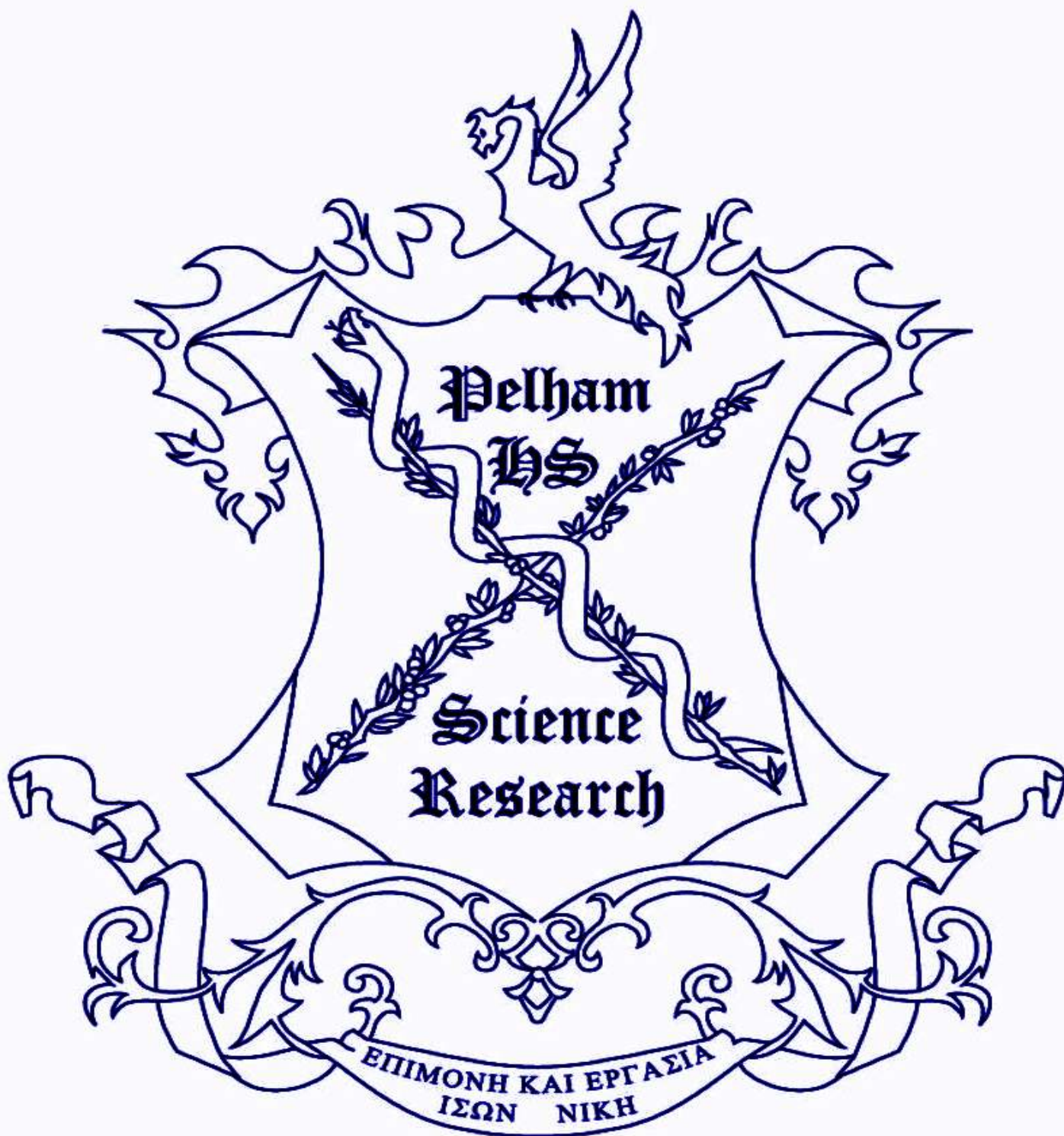


PROGRAM INFORMATION PACKET



An Overview
of
Science Research in the High School

The program affords students the opportunity to participate in the community of scientific research and scholarship as part of their high school experience. It furthers excellence in performance and achievement while drawing from and developing scientific capabilities in a broad spectrum of the student body. This student-centered research course is part of a four year elective program. *During the student's junior and senior years, they may elect to take the course for college credit for a total of up to twelve credits in conjunction with the University at Albany.*

Students taking the course accomplish the following:

- Choose and explore a topic of interest after conducting background research on a variety of fields
- Develop skills to effectively use available online resources to conduct bibliographic searches of international databases
- Find and study several journal articles, eventually choosing one that will be presented to the class
- Contact the authors of journal articles and schedule meetings to discuss their research and explore potential internship opportunities
- Engage in an original piece of research under the supervision of a mentor and classroom research teacher
- Conduct statistical analyses using appropriate statistical computer software
- Create a professional research paper to be presented as a PowerPoint and poster board
- Present findings to the class, school district and at regional, state, national and international competitions

All steps in the students' progress are carefully monitored to ensure that students engage in each phase of scientific research and have attained the desired capabilities. All students are welcome to apply regardless of past academic history. The program is designed for students who are willing to work hard and are determined to research a topic that they are passionate about. Students should be self-motivated, responsible and be able to work independently, setting attainable goals weekly. Students who enjoy the outdoors, gaming or cooking, have developed research projects based on their interests. In addition to Biological Sciences and Physical Sciences, students can study Social Science, Computer Science, Earth and Space Sciences, Mathematics and Engineering. Basically, upon approval, anything that can follow the Pelham Inquiry Cycle can fulfill the requirements of the science research program.

The University at Albany's Involvement in the Science Research Program

The University in the High School Program at the University at Albany was established in 1983 within the former College of Humanities & Fine Arts, now part of the College of Arts & Sciences. The UHS Program was originally designed as an innovative way to provide students in Capital Region high schools with the opportunity to earn University at Albany credit for advanced study in the foreign languages. The Program has since expanded to include course offerings from 27 academic departments.

UHS Program courses provide students with the academic challenges of college-level curriculum during their final year(s) of high school. As a "bridging" experience to college, UHS courses can help students begin to develop the skills and experience necessary for academic success in higher education. Enrollment in UHS courses may provide future opportunities to students, such as the ability to enroll in higher-level college courses or to complete a four-year degree in a shorter amount of time.

The University at Albany has sponsored the Science Research in the High School program since 1994. The schools in the program model the science research classes after the course developed by the late Robert Pavlica, Ph.D. at Byram Hills High School in Armonk, New York. There are presently more than 100 schools in New York State that use this program to involve students as legitimate members of the research community. Students in these classes around the state draw their mentors from a wide array of professional research institutions both in New York and all over the world. In addition, many of the students in the classes take the Science Research course for college credit in their Junior and Senior years, through the University at Albany's "University in the High School Program." (UHS)

Upon successful completion of UHS course requirements, students will receive credit from the University at Albany for the courses in which they have enrolled and for which they have paid. These credits will form the basis of a permanent post-secondary academic record at the University at Albany. Credits obtained through the University at Albany may be eligible for transfer to colleges and universities throughout the country.

approximately \$150 dollars per course

Course Number	Credits	Availability
CAS 109	2	Summer (10 th -11 th grade)
CAS 110	4	Fall-Spring (11 th grade)
CAS 209	2	Summer (11 th -12 th grade)
CAS 210	4	Fall-Spring (12 th)

9th – 11th graders must be enrolled in a Regents or A.P. class to receive credit.

12th graders do not need to be enrolled in any other sciences

If you are considering SUNY college credit, you must speak with Mr. Beltecas before applying for the college credit to confirm that you qualify and totally understand this commitment!

A CAS 109 Intermediate Science Research (2) - JUNIORS

Students learn research methodology in the natural and social sciences by accessing scientific databases, by using online bibliographic search techniques, consulting doctoral-level research scholars, developing hypotheses and performing experiments to test them, and by writing research papers and making presentations at scientific symposia. It is expected that the students will have done many of these activities in the prerequisite high school course, and in this course emphasis is placed upon the formulation of hypotheses and initiation of experiments in consultation with mentors. Prerequisite(s): completion of one year of an approved course in science research at the high-school level; permission of instructor. Offered summer session only. (summer, July and August, entering Junior Year)

A CAS 110 Intermediate Methods of Research (4) - JUNIORS

Students learn research methodology in the natural and social sciences by accessing scientific databases by using online bibliographic search techniques, consulting doctoral-level research scholars, developing hypotheses and performing experiments to test them, and writing research papers and making presentations at scientific symposia. It is expected that the students will have done many of these activities in the prerequisite high school course, and in this course emphasis is placed upon performing experiments in consultation with mentors. Students are expected to spend at least three hours per week outside of class. Prerequisite(s): completion of one year of an approved course in science research at the high-school level; permission of instructor; available for year-long course of study only. Offered through the University in the High School Program only. (Junior Year - Sept through June)

A CAS 209 Advanced Science Research (2) - SENIORS

Continuation of work undertaken in A CAS 109 or equivalent with emphasis placed upon the completion of experiments in consultation with mentors. Students will consult with their teachers as necessary, but will not meet in a formal classroom period. Prerequisite(s): satisfactory completion of A CAS 109 or completion of two years of an approved science research course at the high school level; permission of instructor; offered summer session only. (summer, July and August, entering Senior Year)

A CAS 210 Advanced Methods of Research (4) - SENIORS

Continuation of work undertaken in A CAS 110 or equivalent with emphasis placed upon the communication of results. Students are expected to spend at least three hours per week outside of class. Prerequisite(s): satisfactory completion of A CAS 110 or completion of two years of an approved science research course at the high school level; permission of instructor; students must be enrolled throughout an entire academic year to obtain credit. (Senior Year - Sept through June)

THE “FOUR YEAR” SPAN OF THE SCIENCE RESEARCH COURSE

Freshman Year:

Students begin the Science Research Journey during their freshman year - refining valuable skills and methodologies. During freshman year the research student concentrates on learning a number of skills. First and foremost the student must learn that research always follows the same basic pattern of progress. They do this by extensive reading and by presenting papers written by researchers in their chosen field. These presentations must always contain the same basic elements of a review (to elucidate what has gone on before and prevent repetition) a question/purpose to be addressed, a methodology, a presentation of data (with graphics), a discussion of the data, and a conclusion. Students present their findings to the class and science community.

Student Responsibilities –

- Identify 2 topics of interest that they may be passionate about
 - Find articles and science journal papers for each topic
 - Present research to class as a powerpoint and poster board
 - Perform Mini Experiments
 - Pelham Inquiry Cycle (student generated)
 - Shark Tank
 - Attend Senior PPT Symposium (January - midterm exam)
 - Attend WESEF public viewing session (March)
 - Attend Science Research Symposium (May - final exam)
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Sophomore Year:

During the sophomore year, students continue to refine the above skills and methods as well as learning the importance of time management and detailed record keeping. Students will learn how to create and validate surveys, analyze data in spreadsheets, and are introduced to the different ways to present their research. It is also during this year that the students must identify and secure a mentor. Under the guidance of the mentor, students develop a research plan and carry out their project. In the summer entering Junior year students must work on their research projects and complete their research papers.

Student Responsibilities –

- Finalize Topic Selection and complete a thorough search of journal articles
- Obtain, read and annotate a minimum of 10 published journal articles in their subject area
- Contact and arrange for a mentor to supervise research
- Make arrangements for summer meetings and research with mentor
- Prior to any research, get appropriate IRB/SRC approvals
- Attend local symposia and competitions
- Prepare a ppt and poster board of their research
- Attend Senior PPT Symposium (January - midterm exam)
- Attend WESEF public viewing session (March)
- Participate in Sophomore Competition - Westlake (June - final exam)
- Attend Science Research Symposium (May - final exam)

Junior Year:

The junior year is the year of intense research activity. This is when most of the data collection will happen. The hypothesis is continually refined and public presentations are made of the work being done. Reading continues to keep abreast of new findings in the chosen field. There are multiple competitions that students will be required to enter, such as the JSHS and WESEF.

Student Responsibilities -

- Obtain and read a minimum of 10 additional published journal articles in their subject area
 - Write a research proposal
 - Prior to any research, get appropriate IRB/SRC approvals
 - Complete experimentation
 - Analyze data
 - Complete a scientific paper
 - Prepare a poster board and PowerPoint presentation
 - Complete forms required to enter competitions (depending on progress of research)
 - Attend Senior PPT Symposium (January - midterm exam)
 - Participate in WESEF (March)
 - Participate in Pelham Science Research Symposium (May - final exam)
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Senior Year:

In the senior summer all data collection should be finished. This is the time to finish analyzing data collected and start writing their final STS research paper. Senior year research students should finish the work they have been researching throughout their time in the program. The research paper is written based on the format used in the journal articles the student has been reading. During this year the student must present the final research paper to the class, school and scientific community. The students must also enter as many competitions as they can during the school year. Each senior student should also attempt to publish their research paper.

Student Responsibilities -

- Obtain and read a minimum of 10 more published journal articles on their subject
- Complete experimentation
- Analyze data
- Complete a scientific paper
- Prepare a poster board and PowerPoint presentation
- Complete forms required to enter competitions
- Senior Workshops
- Participate in Regeneron STS
- Participate in the Senior PPT Symposium (January - midterm exam)
- Participate in JSHS (February)
- Participate in WESEF (March)
- Participate in Pelham Science Research Symposium (May - final exam)

Skills learned along the way.....
All of which are Transferable!

- Students can identify and execute the steps of inquiry based learning
 - Conduct Background Research
 - Develop a Question / Purpose
 - Establish Objectives
 - Create a Logical Plan/Solution
 - Collect, Process, Analyze Results
 - Draw Conclusions
 - Present Findings
- Students collaborate with others in their field of science
- Students learn how to communicate with professionals by meeting with their mentor, presenting before IRB/SRC boards and participating in team meetings at the lab
- Students perform online searches using the school and University databases
- Students generate a citation list
- Students use time management skills to establish a research timeline
- Students maintain an organized notebook and portfolio
- Students prepare a scientific poster
- Students prepare and present a scientific PowerPoint presentation
- Students learn the skills of self-reflection and assessment

For the Student

- Attend all regularly scheduled classes
- Participate in the school's annual symposium
- Commit to **240 or more hours** per school year (**September to June**) for their research work (this includes class time, assessment meetings, and all out of class time spent on the research)
- **Summer** research carries a commitment of a minimum **100 hrs of research work** (most strong students average over 250 hours during the summer)
- Maintain a detailed laboratory notebook/spreadsheet of all research work. (lab work, notes, meetings)
- Maintain a comprehensive portfolio binder of all research work
- Present research at all stages of the work, at all available symposia
- Maintain regular, demonstrable contact with a mentor once one is obtained
- Maintain current literature list
- Enter Competitions

Important Dates for Competitions

Competitions found below are MANDATORY

Missing competitions results in a drop of 2 full letter grades

Seniors ONLY

Regeneron STS Competition (November – online submission)

Westlake Competition (1st / 2nd Saturday in June - seniors are judges)

Juniors and Seniors

WESEF Competition [Friday & Saturday in March]

JSHS Competition [First Saturday (rain date Sunday) in February]

Sophomores Only

Westlake Competition (1st or 2nd Saturday in June)

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Grading Policy

100% of the quarter grade will be derived from benchmarks. Each benchmark will be weighted based on the magnitude of the work required. Benchmarks can range from something as simple as a parent signature on a handout to something as complicated as an entire research paper, ppt or poster board. Grading system will be aligned with that of the H.S. Science Department.

Materials for Research

- a. Science Journal (*marble **hardcover** notebook*)
- b. Two pens and two different color highlighters
- d. Accordion Folder (5 section)
- e. 2" D - ring binder, 10 dividers, 50 sheet protectors

(If you have any questions or concerns please contact us, via email found below)