

## Science Research in the High School

The following guidelines for Science Research in the High School courses under the auspices of the University at Albany (SUNY), represent the minimum quality standards that are used by the university staff in evaluating research courses. They are provided to help teachers conduct productive, student centered research programs in their schools. These guidelines have been evolving since the inception of the program in 1994 and have been tailored by regular input from program staff, University in the High School staff, high school administrators, and most importantly, practicing teachers in the field. They are a description of what the University requires of school districts, teachers, and students, for status in both the Science Research in the High School (SRHS) program and the University in the High School (UHS) program. What is listed here should be seen as a minimum to gain and maintain acceptance in the SRHS and UHS programs and is by no means a complete description of what our program teachers do.

The guidelines are divided in three categories:

- For the Student
- For the Teacher
- For the School District

Each of those categories is broken down further into:

- **Required** in order to maintain a school's status.
- **Strongly suggested**, not absolutely required.

In addition to the above, the 'For the Student' section also has subdivisions for Sophomore (first year), Junior (second year), and Senior (third year) students as the requirements for each of these years have specific goals, some of which differ from year to year.

Teachers are encouraged to share this document with students, parents, and administrators. While there is considerable detail here, we recognize that it will continue to evolve. Inquiries may be addressed to Leonard Behr or Dan Wulff at the University.

### For the Student

**All students in an approved SRHS course are required to:**

- Attend all scheduled SRHS classes. **N.B. The only exceptions to mandatory class attendance are for Seniors who have extreme scheduling difficulties. These will only be accepted with teacher approval.**
- Commit to 240 or more hours per school year for their research work.
  - Class time (90 hours).
  - Assessment meetings (one every two weeks, 20 hours).
  - Out of class time (3.5 hours/week, total 140 hours).
  - **N.B.** – We are aware that most classes do not meet for a full hour at a time. This is not a problem. For the student's out of class time where the student does not have to deal with school clocks and bell schedules, an hour is an hour, 60 minutes.
- Attend your school's full local symposium and take part as required by the teacher.

- Maintain a laboratory notebook of all research course experience starting upon entry into the science research course.
  - This must be a bound notebook with numbered, pressure sensitive duplicate pages which can be removed. This is typical of most research laboratory notebooks.
- Maintain a portfolio of all research associated work. The portfolio must contain at least all of the following sections:
  - Interleaf sheets from the Laboratory Notebook.
  - Records of all communications: telephone, face-to-face, e-mail, letters, faxes, etc.
  - Bi-weekly goal sheets.
  - Bibliographic research searches and results.
  - All journal articles that are read.
  - One-to-one assessment sessions including bi-weekly assessment sheet.
  - Copies of all class and non-class public presentations.
  - Copies of all research papers written.
  - Semi-annual research abstracts of the work to date.
  - It is **strongly suggested** that the following sections be included:
    - Any grants obtained.
    - Rules from various competition and other venues for presentation.
    - Honors, recognitions, news clippings, etc.
    - Other pertinent information as deemed important by the course instructor.
- Create a poster presentation of their annual research work.
  - Sophomores should create a poster based on a peer reviewed paper they have presented in class. In any case they should NOT present what they want to do or plan to do unless they are already working with a mentor who has approved their plans.
  - Juniors should create a poster based on their own review of literature and their work so far.
  - Seniors must create a poster based solely on their own research findings.
  - All research students, including speakers, must present posters at the local school symposium.
- Enter available venues for presenting their research at all stages of the work.
- All students must take part in the class end-of-year evening symposium, at the appropriate level for their year in the course.

**Sophomores must also:**

- Keep a demonstrable log of where their time on research goes.
- Advance to the level of reading peer reviewed journal articles by mid-winter of the Sophomore year.
- Present an appropriate, peer reviewed research paper to their classmates and teacher at least once during the school year.

- Conduct thorough and exhaustive literature searches on their chosen topic.
- Always keep in mind that your overarching goal as a first year research student is to find a mentor. Everything you do in your research effort is toward that end.
- Collaborate with the mentor (once there is one) on a hypothesis and begin writing a research plan.
- It is **strongly suggested** that Sophomores continue their research work during the Sophomore/Junior summer. This can be in an internship or other organized program, or individually as long as the mentor approves the work.

**Juniors must also:**

- Carry out the bulk of their experimentation and data gathering.
- Enter venues for competition as deemed appropriate by the instructor.

**Seniors must also:**

- Present their research findings at their local school symposium and at least one other non-competitive venue (school board meeting, PTO, faculty meeting, civic organization, etc.).
- Write a scientific paper of their finished research.
- Enter available competitions as determined by the course instructor.
- Create a PowerPoint (or similar) presentation of their research findings.
- Present their full research findings at the school's local symposium.
- It is **strongly suggested** that they make a serious attempt to publish their work.

**For the Teacher**

**All SRHS teachers are required to:**

- Receive appropriate training.
- Maintain contact with other teachers in the program.
- Establish and maintain contact with student mentors.
- Establish and maintain contact with research student parents/guardians.
- Conduct an appropriate student assessment session, one-to-one with each student, every two weeks.
- Organize and conduct a local end of year evening symposium every year.
- Require all students in the class to present a poster of their work in the local symposium.
- Determine available venues for students to present their work and require reasonable participation.
- Notify the program secretary of the local symposium date as soon as it is determined, at latest by end of February each year.
- Help students identify and contact mentors when deemed appropriate.
- Help students find venues for public presentation of their work.
- Recruit students from a cross section of the student body.
- It is **strongly suggested** that teachers require all Seniors to present a PowerPoint (or similar) show of their research findings in the local symposium.

- It is **strongly suggested** that the teacher become an adjunct instructor in the University in the High School program at the University at Albany and encourage students to take part in the UHS program.
- Form a local Science Research Committee to insure that safe and appropriate (humane) procedure is used in all student projects and that they are 'good science'. (New in 2008.)
- Form a local Institutional Review Board to deal with all research involving humans in any way. (New in 2008.)
- Both of the above may be combined in one SCR/IRB at the teacher's discretion. (New in 2008.)
- The guidelines for forming such committees followed by the Intel ISEF be used as a standard (These are found on Society for Science and the Public web site at <http://www.societyforscience.org/> (New in 2008.)
- Be prepared to certify that all student projects were reviewed by one or both committees before work began.
- Require that all research students attend the full local symposium.
- Require that all Seniors present their research findings as speakers at the local symposium.
- Require that all research students, including the speakers, present posters at the local symposium.
- Always remember that, while it is the teacher's obligation to help students search for mentors, it is ultimately the student's responsibility to identify and secure a mentor.

**For the School District**  
**Schools districts are required to:**

- Provide classroom space with presentation equipment, computers, and internet access as needed to successfully conduct an SRHS course.
- Provide regularly scheduled time for the SRHS class within the school day (this may be flexible but must amount to the equivalent of 90 class periods of 45 minutes or more per year).
- Provide the necessary time for the teacher to meet with each student, one-to-one, for a full class period, once every two weeks.
- Provide appropriate facilities for the end of year evening symposium.
- Recruit students from a cross section of the student body.
- Provide necessary equipment and materials to conduct an SRHS course (computers, internet access, presentation software and equipment, telephone access, e-mail access, fax machine access).
- Provide funding for necessary teacher training.
- Anticipate teacher turnover, identify replacement personnel, and provide funding for training replacement whenever possible.
- Limit enrollment to any research class or expand the number of sections such that ALL students can meet one-to-one with the instructor, for one full class period, once every two weeks.
- It is **strongly suggested** that districts provide transportation and substitute teachers for the SRHS class to attend the nearest division of the Junior Science and

Humanities Symposium and the nearest affiliated division of the International Science and Engineering Fair.

- It is **strongly suggested** that districts provide one day per year for the SRHS instructor to attend follow-up training such as that provided by the University in the High School program.
- Provide a place and time for SRC and/or IRB committees to meet on campus on an as needed basis.