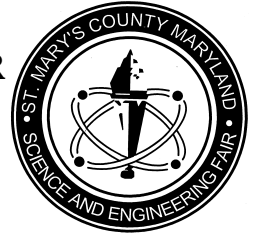


SENIOR DIVISION EXHIBITOR'S HANDBOOK
56th ANNUAL
ST. MARY'S COUNTY SCIENCE & ENGINEERING FAIR
GREAT MILLS HIGH SCHOOL
GREAT MILLS, MARYLAND



January 29-30, 2016

REGISTRATION DEADLINE IS FRIDAY, JANUARY 8, 2016

General Information

All exhibitors must register their projects and must receive confirmation of this registration prior to arrival at the fair on Friday January 29, 2016. **All certification forms need to comply with regulations that accompany the registration form.** All completed forms must be reviewed by the Science Fair Review Board prior to the Fair in order to be considered for participation.

Once the project arrives at the St. Mary's County Science Fair, it will be examined to ensure that it conforms to the ISEF rules. Exhibits not conforming to the ISEF rules will be disqualified, and the exhibit will be removed.

ALL REGISTERED EXHIBITS MUST REMAIN THROUGH THE END OF THE FAIR ON SATURDAY.

In order to complete registration, the **Checklist for Adult Sponsor/Safety Assessment Form (1), Research Plan 1A, Research Plan Attachment, and Approval Form 1B** must accompany the completed online **Registration Form**. Any additional **required certification forms** – i.e. Registered Research Institution, Qualified Scientist, Risk Assessment, Human Subjects, Informed Consent, Vertebrate Animal, Potentially Hazardous Biological Agents, Human and Vertebrate Animal Tissue, and/or Continuation Projects forms - **must also be completed and attached**. All high school students should visit the Intel ISEF Rules Wizard at <https://apps2.societyforscience.org/wizard/index.asp> to access required forms. Applicants must have complied with all requirements including prior SRB or IRB approval if the nature of the project requires this approval. **If a project is being entered as a team project, all team members must complete all forms.** Registrations submitted without **ALL** of the **required forms will not be registered into the fair**. All required forms **MUST** be submitted through each school's Science Fair Coordinator and received by the Science Fair Board *no later than 4:00 p.m. on Friday, January 8, 2016*. Science Fair Coordinators should return all completed registration packets to:

Jason Hayes
Supervisor of Instruction for K-12 Science
23160 Moakley St.
Leonardtown, MD 20650
Phone 301-475-5511 ext. 32116
Email: jwhayes@smcps.org

Each school's science fair coordinator will assign a due date for these forms at the school level. Students should keep copies of all forms that are submitted for registration. These forms will not be returned to students. Additional exhibitor's handbooks may be downloaded from the St. Mary's County Science and Engineering Fair website (<http://www.sm-sef.org>) or the St. Mary's County Public Schools website at <http://www.smcps.org/tlpd/tl/science/st-marys-science-a-engineering-fair>.) **In case of cancellation due to inclement weather, the Science Fair will be held on February 12-13, 2016 and will follow the same time schedule.** Please check the website and Facebook page for cancellation information.

Dear Exhibitor:

Congratulations! You have undertaken the highly rewarding challenge of creating a science fair project. The experimental design process involves the kinds of thinking skills that are practiced by scientists, engineers, and other researchers all over the world on a daily basis. We are confident that your experience will be rewarding, worthwhile, and enjoyable. This packet of information is designed to assist you with your registration, judging, and exhibition.

The 2016 St. Mary's County Science & Engineering Fair will be held at Great Mills High School, 21130 Great Mills Road, Great Mills, Maryland. Science Fair projects will be exhibited in the cafeteria and the Awards Assembly will be held in the auditorium.

PLEASE NOTE: All projects must be pre-registered. **You must have received confirmation from your school science fair coordinator in order to enter your project in the St. Mary's County Science Fair.**

SENIOR DIVISION EXHIBITOR'S PRE-REGISTRATION CHECKLIST

The following steps should be taken immediately after your school fair:

1. **Complete the St. Mary's County Science Fair Registration Form.** *Be sure you have all the necessary signatures.* Select the proper subject area for your exhibit. Use the subject categories in this packet to help you make your decision.
2. Return **ALL** forms listed below to your school science fair coordinator immediately.

- ☐ **Checklist for Adult Sponsor (1):** Student name and project title are required with checklist.
- ☐ **Student Checklist (1A)** – One form for EACH team member needed. Item #6 should reflect dates that occur AFTER dates on Form 1B. Include complete home address in Item #8.
- ☐ **Research Plan Attachment:** Be sure to follow the Research Plan Instructions provided at <http://www.societyforscience.org/document.doc?id=11> in writing your Research Plan. Include the Research Plan as an attachment. Do not include the Research Plan Instructions.
- ☐ **Approval Form (1B)**
- ☐ **Other Certifications/Forms required for your project** (See Rules Wizard at <https://apps2.societyforscience.org/wizard/index.asp> and more details on the following page.)
- ☐ **Abstract Form** – Your abstract must fit into the box on the abstract form. Be sure to check all of the relevant boxes and sign the form.

Additional Certifications/Forms that may be required:

- **Regulated Research Institutional/Industrial Setting Form (1C):** This form must be completed after experimentation by the adult supervising the student research conducted in a regulated research institution, industrial setting or any work site other than home, school, or field.
- **Qualified Scientist Form (2):** This form may be required for research involving human subjects, vertebrate animals, potentially hazardous biological agents, and DEA-controlled substances. It must be completed and signed before the start of student experimentation.
- **Risk Assessment Form (3):** This form is required for projects using hazardous materials, activities or devices. It must be completed before experimentation.
- **Human Subjects Form (4):** This form is required for all research involving human subjects. IRB approval is required before experimentation.
- **Vertebrate Animal Form (5A):** This form is required for all research involving vertebrate animals that is conducted in a Non-Regulated Research Site. SRC approval is required before experimentation.
- **Vertebrate Animal Form (5B):** This form is required for all research involving vertebrate animals that is conducted at a Regulated Research Institution. IACUC approval is required before experimentation.
- **Potentially Hazardous Biological Agents Form (6A):** This form is required for research involving microorganisms, rDNA, fresh/frozen tissue, and blood and body fluids. SRC/IACUC/IBC approval is required before experimentation begins.
- **Human and Vertebrate Animal Tissue Form (6B):** This project is required for all projects using fresh/frozen tissue, primary cell cultures, blood, blood products and body fluids. If the research involves living organisms, please ensure that the proper human or animal forms are completed. *All projects using any of these tissues, must also complete Form 6A.*
- **Continuation Projects Form (7):** This form is required for all projects that are a continuation in the same field of study from a previous project. This form must be accompanied by the previous year's abstract, Form (1A) and Research Plan.
- **Copy of Survey:** If you did a survey as part of your experiment, please provide a copy of the survey.

All projects need sponsor approval; some projects need SRC/IRB approval prior to experimentation. The International Rules and other rules and forms guidance are available at <https://student.societyforscience.org/intel-isef>.

****If you are submitting a team project, each team member must complete and submit all forms.****

Your science fair coordinator must receive all forms no later than 4:00 p.m. on Friday, January 8, 2016.

Senior Division Instructions

Students in the Senior Division (grades 9-12) must complete all of the forms required for all entries on the checklist on page 2 of this handbook. All directions for these forms are the same for both Junior and Senior Divisions. All students must meet with their teacher for Research Plan approval (Form 1-MS) before beginning experimentation. Any proposed changes in the research plan after initial approval must be resubmitted for teacher re-approval.

VERTEBRATES - Projects dealing with vertebrates, including humans, are to be observational or survey type projects only. **Observational projects** include those where information or data is obtained by observing vertebrates, including humans, in their natural environment as well as animals in zoological parks with no interaction between the researcher and the vertebrate. The observed vertebrate must not be aware that observations are being made and the environment may not be altered in any way. **Acceptable** examples of observational vertebrate projects include:

- the observation and recording of data related to left-handedness in males/females by observing a public access door over a period of time
- comparison of the frequency of tree frog chirps with the ambient temperature over a period of time.
- studies using mathematical or computer models rather than live subjects

Unacceptable examples of observational projects are:

- watching the running of mice through a maze;
- monitoring (observing) heart rates or respiration rate after exercise;
- “observing” reactions after the administration of a substance
- treating vertebrates, such as
 - ✓ tapping the fish tank before feeding fish,
 - ✓ changing the normal temperature of the water in an aquarium to study activity of fish
 - ✓ testing vision wearing various colors of glasses.
 - ✓ providing seeds at a bird feeder.

SURVEY PROJECTS must be innocuous and impersonal in nature. Survey questions may not be of a nature that could be considered embarrassing to the person in any way. All surveys must be approved by the teacher prior to conducting the survey. Examples of **Unacceptable** questions include:

- What is your grade point average?
- Do you live in a one-parent or a two-parent household?
- What kind of car do your parents drive?

High school school students may complete those projects that involve no more than **minimal risk** to their human subjects. The federal definition of minimal risk is as follows: ***No more than minimal risk exists when the probability and magnitude of harm or discomfort anticipated in the research are not greater (in and of themselves) than those ordinarily encountered in DAILY LIFE or during performance of routine physical or psychological examinations or test.*** Examples of activities that have **more than minimal risk** and are also **UNACCEPTABLE** include:

- exercise other than ordinarily encountered in DAILY LIFE by that subject
- ingestion (eating, drinking, etc.) of any substance
- exposure to any potentially hazardous materials

The Checklist for Adult Sponsor (1) includes a check list under #6 for projects that include Humans, Vertebrate Animals, Potentially Hazardous Biological Agents, and Hazardous Chemicals, Activities and Devices. Students may conduct projects involving humans and vertebrate animals if they meet the criteria for observational and survey projects only. Students may complete any projects that do not require either SRC or IRB approval. Projects involving Hazardous Chemicals, Activities and Devices do not require SRC or IRB approval. In this case, the student may carry out the project but must include any additional forms required. If the student uses the Rules Wizard at <https://apps2.societyforscience.org/wizard/index.asp> all forms required for the project and information about IRB/SRC approval will be provided.

Senior Division – Team Projects

Team Projects are entered in competition within the chosen subject category. Teams may have up to three members. Only Senior Division students may participate in team projects.

Teams may not have more than three members at a school fair and then decide to eliminate members in order to qualify for the St. Mary's County Science Fair. A Team Project cannot be converted to an individual project. A new member may not be added to a continuing Team Project, but two original team members may continue their research if the third member no longer participates.



Each team should appoint a team leader to coordinate the work and act as spokesperson. However, each member of the team should be able to serve as spokesperson, be fully involved with the project, and be familiar with all aspects of the project.

The final work should reflect the coordinated efforts of all team members and will be evaluated using the same rules and similar judging criteria as the other categories.

Each team member must submit all forms.

Between Pre-Registration and the Science Fair

- ✓ Improve your exhibit (see next page for hints). The time between your school fair and the County Fair is a good opportunity to perfect your project and exhibit. You may change it in any way as long as you still comply with the Science Fair Rules.
- ✓ Prepare a waterproof cover for your exhibit in case of inclement weather on arrival at the Science Fair.
- ✓ All exhibits must be placed in the exhibit area and removed only during the periods of time specified. An exhibitor, who is unable to remove the exhibit at the proper time, because of an emergency, must arrange for someone to remove it. If the exhibit is not called for at the end of the specified time after the Science Fair, it may be disposed of in any manner.

All items exhibited during the Science Fair are entered at the risk of the exhibitor. Neither the Science Fair Board nor the sponsors assume any responsibility for loss or damage to any part of the exhibit. Please do not leave valuables unattended. Bring valuables associated with your project on Saturday morning and take them with you if you leave your exhibit.

First, second, and other awards will not necessarily be given in each subject area. Recognition will be given according to the minimum standards to be determined by the judges.

THE DECISION OF THE JUDGES IS FINAL.

IMPORTANT:

Please inform your Science Fair Coordinator if you are unable to participate in the Science Fair. If you are a “No Show”, you may deprive someone else of an opportunity to participate. If you decide to withdraw from the competition, your confirmation of registration materials cannot be given to another exhibitor for his/her use. If an alternate exhibitor is to be chosen, the school’s Science Fair Coordinator must identify the alternate. The alternate exhibitor must complete the registration process. The Science Fair Coordinator must inform the Science Fair Board of any changes in registration.

Ethics Statement

Scientific fraud and misconduct are not condoned at any level of research or competition. Plagiarism, use or presentation of other researcher’s work as one’s own, forgery of approval signatures and fabrication or falsification of data or approval dates will not be tolerated. Fraudulent projects will fail to qualify for competition in affiliated fairs or the ISEF.

Helpful Hints for Project Improvement

| Helpful Hints Before Fair | Four Elements of a Science Notebook |
|--|---|
| <p>A Good Title Your title is an extremely important attention-grabber. A good title should simply and accurately present your research. The title should make the casual observer want to know more.</p> <p>Take Photographs Many projects involve elements that may not be safely exhibited at the fair, but are an important part of the project. You might want to take photographs of important parts/phases of your experiment to use in your display. Photographs or other visual images of human test subjects must have informed consent.</p> <p>Be Organized Make sure your display is logically presented and easy to read. A quick glance should permit anyone (particularly the judges) to locate quickly the title, experiment, results, and conclusions. When you arrange your display, imagine you are seeing it for the first time.</p> <p>Eye-Catching Make your display stand out. Use neat, colorful headings, charts, and graphs to present your project. Home built equipment, construction paper, and colored markers are excellent for project displays. Pay special attention to the labeling of graphs, charts, diagrams, and tables. Each item must have a descriptive title. Anyone should be able to understand the visuals without further explanation.</p> <p>Correctly Presented & Well Constructed Be sure to adhere to the size limitations and safety rules when displaying your project. Display all required forms for your project. Make sure your display is sturdy, as it will need to hold up for quite a while. Do not hesitate to ask for advice from adults if you need it. (Remind your teacher sponsor to check the display rules.)</p> <p>For additional information visit: https://student.societyforscience.org/intel-isef.</p> | <p>1. Project Notebook A project notebook is your most treasured piece of work. Accurate and detailed notes make a logical and winning project. Good notes show consistency and thoroughness to the judges, and help when writing a paper.</p> <p>2. Abstract After finishing research and experimentation, you are required to write a (maximum) 250-word abstract. An abstract should include the purpose of the experiment and the procedures used, as well as the data and conclusions. It also may include any possible research applications.</p> <p>3. Research Paper A research paper should be displayed along with a project notebook, and any necessary forms or relevant written materials. A research paper helps organize data as well as thoughts. A good report includes eight sections. Most sections should be short, except for the discussion</p> <ul style="list-style-type: none"> a) Title Page. Center the project title, and put your name, address, school, and grade at the bottom right. b) Table of Contents. Number each section when finished. c) Introduction. The introduction sets the scene for your report. The introduction includes your hypothesis, and explains what prompted your research and what you hoped to achieve. d) The Experiment. Describe in detail the methodology used to derive your data and observations. Your report should be detailed enough so that someone would be able to repeat the experiment just by reading the paper. Include detailed photographs or drawings of self-designed equipment. e) Discussion. The discussion is the meat of your paper. The results and conclusions should flow smoothly and logically from your data. Be thorough. Take readers through your train of thought, letting them know exactly what you did. Compare your results with theoretical values, published data, commonly held beliefs, and/or expected results. Also include a discussion of possible errors. How did the data vary between repeated observations of similar events? How were your results affected by uncontrolled events? What would you do differently if you repeated this project? What other experiments should be conducted? f) Conclusion. Briefly summarize your results. Be specific, do not generalize. Never introduce anything in the conclusion that has not already been discussed. g) Acknowledgements. You should always credit in your paper those who assisted you, including people, businesses, and institutions, as well as financial support and donated materials. h) References. Your reference list should include any material that is not your own (i.e., books, journal articles). <p>4. Visual Display You want to attract and inform. Make it easy for interested spectators and judges to assess your study and the results you have obtained. Make the most of your space using clear and concise displays. Make headings stand out, and draw graphs and diagrams clearly and label them correctly.</p> |

SENIOR DIVISION EXHIBITOR'S SCHEDULE

EXHIBITORS MUST WEAR THEIR EXHIBITOR TAGS AT ALL TIMES

Friday, January 29, 2016

- 6:00 – 7:00 P.M. **SENIOR EXHIBITORS REGISTER** and set up projects. Help will be available to carry projects into the exhibit area. **Parents are not allowed in the exhibit area!** Parents can wait for the exhibitors in the registration area. After the project is registered, set up, and the safety check is completed, the exhibitor is to leave the exhibit area. Students will not be allowed to set up projects prior to 6:00 p.m.
- 8:00 P.M. **The exhibit area closes.**

Saturday, January 30, 2016

- 7:45 – 9:00 A.M. Projects are judged without exhibitors.
- 9:00 A.M. – 12:30 P.M. Judging continues with exhibitors present.
- 12:30 – 1:30 P.M. Exhibit area closed. Lunch will be available for exhibitors to purchase. Exhibitors should remain for grand award judging and other special award judging.
- 1:30 - 3:30 P.M. Exhibits are open to the public. Exhibitors must be at their exhibit.
- 3:30 – 5:30 P.M. Awards Ceremony, which is open to the public is held. All exhibitors should be present.
- 5:30 – 6:00 P.M. Projects are removed from the exhibit area.
- 6:00 P.M. Exhibit area closed.**



In case of inclement weather, the Science Fair will be held on February 12-13, 2016 with the same time schedule. Please check the website and Facebook page for cancellation information.

The St. Mary's County Science and Engineering Fair Board is an all-volunteer Board. We welcome donations to help defray our operating expenses and there are opportunities to contribute as judges, workers, or in other ways for next year's Science Fair. If you are interested in contributing in any way, please leave your name with any member of the Science Fair Board. We are very grateful for your interest.

RULES

St. Mary's County Science Fair

1. Exhibitors

- a. Exhibitors must make every effort to be present for judges' interviews during the time specified.
- b. Exhibits must remain through the end of the fair.
- c. An exhibitor who will have reached age 21 on or before May 2016 is not eligible to participate in the Science Fair regardless of year or grade in school.
- d. Senior Division Team Projects may have only two or three members.

2. Categories established for grouping and judging science fair research projects are:

| | |
|---|--|
| <input type="checkbox"/> Animal Sciences | <input type="checkbox"/> Energy: Chemical |
| <input type="checkbox"/> Behavioral and Social Sciences | <input type="checkbox"/> Energy: Physical |
| <input type="checkbox"/> Biochemistry | <input type="checkbox"/> Engineering Mechanics |
| <input type="checkbox"/> Biomedical and Health Sciences | <input type="checkbox"/> Environmental Engineering |
| <input type="checkbox"/> Biomedical Engineering | <input type="checkbox"/> Materials Science |
| <input type="checkbox"/> Cellular and Molecular Biology | <input type="checkbox"/> Mathematics |
| <input type="checkbox"/> Chemistry | <input type="checkbox"/> Physics and Astronomy |
| <input type="checkbox"/> Computational Biology and Bioinformatics | <input type="checkbox"/> Plant Sciences |
| <input type="checkbox"/> Earth and Environmental Sciences | <input type="checkbox"/> Robotics and Intelligent Machines |
| <input type="checkbox"/> Embedded Systems | <input type="checkbox"/> Systems Software |
| | <input type="checkbox"/> Translational Medical Science |

NOTE: Senior Division Team Projects *must be* registered in one of the above subject categories.

- a. An exhibitor may enter only one research project and it must be his/her own work.
- b. The identical repetition of a previous year's work is not permitted. Students may only use research completed since the last fair, although limited reference can be made to previous year's work. However, **students will be judged on the current year's work only.** Any continuing research must document substantial expansion of experimentation. Documentation must include any previous abstracts and research reports, as well as permits and forms that were approved by an SRC. Attach signed copies to the current year's research plan and forms.
- c. All exhibits must adhere to Science Fair Safety Rules and size requirements as well as ISEF Rules. A full text of the International Science and Engineering Fair (ISEF) Rules are available at <http://www.societyforscience.org/document.doc?id=9>. .
- d. Each exhibitor may display a project notebook, and the display of a research paper is strongly recommended.

St. Mary's County Science Fair Judging Criteria

| | Individual Points | Team Points | Evaluation Descriptors |
|---|-------------------|-------------|---|
| Creative Ability | 30 | 25 | <ul style="list-style-type: none"> Does the project show creative ability and originality in the questions asked -the approach to solving the problem, the analysis of the data, the interpretation of the data, the use of equipment, the construction or design of new equipment? Creative research should support an investigation and help answer a question in an original way. A creative contribution promotes an efficient and reliable method for solving a problem. When evaluating projects, it is important to distinguish between gadgeteering and ingenuity. |
| Scientific Thought and Engineering Goals | 30 | 25 | <p>Scientific Thought</p> <ul style="list-style-type: none"> Is the problem stated clearly and unambiguously? Was the problem sufficiently limited to allow a plausible approach? Good scientists can identify important problems capable of solutions. Was there a procedural plan for obtaining a solution? Are the variables clearly recognized and defined? If controls were necessary, did the student recognize their need and were they correctly used? Are there adequate data to support the conclusions? Does the finalist or team recognize the data's limitations? Does the finalist/team understand the project's ties to related research? Does the finalist/team have an idea of what further research is warranted? Did the finalist/team cite scientific literature, or only popular literature (local newspapers, Reader's Digest)? <p>Engineering Goals</p> <ul style="list-style-type: none"> Does the project have a clear objective? Is the objective relevant to the potential user's needs? Is the solution workable, acceptable to the potential user, economically feasible? Could the solution be utilized successfully in design or construction of an end product? Is the solution a significant improvement over previous alternatives? Has the solution been tested for performance under the conditions of use? |
| Thoroughness | 15 | 12 | <ul style="list-style-type: none"> Was the purpose carried out to completion within the scope of the original intent? How completely was the problem covered? Are the conclusions based on a single experiment or replication? How complete are the project notes? Is the finalist/team aware of other approaches or theories? How much time did the finalist or team spend on the project? Is the finalist/team familiar with scientific literature in the studied field? |
| Clarity | 10 | 10 | <ul style="list-style-type: none"> Does the finalist/team have the required laboratory, computation, observational and design skills to obtain supporting data? Where was the project performed? (home, school laboratory, university laboratory) Did the student or team receive assistance from parents, teachers, scientists, or engineers? Was the project completed under adult supervision, or did the student/team work largely alone? Where did the equipment come from? Was it built independently by the finalist or team? Was it obtained on loan? Was it part of a laboratory where the finalist or team worked? |
| Skill and Neatness | 15 | 12 | <ul style="list-style-type: none"> How clearly does the finalist discuss the project and explain the purpose, procedure, and conclusions? Watch out for memorized speeches that reflect little understanding of principles. Does the written material reflect the finalist's or team's understanding of the research? Are the important phases of the project presented in an orderly manner? How clearly is the data presented? How clearly are the results presented? How well does the project display explain the project? Was the presentation done in a forthright manner, without tricks or gadgets? |
| Teamwork (Team projects only) | | 16 | <ul style="list-style-type: none"> Did the finalist/team perform all the project work, or did someone help? Are the tasks and contributions of each team member clearly outlined? Was each team member fully involved with the project, and is each member familiar with all aspects? Does the final work reflect the coordinated efforts of all team members? |

DISPLAY AND SAFETY RULES

St. Mary's County Science Fair

The rules below represent a general overview of rules that apply to most projects. However, in some cases, there are additional rules that apply to certain projects. For additional assistance where other rules apply, use the International Rules and Guidelines at <https://apps2.societyforscience.org/wizard/index.asp>

(NOTE: Chairs, stools, or other pieces of furniture used for seating (other than wheelchairs) will **NOT** be permitted in the exhibit area at any time during the fair.)

1. Size – **Any exhibit exceeding these dimensions will be disqualified. Please measure in advance of registration.**
 - a Senior Division (grades 9-12) - Exhibit size is limited to 76 cm deep (30 inches), front to back; 122 cm wide (48 inches), side to side; and 274 cm high (108 inches) floor to top. (ISEF Limits)
 - b Junior Division (grades 6-8) - Exhibit size is limited to 61 cm deep (24 inches), front to back; and 95 cm wide (36 inches), side to side; and 274 cm high (108 inches) floor to top.
2. The local school Science Fair Coordinator must approve all forms from that school. **Your registration will not be processed without the School Science Fair Coordinator's approval.**
3. **Checklist for Adult Sponsor/Safety Assessment Form (1), Research Plan (1A) or Research Plan (1A) – TEAM, Research Plan Attachment, and Approval Form (1B)** are required for **all** science projects. In addition, all other required approvals must be obtained and forms submitted.
4. Other Written Material: A paper describing the research, notebooks, computer programs, or other relevant written materials are encouraged and may be displayed. **Note:** Students are encouraged to use photographs, drawings and diagrams to illustrate the research. Photographs and other visual presentations of surgical techniques, dissection, necropsies and/or laboratory techniques depicting vertebrate animals in other than normal conditions may not be displayed on the student's exhibit, but may be contained in an accompanying notebook to be shown only during judging. Photographs of special needs human subjects require signed consent, as per federal regulations. Display of photographs or other visual images of human subjects from a study is permitted as long as the student researcher obtains informed consent from the subject(s) to use their photographs and makes reference to the author on or beneath the photo on the display. Handouts to judges must be limited to one page narratives related to the essentials of this year's project. Personal photographs, accomplishments, acknowledgments, addresses, and phone and fax numbers are not permitted.
5. Animal Displays (Vertebrate or Invertebrate): No live animals, preserved vertebrate/invertebrate animals, taxidermy specimens or parts, including embryos, may be exhibited. Research involving the use of animals may display drawings, charts or graphs to illustrate the conditions, developments, and results of the investigations. Sealed insect collections will be permitted on display.
6. Power: Normally, 110-volt AC, single - phase service with 500 watts per exhibit will be available, **if requested on the registration form.**
7. Extension Cords: Exhibitors are expected to furnish their own 9 ft. three wire (3-prong) grounded electrical extension cords or power strips to reach power connections if electricity is required.
8. Assembly: Each Exhibitor must assemble his/her own exhibit without major outside help, except for transportation and unpacking. **All projects must be set up on Friday evening to be eligible for judging on Saturday.** No projects may be set up on Saturday. **All materials that are part of the display must be brought and set up on Friday night for inspection by the Safety Committee.** Materials that have not been checked and approved by the Safety Committee on Friday evening may not be brought for display during judging or public exhibition. Assistance from the local Civil Air Patrol may be available. **Parents, other family members, and friends are prohibited in the display area during the Friday night setup time and during judging.**

DISPLAY AND SAFETY RULES (continued)

9. General Rules for Display and Safety

- a. **Anything, which could be hazardous to the public, is PROHIBITED from display.** The intent of this rule is to protect the public and other students and not to hinder the student's ability to present the project to the judges. The prohibited items include:

- Live materials including plants, animals and microbes
- Awards, medals, business cards, flags, etc.
- Photographs or other visual presentations depicting vertebrate animals in other-than-normal conditions (i.e., surgical techniques, dissection, necropsies or other lab techniques)
- Preserved vertebrate or invertebrate animals (includes embryos)
- Human/animal parts (**Exceptions:** teeth, hair, nails, dried animal bones, histological dry mount sections, and wet mount tissue slides)
- Microbial cultures and fungi, live or dead, including unknown specimens.
- Live disease-causing organisms which are pathogenic to man or other vertebrates.
- Dried plant material.
- Human or animal food.
- Soil and waste samples and materials.
- Any and all chemicals including containers filled with water for display. Empty chemical containers and nonfunctional apparatus are also discouraged.
- Dry ice or other sublimating solids (solids which vaporize into a gas without passing through the liquid phase).
- Poisons, drugs, controlled substances, hazardous substances or devices (i.e., firearms, weapons, ammunition, or reloading devices)
- Syringes, pipettes and similar sharp devices.
- Taxidermy specimens or parts
- Any flames, open or concealed or highly flammable display material
- Any apparatus producing temperatures that will cause physical burns, unless adequately insulated.
- Highly flammable display materials.
- Tanks which have contained combustible gases, including butane and propane, **unless** they have been purged with carbon dioxide
- Operation of a Class III or IV laser (DISPLAY ONLY)
- Operation of projects with unshielded belts, pulleys, chains, and moving parts with tension or pinch points (DISPLAY ONLY)

- b. **Proper attention to safety is expected of all science fair participants, including compliance with the following requirements for all operating exhibits.**

- Any exhibit producing temperatures exceeding 100° C (212° F.) must be adequately insulated from its surroundings.
- Batteries with open top cells are not permitted. Other types of batteries may be used for electric power.
- High voltage equipment must be shielded with a grounded metal box or cage to prevent accidental contact.
- Large vacuum tubes or dangerous ray-generating devices must be properly shielded.
- High voltage wiring, switches and metal parts must be located out of reach of observers and designed with an adequate overload safety factor. High voltage equipment must be shielded with a grounded metal box or cage to prevent accidental contact.
- Electric circuits for 110-volt AC must have an Underwriters Laboratories (UL) approved cord of proper load-carrying capacity, which is at least nine feet long and equipped with a standard grounded (3-prong) plug.
- All wiring must be properly insulated. Nails, tacks, or non-insulated staples must not be used to fasten wiring.
- Bare wire and exposed knife switches may be used only on circuits of 12 volts or less; otherwise standard enclosed switches are required.
- Electrical connections in 110-volt circuits must be soldered or fixed under approved connectors and connecting wires properly insulated. High voltage wiring, switches, and metal parts must have adequate insulation and overload safety factors, and must be inaccessible to others.

DISPLAY AND SAFETY RULES (continued)

10. Research Involving State and Federal Regulations

- a. Controlled Substances (drugs, chemicals, anesthetics, narcotics, etc., the use of which is regulated). All controlled substances **MUST** be used according to existing local, state, and federal laws. Check with your local pharmacist or for more information write your State Department of Health. Production of alcohol is federally regulated and students must contact the Bureau of Alcohol, Tobacco and Firearms for regulations.
- b. Lasers Only Class I and Class II lasers may be displayed and operated at the Fair. If a Class II laser is operated, it must be done under the following restrictions:
 - Only operated by the Finalist
 - The students must be present at all times the Class II laser is operating.
 - Operated only during Display and Safety inspection and during judging.
 - A sign must be displayed reading as follows:

“LASER Radiation: Do Not Stare Into Beam”

- The Class II laser **MUST** have a protective housing or barricade, which, when in place, prevents human access to the beam during operation. The laser must be disconnected when not operating.
- Class III and Class IV lasers may be displayed but not operated at any time and must have no means of electrical connection. For information on laser research, write to the Office of Compliance and Surveillance, Food and Drug Administration, 1390 Piccard Drive, Rockville, MD 20850 (Telephone 301-427-1172).

c. Human Subjects: All research involving human subjects must comply with Federal Regulations. For information write to the Office for Protection from Research Risks, National Institutes of Health, Building 31, Room 5B-63, 9000 Rockville Pike, Bethesda, MD 20892. (Telephone 301-496-7005) The practice of medicine by students is illegal and will not be permitted without documentation of direct and complete involved supervision of a licensed professional.

- d. Recombinant DNA Technology: All research involving recombinant DNA technology **MUST** be carried out in accordance with the rules contained in the documents listed below.

| | | |
|--|--|--|
| NIH Guidelines for Research involving Recombinant DNA Molecules Office of Recombinant DNA Act. National Institutes of Health Building 31, Room 4B-11 Bethesda, MD 20892 301-496-9838 | CDC-NIH Biosafety in Microbiological and Biomedical Laboratories Publication #017-040-00523-7 Superintendent of Documents U.S. Government Printing Office Washington DC 20402 202-783-3238 | Working with DNA and Bacteria in Pre-College Science Classrooms National Assn. of Biology Teachers 11250 Roger Bacon Drive #19 Reston, VA 22090 703-471-1134 |
|--|--|--|

- e. Gasohol: All research involving the production of gasohol must conform to the Federal regulations of the Department of the Treasury, Bureau of Alcohol, Tobacco and Firearms. For more information contact ATF and 202-927-8210
 - f. Federal and/or State Permits: All research requiring a Federal and/or State Permit will be expected to have the permit prior to the onset of the research. A copy of the permit must be attached to the project and a copy must be submitted for review during pre-registration.
11. Each research exhibit will be examined to ensure that it conforms to the Rules for display size, quarantine, safety, animal research, human subjects, and recombinant DNA. Exhibits not conforming will be disqualified, and the exhibit must be removed. The exhibitor may make no changes, modifications or additions to exhibits after approval by the Display and Safety Committee or the Scientific Review Committee.

DISPLAY AND SAFETY RULES (continued)

12. Photographs and/or visual depictions are allowed if:

- a. Credit lines of their origins are attached. If all photographs being displayed were taken by the finalist, one credit line prominently displayed indicating that the finalist took all photographs is sufficient.
- b. They are from Internet, magazines, newspapers, etc. and credit lines are attached.
- c. They are photographs of the finalist or the finalist's family.
- d. They are photographs of human subjects for which signed consent forms are at the project.
- e. They are not deemed offensive by the Scientific Review Committee, Display and Safety Committee or the Science Fair Board.

PLEASE NOTE: Students should have a copy of all research, photographs, etc. that they display with their projects. All items exhibited during the Science Fair are entered at the risk of the exhibitor. Neither the Science Fair nor the sponsors assume any responsibility for loss or damage to any part of the exhibit. Do not leave expensive components unattended. Please take research materials with you when the project is unattended.



Rules on the Web

<https://apps2.societyforscience.org/wizard/index.asp>

The International Rules and Guidelines for Science Fairs is available on the Society for Science and the Public website in a number of formats to better aid all of those involved in the process: students, parents, teachers, mentors, fair directors, and local, regional and state scientific review committees (SRC) and institutional review boards (IRB).

- International Rules and Guidelines – The full text of the International Rules and the forms both in html and in a downloadable format.
- The Intel ISEF Rules Wizard – This “wizard” asks a series of questions about your planned project and will provide a list of forms that you need to complete.
- Clarification for Forms & Dates – This document lists each form in the International Rules and Guidelines and provides a brief explanation of the form's purpose and when in the science fair project process it should be completed.
- Common SRC Problems – This list was generated from the SRC reviews from several Intel ISEF events. Read these to get pointers on what NOT to do.

2016 Science Fair Categories and Sub-Categories

| Category | Subcategories |
|---|--|
| Animal Sciences | Animal Behavior, Cellular Studies, Development, Ecology, Genetics, Nutrition and Growth, Physiology, Systematics and Evolution |
| Behavioral and Social Sciences | Clinical & Developmental Psychology, Cognitive Psychology, Neuroscience, Physiological, Psychology, Sociology and Social Psychology |
| Biochemistry | Analytical Biochemistry, General Biochemistry, Medicinal Biochemistry, Structural Biochemistry |
| Biomedical and Health Sciences | Cell, Organ, and Systems Physiology, Genetics and Molecular Biology of Disease, Immunology, Nutrition and Natural Products, Pathophysiology |
| Biomedical Engineering | Biomaterials and Regenerative Medicine, Biomechanics, Biomedical Devices, Biomedical Imaging, Cell and Tissue Engineering, Synthetic Biology |
| Cellular and Molecular Biology | Cell Physiology, Cellular Immunology, Genetics, Molecular Biology, Neurobiology |
| Chemistry | Analytical Chemistry, Computational Chemistry, Environmental Chemistry, Inorganic Chemistry, Materials Chemistry, Organic Chemistry, Physical Chemistry |
| Computational Biology and Bioinformatics | Computational Biomodeling, Computational Epidemiology, Computational Evolutionary Biology, Computational Neuroscience, Computational Pharmacology, Genomics |
| Earth and Environmental Sciences | Atmospheric Science, Climate Science, Environmental Effects on Ecosystems, Geosciences, Water Science |
| Embedded Systems | Circuits, Internet of Things, Microcontrollers, Networking and Data Communications, Optics, Sensors, Signal Processing |
| Energy: Chemical | Alternative Fuels, Computational Energy Science, Fossil Fuel Energy, Fuel Cells and Battery Development, Microbial Fuel Cells, Solar Materials |
| Energy: Physical | Hydro Power, Nuclear Power, Solar, Sustainable Design, Thermal Power, Wind |
| Engineering Mechanics | Aerospace and Aeronautical Engineering, Civil Engineering, Computational Mechanics, Control Theory, Ground Vehicle Systems, Industrial Engineering-Processing, Mechanical Engineering, Naval Systems |
| Environmental Engineering | Bioremediation, Land Reclamation, Pollution Control, Recycling and Waste Management, Water Resources Management |
| Materials Science | Biomaterials, Ceramic and Glasses, Composite Materials, Computation and Theory, Electronic, Optical, and Magnetic Materials, Nanomaterials, Polymers |
| Mathematics | Algebra, Analysis, Combinatorics, Graph Theory, and Game Theory, Geometry and Topology, Number Theory, Probability and Statistics |
| Microbiology | Antimicrobial and Antibiotics, Applied Microbiology, Bacteriology, Environmental Microbiology, Microbial Genetics, Virology |
| Physics and Astronomy | Atomic, Molecular, and Optical Physics, Astronomy and Cosmology, Biological Physics, Computational Physics and Astrophysics, Condensed Matter and Materials, Instrumentation, Magnetism, Electromagnetics and Plasmas, Mechanics, Nuclear and Particle Physics, Optics, Lasers, and Masers, Quantum Computation, Theoretical Physics |
| Plant Sciences | Agriculture and Agronomy, Ecology, Genetics and Breeding, Growth and Development, Pathology, Plant Physiology, Systematics and Evolution |
| Robotics and Intelligent Machines | Biomechanics, Cognitive Systems, Control Theory, Machine Learning, Robot Kinematics |
| Systems Software | Algorithms, Cybersecurity, Databases, Human/Machine Interface, Languages and Operating Systems, Mobile Apps, Online Learning |
| Translational Medical Science | Disease Detection and Diagnosis, Disease Prevention, Disease Treatment and Therapies, Drug Identification and Testing, Pre-Clinical Studies |

Prince George's Area Science Fair Participation

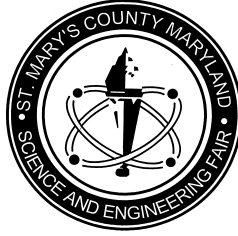
The Prince George's Area Science Fair will take place March 18-19, 2016. The Fair will include entries from St. Mary's, Calvert and Prince George's County. There are many reasons for participating in the Prince George's Science and Engineering Fair. They are:

1. The Prince George's Science and Engineering Fair is an International Science and Engineering Fair affiliate and in the past the top two individual projects and the top team project from the senior division at the Prince George's Fair have been invited to attend the International Science and Engineering Fair which is a week-long event and usually includes finalists from 57 countries and approximately 1400 – 1500 projects.
2. There are many awards given away at the Prince George's Fair.
3. It is a great opportunity to discuss science with other participants and view some of the top projects in the three counties.

The St. Mary's County Science and Engineering Fair Board shares the expenses of the Prince George's Area Fair. The goal of the St. Mary's County Science and Engineering Fair Board is to send all First and Second Place winners at our Science and Engineering Fair to the Prince George's Area Science Fair. Additional students may be invited.

The PGASEF is held at Charles Herbert Flowers High School in Springdale, Maryland. The agenda for the fair includes entrant participation in the Friday and Saturday events of the Fair weekend. Participants from St. Mary's County in the Prince George's Science Fair will be required to either commute to the fair throughout the weekend or to obtain lodging close to the fair. Expenses for food, lodging and transportation are the responsibility of the participant and his/her parent(s) or guardian(s).

Category Reassignment



It is the wishes of the St. Mary's Science Fair Board that your project be judged as properly and as accurately as possible. As the Board reviews all projects, they may decide that your project is misplaced and recommend that it be moved to another more appropriate category.

If you agree with the statement above, please check the box for Yes and sign on the line. If you do not agree, please check the box for No.

- ☐ Yes, the Science Fair Board has my permission to move my science fair project to a more appropriate category if necessary.
- ☐ No, the Science Fair Board does not have my permission to move my project to another category.

Signature

| | |
|---|---|
| Senior Division (High School Grades 9-12) Registration Form 2016 Prince George's Area Science Fair <small>(PLEASE TYPE or PRINT Clearly in Blue or Black Ink)</small> | Deadline for Registration Form and accompanying documents to be delivered to SRC at the: PGCPS SCIENCE OFFICE 9201 East Hampton Drive Capital Heights MD 20743 Wednesday, February 17, 2016 |
| Enter information on this form, as you would like it to appear in the program booklet and on awards and certificates. | |
| The information below will be used to mail confirmations and complete awards. Please check accuracy. | |
| Name _____ Address _____ Apt. # _____ Home Phone _____ City, State, Zip _____ E-mail _____ School Name _____ School Address _____ City, State, Zip _____ Gender: _____ Male _____ Female | Circle Grade Level: 9 10 11 12 Do you need an electrical outlet for your project? Yes _____ No _____ Phone number during fair _____ Is your exhibit designed to be placed on a table or on the floor? (See rules for size limitations.) Table _____ Floor _____ |
| EXHIBIT CATEGORY: Check one <div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> _____ Animal Sciences _____ Behavioral and Social Sciences _____ Biochemistry _____ Biomedical & Health Sciences _____ Cellular & Molecular Biology _____ Chemistry _____ Computational Biology & Bioinformatics </div> <div style="width: 48%;"> _____ Earth & Environmental Sciences _____ Embedded Systems _____ Energy: Chemical _____ Energy: Physical _____ Engineering Mechanics _____ Environmental Engineering _____ Materials Science </div> <div style="width: 48%;"> _____ Mathematics _____ Microbiology _____ Physics & Astronomy _____ Plant Sciences _____ Robotics & Intelligent Machines _____ Systems Software </div> </div> | |
| IMPORTANT – PLEASE READ 1. All exhibitors must staple the Checklist (1), Research Plan (1A), Research Plan Attachment, Form 1B and other required forms to this Registration Form. 2. All forms must be complete and include proper approvals, signatures and valid dates as required. Otherwise, the registration process will not be completed and exhibitor may be prevented from participating in the fair. | |
| Please indicate whether your project is a Science or Engineering project. <input type="checkbox"/> Science <input type="checkbox"/> Engineering | |
| Select One: _____ Team Project _____ Individual Project | |
| EXACT TITLE OF PROJECT (May not exceed 40 characters.) PLEASE PRINT CLEARLY | |
| Certification: Read the RULES in the Exhibitor's Handbook and ISEF rules available at https://student.societyforscience.org/forms before signing. As the exhibitor, I certify that both the project and the exhibit are principally my own work and have been prepared in accordance with the Science Fair Rules. I have read the rules and agree to be governed by them | |
| Printed Name of Exhibitor _____ Signature of Exhibitor _____ | Printed Name of Parent or Guardian _____ Signature of Parent or Guardian _____ |
| As the science fair coordinator, I certify that this exhibitor has been officially selected to compete in the Prince George's Area Science Fair. I have examined this form and to the best of my knowledge and belief, all the information requested has been fully and accurately completed. In addition, all other required forms | |
| Printed Name of Science Fair Coordinator _____ Signature of Science Fair Coordinator and Date _____ Mobile Phone Number _____ | |