

# Covestro Pittsburgh Regional Science & Engineering Fair GUIDE

March 23-24, 2018 Heinz Field, Club Levels

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## 2018 Student Registration Deadlines

- **Human Participants, Non-Human Vertebrate Animals, Potentially Hazardous Biological Agents and Hazardous Chemicals, Activities and Devices** - Pre-approval is required. Please submit on or before December 3, 2017.
- All other student registration forms are due **January 5, 2018**.
- **School Fairs** - Special arrangements can be made for schools that have school science fairs. Please call the Covestro PRSEF office prior to January 1, 2018 to make these special arrangements.

## New for 2018

- **Project Summary** - If changes are made during the research such changes can be added to the original research plan as an addendum, recognizing such changes may require returning to the IRB or SRC for appropriate review and approvals. If not additional approvals are required, this addendum serves as a project summary to explain the changes in the original research. If no changes are made from the original research plan, no project summary is required. See page 2 of Form 1A for more details.
- **Maximum number of students rule eliminated** - We have eliminated the rule that limits 20 projects per division per school building.

**Covestro Pittsburgh Regional Science & Engineering Fair (PRSEF)**  
c/o Carnegie Science Center  
One Allegheny Avenue, Pittsburgh, PA 15212-5850  
Phone: 412.237.1534  
Website: [www.pittsburghsciencefair.org](http://www.pittsburghsciencefair.org)  
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# CALENDAR

**2018**

**SCIENCE**

**FAIR**

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November 15, 2017	Covestro PRSEF School Online Registration Deadline
December 3, 2017	Deadline for pre-approval of Covestro PRSEF projects using Human Participants, Non-Human, Vertebrate Animals, Potentially Hazardous Biological Agents, and Hazardous Chemicals, Activities and Devices
January 5, 2018	Deadline for Covestro PRSEF paperwork for all other projects
February 2, 2018	Deadline for Schools with a school science fair paperwork
March 23, 2018	Covestro PRSEF Competition Day, 7:00 a.m. - 4:00 p.m. - Heinz Field, Club Levels
March 24, 2018	Covestro PRSEF Awards Celebration, 9:00 a.m - 11:30 a.m. - Heinz Field, Club West

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# OVERVIEW



The Covestro Pittsburgh Regional Science & Engineering Fair (Covestro PRSEF) is affiliated with the Intel International Science & Engineering Fair (ISEF). Therefore, the International Rules for PreCollege Science Research are applied to all projects submitted to the Covestro PRSEF. The complete rules are available at <https://student.societyforscience.org/international-rules-pre-college-science-research> from the Society for Science & the Public website.

This Guidebook along with the documents mentioned above will answer most questions and cover the details and requirements for students to compete at Covestro PRSEF. However, should you still have questions, please contact us at 412.237.1534 or at [prsef@carnegiesciencecenter.org](mailto:prsef@carnegiesciencecenter.org).

On competition day, students will display their presentation boards and discuss their research with scientists and engineers. More than \$1 million in scholarships, cash prizes and trips are awarded. Sponsor and other special awards are presented on competition day, March 23, 2018. Category, Scholarships, Perseverance, and ISEF award winners will be announced at the Awards Celebration, March 24, 2018. First place category award winning projects will be displayed at Carnegie Science Center following Covestro PRSEF.

Thanks to all of the teachers, parents, and volunteers for your long hours of dedication in helping our young scientists and engineers to explore their world through hands-on science research. Without you, Covestro PRSEF would not exist. These young scientists and engineers are our future. Thanks for your commitment to our future.

## 2018 Deadlines and Changes



Rules and guidelines for conducting research were developed with the intent to do the following:

- protect the rights and welfare of the student researcher and human subjects
- protect the health and well-being of vertebrate animal subjects
- follow federal regulations governing research
- use safe laboratory practices
- protect the environment

2018 School and Student Registration Deadlines:

- School Registration and Fee - November 15, 2017; School must register online.
- Human Subjects/Non-Human Vertebrate Animals/Potentially Hazardous Biological Agents and Hazardous Chemicals, Activities and Devices - Pre-approval is required and is due on or before December 2, 2018.
- All other student registration forms are due January 5, 2018.
- School Fairs - Special arrangements can be made for schools that have school science fairs. However, final student registration forms must be in the PRSEF office by February 3, 2018.

New for 2018:

- **Project Summary** - If changes are made during the research such changes can be added to the original research plan as an addendum, recognizing such changes may require returning to the IRB or SRC for appropriate review and approvals. If not additional approvals are required, this addendum serves as a project summary to explain the changes in the original research. If no changes are made from the original research plan, no project summary is required. See page 2 of Form 1A for more details.
- **Maximum number of students rule eliminated** - We have eliminated the rule that limits 20 projects per division per school building.

Reminder: Teachers/Adult Sponsors - All teachers and/or adult sponsors must review the PRSEF scientific review committee most common problems powerpoint. It provides important information on common paperwork problems and how to solve them. This document must be reviewed by every teacher and/or adult that supervises a student at Covestro PRSEF. Please see [www.pittsburghsciencefair.org](http://www.pittsburghsciencefair.org) for more information.

# Required Registration Forms



The following will summarize which forms are required for different types of projects. All student registration forms must be submitted by **January 5, 2018**. However, projects involving **Human Participants, Non-Human Vertebrate Animals, Potentially Hazardous Biological Agents and Hazardous Chemicals, Activities and Devices** require approval prior to beginning research and must be submitted on or before **December 3, 2017**.\*

## Forms required for ALL STUDENTS

- Form 1 – Checklist for Adult Sponsor
- Form 1A – Student Checklist
- Research Plan (Must include detailed description of research and at least five (5) references)
- Form 1B – Approval Form
- Student Registration Form (or online signature page)
- Abstract (abstracts must be submitted online on the registration form on or before February 2, 2018)

All required forms can be accessed online at [www.pittsburghsciencefair.org](http://www.pittsburghsciencefair.org).

Many student researchers require additional forms. The following chart indicates which additional forms are required:

### Non-Human Vertebrate Animals\* – Forms 1, 1A, Research Plan, 1B, Student Registration Form and

- Form 2 – Qualified Scientist and
- Form 5A – Vertebrate Animal Form (if conducted in a school, home or field research site), **OR**
- Form 5B – Vertebrate Animal Form (if conducted in a Regulated Research Institution)

If applicable:

- Form 1C – Regulated Research Institution/Industrial Setting Form (if conducted in a Regulated Research Institution)

### Human Participants\* – Forms 1, 1A, Research Plan, 1B, Student Registration Form and

- Form 4 – Human Subjects Form with applicable consents and surveys

If applicable:

- Form 1C – Regulated Research Institution/Industrial Setting Form (if conducted in a Regulated Research Institution)
- Form 2 – Qualified Scientist (required if more than minimal risk is involved)

### Potentially Hazardous Biological Agents\* – Forms 1, 1A, Research Plan, 1B, Student Registration Form and

- Form 2 – Qualified Scientist, and
- Form 6A – Potentially Hazardous Biological Agents

If applicable:

- Form 1C – Regulated Research Institution/Industrial Setting Form (if conducted in a Regulated Research Institution)
- Form 3 – Risk Assessment
- Form 6B – Human and Vertebrate Animal Tissue Form (for all studies involving tissues and body fluids.)

### Hazardous Chemicals, Activities or Devices (includes DEA-controlled substances, prescription drugs, alcohol and tobacco, firearms and explosives, radiation, lasers, etc.)\* – Forms 1, 1A, Research Plan, 1B, Student Registration Form and

- Form 3 – Risk Assessment

If applicable:

- Form 1C – Regulated Research Institution/Industrial Setting Form (if conducted in a Regulated Research Institution)
- Form 2 – Qualified Scientist

Still unsure on what forms are required? Visit <https://apps2.societyforscience.org/wizard/index.asp>, click Intel ISEF Rules Wizard. Please contact the Covestro PRSEF office at 412.237.1534 with any questions.

\*Requires Covestro PRSEF SRC/IRB approval prior to experimentation. For Human Participants, the School IRB is required.



## Rules of Participation

- Scientific fraud and misconduct are not condoned at any level of research or competition. This includes plagiarism, forgery, use or presentation of other researcher's work as one's own and fabrication of data. Fraudulent projects will fail to qualify for competition. Covestro PRSEF reserves the right to revoke recognition of a project subsequently found to have been fraudulent
- You must be less than 21 years of age as of May 1, 2017.
- You must live in one of the following counties: **PENNSYLVANIA:** Allegheny, Armstrong, Beaver, Bedford, Blair, Butler, Cambria, Clarion, Clearfield, Fayette, Greene, Indiana, Jefferson, Lawrence, Mercer, Somerset, Venango, Washington, Westmoreland; **MARYLAND:** Garrett.
- The Covestro Pittsburgh Regional Science & Engineering Fair is the **ONLY** science fair in western PA which is affiliated with the ISEF. Please note that students may compete in only one ISEF affiliated science fair per school year.
- The **project must be solely the work of the exhibitor(s)** in research, construction and design of the exhibit. Parents or sponsors may only advise. (Adult supervision and assistance with the use of power tools are recommended).
- **Team Projects (2 or 3 students)** are permitted in all divisions. All team members must be present on Fair Day to compete.
- Each student **MUST** have an adult sponsor (parent/teacher/mentor) who is ultimately responsible for the health and safety of the student conducting the research and of any human or animal subjects. An adult sponsor may be a teacher, parent, university professor or scientist who has a solid background in science and will closely supervise the student's research.
- All students (in all divisions) conducting **research involving vertebrate animals, human subjects, tissue, recombinant DNA, microbes, and potentially hazardous biological agents or hazardous chemicals, activities or devices, MUST** have their research approved **BEFORE** starting the project. Please visit <https://student.societyforscience.org/intel-isef-forms> for additional information and requirements.
- ! • **Prohibited Human Participant Studies** - Projects involving the consumption, ingesting, tasting, applying, absorbing of any substance are prohibited even if conducted in a Regulated Research Institution.
- ! • **Bacteria/Mold Research** - Many students collect bacteria in a home environment. This is acceptable as long as the collected bacteria are immediately transported to a laboratory with the appropriate level of biosafety containment. (See <https://student.societyforscience.org/intel-isef-forms>, 2018 Rules and Guidelines page 15).
- Students **MUST** set up their own exhibit at Covestro PRSEF for project inspection. If parents or teachers are present in the exhibit area between 7a - 4p, the student will be disqualified.
- Students **MUST** be present at their project boards during the official judging time on Competition Day. The exhibit area is a restricted area during official judging. **ONLY students, judges, and official Covestro PRSEF volunteers/staff are permitted on the exhibit floor during judging times.**
- All students must remove their project boards from the exhibit area after the Awards Celebration on March 24. Remaining projects will be discarded due to space limitations.
- Any student leaving early **MUST** have completed the early dismissal form and have approval from the Covestro PRSEF staff. Visit [www.pittsburghsciencefair.org](http://www.pittsburghsciencefair.org) for the early dismissal policy.



*These rules are intended to protect the student researcher by ensuring that the proper supervision is provided and that all potential risks are considered so that the appropriate safety precautions are taken.*

- ! • **Institutional Review Board (IRB) - Human Participant Studies** - Schools are asked to form a school IRB to evaluate the potential physical and/or psychological risk of research involving humans. The school IRB must complete Form 4 prior to submitting paperwork to Covestro PRSEF. Incomplete forms will be returned to the school. See page 8 of the 2018 Rules and Guidelines, <https://student.societyforscience.org/intel-isef-forms>. **Covestro PRSEF's SRC and IRB has final approval of all projects submitted to the competition.**
- ! • **Teachers and/or Adult Sponsor**  
All teachers and/or adult sponsors must review the Covestro PRSEF Scientific Review Committee's most common paperwork problems powerpoint prior to submitting students' paperwork. Visit the Covestro PRSEF website at [www.pittsburghsciencefair.org](http://www.pittsburghsciencefair.org) to learn more.
- **Required registration forms for all students:**  
Forms 1, 1A, Research Plan (see research plan instructions on page 2 of 1A), 1B. Other forms may be required (see page 2 Required Registration Forms or visit the ISEF forms wizard at <https://apps2.societyforscience.org/wizard/index.asp>, click Intel ISEF Rules Wizard.) Teachers must submit the student registration form online. Abstracts must be submitted online on or before February 2, 2018.
- **Deadline** for all registration forms: **January 5, 2018**. However, projects involving **Human Participants, Non-Human Vertebrate Animals, Potentially Hazardous Biological Agents and Hazardous Chemicals, Activities and Devices** require approval prior to beginning research and must be submitted on or before **December 3, 2017**.
- Students' research plans **MUST** include a detailed description of the methods or procedures involved in their projects (**list all materials, chemical concentrations, drug dosages**). The procedure should be clear to the reviewer. **Research plans** must list at least **5** major references (e.g. science journals, books, articles, internet sites will be checked and must be well documented).
- **A Scientific Review Committee (SRC) within the school is recommended** to support the teacher in reviewing students' research plans. Proper review of students' research plans will eliminate the risk of a student being disqualified from participation in Covestro PRSEF. **Covestro PRSEF's SRC has final approval of all projects submitted to the competition.**
- Check all forms for completion. Signatures on ALL forms (except 1C, if applicable) **must** be obtained **prior** to the **start** of the **student's experimentation**. Note: Form 1 must be approved after Form 1B. Form 1B approval must be before Form 1A experimentation dates.
- **Form (3) Risk Assessment Form is required for projects using hazardous chemicals, activities or devices or regulated substances and some potentially hazardous biological agents.** The rules include substances and devices that are regulated by local, state, country or international law, most often with restrictions of their use by minors such as DEA-controlled substances, prescription drugs, alcohol and tobacco and firearms and explosives. Hazardous activities are those that involve a level of risk above and beyond that encountered in the student's everyday life.
- Conducting experiments which pose a threat to the safety and welfare of animals (such as feeding them human food or placing the animal in an unsafe or unethical environment) are prohibited. Please visit <https://student.societyforscience.org/intel-isef-forms>, 2018 Rules and Guidelines, page 12, for additional rules regarding animal research.
- **Photographs and/or visual depictions** are permitted on the display board IF: a) they are not deemed offensive or inappropriate by Covestro PRSEF; b) credit lines of their origins ("Photographs taken by..." or "Image taken from ..." are attached; c) they are from the internet, magazines etc., and credit lines are attached; d) they are photographs of the student researcher; e) they are photographs of the human participants for which consent forms were obtained. NOTE: Photographs or visual presentations depicting vertebrate animals in surgical techniques, dissections or other lab procedures are **not permitted**.



## Scientific Research

By following the seven stages listed below, you should be able to produce a superior scientific experiment.

1. Be curious, choose a limited subject, ask questions, identify or define a problem.
2. Review published materials related to your question.
3. Evaluate possible solutions and make your educated guess (hypothesis).
4. Design the experiment where only one variable is changed at a time. This makes the experiment a "controlled" experiment.
5. Challenge and test your hypothesis through experimentation (data collections) and analysis.
6. Evaluate the results of your experiment and reach conclusions based on your data.
7. Prepare report and exhibit.

Good scientists, both young and old, follow a similar approach to study what they see in the world. Research is the process by which people create new knowledge about themselves or the world in which they live in order to answer a question or solve a problem. **When choosing your topic, give careful thought as to how your research might enhance the world and its inhabitants.**

Questioning is probably the most important part of scientific creativity and is often followed by an "if... then" statement. Questioning usually leads to experiments or observations.

Students should learn to be skeptical of all research results, especially their own. A good experiment may or may not answer the questions asked, but almost always leads to fresh questions requiring new experiments or observations. The hypothesis often changes during the course of the experiment. Supporting or not supporting your hypothesis is secondary to what is learned and discovered during the research.

## Goals of Engineering

What is the difference between a scientist and an engineer? Scientists try to understand how nature works, engineers create things that never were or improve on a previous design. An engineering project should state the engineering goals, the development process and the evaluation of improvements. Engineering projects may include the following stages:

1. Define a need.
2. Develop design criteria.
3. Search literature to see what has already been done.
4. Prepare preliminary designs.
5. Build and test a prototype.
6. Retest and redesign as necessary.
7. Present results.

## Other Non Inquiry Based Research

**Computer Science Projects** - These often involve creating and writing new algorithms to solve a problem or improve on an existing algorithm. Simulations, models or "virtual reality" are other areas on which to conduct research.

**Mathematics Projects** - These projects involve proofs, solving equations, etc. Math is the language of science and is used to explain existing phenomena or prove new concepts and ideas

**Theoretical Projects** - These projects involve a thought experiment, development of new theories and explanations, concept formation or designing a mathematical model.

# CATEGORIES



Select category and type (Individual/Team) online when registering students.

We reserve the right to modify categories based on the number of projects per category.

## JUNIOR DIVISION (Grade 6)

**Behavioral & Consumer Sciences:** These projects will explore consumer products and the science of how people respond to the world around them. The areas include:

### Behavioral Science Related

- Psychology
- Human and Animal Behavior
- Learning and Perception
- Educational and Testing
- Surveys

### Consumer Related

- Consumer Product Testing
- Consumer Product Design and Enhancements
- Comparisons and Evaluation of Commercially Available Products

**Biological Sciences:** These projects will explore living things, including plants, animals and humans, and the things which affect them. The area includes:

### Life Science Related

- Biology, Botany & Zoology
- Photosynthesis
- Plant Growth
- Biochemistry
- Genetics & Inherited Traits

### Health Related

- Nutrition
- Allergies
- Exercise
- Studies of Animal/Human Health

**Chemistry:** These projects will explore chemistry, which includes study of any kinds of chemicals. These areas include:

### Chemistry Related

- Organic & Inorganic Chemistry
- Chemical Compounds
- Household Chemicals (chemistry focus, not functional emphasis)
- Chemical Engineering

Note: If the project focuses on the biological impact/effect of the chemical, then the project should be placed in the biological sciences category.

**Physical Sciences & Engineering:** These projects will explore physics which includes our mechanical world, and engineering, which includes building things and solving problems.

### Physics Related

- States of Matter
- Optics and Photography
- Sound and Acoustics
- Heat, Cold and Thermal Conductivity
- Pressure and Vacuum
- Electricity and Magnetism
- Friction
- Inertia
- Gravity
- Density

### Engineering Related

- Mechanical Engineering
- Transportation
- Buildings and Bridges
- Planes, Trains, Boats and Cars
- Sports
- Robotics
- Computers
- Energy Production, Conversion and Storage
- Alternative Energy, such as Wind and Solar



# CATEGORIES (cont'd)



Select category and type (Individual/Team) online when registering students.

We reserve the right to modify categories based on the number of projects per category.

## INTERMEDIATE DIVISION (Grades 7 & 8)

**Behavioral and Social Science:** human and animal behavior, social and community relationships – psychology, sociology, anthropology, archaeology, ethology, ethnology, linguistics, learning, perception, urban problems, reading problems, public opinion surveys, educational testing, etc.

**Biology:** botany, zoology, genetics, biochemistry, including hormones, molecular biology, molecular genetics, enzymes, photosynthesis, blood chemistry, protein chemistry, food chemistry, etc.

**Chemistry:** inorganic, organic, physical materials, plastics, fuels, pesticides, metallurgy, etc.

**Computer Science/Math:** development of computer hardware, software engineering, internet, simulations, statistics, calculus, geometry, abstract algebra, number theory, probability, etc.

**Consumer Science:** consumer product testing and design.

**Earth/Space/Environment:** pollution and sources of control, ecology, geology, mineralogy, oceanography, meteorology, climatology, astronomy, geology, seismology, etc.

**Engineering/Robotics:** technology; projects that apply scientific principles to manufacturing and practical uses - civil, mechanical, aeronautical, chemical, heating and refrigerating, transportation, electrical, photographic, sound, automotive, marine, etc.

**Medicine & Health/Microbiology:** bacteriology, virology, fungi, bacterial genetics, etc.; study of diseases and health of humans and animals - dentistry, pharmacology, pathology, ophthalmology, nutrition, sanitation, pediatrics, dermatology, allergies, speech and hearing, etc.

**Physics:** solid state, optics, acoustics, particle, nuclear, plasma, superconductivity, fluid and gas dynamics, magnetism, quantum mechanics, biophysics, etc.

## SENIOR DIVISION (Grades 9-12)

**Behavioral and Social Science:** human and animal behavior, social and community relationships – psychology, sociology, anthropology, archaeology, ethology, ethnology, linguistics, learning, perception, urban problems, reading problems, public opinion surveys, educational testing, etc.

**Biology:** botany, zoology, genetics, biochemistry, including hormones, molecular biology, molecular genetics, enzymes, photosynthesis, blood chemistry, protein chemistry, food chemistry, etc.

**Chemistry:** inorganic, organic, physical materials, plastics, fuels, pesticides, metallurgy, etc.

**Computer Science/Math:** development of computer hardware, software engineering, internet, simulations, statistics, calculus, geometry, abstract algebra, number theory, probability, etc.

**Earth/Space/Environment:** pollution and sources of control, ecology, geology, mineralogy, oceanography, meteorology, climatology, astronomy, geology, seismology, etc.

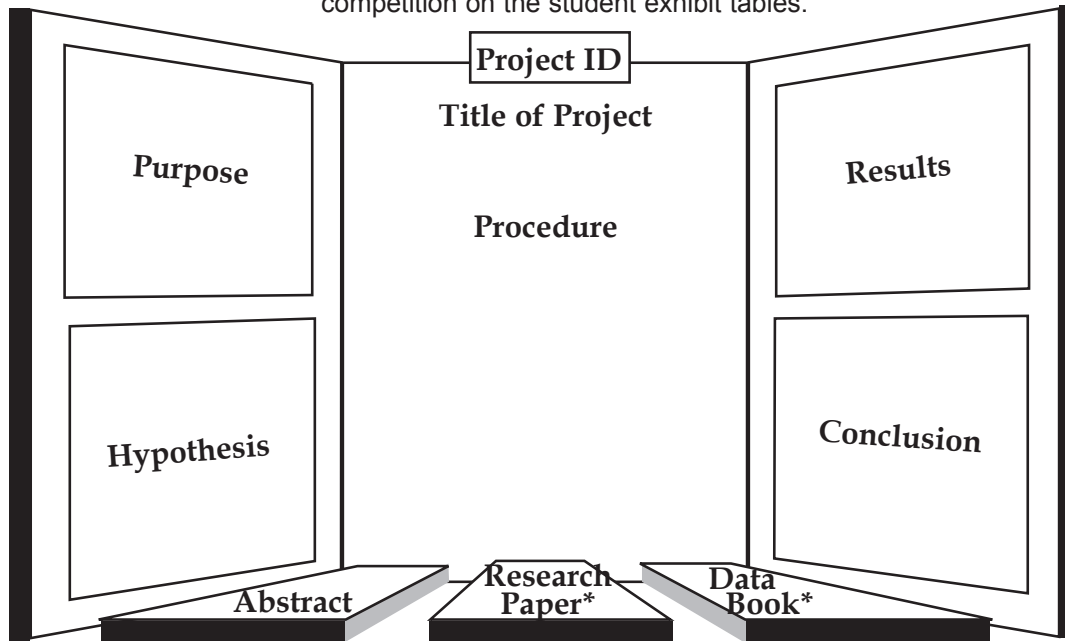
**Engineering/Robotics:** technology; projects that apply scientific principles to manufacturing and practical uses - civil, mechanical, aeronautical, chemical, heating and refrigerating, transportation, electrical, photographic, sound, automotive, marine, etc.

**Medicine & Health/Microbiology:** bacteriology, virology, fungi, bacterial genetics, etc.; study of diseases and health of humans and animals - dentistry, pharmacology, pathology, ophthalmology, nutrition, sanitation, pediatrics, dermatology, allergies, speech and hearing, etc.

**Physics:** solid state, optics, acoustics, particle, nuclear, plasma, superconductivity, fluid and gas dynamics, magnetism, quantum mechanics, biophysics, etc.



Project ID Cards will be provided at the competition on the student exhibit tables.



## Presentation Board Size Requirements

\* not required, but highly recommended  
(see next page for more details)

The standard presentation board is a three-panel, free-standing structure that folds for ease in transporting to and from Covestro PRSEF. You can make your own or ask your teacher about ordering a stock board from an educational supply catalog or visit your local office supply store.

Board size MUST NOT exceed:

**Tabletop Display:** 36" wide (122 cm) x 30" deep (76 cm) x 78" high (198 cm)

**Floor Display:** 36" wide (122 cm) x 30" deep (76 cm) x 108" high (274 cm)

Note: Please inform PRSEF one month prior to Fair Day to make special arrangements for floor displays.

**Oversized exhibits may be disqualified.**

**IMPORTANT NOTE:** Students must set up their project displays. Heavy wooden, double-stacked, plastic, or metal display boards are **not** recommended. Parents and teachers are not permitted on the exhibit floor. There are areas in Heinz Field with low ceiling height. Please plan accordingly.

## Helpful Hints

**Photographs.** Many projects involve elements that may not be safely exhibited at Covestro PRSEF, but are an important part of the projects. Take photographs of important parts/phases of your experiment to use in your display. Photographs of human test subjects must have signed consent forms. Credit must be given for all photographs.

**A Good Title.** Your title should be simple, accurate and descriptive. Make the observer want to know more.

**Organization.** Make sure your display is logically presented and easy to read. A glance should permit anyone (particularly the judges) to locate quickly the title, experiments, results, and conclusions. When you arrange your display, imagine that you are seeing it for the first time.

**Eye-catching.** Make your display stand out. Include photographs. Use neat, colorful headings, charts, and graphs. 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.



## Written Presentation

A research paper should be prepared and available along with a project data book, and any necessary forms or relevant written materials for display during Covestro PRSEF.

### Project Data Book

A project data book is your most treasured piece of work. Record accurate and detailed notes to make a logical and winning project. Good notes show consistency and thoroughness to the judges and will help you when writing your research paper. Data tables are also helpful.

### Research Paper

A research paper helps organize data as well as thoughts. A good paper includes the following sections. Please visit [http://www.scitechfestival.org/mainsf\\_gs\\_sum.asp](http://www.scitechfestival.org/mainsf_gs_sum.asp) for the ISEF Research Paper requirements.

**Title Page and Table of Contents.** The title page and table of contents allows the reader to follow the organization of the paper quickly.

**Abstract.** Summary of your experiment in 250 words (note: the abstract submitted for competition cannot exceed 100 words).

**Introduction.** The introduction sets the scene for your report. The introduction includes your purpose, hypothesis, an explanation of what prompted your research, and what you hoped to achieve.

**Materials/Methods.** Describe in detail the methodology used to collect your data or make your observations, design apparatus, etc. Your research paper should be detailed enough so that someone could repeat the experiment from the information in your paper. Include detailed photographs or drawings of self-designed equipment. Only include this year's work.

**Results.** The results include data and analysis. This should include statistics, graphs, etc.

**Discussion.** Be thorough, the discussion is the essence of your paper. Tell your readers exactly what you did and thought. Compare your results with theories, published data, commonly held beliefs, and expected results. Discuss possible errors. How did the data vary between repeated observations of similar events? How were results affected by uncontrolled events? What would you do differently if you repeated this project? What other experiments should be conducted?

**Conclusion.** Briefly summarize your results. Be specific. Do not generalize. Never introduce anything in the conclusion that has not already been discussed. Also mention practical applications.

**Appendix** includes **Acknowledgments:** Credit those who assisted you, including individuals, businesses, and educational or research institutions. Note any financial or material donations. (Remember, however, DO NOT LIST teachers/ parents/school by name); and **Bibliography:** List any documentation not your own (i.e., books, journal articles). See an appropriate reference for for-

### Abstract

After finishing your research and experimentation, you are required to write a maximum 100-word, one-page abstract. An abstract should include: (a) purpose of the experiment, (b) procedures used, (c) data, (d) conclusions. It also may include any possible research applications. Only minimal reference to previous work may be included. For continuation projects, the abstract should focus on work done since the last Covestro PRSEF and **should not** include: a) acknowledgments, or b) work or procedures done by the mentor. Abstracts must be submitted electronically by email or during online registration. See <http://www.carnegiesciencecenter.org/stemcenter/stemcenter-science-fair-abstract-criteria/> for sample abstracts.

## Patent and Copyright Information

You may want to consider applying for a patent or copyright if you want to protect your work. Contact the U.S. Patent and Trademark Office, at 1-800-786-9199 or [www.uspto.gov](http://www.uspto.gov) for patent information, or the Library of Congress at 202-707-3000 or [www.copyright.gov](http://www.copyright.gov) for copyright information.



## What You Must Bring to the Science Fair at Heinz Field-Club Levels:

**YOUR DISPLAY** which includes:

- Project Data Book (highly recommended by the judges, but not required)
- Research Paper (recommended, but not required)
- Presentation Board
- Copies of your final Abstract

*V.I.S.!! Very Important Stuff to remember.....*

Names **must not** be displayed on your project board or paperwork. Please remember this when you are putting together your project board. **Also, do not list parents or teachers by name on the acknowledgments.** However, names can be placed on the back of the board for identification purposes.

Your **Project ID** will be assigned by Covestro PRSEF and will be available online in mid-March at [www.pittsburghsciencefair.org](http://www.pittsburghsciencefair.org). **Project ID Cards will be provided on Fair Day for use on your project board.**

### **Be Prepared!**

Practice your presentation! Remember that the judges will be interviewing you and asking about your work. You must know your research **and** be able to communicate your research to others effectively. The judges are interested in hearing why you chose your research topic, what interested you most in your findings, how your research can enhance the world and its inhabitants. Note cards are permitted, but please do not read directly from them.

### **THE FORMS**

Bring your copy of the forms submitted to Covestro PRSEF - for reference only - NOT FOR DISPLAY.

### **A LIGHT SNACK**

We suggest that you bring a piece of fruit, granola bar and/or water with you, especially if you are leaving early from home or school on fair day! Unopened water bottles or refillable empty water bottles are permitted. Concession stands at Heinz Field will be open for lunch.

### **JUDGING**

Students will be required to stand by their projects during the entire judging session. Please dress appropriately and wear comfortable shoes. You will be standing and walking to/from Carnegie Science Center and Heinz Field.

**Competition Day - Friday, March 23, 2018, 7:00 a.m. - 4:00 p.m.** (students will be released by 4:30 p.m.)  
**Awards Ceremony - Saturday, March 24, 2018, 9:00 a.m. -11:30 a.m.**

# PROJECT INSPECTION CHECKLIST



*Students' displays are inspected after set up and prior to judging. All projects must satisfy certain inspection requirements before they are cleared for judging. The following is a checklist used by Covestro PRSEF inspectors and is provided here, FOR REFERENCE PURPOSES ONLY, to assist students/teachers in double-checking their project displays before Covestro PRSEF day. DO NOT COMPLETE THIS FORM, DO NOT MAIL OR BRING THIS FORM TO PRSEF – FOR REFERENCE ONLY.*

1. Is the project # displayed on the top center of the student's board presentation?  
 yes, go to #2       no, move it to the center
2. Is the project # on the back of this form the same as the project number on the student's presentation?  
 yes, go to #3       no, send student to Information Hub
3. Is the name of the student, school, teacher, or advisor/mentor anywhere on the project or in the report?  
 yes, have the student       no, go to #4  
cover it up with a black marker or labels
4. Size SHOULD NOT exceed:  
Table top display - 36" w (122 cm) x 30" d (76 cm) x 78" h (198 cm)  
Floor display - 36" w (122 cm) x 30" d (76 cm) x 108" h (274 cm)
5. Project SHOULD NOT contain the following:  
 living organisms (plants, animals, microbes, bacteria)  
 dried plants (living/ dead/preserved) which are in their raw or unprocessed or unmanufactured state  
 taxidermy specimens or parts (stuffed or mounted skins of dead animals)  
 preserved vertebrate (having a backbone or spinal column) or invertebrate animals  
 human or animal food  
 human/ animal parts or body fluids; exceptions: teeth, hair, nails, dried animal bones, histological dry mount sections and wet mounts properly acquired.  
 soil or waste samples unless permanently encased in a slab of acrylic  
 liquids of any kind (laboratory chemicals and WATER)  
 poisons, drugs, controlled substances, hazardous substances or devices (firearms, weapons, ammunition, reloading devices)  
 dry ice or other sublimating solids (i.e., solids which vaporize to a gas without passing through a liquid phase)  
 "loose" sharp objects (pins, tacks, knives, scalpels, needles, syringes, etc.) unless firmly intact on the project  
 empty tanks that have previously contained combustible liquids or gases, unless purged with carbon dioxide  
 open top cell batteries (i.e., batteries with a removable cap/can see acid inside if removed)  
 breakable objects (beakers, test tubes, slides, etc.) unless they are firmly attached to the project  
 electrical or hot apparatus that is not properly insulated (must be UL approved electrical materials, i.e., extension cords/surge suppressors)  
 photographs or other visual presentations depicting vertebrate animals in other than normal conditions (i.e., surgical techniques, dissections, necropsies or other lab techniques)  
 photographs ARE PERMITTED if credit lines of their origins are attached (such as "Photograph taken by..."). These labels can be found at the Information Hub. Photographs from the internet, magazines should also have credit lines. Photographs of the Finalist are permitted. Photographs of human subjects are permitted if photo release form is completed.  
 active internet or email connections as part of displaying/operating project.  
 prior year's written or visual depictions on display board (Exception: the project title may mention year or years in the title ie. "Year Two of an Ongoing Study").

# ABOUT THE JUDGES



One of the most valuable experiences for young scientists and engineers is the opportunity to discuss their findings with established members of the scientific, engineering and technology communities. Covestro PRSEF competitors take great pride in their work and judging interviews greatly contribute to the overall educational experience of the competition. Each year, professionals, representing university faculty, industrial scientists and engineers, representatives of private and federal research centers and agencies, and medical researchers volunteer their time to interview and award our region's most promising young scientists and engineers.

There are six different categories of judges at Covestro PRSEF: **Category Award** judges will select winners in each of the 21 categories; **Sponsor Award** judges represent their professional organizations or institutions and judge students' projects for their specific award criteria; **Affiliated Award** judges represent the sponsors from the Intel International Science and Engineering Fair; **Scholarship Award** judges choose students who qualify for scholarship awards from participating colleges and universities in our region; **Intel International Science and Engineering Fair (Intel ISEF)** judges will select the winner(s) to attend Intel ISEF; and **Collegiate Award** judges are college students that will interview junior division students, select their best projects and present them with certificates and giveaways.

The decisions of the judges, determined on the day of the fair, are final.

Covestro Pittsburgh Regional Science & Engineering Fair judges all adhere to the following ethics standard:

*To preserve the integrity of the Covestro Pittsburgh Regional Science & Engineering Fair, even the appearance of prejudice must be avoided. If a judge has any relationship to or knowledge of an entrant or project, that judge must decline participation where it may influence an entrant's award.*

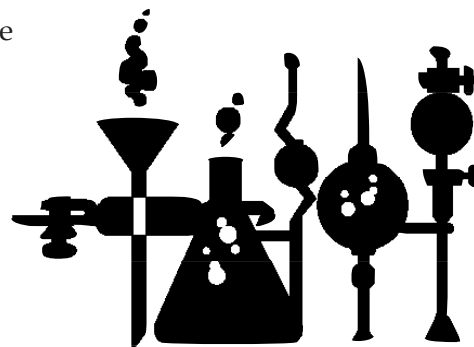
## Message From the Judges:

Be ready to talk in depth about your research. You should be able to have a conversation about your work and results. Practice explaining your research to your parents, teachers, and friends, especially people who don't understand your research. Tell everyone to ask you at least three questions.

Judges look for well thought out research. They consider how significant your project is in its field, as well as how thorough you were in conducting your research. Did you leave something out? Did you start with four experiments and finish only three?

**Judges recognize students who can speak freely and confidently about their work. They are not interested in memorized speeches but prefer simply to TALK with you about your project to see if you have a good grasp of your research from start to finish.** Note cards are permitted, but please do not read from them. Besides asking the obvious questions, judges often ask questions to test your insight into your project, such as, "What was your role?" or "What didn't you do?" and "What would be your next step?"

**JUDGES EXPECT YOU TO DEMONSTRATE THAT YOU DID THE WORK.**





## Category Judges

Category Judges choose the winners in each category. Students are judged on scientific thought or engineering goals, experimental method or procedural plan, analytical approach, visual presentation and oral presentation. Rubrics are tailored for specific research. Point scores are used as a judging tool. Rubrics, less the point values, will be provided to the students' teachers after the competition. Visit <http://www.carnegiesciencecenter.org/stemcenter/stemcenter-science-fair-category-judges-forms/> for the judging rubrics, procedure and selection process. The decisions of the judges, determined on the day of the fair, are final.

## Sponsor Judges

Sponsors of Covestro PRSEF send a representative to select the winning science fair project(s) in its fields of interest. These judges have specific criteria based on their company's mission. For example, PPG will present six (6) awards for projects involving chemistry, physics, engineering, or material science which demonstrate creativity and knowledge in topics related to fiberglass, glass, coatings, paints, plastics, inks, adhesive, color, optically transparent material, polymers or chemicals. Two awards in each division (6th, 7th-8th, 9th-12th). **Awards are presented on the exhibit floor between 2p - 4p on March 23.** For a list of project ideas from our sponsors, visit <http://www.carnegiesciencecenter.org/stemcenter/stemcenter-science-fair-science-project-ideas-from-sponsors/>. Visit <http://www.carnegiesciencecenter.org/stemcenter/stemcenter-science-fair-sponsor-judges/> for the complete list of Covestro PRSEF sponsor awards.

## Affiliated Sponsor Judges

As a regional science fair affiliated with the Intel ISEF, awards are presented at Covestro PRSEF based on criteria received from the Intel ISEF. For example, the National Oceanic and Atmospheric Administration provides certificates and medallions to the projects that emphasize NOAA's mission to understand and predict changes in Earth's environment and conserve and manage coastal and marine resources to meet our Nation's economic, social and environmental needs. For a complete list of affiliated awards, visit <http://www.carnegiesciencecenter.org/stemcenter/stemcenter-science-fair-affiliate-judges/>.

## Scholarship Judges

In 2018, more than \$1 million in scholarships is expected to be awarded to Covestro PRSEF student researchers from local colleges and universities. Scholarships include full/half/partial tuition scholarships, pre-college program scholarships. For example, Carnegie Mellon University awards two pre-college program commuter scholarships to be utilized for the Advanced Placement/Early Action Program valued up to \$7,374. Allegheny College awards up to four scholarships in the amount of \$16,000 per recipient. Preference for scholarship consideration will be given to students who embody the philosophy of the College and wish to explore their diverse interests after high school. Visit <http://www.carnegiesciencecenter.org/stemcenter/stemcenter-science-fair-scholarship-judges/> for a complete list of scholarships.

**TIP: Judges applaud those students who can speak freely and confidently about their work. They simply want to talk with you about your research. Greet the judges with a firm handshake. Appearance, good manners, appropriate attire and enthusiasm for what you are doing will impress the judges.**

# AWARDS AND SCHOLARSHIPS



## More than \$1M in cash prizes and scholarships are awarded!

Over 30% of all PRSEF participants in 2017 won an award!

### INTERNATIONAL SCIENCE & ENGINEERING FAIR (ISEF) AWARDS

**Senior Division (9th - 12th grades):** Each student researcher entering an exhibit in this division may apply for participation in the Intel ISEF, <https://student.societyforscience.org/intel-isef>. Student must apply by March 1, 2018 to be considered. The procedure can be accessed at [www.pittsburghsciencefair.org](http://www.pittsburghsciencefair.org). High school student researchers will be chosen and compete at Intel ISEF, held May 13-18, 2018 in Pittsburgh, Pennsylvania, all expenses paid. Visit <https://student.societyforscience.org/attendees>.

**Junior Division (6th grade) and Intermediate Division (7th - 8th grades):** First, second and third place category award winners are nominated to advance to the the Broadcom MASTERS (Math, Applied Science, Technology, and Engineering for Rising Stars), a program of Society for Science & the Public. Learn more at <https://student.societyforscience.org/broadcom-masters>.

### CATEGORY AWARDS

#### Senior Division:

\$300 - First Place                \$75 - Third Place  
\$150 - Second Place            \$25 - Honorable Mention

#### Intermediate Division:

\$150 - First Place                \$35 - Third Place  
\$75 - Second Place              \$20 - Honorable Mention

#### Junior Division:

\$75 - First Place                 \$30 - Third Place  
\$50 - Second Place              \$15 - Honorable Mention

Certificates of Science Excellence will be sent to the students' schools. All category award winners receive medals. Teams will split the cash prizes. Checks are mailed to students' homes in June.

### SPONSOR AWARDS

Sponsor awardees receive \$50 and a medal. Sponsor awards are defined and selected by the sponsoring organization. Many sponsors also recognize the sponsoring teacher with a cash award of \$50. **Affiliated Sponsor** awards (certificates, medallions, items as determined by sponsors) are awarded at PRSEF, because of its affiliation with ISEF. These sponsors include Intel, Ricoh Americas Corporation and Yale Science and Engineering Association.

### SCHOLARSHIPS

Full/half/partial tuition and pre-college program scholarships are determined and selected by the awarding colleges and universities.

### PERSEVERANCE AWARDS

Inscribed trophies are awarded to students for their continued dedication to the exploration of science and engineering. Qualifying students must submit the perseverance form by Feb. 28, 2018.

#### Honorary Scientist

Eleventh and twelfth graders with five or more years of active participation.

#### Associate Scientist

Eleventh and twelfth graders with three or four years and tenth graders with four or five years of active participation.

#### Junior Scientist

Eighth and ninth grade students with three or four years or tenth grade students with three years of active participation.

### MERIT AWARDS

Category Judges select students who exhibit excellence in Creativity, Presentation, or Scientific Method. Students will receive a certificate of excellence that signifies their outstanding performance in one of these areas.

### SPECIAL AWARDS

Schools and Teachers with the **most winning entries** in each division are honored. One student in each Division is honored at the Carnegie Science Awards in May 2018. Some sponsors invite students to club meetings, recognition dinners or site tours.

### Sponsors

Covestro, FedEx Ground, with additional support from regional academic institutions, corporations, foundations & professional societies.