brain

Design and Fabrication of a Collapsible Kayak

The effects of vitamin A in reducing the growth of Breast Cancer.

Analyzing and improving Internet Search Engines

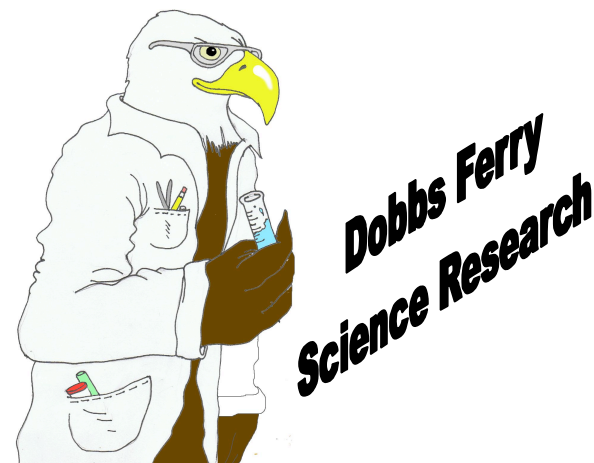
Using a natural fungicide to control the tick population that transmits Lyme disease.

Creating an energy collecting step that can store energy when people walk on it.

The impact of having a sibling with special needs on non-disabled children

### For more info. contact:

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*Would you like the opportunity to research and learn about anything that interests you from any area of Science or Technology and then design and conduct an experiment within that area, under the guidance of one of the top scientists in that field?*

## Sound exciting?

## WELCOME

to the  
Dobbs Ferry High School  
**Science Research Program**