

# Mentor Packet

# What is Science Research?

The Somers High School Science Research Program offers students the opportunity to participate in authentic scientific research as part of their high school experience. This experiential learning opportunity allows students to explore scientific fields while promoting STEM and developing scientific capabilities. Students taking the course:

- Choose and explore a STEM topic of interest.
- Develop research skills and conduct searches of scientific databases. Students will perform a thorough literature review of the published work in their field.
- Design and conduct an authentic research project that produces original findings under the supervision of a mentor.
- Present their findings through various media at the local, regional, national, and international level. Students will learn to present scientific research with attention being placed upon the scientific method.

Students traditionally enter the course in their sophomore year and spend the next three years working towards the successful completion of their research. Student may present findings in competitions their Junior year, Senior year, or both (depending on their progress and if conclusive findings have been obtained) The course culminates with the students presenting their work in local, state and national competitions and writing a university-level academic research paper.

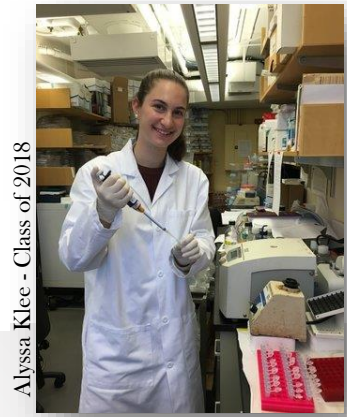


Westchester Science & Engineering Fair - 2018



# Your Role as a Mentor

*This is a typical sequence for students in the program. This may vary based on a student's progress. Some students may conduct research both summers and present their findings at competitions their Junior **and** Senior year.*



Alyssa Klee - Class of 2018

## Sophomore Year

- Suggest Articles and Readings to allow the student to develop a deep and meaningful understanding of both the topic and the techniques readily used in the field.
- Communicate with the student twice a month via either email, phone conversation, or Skype sessions to discuss your work and/or the student's interests and progress.
- If geographically feasible, have student visit you in your research facility. Students and mentors work together during the year, during breaks, or during the summer. Work with the student to develop a suitable protocol for an authentic experiment (***Ideally, the work should aid you in your own research but can be any project you are willing and able to guide***). This may not take place until Junior year depending on student's progress.



## Junior Year

- Continue to suggest readings and communicate with the student to evaluate the student's understanding
- Advise and evaluate the student's ongoing research project – students may begin researching any time you feel they are ready. This could begin the summer before their Junior year.
- If the project involves human subjects, have student work under your Institutional Review Board approval or assist them in preparing for our school's annual spring IRB meeting. If feasible, have student work at your research facility to familiarize them with lab techniques and equipment. Some projects are conducted remotely.



## Summer of Junior Year

- Guide students as they complete research (either at your lab or on their own); all data is collected by the end of the summer.
- Aid the student in statistically analyzing data and drawing conclusions.



## Senior Year

- Help student edit the final paper for the submission to the Regeneron Science Talent Search in November (<http://www.societyforscience.org/STS>), and write an honest evaluative letter on behalf of the student for the Regeneron competition.

# Student Expectations

Students will be responsible to do the following throughout their research:

- Identify an area of interest for their study
- Consistently read scientific journal articles to become knowledgeable in the area of research
- If geographically feasible, meet with mentor at their facility or utilize virtual telecommuting (Skype, GoToMeeting, etc.).
- Maintain open communication with mentor at least twice a month (Email, Skype, Phone Call, etc.)
- Develop a research plan prior to the start of experimentation
- Perform a thorough literature review
  - Present research to Somers High School Institutional Review Board for approval (if necessary) prior to the start of experimentation and complete all necessary ISEF forms *PRIOR* to commencing research
- Independently or with the aid of the mentor, develop a hypothesis/objective/goal statement that is *measurable*
- Independently, or with the aid of the mentor, develop and conduct the methodology
- Collect data
  - Independently, or with the aid of the mentor, analyze the data to draw conclusions and run statistical testing on the results.
- Write an abstract
- Write a 12-20 page university-level research paper (with the potential to submit to scientific journals for publication)



Sun Graham  
Class of 2020

# Frequently Asked Questions

➤ **How significant is the time commitment and how will mentoring a student interfere with my own work?**

- *Working with a student should never interfere with your professional work. This is a common question but it is difficult to answer definitively because the amount of time a mentor will commit to a student varies greatly. This will depend on the nature of the project and the availability you have as a mentor. For example, a computer science project may be more student-driven and your commitment would be a brief Skype/email check-in twice a month. On the other hand, an immunology project would likely require significantly more input from you as a mentor (access to facilities, instruction on laboratory techniques, supervision, etc.)*

➤ **Would a student be required to create their own project from scratch or would they work on an existing experiment?**

- *Again, this is a very project-specific question. Some students, if they have the knowledge and ability, will design their own research independently. More advanced projects will likely require more input from a mentor. Students are allowed to assist with your ongoing research, but should be included (to whatever extent possible) in the scientific process (developing the hypothesis, methodology, analysis, etc.). They can also be assigned a piece of an ongoing project that they would take ownership for, but would ultimately tie into your work. The goal is for the student to be as unobtrusive as possible and ideally contribute to your work.*

➤ **Can I assign a student to a post-doctoral student or another member of the laboratory?**

- *Absolutely. Often times students work under the direct supervision of a post-doctoral student or a laboratory director. The person who works with the student should have knowledge of the research and be able to ensure the safety of the student.*

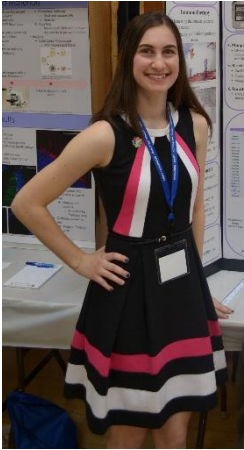
➤ **What will be done with this research? How will confidentiality be treated?**

- *Students will be required to write a 12-20 page academic research paper that is written at a university level. They will be sharing this paper with you for review prior to submitting it to competitions. Submission for publication would only happen if you, as the mentor, felt it appropriate. Students will also present their findings at numerous local and regional competitions via PowerPoint or poster, with the possibility of moving on to national and international competitions.*

➤ **What is the liability to my institution and I if I allow a student to work in my laboratory?**

- *Somers High School does not assume any liability for students conducting research outside of the school.*
- *If your institution requires, a parental permission form and memorandum of understanding (MOU) can be provided for the student and parent/guardian to assume liability during their time conducting research at your institution. Samples of these can be found on the Somers Science Research Website.*

# Sample Projects

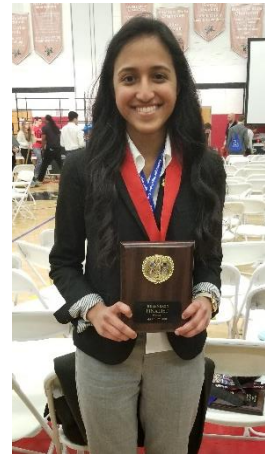


“The Identification of the Binding Sites of PD-1, B7-1, and Atezolizumab on PD-L1 as a Strategy to Reduce Toxicities of Novel Immunotherapies” – Alyssa Klee ‘18

*ISEF Finalist / Siemens Semi-Finalist / Regeneron STS Scholar*

“Maximizing Energy Efficiency: Improvements in Litz Wire Designs in the Megahertz Range” – Rachel Joseph ‘19

*ISEF Finalist / ACORDA Scientific Excellence Award*

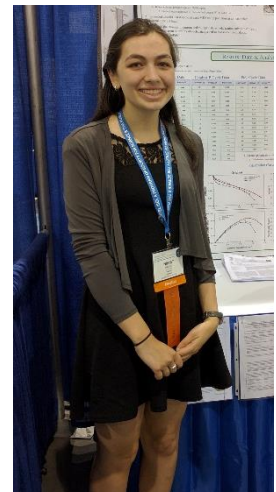


“Bio-Inspired Airfoil Modifications and Their Effect on Noise and Sound Production of Wind Turbines ” – Mark Worsley ‘17

*National JSHS Finalist / I-SWEEEP Finalist / Regeneron STS Scholar*

“Assessment of the Stability and Durability of Pt/C and AuPt/C Nanocatalysts in Proton Exchange Membrane Fuel Cells” – Nimat Maloney ‘16

*ISEF Finalist / I-SWEEEP Finalist / ACORDA Scientific Excellence Award*







## “Comparing Gene Expression in the Hippocampal Formation of Animals Subjected to Chronic Stress vs. Controls” – Manisha Kunala ‘16

*ISEF Finalist*

## “Proving the Synthetic Lethal Interaction between ARID1A and EZH2 in Hepatocellular Carcinoma” – Maya Berlinger ‘16

*INTEL STS Semifinalist / I-SWEEEP Finalist*



## “Copper-Infused Ceramic Pots as an Effective Water Filter” – Maya Watt ‘17

*I-SWEEEP Finalist / GENIUS Olympiad Finalist*

## “Role of Referential Integration and Referential Ambiguity in Repeated Name Processing During Natural Reading” – Raghav Nathan ‘19

*ACORDA Scientific Excellence Award*





## Klee named Siemens semifinalist

Somers High School student Alyssa Klee was among the 491 semifinalists named across the United States in this year's Siemens Competition, a national competition in math, science and technology for high school students.

Klee was selected from more than 1,860 students who submitted innova-

tive individual and team research projects. Klee was mentored by Dr. Gordon Freeman of the Dana-Farber Cancer Institute in Boston.

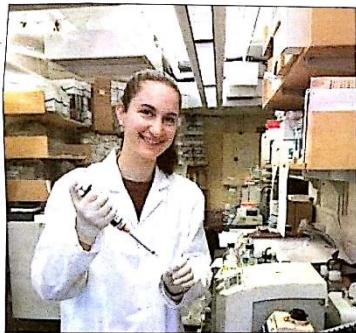
"These semifinalists should be extremely proud of this high-level academic accomplishment," said David Ertzweiler, CEO of the Siemens Founda-

tion. "Their projects represent some of the most noteworthy and exceptional of those submitted and reflected an advanced level of STEM research."

Launched by the Siemens Foundation in 1999, the Siemens Competition promotes excellence in math, science and technology. More than \$600,000

in college scholarships are awarded to students annually through the Siemens Competition during regional and national events administered by Discovery Education.

For more information about the Siemens Competition, go to [siemenscompetition.discoveryeducation.com](http://siemenscompetition.discoveryeducation.com).



Alyssa Klee hard at work in the lab

PHOTO COURTESY OF SIEMENS

## The Somers Record

Vol. 6 No. 39

Visit [TapIntoSomers.net](http://TapIntoSomers.net) for the latest news.

Thursday, January 12, 2017

### Student advances in national science competition

Mark Worsley designs quieter wind turbines

BY BRIAN MARSCHHAUSER  
EDITOR

Out of 1,700 applicants from 527 high schools in 46 states and seven international schools, Somers' own Mark Worsley has been selected as one of 300 semifinalists in the Regeneration Science Talent Search.

In a project that science research teacher William Macia describes as "simple, yet pro-

found," Worsley set out to design quieter wind turbines. Though wind turbines are seen as a crucial supplier of renewable energy, Worsley said there is a stigma attached to them because of the loud noise they produce. Significantly reducing this noise, he said, would likely increase their use.

Worsley, who worked at a 3D printing shop in Yorktown, printed many different models and tested them in the classroom. He

designed the blades using qualities found in owls, forest canopies and whales. This is called biomimicry, Worsley explained, which is the science of imitating nature to solve human problems.

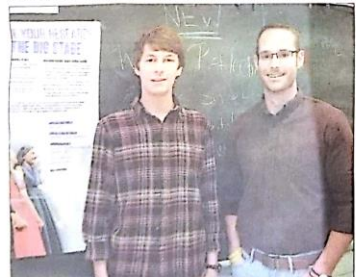
"He developed it from the ground up," Macia said. "He came up with the idea, he developed all the models and he printed them himself."

Worsley first became familiar with the loud noise of wind turbines while on a ski trip. Looking to get away from the crowd, Worsley suddenly realized why

he didn't expect to like it because I



An example of a wind turbine designed by Worsley  
PHOTO COURTESY OF WILLIAM MACIA



Somers High School senior Mark Worsley and science research teacher William Macia

## Your Neighbor

INTEL SCIENCE TALENT SEARCH OF 2016

### Two Somers students named as semi-finalists

Each wins \$1,000 for themselves and \$1,000 for Somers High School

BY BETH TOLMACH  
OF THE SOMERS RECORD

Two Somers High School students have been named as semifinalists in the Intel Science Talent Search of 2016.

The students, seniors Casey Zorn and Maya Berlinger, received recognition for independent studies that they conducted in



Somers High School seniors and Intel semi-finalists Casey Zorn and Maya Berlinger.

and Berlinger aren't yet sure what school they'll be attending next fall, but both know they want to study chemical engineering.

There are 80 students in the science research program, a number that has grown substantially since the program was first offered, when just 28 students participated.

Each year, the Intel Science Talent Search names a handful of high school students who represent some of the best young scientific minds in the country. There were 300 high school seniors chosen as semifinalists from a pool of 1,750 students from schools all over the U.S. Semifinalists are personally awarded \$1,000 from the Intel Foundation, as well as receiving an additional \$1,000 for their schools. Zorn and Berlinger will put this award money towards their research.

Finalists were announced on Jan. 20, narrowing the field to 40 students. Finalists receive an all-expenses-paid trip to Washington D.C. in March, where they will compete for a total of \$1 million in awards. While Zorn and Berlinger weren't named as finalists, a student in neighboring Yorktown was on the list.

The Intel Science Talent Search isn't the only way that high school students can show off their science research projects to a panel of experts. Every March, the Westchester Science & Engineering Fair honors the best science research students in Westchester and Putnam counties. The fair, known as WESEF, launched in 2001 and has 500 students from several different school systems participate.

Somers resident Michael Blueglass, WESEF president and a Yorktown High School science teacher, explained that the fair takes place over the course of one day where each student presents their research via poster board to professional engineers and scientists. Intel also plays a role in WESEF, as WESEF finalists attend Intel's International Science and Engineering Fair to compete with top science research students in the country.

This year, WESEF will take place on Friday, March 11, at Sleepy Hollow High School.

## Somers hosts its first science research fair

BY GABRIELLE BILIK  
STAFF WRITER

Somers High School held its inaugural Northern Westchester Science Research Fair on Saturday, June 3, where more than 205 students from 15 schools gathered to share their science projects.

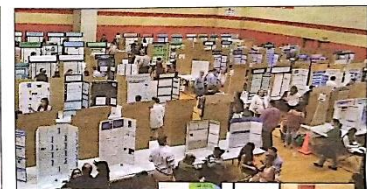
With no flashy demonstrations or baking soda volcanoes in sight, the exhibits appeared simple. At closer inspection, however, the tri-fold poster boards were anything but. Probing subjects such as modular robots, microbial fuel cells and climate change, these kids came to play, tackling some of the world's most perplexing issues.

The fair offered high school students enrolled in the first year of the Science Research Program, an intensive three-year course, to showcase their work and compete against students from other schools. In the first year, students focus on developing their research techniques and reporting their findings, said William Macia, the head of the program at the high school.

Students then work with a professional in the field on their chosen subject matter at an internship. "This process increases student



The students at Somers High School love science!



More than 200 students from 15 area schools presented their research.

kind of putting these pieces together because I know water sanitation, that's a big issue and it poses the threat of climate change," she said. "So, kind of figuring out how all these pieces fit together and finding something that has the least negative effect."

with students from other schools. That's not to say it was a cakewalk, or that their attention strayed from core mission of their research topics. The forward-thinking students chose subjects they were passionate about and took their research, and the potential future benefits of it seriously.

Rachel Joseph, second-place winner in the category of environmental and plant sciences, researched natural methods, such as bacteria, to sanitize water in lieu of using fossil fuels. "I think the hardest part was

Rachel Joseph explains her project, "Bioelectricity Generation During Wastewater Treatment Using Dual Chamber Microbial Fuel Cell."

PHOTOS: GABRIELLE BILIK



# Science students win big

Will move on to international competitions

Students from the Somers Science Research Department have had an impressive month, with most a half-dozen students advancing to international competitions taking place in California and Texas. Some punched their tickets with impressive showings at regional competitions, while others were admitted through their research papers.

## WESEF

At the Westchester Science and Engineering Fair (WESEF), one of the 26 Somers students who competed won special awards or placed in their category:

- Fourth-place winners: Michelle Rosenblum, Keelyn Foley, Melina Couzis, Iain Janacka
  - Third-place winners: Rocco Asciano, Nathan Reynolds, Greg Siemers
  - Second-place winners: Aidan Mahoney, Mark Worsley, Eitan Laredo
  - First-place winners: Alyssa Lee, Rachel Mendelson, Maya Watt
- Out of 575 projects, two Somers Science Research students took home grand prizes. One grand prize winner, Watt, on an all-expenses paid trip to compete at the International WEEP (World Energy, Engi-

net) competition from May 3 to May 8 in Houston. There, Watt will compete against 750 students from over 70 countries. Worsley, Reynolds and Siemers will also compete at ISWEEP. They were selected based on their research papers.

The other grand prize award went to Klee. She will travel to Los Angeles to compete in the largest pre-college science competition in the world, the Intel International Science and Engineering Fair, from May 14 to May 19. She will be up against more than 1,700 students from 75 countries, regions and territories for approximately \$4 million in prizes.

## JSHS

Students from Somers Science Research also participated in the State Junior Science and Humanities Symposium (JSHS) in Albany earlier this month. Laredo and Reynolds presented their research via poster and Worsley presented as a PowerPoint speaker.

Worsley placed first in his category and had the opportunity to present his project to the entire symposium. Worsley won the first-place award for the overall competition, making him the first student from Somers to ever

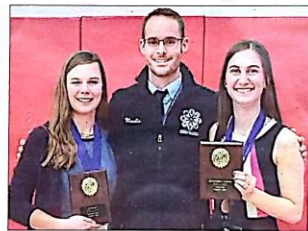


PHOTO COURTESY OF SOMERS CENTRAL SCHOOL DISTRICT  
WESEF grand prize winners Maya Watt and Alyssa Lee with science teacher William Maelia



PHOTO COURTESY OF SOMERS CENTRAL SCHOOL DISTRICT  
JSHS first-place winner Mark Worsley with science teacher William Maelia

national JSHS competition. He will travel to San Diego next month to compete at the National JSHS competition.

Science teacher William Maelia said his students have worked hard pursuing their passions in science.

"It is wonderful to see such hardworking students receiving the recognition that they deserve," Maelia said. "It is inspiring to see these students produce such high caliber work through their commitment and dedication to their projects. I am excited for the students who are going to have the opportunity to share their work on the international stage at the

Diego, Houston and Los Angeles."

# Somers science research class gathers more awards

Editor's Note: The following information was provided by Jim Larelli.

After the successful performance at WESEF (Westchester Science and Engineering Fair) on March 7, where 21 awards were received, Somers High School students gathered two new first-place awards for ISWEEP and three awards at JSHS NY State competition in Albany.

On March 17, Catherine Malise and Antonella D'Ascenzo qualified as finalists by research paper and will join Maria Huron representing Somers High School at ISWEEP this May in Houston. ISWEEP, the International Sustainable World Energy, Engineering, Environment Project Olympiad, is an international science competition in which more than 66 countries participate.

There are two modes to qualify to ISWEEP: one through presentation at WESEF where Maria Huron obtained a spot, or by a research paper review by faculty members. Malise's paper, "Use of Specific Tracking Analysis for the Early Identification of Cardiovascular Dysfunction as a Consequence of Diabetic Cardiomyopathy and D'Ascenzo's paper on Induction of Indoleamine 2,3-di-

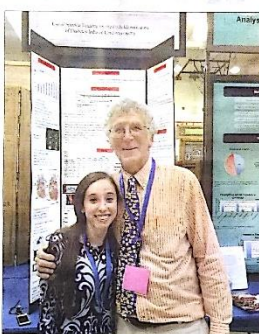


PHOTO COURTESY OF AMY BUCKLE  
Catherine Malise is all smiles at WESEF with science research teacher Greg Horace.

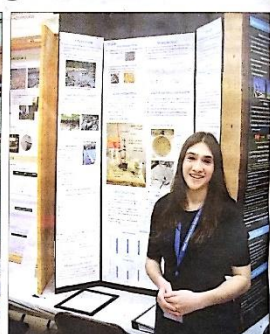


PHOTO COURTESY OF WILLIAM MAELIA  
Dalia Laredo with her project board at WESEF

oxygenase by B. burgdorferi RNA: A mechanism for promoting Lyme disease pathogenesis.

On March 12 in Albany at the JSHS NY State Competition, Dalia Laredo received first place in genome-wide association study.

SEE SCIENCE PAGE 27

# GENIUS Olympiad finalists



The finalists in the 2018 International GENIUS Olympiad in Oswego have been announced. Six students from Somers High School were selected to present their research at the week-long competition in June. Katherine Taylor, Rachel Joseph, Luke Khourram, Chelsea Brown, Alina Hackmeyer and Emma Jones will travel to the fair to compete against 720 students from 70 countries and 34 states.

GENIUS Olympiad promotes a global understanding of environmental issues and the achievement of sustainability through basic science, arts, creative writing, engineering, design, and business development. GENIUS Olympiad provides challenges and opportunities for secondary school students to invest in them the skills and knowledge needed to be the citizens, leaders, scientists, artists, writers.

PHOTO COURTESY OF SOMERS SCHOOLS

# Science research students earn top spots at competition

Somers High School Science Research Program sent 23 students to compete at the Westchester-Rockland Junior Science & Humanities Symposium at John Jay High School on Saturday, Feb. 4.

Nine seniors qualified for the speaker competition, using PowerPoint and presenting in front of a panel of judges; 14 students (juniors and seniors) presented their posters.

In the poster competition, Kim Katz earned third place and Greg Siemers earned second place.

In the speaker competition, Eitan Laredo earned fourth place in environmental science, Nathan Reynolds earned third place in engineering, and Mark Worsley earned second place in engineering. Laredo and Reynolds will advance to the state poster competition in Albany and Worsley will advance to the state speaker competition also in Albany this coming March.

The Science Research Program is preparing for its next competition: WESEF (Westchester Science and Engineering Fair), which takes place March 4 at Sleepy Hollow High School.



Greg Siemers, Mark Worsley, Nathan Reynolds, Eitan Laredo and Kim Katz received awards for their presentations.

PHOTOS COURTESY OF AMY ESKRIDGE



Twenty-three students from Somers participated in a regional competition on Saturday, Feb. 4.

# The Somers Record

Vol. 6 No. 9

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Thursday, June 16, 2016

## SOMERS HIGH SCHOOL

# Science Research Program finishes record year

BY WILLIAM MAELIA  
GUEST WRITER

...ington, D.C. in March to participate in final judging, display their work to the public, meet with scientists, and compete for top awards of \$150,000. Alumni of STS hold more than 100 of the world's most coveted science and Nobel prizes, including the Nobel Prize and the Medal of Science.

Maya Berlinger (12th grade)—Proving the Synthetic Interaction between ARI and E2F1 in Hepatocellular carcinoma

SEE SCIENCE PAGE 2



PHOTO COURTESY OF WILLIAM MAELIA  
Nimat Maloney, teacher William Maelia, Maya Berlinger and Maya Watt at the ISWEEP competition in Houston, Texas

Thursday, June 16, 2016

an Effective Water Filter  
The Intel International Science and Engineering Fair (ISEEF) is the Intel International Science and Engineering Fair (ISEEF) program of the Society for Science and the Public (SSP), the world's largest international pre-college science competition. Approximately 1,700 high school students from more than 75 countries, regions, and territories are awarded the opportunity to showcase their independent research and compete for approximately \$4 million in prizes. Today, millions of students worldwide compete each year in local and school-sponsored science fairs; the winners of these events are invited to participate in SSP-affiliated regional and state fairs from which the best will win the opportunity to attend Intel ISEEF.

Somers Finalists:  
• Manisha Kuzala (12th grade)—Comparing Gene Expression in the Hypocampus of Thymic Stress vs. Controls  
• Nimat Maloney (12th grade)—Assessment of the Stability and Durability of PpC and pPpC Nanocapsules in Protein Exchange membrane Fuel Cells



William Maelia is a science research teacher at Somers High School.



# Calendar of Important Dates for Mentor

The schedule below outlines some of the important dates that you should be aware of as the mentor. These competitions will require a completed research paper from the student as well as either a letter of recommendation or appropriate forms from you as the mentor. There are additional competitions that are not listed, but students should not need direct input from you to submit their work.

## **Prior to Experimentation**

*Students and mentors must complete applicable forms. Examples of these forms are 'Qualified Scientist Form' (Form 2), Human Subjects Form (Form 4), Vertebrate Animals Form (Forms 5A), Potentially Hazardous Biological Agents Form (Form 6A), etc.*

*These forms can be found at the following website: <https://student.societyforscience.org/overview-forms-and-dates>*

## **Early November – Regeneron Science Talent Search (Seniors Only)**

*Items Needed: Abstract, Research Paper, Letter of Recommendation, Copy of IACUC & IRB (if necessary)  
(Only Seniors are eligible to compete)*

## **Late November – Westchester/Rockland Junior Science & Humanities Symposium**

*Items Needed: Abstract, Research Paper, Mentor Certification Form  
(Seniors and Juniors are eligible to compete)*

## **Mid December – Westchester Science & Engineering Fair**

*Items Needed: Research Paper, Any applicable forms that are required post-experimentation  
(Seniors and Juniors are eligible to compete)*



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