North Salem Middle/High School

Science Research

This three-year program of study begins in the sophomore year. In the first year, students will develop the skill sets required for independent research, identify an area of study, prepare a research proposal, and find a mentor for a project. Students will then carry out their project over years two and three, which will include a summer research internship with a mentor. Throughout the program students will give public presentations of their reading and research. All students will present their work at the end of the year at the North Salem Science Research Symposium and students will be encouraged to participate in a number of local and national science competitions throughout the program.

Instructor: Mr. Collea
E-mail: dcollea@northsalemschools.org
Websites: Collea's Corner / Google Classroom
Office Hours: After school: Tuesday and Wednesday
Room #: W-19

Course Materials:

Students must have the following materials for class.

(1) *3-Ring Binder*: This will be used to develop a portfolio of your work during the class. The binder must include the following sections:

- Assessments from biweekly meetings
- Goal sheets from biweekly meetings
- Journal Articles with summaries and annotations
- Laboratory work and hourly log of lab hours
- Communications related to class including emails, phone log, etc.

Required Event:

Science Research Symposium - Tuesday, May 22nd 2024 (6:00 pm – 8:00 pm) It is mandatory for all students to attend our annual science research symposium and present a poster of an article read (*first year*), or their work to date (*second year*) or their findings (third year). In addition to the posters, all Seniors will present a Google Slide talk on their research findings.

Other Out-of-School Events: *(Dates will be posted on Collea's Corner)*

May be required depending upon student level and progression of research project.

- Westchester Rockland National Junior Science and Humanities Symposium (WR-JSHS)
- Tri County Science and Technology Fair
- Regeneron Westchester Science & Engineering Fair (WESEF)
- Somers Science Fair (first-year science research students only)
- Regeneron Science Talent Search (Seniors only)
- International Science and Engineering Fair (ISEF) is the most prestigious science fair for high school students in the country.
- Westchester Science and Engineering Fair - Saturday, March 16th (Somers, NY)
- Somers Science Fair (Year 1 and Year 3 only) - 1st Saturday of June

Location and Meetings:

Every other week each student meets one on one with Mr. Collea, where the student's progress in developing a research plan, carrying out a project, collecting and organizing data and writing a conclusion is discussed and evaluated. In addition, new goals are formulated for the next session. Also, the course meets formally every other day as a research seminar in W19, where students have the opportunity to ask questions, brainstorm ideas, present their findings to their fellow classmates and develop other science research prerequisites required to be successful in the class. Students will also be critiqued on their effective use of class time, content of their research, and presentation skills.

Grading Policy:

80% Biweekly-Meetings:

Due to the unique nature of this course, grading will be based largely on individual progress and work ethic rather than on "success" of the research project. Every two weeks, students will prepare a goals sheet, time sheet, article summaries, and any presentations they have been working on. Students will then attend a bi-weekly meeting with Mr. Collea. The student and teacher will each agree on and sign off on the biweekly rubric. Grades will be averaged each quarter for this portion of their grade.

20% Student Presentations:

Students will be required to make **a *minimum* of one formal presentation per quarter** on either their work or a preapproved journal article. Students will give their presentation, receive a graded rubric along with peer feedback, and write a reflection of their work. All presentations will be averaged for this portion of the grade.

Final Project Grade:

Students will be required to present at the Science Research Symposium. ***Their presence at symposium is mandatory and failure to attend will result in a 0 for their final exam grade.*** The final grade will be based on their attendance, poster and presentation quality. This project will be worth 20% of the final grade for the course.

Summer students are evaluated in the following manner:

The teacher will meet with or speak to the mentor about the student's progress during the summer. The teacher will meet with each summer student during the first week of school for a summer assessment session to determine the student's grade.

Course Requirements:

Attendance policy: Attendance is required at all sessions, unless the student is at his/her specific research site conducting work. No more than 10 absences from the group sessions are allowed in the full year classes, and 2 absences in the summer classes. Unexcused absences that occur on the day students are assigned to present results in a deduction of points during your biweekly meeting. An unexcused absence from an individual research meeting results in reduction of points on your biweekly grading sheet.

Picking a topic: The first thing a student must do in this class is pick a valid research topic. The student will begin this process by reading general articles from magazines, newspapers, search engines or sites posted on Collea's Corner and Google Classroom. Once the student has thoroughly researched and chosen a topic, they can begin to read and present on peer-reviewed research articles. The students will be regularly presenting on these articles and topics. ***By the end of their first year of research, students are required to write a formal research proposal as a part of their final evaluation for the year*.**

***Biweekly Meetings*:** Biweekly meetings will be scheduled for each quarter. See the grading policy for details.

Finding a Mentor*:** Finding a mentor in the research community is a fundamental aspect of this course. Your mentor must hold an M.D., Ph.D., or hold a professional certificate in their field. We will spend a great deal of time in class discussing how to find a mentor. Finding a mentor is your primary goal for your sophomore year. ***Before reaching out to potential mentors, you must seek permission from Mr. Collea to do so. This is to ensure that you are well read and fully prepared to have a professional conversation with the mentor about their work and field. ***After you find one, Mr. Collea reserves the right to contact that mentor at any point to check in.***

Institutional Review Board (IRB) / Science Review Committee (SRC): Before beginning any research, you must complete a research proposal and submit it to the school IRB/SRC, which is composed of Dr. Murphy (*Assistant Principal*), Ms. Castelli (*School Psychologist*), Mr. Birdsall (*Science Teacher*), and Ms. McCarren (*English Teacher*). If any of the IRB / SRC members request a change to the proposal, that change must be made then resubmitted in a timely manner (*within 2 weeks*). If any changes are made to the project after initial approval, an addendum must be submitted and approved by the SRC / IRB before research can continue. Projects involving any living tissue samples, living animals, or biological samples will also need to be approved by a regional SRC prior to implementation of the project.

***Research Time Line*:** Please refer to the "3 Year Timeline" document attached to this syllabus (*and available on the website*) for a detailed three-year research sequence. Note that this is an ideal timeline and that progress will look different for each individual student. Students will not be graded based on this timeline. Think of it as more of a goal to work towards.

***Presentations and Written Articles*:** An important aspect of the research is publically presenting your work in the forms of presentations and formal writing. Students will be expected to do formal presentations and generate research documents based on their work each year.

- **Year 1 students** will present their literature review and research hypothesis at a science fair / symposium. The primary goal of Year 1 students will be to find a research mentor to work with for the remainder of their research experience. Sophomores will be expected to present at Somers Science Fair on the first weekend of June and will be required to complete a research proposal by the end of their sophomore year for approval by the school IRB/SRC.
- **Year 2 students** will implement their research and present on a combination of their research results and relevant primary literature pertaining to their work. Students who are far enough along in their research and have completed summer work with a mentor may compete in regional science competitions such as WESEF or JSHS with instructor permission. At the end of the year, juniors will write a research update detailing the work they have done so far and their plans over the summer.
- **Year 3 students** will be required to write a formal document describing the background and results of their project, modeling a peer reviewed journal article. They may be expected to apply to JSHS and may also apply to WESEF or other competitions depending on the depth of their research. By the end of the year, seniors will give a 10-15 minute presentation on the results of their research at Symposium. Year 3 students may also be asked to act as mentors to Year 1 and 2 students.
- **All Students** will be required to give article summaries and research update presentations in class on a very regular basis. A *minimum* of one formal presentation per quarter will be required. Fellow classmates will be required informal feedback to the presenter.

Safety Policy*:*

Working in laboratories carries the potential for accidents. All students are expected to behave in a safe manner to prevent mishaps and have a signed Flynn Scientific Safety Contract on file.

Three Year Course Overview:

Year 1

During the sophomore year, the research student concentrates on learning a number of research and associated skills. First and foremost, the student must learn to see 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 hypothesis or statement of a problem to be addressed, a methodology, a presentation of data, with graphics, a discussion of the data, and a conclusion.

Students are assessed by Mr. Collea and their peers in their presentations. Also during the sophomore year, the student must learn search techniques for finding literature, time management, and the importance of detailed record keeping. It is during this year that the student must identify possible mentors and their locations and contact at least one of them to ask for help with the work. Also, this year, the student has to plan a project, under the guidance of a mentor, and secure a place to do his/her research.

Year 2

In the sophomore/junior summer, the student is expected to work on the research project. While this is always influenced by family expectations and time constraints, at least some part of the work should be done in this summer.

The junior year is the year of intense research activity. This is when most of the data collection will happen. Their hypothesis and experimental design is continually refined and public presentations are made of the work being done. Year 2 students continue to keep abreast of new findings in the chosen field or topic of study. Some competitions, such as the JSHS and the ISEF may be entered.

In the junior/senior summer all data collection should be finished. This is the time to finish analyzing data collected and start writing the research paper.

Year 3

Senior year research students should finish their work. Student/teacher meetings continue through this year. 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, and the school in general at the Science Symposium. The student may also enter any competitions open to her/him. Each senior student must also attempt to publish the research paper and may be asked to serve as a mentor to Year 1 and 2 students.

Standards of Academic Integrity:

The University at Albany expects all members of its community to conduct themselves in a manner befitting its tradition of honor and integrity. Members are expected to assist the University by reporting suspected violations of academic integrity to appropriate faculty and/or administrative offices. Behavior that is detrimental to the University's role as an educational institution is unacceptable. Claims of ignorance, of unintentional error, or of academic or personal pressures are not sufficient reasons for violations of academic integrity. The following are examples of the types of behaviors that are defined as academic dishonesty and are therefore unacceptable:

- **Plagiarism:** Presenting as one's own work the work of another person. Plagiarism includes paraphrasing or summarizing without acknowledgment, submission of another student's work as one's own, the purchase of prepared research or completed papers or projects, and the unacknowledged use of research sources gathered by someone else.
- **Multiple Submission:** Submitting substantial portions of the same work for credit more than once.
- **Sabotage:** Destroying, damaging, or stealing of another's work or working materials.
- **Unauthorized Collaboration:** Collaborating on projects, papers, or other academic exercises that is regarded as inappropriate by the instructor(s).
- **Falsification:** Misrepresenting material or fabricating information in an academic exercise or assignment.
- **Bribery:** Offering or giving any article of value or service to an instructor in an attempt to receive a grade or other benefits not legitimately earned or not available to other students in the class.
- **Circumventing Security:** Users are prohibited from attempting to circumvent or subvert any system's security measures. Users are prohibited from using any computer program or device to intercept or decode passwords or similar access control information.
- **Forgery**: Imitating another person's signature on academic or other official documents, including class material.
- **Theft, Damage, or Misuse of Library or IT Resources**: Removing uncharged library materials from the library, defacing or damaging library materials, intentionally displacing or hoarding materials within the library for one's unauthorized private use, or other abuse of reserve-book privileges. This also includes, but is not limited to, unauthorized use of another person's computer accounts, codes, passwords, or facilities; damaging computer equipment or interfering with the operation of the computing system of the school.

Please note:

The instructor reserves to right to amend these expectations in writing at any time.
A copy of these expectations can be found on Collea's Corner and Google Classroom.