



Student Application Packet 2018



March 1, 2018

Dear Science Fair Student,



California Science and
Engineering Fair Board

Barbara Henderson
Chair

Robert V. Anderson

Philip Fine, Ph.D.

John J. Germroth

Christopher M. Gould, Ph.D.

Tom LeBon, Ph.D.

Geraldine J. Peters, Ph.D.

Kevin Wegener

As chair of the 2018 California Science & Engineering Fair I am excited to say congratulations and due to your science fair accomplishments cordially invite you to attend and participate in the 67th Annual California Science & Engineering Fair presented by the California Science Center. The fair will be held on Monday and Tuesday, April 23-24, 2018. All project displays and ceremonies will be at the California Science Center located in Exposition Park, just south of downtown Los Angeles.

Each year the top projects from students in grades 6-12 throughout the state are presented at the State of California's official science fair. More than 500 volunteer judges and staff will be working to ensure this event will rank as one of the exceptional experiences in your life. Over \$50,000 in prizes and scholarships will be presented. The California Science & Engineering Fair is affiliated with the Broadcom MASTERS national STEM competition for middle school students.

Please review the enclosed Application Packet completely. You will find detailed information about the fair along with an application checklist. You must complete the electronic application by your deadline date (see page 10). The application must be completed online from the California Science & Engineering Fair website (CSEF.usc.edu).

We are very proud of you and look forward to joining your family, teachers, mentors and friends in celebrating your accomplishments.

Sincerely,

A handwritten signature in black ink that reads "Barbara B. Henderson".

700 Exposition Park Drive
Los Angeles, California
90037

Barbara B. Henderson
Chair
2018 California Science & Engineering Fair

www.californiasciencecenter.org/CSSF

2018 DATES AND DEADLINES

Depends upon your Fair	Your Application Deadline See page 10. California Science & Engineering Fair Application See page 12 for other materials which must be mailed to the Fair.
April 5 Thursday	Deadline for Teacher of the Year Nominations This is a receipt deadline, not a postmark deadline.
April 12 Thursday	Deadline for Student of the Year Applications This is a receipt deadline, not a postmark deadline.
April 18 Wednesday	Last day to request change of category assignment.

April 23 Monday	Registration and Project Setup	10:00 am - 3:30 pm
	Public Seminar (first of two)	1:30 - 2:30 pm
	Public Viewing All students are requested to be present at displays	3:00 - 4:30 pm
	Opening Ceremony and Keynote Address	5:00 - 6:00 pm
April 24 Tuesday	Student Orientation	8:00 - 8:25 am
	Judging Interview Periods	8:30 am - 12:30 pm
	Removal of Projects	1:30 - 3:30 pm
	Awards Ceremony	4:00 - 5:30 pm

Project Set Up and Removal

Set Up: All projects must be delivered and set up between 10:00 am and 4:00 pm on Monday, April 23. **Early arrivals will not be accepted.** Projects must arrive at Registration by 3:30 pm, although the display area will remain open to complete project set-up following registration until 4:00 pm. Science Center staff and security will not admit projects outside of this scheduled set up time. Projects may be delivered and set up by a parent, teacher, or other designated person if the entrant is unable to do so personally.

Removal: Projects must be removed on Tuesday, April 24, between 1:30 and 3:30 pm. No projects may be removed before this time. If you are traveling by air, please make your reservations accordingly. If you must leave before the project may be removed, arrange for others in your group to collect your project. The Science Center will not store projects. Projects remaining on the display floor after the removal period will be discarded.

TABLE OF CONTENTS

Important Dates and Deadlines	ii
Project Set Up and Removal	ii
Communicating with the Fair	iv
 California Science & Engineering Fair Rules	
Eligibility Rules	1
Application Acceptance Criteria	2
Project Display Regulations	3
Choosing Your Category	4
Project Categories	5
 Application Forms	
Application Deadlines	10
Application Calendar	12
Application Checklist	13
Instructions for Project Summary	14
Project Summary	15
Professional Research Opportunity Support	16
Regulations for Student Research	17
Certification Form	18
Application for the Science Fair Student of the Year Award	19
Nomination for the Science Fair Teacher of the Year Award	21
Teacher Statement for the Science Fair Teacher of the Year Award	23
 Getting to the Fair	
Local Housing Arrangements	24
Food	24
Local Transportation	24
 At the Fair	
Awards Program	25
What You Should Expect During the Judging	27
Student Schedule	28
Map of Exposition Park and Vicinity	30
Signature Card	31
Application Fee Form	32

Communicating with the Fair

World Wide Web Home Page

<http://csef.usc.edu/>

The California Science & Engineering Fair maintains the oldest and most complete science fair site on the World Wide Web including your on-line application, current information on the status of your application to the Fair, and the complete project summaries of all projects in the Fair. Reference information here includes rules and regulations, applications, and results from previous fairs. There are also resources here to assist you in preparing your science fair project.

Electronic Mail to the Fair

e-mail: CSEF@usc.edu

Questions from students on all aspects of the Fair may be sent to this address 24 hours a day. Please first check the Web site above because most questions will already be answered there authoritatively. A response will be sent via e-mail, usually within one business day.

Some Frequently Asked Questions and Where to Find Answers:

What category should I choose?	Page 4 and e-mail contact
When do I have to send the Application?	Page 10
How close is my fair to filling its allocation?	Web site
Do I need to include the certification form?	E-Mail contact
Do I have to do the Monday set-up myself?	Page ii
What should I wear?	Page ?
What will happen during the judging?	Page 27
Can my advisor be a judge?	E-Mail Contact
Has my application been received? Has my application been accepted?	Web site

CALIFORNIA SCIENCE & ENGINEERING FAIR

2018 ELIGIBILITY RULES

1. Affiliated Fair. Qualification to the California Science & Engineering Fair is through an affiliated county or regional science fair, and is by being specifically identified as a qualified (or an alternate) project from the affiliated fair. (See *Affiliated Fairs Note* below.) Each student must qualify through the single affiliated fair responsible for the geographical domain which includes the location where the student receives instruction. That location for students enrolled in most schools, including boarding schools, is the school. That location for students enrolled in online schools is the student's residence, regardless of the school's incorporation address. Exception requests, including students whose schools are not accepted by any current affiliate, must be emailed to CSEF@usc.edu. California finalists in the Regeneron Science Talent Search also qualify for entry; such projects are not counted against the allocation of any affiliate.

2. California Student. Each applicant must be a student in an educational institution recognized by the State of California and enrolled in grades 6-12 at the time of qualification. Students in grades 6-8 participate in the Junior Division, while students in grades 9-12 participate in the Senior Division. The division for team projects with students in different grades is determined by the highest grade represented. Students are limited to a maximum of seven (7) entries during their lifetime.

3. Single Entry. Each student may enter only one project each year. Each project may have one to three authors. Team projects will be placed in competition with individual projects in the same categories, though judging panels will have a higher level of expectation for team projects commensurate with the number of students on the team. All work must be done by the student(s) named as author(s). Projects entered into the Fair under an individual's name but discovered by the judging panel to have been prepared by a team of more than one student will be disqualified.

4. Category Assignment. The Directors of Judging will determine, upon review of submitted Project Summaries, the correct category for each project. The California Science & Engineering Fair reserves the right to disqualify any project due to poor quality, incompleteness, or inappropriateness of project content.

5. New Research. Any project reentered from a past California Science & Engineering Fair must show *substantial* new research and development to be eligible for an award. Final determination will be made by the category judges.

6. Supervision Students not accompanied by their own parent(s) *must* be under authorized supervision by an adult escort, teacher, or administrator. Each student must have appropriate signed permission form(s) as required by his/her own school district. The California Science & Engineering Fair is not responsible for the supervision of any participant.

All Eligible Projects Will Not Necessarily Be Accepted

Each affiliated fair has been allocated a maximum number of projects which it may qualify to CSEF. Affiliates may also identify a small number of alternates for consideration if students of some of its qualified projects elect not to complete an application. Every project should be informed by the affiliate whether they are qualified or an alternate.

CALIFORNIA SCIENCE & ENGINEERING FAIR

2018 APPLICATION ACCEPTANCE CRITERIA

Submission of an Application to the California Science & Engineering Fair does not guarantee acceptance to the Fair. The Fair has always rejected applications on the basis of inappropriate content and for violations of Fair regulations. Projects which are substandard (poor quality) or incomplete will also be rejected. The basis for this judgement of quality is exclusively the information provided within the project's on-line application. The California Science & Engineering Fair does not consider other submitted materials or awards won at affiliated fairs.

The following is the official list of acceptance criteria:

1. Acceptance to present a project at the California Science & Engineering Fair requires the approval of an Application submitted by the student(s).
2. Applications without a Project Abstract will be rejected without recourse to appeal. Each student on a team project must complete his/her own personal Application, but the Project Abstract must be supplied by the first member of the team to submit his/her application.
3. Abstracts must demonstrate a level of knowledge and investigation that is appropriate for the grade of the student and discipline and which is beyond what is considered common knowledge. In other words, the investigations must demonstrate knowledge that is not found in middle or high school textbooks.
4. Abstracts must communicate ideas effectively and use standard English.
5. The methodology and experimental design should be appropriate for the student's grade and discipline, and should include the following where appropriate:
 - experiments are appropriate to achieve the stated objective;
 - the sample size and/or number of trials is sufficient for projects where replication is necessary to establish validity;
 - the statistical analysis is appropriate for the students' grade and discipline; the conclusion is relevant to the stated hypothesis.
6. Projects which are merely demonstrations, display collections, and literature searches are generally not acceptable. In order to be acceptable, the student must use the demonstration, collection, or search results, to extract new information not previously known to the student.
7. Applications may be rejected for failing to satisfy the rules of the Fair.
8. Application Fees are not refundable. The only exceptions are for multiple payments for the same application and alternates not accepted but mistakenly paying early, as described on page 10.
9. All rejected Applications will be reviewed by the Directors of Judging and are subject to appeal (with the exception of those applications which do not contain an Abstract).

Students, parents, and advisors should be aware that these acceptance criteria are not intended to limit the number of participants but rather, by requiring higher standards for project abstracts, the criteria are intended to improve the quality of the Fair and to ensure that all participants are able to effectively communicate their projects to the judges. Only a small percentage of Applications have ever been identified as likely to be rejected. Every Application so identified this year will be contacted in a timely manner as described in the Calendar on pg. 12, where the process of appeal is also described.

CALIFORNIA SCIENCE & ENGINEERING FAIR

2018 PROJECT DISPLAY REGULATIONS

1. Display size limitations:

Maximum width	4 feet (122 cm)	
Maximum depth	2½ feet (76 cm)	
Maximum height	6½ feet (198 cm)	table
	9 feet (274 cm)	floor

- Projects displayed on tables are the preferred standard. Projects requiring floor access, termed “floor displays,” may not use Fair table space. The entire floor display, including any student-provided table or support structure, must fit within the size limitations specified above. Floor displays may be placed out of numerical sequence and possibly away from other projects in the same subject category.

- All projects must fit within these prescribed space limitations. This includes elements of the project that may extend or protrude. Displays which are admitted, but are later augmented to exceed the space limitations will be disqualified until brought into conformance. Using the aisle between projects as additional display space, even temporarily during interviews, is cause for disqualification.

2. Students must be present at their display during the judging period or the project will not be judged. For team projects, at least one of the authors must be present before judging will be allowed.

3. The student's *original* laboratory notebook must be present for inspection during judging. However, it is advised that this notebook be on display *only* during the actual judging period.

4. Display Safety Concerns:

- All project displays must adhere to all Los Angeles, State, and federal laws for public safety. Lasers must be appropriately shielded. Projects must sustain their own weight.

- No hazardous materials may be exhibited at the project display.** This includes, but is not

limited to, acids, unsecured glassware, mercury (including glass thermometers), hazardous microbes, carcinogenic and radioactive materials, open flames, and unsealed foodstuffs which may attract pests. For these items, the substitution of illustrations or photographs is encouraged. A more complete list of disallowed display materials will be included in your confirmation letter. Materials in violation of this rule will be marked and must be removed by the participant before judging will be allowed. The judgment of the Directors of Judging is the final authority on permissible materials.

- The California Science & Engineering Fair will disqualify any project deemed unsafe.

5. Displays may not contain any living organism. This prohibition includes all animals, plants, and studied collections of microscopic life forms such as bacteria, fungi, and molds. The display of preserved animals is not permitted. Projects may not display photographs of procedures detrimental to the health and well being of vertebrate animals. Photographs of surgical procedures may not be exhibited.

6. Projects requesting electrical power will be provided with one 110 volt outlet. **You must bring your own UL approved three prong grounded extension cord. CSEF does not provide extension cords.** No gas or water outlets are provided.

7. A project display at the California Science & Engineering Fair need not be identical to the display at the County or Regional Fair. The display may be altered to improve the presentation or to

(continued on next page)

incorporate the results of research subsequent to the earlier Fair.

8. All projects must clearly distinguish between the work of the student participant and the work of others. Students participating in a research opportunity in industry, a university, hospital, or institution other than their school, must display only *their* research. Such students must have the principal research director complete the Professional Research Opportunity Support form (pg 16) specifying the assistance received and the role and contributions of others in the project. **A copy of this form must be submitted as part of**

the application. The original must be included in the project notebook at the project display for inspection by the judges. Though discouraged, ISEF Form 1C is an acceptable alternative.

9. Awards won at, and participation in, previous competitions may not be displayed or announced.

10. Participants are not permitted to distribute any items to the judges.

11. Parents and advisors are not permitted in the display areas during judging. Violations may result in disqualification of student participants.

IMPORTANT: LOSS OR DAMAGE Valuable equipment, such as computers, may be part of the display only if the *student participant* accepts full responsibility. It is advised that valuable materials (*e.g.* computers, research notebook) be on display *only* during the actual judging period. Although precautionary security service will be provided, the California Science & Engineering Fair assumes no responsibility for loss of, or damage to, any project or project part. Exhibitors must exercise care in protecting equipment. It is advisable to have an extra copy of notebooks and all printed materials.

CHOOSING YOUR CATEGORY

Please read the category definitions on the following pages carefully. These definitions are likely different from those used in your county or regional fair. Examples of titles of past projects appropriate to each category have been included to help you decide where your project belongs.

Read your project description. *What your project is about, what you actually studied, defines the category in which your project belongs, not the methods that were used.* For example, if you compared the effectiveness of different antibiotic products using bacteria as a tool, the subject was the commercial products, so the project belongs in Product Science (Biological). However, if the specific effects of an antibiotic on the bacteria were studied, the project belongs in Microbiology (Medical). Similarly, comparing forest fires to computer models of forest fires belongs in Earth and Atmospheric Sciences, but if the study was of the forest fire simulation algorithm itself, then the

project belongs in Mathematical Sciences.

The Project Abstract Review Committee (composed of scientists and engineers from universities and industry who are also experienced CSEF judges) reads each Project Summary in order to assign each project to a category. Your project may be placed into a category which is different from the one to which it was assigned at your county or regional Fair. This is not unusual and is done to ensure that similar projects are placed together with each other in the same category. Proper category selection increases your project's likelihood of recognition through Fair awards.

Your assigned category will be determined by the specific focus of your study, not the general subject area.

CALIFORNIA SCIENCE & ENGINEERING FAIR

2018 PROJECT CATEGORIES

Category and Definition	What Belongs	What Doesn't Belong
1. Aerodynamics/ Hydrodynamics (Junior Division Only): Studies of aerodynamics and propulsion of air, land, water, and space vehicles; aero/ hydrodynamics of structures and natural objects. Studies of the basic physics of fluid flow.	<i>Effect of Dimples on Golf Ball Flight; Airfoil Stall Characteristics; Effect of Fins on Water Rocket Stability; Low Drag Launch Lug for Model Rockets.</i>	Ballistics studies comparing other than different shapes or surface textures belong in Materials Science or Applied Mechanics. Senior Division projects otherwise appropriate for this category belong in Applied Mechanics.
2. Alternative Energy (Junior Division Only): Studies of power generation using alternative energy technologies such as solar cells.	<i>Analysis of Nanocrystal Dye-sensitized Solar Cells; Maximizing the Power Output of a Crystalline Silicon Photovoltaic Module through the Use of Solar Concentrators.</i>	Aerodynamic studies on turbines belong in Aerodynamics/ Hydrodynamics. Hydroelectric projects generally belong in Electricity & Electronics. Senior Division projects otherwise appropriate for this category belong in the relevant basic science (e.g., Physics & Astronomy, Electronics & Electromagnetics, Chemistry).
3. Applied Mechanics & Structures: Studies concerning the design, manufacture, and operation of mechanisms, including characteristics of materials, dynamic response, and active/ passive control. Testing for strength and stiffness of materials used to provide structural capability; studies and testing of structural configurations designed to provide improved weight and force loading or stiffness capabilities. <i>Senior Division only:</i> includes aerodynamics, hydrodynamics, and fluids projects.	<i>An Underwater Glider for Marine Exploration; Measurement of CD Variations; Tensile Strength of Composite Materials; Bridge Design; Can Foam Make Steel Stronger?; How Does Arch Curvature Affect Strength? How Do Different Foundations Stand Up to Earthquakes? Sr. Div: "Arrow" Dynamics; Measuring the Effect of Aerodynamic Design on Vehicular Drag.</i>	Junior Division aerodynamics/ hydrodynamics projects belong in Aerodynamics/ Hydrodynamics. Engineering studies of soil stability during earthquakes belong in Earth & Atmospheric Sciences.
4. Behavioral & Social Sciences: Studies of human psychology, behavior, development, linguistics, and the effects of chemical or physical stress on these processes. Experimental or observational studies of attitudes, behaviors, or values of a society or groups within a society, and of the influences of society on group behavior. Includes gender and diversity studies, anthropology, archaeology, and sociology. Studies may focus on either normal or abnormal behavior. <i>Senior Division only:</i> includes studies of cognition.	<i>A Study of the Senses in Stress Management; Racial Awareness in Infants; AIDS Awareness in Teens; The Effect of Authority Figures on Group Decision Making.</i>	Animal behavior projects belong in Zoology or Mammalian Biology. Junior Division projects studying memory, learning, and sensory perception belong in Cognitive Science.

Category and Definition	What Belongs	What Doesn't Belong
5. Biochemistry/ Molecular Biology: Studies at the molecular, biochemical, or enzymatic levels in animals (including humans), plants, and microorganisms, including yeast. Studies of biological molecules, <i>e.g.</i> , DNA, RNA, proteins, fats, vitamins, nutrients.	<i>Lipoxygenase Influence on Lipofuscin Granule Formation in Bananas; Effects of P1 Precursors on Virus Growth; Isolation of Pre-mRNA Mutants in Saccharomyces cerevisiae; Determination of Ascorbic Acid Concentration in Orange Juice Using a Redox Reaction; Effects of Food Preparation on Vitamins.</i>	Studies of the physical properties of biochemicals such as oxidation-reduction reactions belong in Chemistry. Functions of major organ systems belong in Mammalian Biology or Zoology.
6. Chemistry: Studies in which chemical properties of nonbiological organic and inorganic materials (excluding biochemistry) are observed. Some studies involving physical properties are appropriate, including phase changes, crystal structures and formation, intermolecular and intramolecular forces.	<i>Isolation, Purification, and Specific Rotation Determination of Ricinoleic Acid; Conductivity of Electrolytes; Does Water Purity Affect Surface Tension?</i>	Chemical studies of metabolic processes (<i>e.g.</i> fermentation and/or yeast), processes mediated by biochemical intermediates (<i>e.g.</i> enzymes), or biological organic molecules belong in Biochemistry. In the Junior Division, projects that deal with the characterization of chemical products in everyday life belong in Materials Science or Product Science (Physical).
7. Cognitive Science (Junior Division Only): Studies of learning, memory, and cognition in humans, using human or animal models for human processes. Studies of the effects of chemical or physical stress on cognition. Includes projects on subliminal perception, optical illusions, recall and observations (<i>e.g.</i> reliability of eyewitnesses), and the interaction of different senses.	<i>Does Age Affect Implicit Learning?; The Effectiveness of Flash Cards vs. Computer Scripts; Optical Illusions; Subliminal Persuasion by Television; Eyewitness Identifications; Effect of Curcumin on Memory.</i>	Studies examining basic human senses and physiological, rather than psychological, reactions belong in Mammalian Biology. Senior Division projects otherwise appropriate for this category belong in Behavioral and Social Sciences.
8. Computational Systems & Analysis: Studies that focus primarily on the development or use of computational systems for applications in the biological, physical, or engineering sciences, such as analyzing big data, modeling and simulations, autonomous navigation, and bioinformatics.	<i>Neural Network Model to Predict Future Body Mass Index; Safecopter: Developing a Collision Avoidance System Based on an Array of Time-of-Flight 3D Cameras; Using Artificial Intelligence Systems for Autonomous Visual Comprehension and Handwriting Generation; Value of Splines in Modeling the Extragalactic Background Light; Assessing the Practicality of Asteroid Deflection Strategies Using Simulation; Mathematical Models of Cancer Development in the Human Digestive System.</i>	Projects using computers or mathematics as a tool (without developing a program or a model) or that include actual experimentation to study a different subject belong in that category. For example, a computer-based analysis to identify obesity driver genes would belong here, but if the project also experimented with those genes it would then belong in Biochemistry/ Molecular Biology. Computer hardware projects belong in Electronics & Electromagnetics.

Category and Definition	What Belongs	What Doesn't Belong
9. Earth & Atmospheric Sciences (Junior Division Only): Studies in geology, seismology, physical oceanography, marine geology, coastal processes, atmospheric physics and chemistry, meteorology, and climatology including measurements, models, and the effects of climate change.	<i>Gravity Current Velocities; Beach Sand Fluctuations and Cliff Erosion; Dependence of Liquefaction upon Soil Composition; Influence of Site Effects on Peak Ground Acceleration in the Northridge and Whittier Narrows Earthquakes; Solar Activity and Refraction Properties of the Ionosphere. The Effect of CO(2)-Induced Carbonic Acid on Calcium Carbonate in Sea Water</i>	Studies concerning human-caused pollution and its effects on the environment, other than climate, belong in Environmental Science. Studies of methods to mitigate pollution's effects on the environment, including climate, belong in Environmental Engineering. Earthquake engineering projects (other than soil stability) belong in Applied Mechanics & Structures. Senior Division projects otherwise appropriate for this category belong in Environmental Science (climate) or the relevant basic science (e.g., Physics & Astronomy, Chemistry, etc.).
10. Electronics & Electromagnetics: Experimental or theoretical studies with electrical circuits, computer design, electro-optics, electromagnetic applications, and antennas.	<i>Satellite Reception Without a Dish; The Gauss Rifle; Transmission of Information by Laser; Are Maglev Trains Practical?</i>	Projects that merely use electronics to study something else (e.g., hearing in birds) belong in another category (Zoology in this example).
11. Environmental Engineering: Projects which apply technologies such as recycling, reclamation, restoration, composting, and bioremediation which could benefit the environment and/or the effects of pollution on the environment.	<i>Newspapers as Mulch; Oil Control; Water Hyacinth: Primary Water Treatment?; What Soil Conditions Best Control Soil Erosion While Assisting Growth?; Designing a New Home Sewer System.</i>	Projects that measure or survey environmental impacts without any mitigation of those impacts belong in Environmental Science or Earth & Atmospheric Sciences. Projects that study the mitigation of climate change through alternative energy production belong in Alternative Energy.
12. Environmental Science: Projects surveying, measuring, or studying the impact of natural and man-made changes on the environment. Examples include floods, fires, biohazardous spills, acid rain, earthquakes, air pollution, and water pollution.	<i>The Effects of Fires on Flora and Fauna; How Does Water Quality Affect the Abundance and Diversity of Micro-invertebrates; Bacteria Pollution in Our Beaches; An Analysis of Dissolved Oxygen and Density in Ballona Creek.</i>	Junior Division studies that measure or model climate change and its effects belong in Earth & Atmospheric Sciences. Studies of methods to mitigate pollution's effects on the environment, including climate, belong in Environmental Engineering. Studies performed under unrealistic or simulated conditions to examine the negative effects of substances or conditions on living things belong in Toxicology.
13. Mammalian Biology: Studies of growth and developmental biology, anatomy, and physiology in all mammals, including humans. Studies of the behavior of all mammals in their natural habitats (or reproductions of them).	<i>Effect of Age on Aerobic Abilities; Peripheral Vision; Correlation of Strength with Gender; Effect of Vaccination on Antibody Development in Neonatal Bovines. Lung Capacity, Age, and Exercise; Crossed Hand-Eye Dominance</i>	Projects studying physiology of birds, insects, etc. belong in Zoology. Studies of the effect of chemicals on a physiological function may belong in Toxicology. Studies in which animals serve as a model for human learning or behavior belong in Cognitive Science (Jr) or Behavioral & Social Sciences (Sr).

Category and Definition	What Belongs	What Doesn't Belong
14. Materials Science (Junior Division Only): Studies of materials characteristics and their static (not in motion) physical properties. Includes measurements and comparisons of materials durability, flammability, and insulation properties (thermal, electrical, acoustic, optical, electromagnetic, etc.).	<i>Which Metal Conducts the Most Heat? What Is the Effect of Duct Tape as an Insulation Material? Sun Protection on the Courts: A Test of Colors and Materials in Tennis Clothing; Which Building Material Disrupts a Wireless Connection the Least?</i>	Studies of fundamental properties of matter (e.g., specific heat) belong in Physics and Astronomy. Studies comparing and testing natural and manmade products for effectiveness in intended use in real-world, consumer-oriented applications belong in Product Science (Physical).
15. Mathematical Sciences: Studies of mathematics (e.g., algebra, geometry, logic), and computer science (e.g., artificial intelligence, and the design, improvement, or optimization of algorithms, computer languages, operating systems, or software architecture.)	<i>Maximally Dispersed Points on a Sphere; Knot Mathematics; Mathematical Optimization of Multiple Precision Multiplication; Computerized Deductive Reasoning Using Bipartite Rules; Using Global Optimization to Separate Mixed Signals in a Noisy Environment; The Algebra and Geometry of Quasicategories; A Combinatorial Proof for the Geometric Series, Binomial Theorem, and the Square of a Polynomial with Tiling</i>	Computer programming projects belong in Computational Systems & Analysis. Projects using mathematics or computers as a tool to study a different subject, that develop an engineering solution, or that lead to a specific experiment, belong in that category.
16. Microbiology (General): Studies of genetics, growth, and physiology of bacteria, fungi, protists, algae, or viruses. Includes surveys of bacterial contamination. <i>Senior Division Only:</i> includes projects described within the category Microbiology (Medical).	<i>Studies of Light Producing Bacteria; Enhancement of Algae Lipid Composition through the Manipulation of Temperature, Light, and Nutrient Levels; The Utilization of a Photobioreactor to Optimize the Growth Rate of Lipids in Microalga.</i>	Projects studying photosynthesis or fermentation belong in Biochemistry. Projects using bacteria as a tool to study another subject belong in that subject.
17. Microbiology (Medical): (Junior Division Only) Studies of prevention, diagnosis, and treatment of infectious diseases caused by pathogenic bacteria, fungi, or viruses. Includes all antimicrobial studies except testing of commercial antimicrobials.	<i>Effects of Spices on Escherichia coli growth on food; Antibiotic Resistance in Bacteria; Effects of Hand Washing on Absenteeism in Schools</i>	Projects using bacteria as a tool to study another subject belong in that subject. Testing of commercial antimicrobial products belongs in Product Science (Biological). Senior Division projects otherwise appropriate for this category belong in Microbiology (General).
18. Physics & Astronomy: Studies of the physical properties of matter, light, acoustics, thermal properties, solar physics, astrophysics, orbital mechanics, observational astronomy, planetary science, and astronomical surveys. Computer simulations of physical systems are appropriate in this category.	<i>Emissivity as a Function of Geometry; Do High Temperature Superconductors have a First Order Phase Transition?; Chaotic Pendulum; Photometric Detection of an Extrasolar Planetary Transit; Jupiter's Decametric Emission; Solar Activity and Geosynchronous Satellites.</i>	Electromagnetic propagation studies (e.g., antennas) belong in Electronics & Electromagnetics. Junior Division projects studying the characteristics of materials such as insulation properties belong in Materials Science.

Category and Definition	What Belongs	What Doesn't Belong
19. Plant Biology: Studies of the genetics, growth, morphology, or physiology of plants. Studies of the effects of fertilizers on plants.	<i>The Effects of Organic and Inorganic Fertilizers on Plant Growth; Effect of Rhizobium on Legume Plants (Pisum); Transpiration of Plants Under Different Light Sources.</i>	Studies using plants for indication or remediation of environmental pollution belong in the appropriate environmental category. Studies of the negative effects of chemicals on plants belong in Toxicology.
20. Product Science (Biological) (Junior Division Only): Comparison and testing of commercial off-the-shelf products for quality and/or effectiveness for intended use in real-world consumer-oriented applications. This category is reserved for experimental methods involving biological sciences and processes.	<i>Preventing Pumpkin Decomposition; Antibacterial Soap vs. Antibacterial Gel: Cause for Concern? Tylenol Brand vs. Store Brand Acetaminophen; Does Orange Oil Really Work?</i>	Biological studies that do not include a commercial off-the-shelf product but are only testing potentially new consumer applications belong in their respective Life Science Category. Senior Division projects otherwise appropriate for this category belong in the relevant basic science.
21. Product Science (Physical) (Junior Division Only): Comparison and testing of commercial off-the-shelf products for quality and/or effectiveness for intended use in real-world consumer-oriented applications. This category is reserved for experimental methods involving non-biological, physical sciences and processes.	<i>Water Absorption in Eight Selected Hardwoods With and Without Sealants; Best Plywood for Homemade Skateboards; Cotton, Linen, Wool: Which One Lasts Longer?; Fire Resistance of Roofing Materials; Which Laundry Detergent Works the Best? Shock Attenuation in Baseball Helmets.</i>	Non-biological studies that do not include a commercial off-the-shelf product but are only testing potentially new consumer applications belong in their respective Physical Science category. Senior Division projects otherwise appropriate for this category belong in the relevant basic science.
22. Toxicology: Studies of the negative effects of chemicals, toxins, medicinal and nutritional factors, prescription drugs, natural remedies, food components (caffeine), and other potentially harmful factors (such as temperature, carbon dioxide, radiation) at the cellular or higher levels on plants and animals.	<i>Effect of Caffeine on Daphnia; Copper Toxicity of Marine Embryos; The Effects of Intermittent and Constant EMFs on Drosophila; The Effects of Petroleum Contaminated Water on Aquatic Plants.</i>	Studies of the positive or beneficial effects of external factors such as nutritional components, medicines, vitamins, natural remedies, and fertilizers, belong in the relevant basic life science (e.g., Mammalian Biology, Zoology, Plant Biology, etc.) Studies of changes in actual ecosystems due to pollution belong in Environmental Science.
23. Zoology: Studies of growth and developmental biology, anatomy, and physiology in animals other than mammals. Studies of the behavior of all animals (excluding mammals) in their natural habitats (or reproductions of them).	<i>Hot Fish, Cold Fish: Respiration in Goldfish; Hearing and the Dominance Hierarchy of Crickets; Effect of Gravity on Living Organisms; Invertebrates in Kelp Holdfasts; Auditory Stimuli in Interganglial Neurons of Acheta domesticus; Bird Responses to Boar Rootings.</i>	Studies of mammals belong in Mammalian Biology. Studies in which animals serve as a model for human behavior belong in Behavioral & Social Sciences.

2018 APPLICATION DEADLINES

The procedures for qualified projects and for alternates are different.

County/ Regional Fair	Submission Deadline
Alameda	Apr 4
Butte	Mar 15
Calaveras	Mar 21
Contra Costa	Mar 26
Fresno	Mar 22
Glenn	Apr 2
Humboldt	Mar 26
Kern	Mar 21
Los Angeles	Mar 30
Mendocino	Mar 21
Merced	Mar 20
Modoc	Mar 19
Monterey	Mar 26
Nevada	Apr 8
Orange	Apr 2
Placer	Mar 16
Riverside	Mar 28
Sacramento	Mar 21
San Benito	Mar 28
San Diego (GSDSEF)	Mar 22
San Francisco (Golden Gate)	Mar 29
San Joaquin	Mar 15
San Mateo	Mar 20
Santa Barbara	Mar 21
Santa Clara	Mar 27
Santa Cruz	Mar 27
SIM (San Bernardino)	Apr 5
Solano	Mar 29
Tulare	Mar 21
Ventura	Apr 2

DEADLINES AND DECISIONS

The **Submission Deadline** is the date by which you should complete the online application. Failure to meet this deadline may result in qualified applicants being rejected in favor of alternates from the same affiliate.

The **Final Submission Deadline** is the last date on which applications may be submitted absent explicit instructions otherwise. For 2018 the Final Submission Deadline is Wednesday, April 4.

The **Decision Date** for any affiliate is the day on which acceptance and rejection decisions will be announced. This date is seven (7) calendar days after the affiliate's Submission Deadline, or the **Final Decision Date**, whichever is earlier. For 2018 the Final Decision Date is Sunday, April 8.

Submission Deadline

Your Submission Deadline is the date on or before which your Application should be submitted. Your application will be considered submitted when you have completed the final page of the application and pressed its "Submit" button. You will receive confirmation of receipt of your application via e-mail immediately following its submission. Within one working day submitted applications will be acknowledged on the Fair's Web site. Please note that although your Application must be submitted through the Fair's Web site, all other forms found in this Application Packet (where required) must be mailed.

Applications may continue to be submitted after an affiliate's Submission Deadline, but will only be accepted if the affiliate's allocation has not already been filled by qualified and alternate projects which were submitted earlier.

Team Projects: While all members of a team must submit their own individual application (and submit their own ancillary materials below), for purposes of determining whether the team's application was submitted on time or not we will use the earliest Submission Date of any member of the team. Subsequent members of the team should still meet the Submission Deadline but will not be penalized if their application is submitted later.

Ancillary Materials

Immediately after completing online applications, students with qualified projects (*N.B.*, qualified projects only, not alternates) should mail all other required materials to the Fair. See the Application Checklist (pg. 12) for the complete list of items. Any required ancillary materials must be received in order for your application to be considered complete. Students with incomplete applications may be accepted, but will not be allowed to register at the Fair, set-up their project display, or otherwise participate in the Fair until all required materials have been received.

Qualified Projects vs. Alternates

It is likely that many, if not most, alternates will not be accepted. Therefore, even though alternates must meet the same Submission Deadline as qualified projects, alternates should not pay the Application Fee after submitting their application. If accepted, alternates will then be instructed to pay the Application Fee and submit other ancillary materials which must be received before they will be allowed to participate in the Fair.

Acceptance Decisions

Applicants from each affiliated fair whose Project Summaries have passed the PARC (Project Abstract Review Committee) quality review described on pg. 2 will be accepted in the following order:

1. All qualified projects submitted on time will be accepted.
2. Alternate projects submitted on time will be accepted in the priority order specified by their affiliated fair until the affiliate's allocation has been filled.
3. Any projects submitted after the affiliate's Submission Deadline will be accepted in order of submission without regard to their status as qualified or alternate until the affiliate's allocation has been filled.



APPLICATION CHECKLIST

First, submit your online application by your Application Deadline (pg. 10). Here we have collected together in one place, everything else that you may need to submit in order to complete your application. Send all items to the Fair at the address given below.

Team Projects Note: Every member of a team project must complete his or her own application along with a separate signature card and application fee payment. However, only the first member of the team is required to submit the complete Project Summary (and Certification form, if applicable), as these concern the common work of the team.

Alternate Projects Note: The following applies only to *qualified* projects at the time the online application is submitted. *Alternate* projects should not send any of the following until and unless they have been accepted. At that time they will be directed by the Fair to send these items.

- Every student is required to provide the following items:
 - ☐ **Signature Card** (pg. 31) – Both student and a parent/guardian must sign this card.
 - ☐ **Application Fee Form** (pg. 32) – Include this form with your payment.
- Depending upon your project you may need one or both of the following items:
 - ☐ **Human Subjects/ Tissue Samples/ Humane Treatment Certification.** If your project used human subjects, vertebrate animals, etc. you must include this certification (pg. 18).
 - ☐ **Professional Research Opportunity Support (PROS form)** (pg. 16). If you worked in a professional research environment, give a copy of this form to your research supervisor and have him/her send the completed form directly to the Fair. See Display Regulation #8.
- All students have the opportunity to nominate their advisor as a California Science & Engineering Fair Science Fair Teacher of the Year with this form:
 - ☐ **Science Fair Teacher of the Year Nomination** (pg. 21). This has a receipt deadline.
A complete nomination has three parts. The nominating student should
 1. Include the Nomination Form in the mailing to the Fair below,
 2. Give the Teacher Statement Form to the nominated teacher, and
 3. Request a recommendation letter from the nominated teacher's department chair or principal.
- Students in grade 12 have the opportunity to nominate themselves as the California Science & Engineering Fair Science Fair Student of the Year:
 - ☐ **Science Fair Student of the Year Application** (pg. 19). This has a receipt deadline.

Send all needed items (together or separately) by US Mail or private delivery service to:

California Science & Engineering Fair
California Science Center
700 Exposition Park Drive
Los Angeles, CA 90037



2018 APPLICATION CALENDAR

Receipt Confirmation

As Submitted

When you complete the Application on the Fair's Web site, you will receive an e-mail confirming its receipt within a few minutes. This email will include your confirmation code and instructions to complete the application process. If you do not receive this email, contact us immediately. Confirmation of all Applications will appear on the Fair's Web site within one working day.

PARC Review / Category Assignment

Saturday, April 7

Every Application is reviewed for acceptability according to the rules on pg. 2 by the Project Abstract Review Committee (PARC), an experienced group of judges at the California Science & Engineering Fair. Over roughly the month before final decisions are made, this committee reads every Project Summary in order to determine the correct subject category to which it should be assigned. Final decisions will be made on this date.

Notice of Acceptance or Rejection

Sunday, April 8

All applicants identified through the PARC review as candidates for rejection will be contacted by phone by the Directors of Judging no later than this date, to provide an opportunity for appeal. For all other rejections (alternates, late applications, etc.) notice will be made *only* through e-mail. If a functional e-mail address has not been provided to CSEF, no direct notice will be given. The official notice of acceptance will be the listing of names on the Fair's Web site no later than this date. Notices of acceptance will be e-mailed shortly thereafter, and sent via US Mail within a week.

Confirmation of Category Assignment

Wednesday, April 11

All category assignments will be posted to the Fair's Web site (pg. iv) as soon as they are available, and no later than the above date. You will receive written confirmation of your project's category assignment. You may request a different assignment, but only until Wednesday, April 18. The Directors of Judging are the final authority as to project acceptance and category assignments. Details will be included in your confirmation letter.

INSTRUCTIONS FOR PROJECT SUMMARY

Your Project Summary will be entered as plain text into the online application only. The following page is a model of what will be produced from what you enter. *Prepare your Project Summary in advance so that it will fit into the space provided. Don't wait until you're online before you begin to compose it.* If you use Times Roman font with 12 point size and do not exceed the space allotted on the page, your Project Summary should fit within the confines of the online application. When you complete the web application, you will see a preview of the page which will be generated for your judges. Further guidance for all fields will be provided on the web application itself.

Name — Your name (and those of your co-authors if yours is a team project) only. Do not include your school, county, or teacher's name.

Project Title — This is the title as it will appear on your actual display. It should clearly indicate the subject as explained in the Summary Statement. Additionally, Special and Recognition Award judges use project titles to determine eligibility for their awards. A title unclear as to subject matter may result in your project being overlooked. This title need not be identical to the one used for presentation at the county or regional fair from which you qualified, but must be the same as will appear on your display at the California Science & Engineering Fair. **Important: The maximum number of characters *including spaces* allowed for the title is 120.** Do not abbreviate unless necessary to meet this character count limit. Longer titles will be unceremoniously truncated.

Division — Check your grade level (6-8 = Junior; 9-12 = Senior).

Preferred Category — Indicate your preferred category. Your preference will be respected if possible, but the Directors of Judging have final authority in assigning your project to the appropriate subject category.

Abstract — While most abstracts should include all of the elements listed here, all elements may not be appropriate for your project.

Objective or Goal: State the objective, goal, or hypothesis upon which the project is based.

Example: I wanted to learn if the feeding habits of hummingbirds are affected by color.

Materials and Methods: To the extent necessary to understand what you did, indicate the materials, methods, and experimental design used in your project. Briefly describe your experiment or engineering methods. Do not include a long list of materials.

Results: Summarize the results of your experiment and indicate how they pertain to your objective.

Conclusion/Discussion: Indicate if your results supported your hypothesis or enabled you to attain your objective. Discuss briefly how information from this project expands our knowledge about the category subject.

Summary Statement — In one sentence, state what your project is about.

Help Received — Describe the help provided by mentors, institutions, and others beyond what would be available at most schools. If your project was completed partially or wholly within a professional research organization, you must complete the Professional Research Opportunity Support form (page 16). See Display Regulation #8 (page 4).



2018 PROJECT SUMMARY

Your Name (List all student names if multiple authors.)		Science Fair Use Only
Project Title (Limit: 120 characters. Those beyond 120 will be ignored. See pg. 14)		
		Division (Grades) _ Junior (6-8) _ Senior (9-12)
Preferred Category (See page 5 for descriptions.)		
Abstract (See samples on page 16.) Objectives/Goal:		
<hr/> Methods/Materials:		
<hr/> Results:		
<hr/> Conclusions/Discussion:		
Summary Statement (In one sentence, state what your project is about.)		
Help Received in Doing Project (e.g., Used lab equipment at university X under the supervision of Dr. Y; Participant in NSF Young Scholars Program) See Display Regulation #8 on page 4.		

CALIFORNIA SCIENCE & ENGINEERING FAIR

PROFESSIONAL RESEARCH ORGANIZATION SUPPORT (PROS)

This form is required of all projects completed partially or entirely within the facilities of a professional research organization whether academic, industrial, or government. Include this form and any attachments at your CSEF project display; a copy is required as part of your application. Complete the top two lines before delivering this form to your research advisor.

Student Name(s)	Confirmation Code
Project Title	

For the Institutional Representative: Note any additional responses on separate attached pages.

1. What led the student(s) to your organization?

- ☐ Announced institutional program (*e.g.*, NSF or NASA REU, Summer Interns)
- ☐ Student(s) independently sought us out for unspecified research experience
- ☐ Student(s) independently sought us out for this specific project
- ☐ Student(s) only needed specialized measurement tools in our lab
- ☐ Other:

2. What was the origin of this specific project?

- ☐ Intended path of our regular research program
- ☐ Tangentially related to our research and suggested to the student as a project
- ☐ Student(s) independently proposed this project to us
- ☐ Other:

3. What special training or instruction was required of the student(s) prior to starting in the lab? Include legally required training as well as training in the use of specific equipment/procedures.

4. What specific procedures or special equipment did the student(s) personally use for the project? Please list and describe. (Do not list procedures student only observed.)

5. What did the facility or members of the research group do to aid the student(s) in completing this project? Include assistance in meeting SRC/IRB requirements.

Signature	Date	Phone
Printed Name	Email	
Institution	Title	

CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 REGULATIONS FOR RESEARCH INVOLVING HUMAN SUBJECTS,
TISSUE SAMPLE SOURCES (INCLUDING DNA SOURCE MATERIALS),
AND HUMANE TREATMENT OF LIVE VERTEBRATE ANIMALS

The following codes apply to all student research projects. Project advisors must acknowledge on the certification forms that the student has complied with all research regulations.

FOR ALL PROJECTS INVOLVING HUMANS AS THE SUBJECT OF RESEARCH:

The Code of Federal Regulations 45 CFR 46 §46.102 defines

"Human Subject" means a living individual about whom an investigator (whether professional or student) conducting research obtains (1) data through intervention or interaction with the individual, or (2) identifiable private information. In order for the obtaining of private information to constitute research involving human subjects, the identity of the subject must be readily associated with the information.

"Minimal Risk" means that the risks of harm anticipated in the research are not greater, considering probability and magnitude, than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests.

Examples of unacceptable risk include: (1) ingestion or physical contact with any potentially hazardous materials including toxic chemicals, known or suspected pathogens or carcinogens, or exposure to ionizing radiation; (2) intentionally inducing emotional stress through questioning or invasion of privacy; (3) physical stress to pregnant women or anyone suffering debilitating physical illness; and (4) psychological stress to the mentally handicapped or those suffering psychiatric disorders. This list is intended to be illustrative, not exhaustive.

The regulations of the Fair are intended to protect human subjects, both physically and psychologically. The regulations supplement, and do not supplant, relevant State and Federal regulations dealing with such protection.

FOR ALL PROJECTS INVOLVING TISSUE SAMPLES:

Live tissue samples must be taken either from a continuously maintained tissue culture line already available to institutional researchers, or from animals already being used in an on-going institutional research project.

Students may not be involved in the direct acquisition of these samples from living human or vertebrate animals.

FOR ALL PROJECTS USING ANY LIVE VERTEBRATE ANIMAL, EXCLUDING HUMANS:

The State of California Education Code §51540:

In the public elementary and high schools or in public elementary and high school school-sponsored activities and classes held elsewhere than on school premises, live vertebrate animals shall not, as part of a scientific experiment or any purpose whatever:

(a) Be experimentally medicated or drugged in a manner to cause painful reactions or induce painful or lethal pathological conditions.

(b) Be injured through any other treatments, including, but not limited to, anesthetization or electric shock.

Live animals on the premises of a public elementary or high school shall be housed and cared for in a humane and safe manner. The provisions of this section are not intended to prohibit or constrain vocational instruction in the normal practices of animal husbandry.



CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 CERTIFICATION OF COMPLIANCE FOR RESEARCH
INVOLVING HUMAN SUBJECTS, TISSUE SAMPLE SOURCES,
AND HUMANE TREATMENT OF LIVE VERTEBRATE ANIMALS

NAME OF APPLICANT (LAST NAME, FIRST NAME)	NAME OF SCHOOL
PROJECT TITLE	

This form is for:

Compliance for Research Involving Human Subjects

Tissue Sample Source Verification

Humane Treatment of Animals

We certify that the experimental procedure used in this science fair project complies with State and Federal regulations including, but not limited to, 45 CFR 46 §46.102 and California Education Code §51540:

SIGNATURE OF STUDENT	DATE SIGNED
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PROJECT ADVISOR

PRINT NAME	TITLE	
NAME OF INSTITUTION		TELEPHONE NUMBER
ADDRESS OF INSTITUTION		
SIGNATURE OF PROJECT ADVISOR		DATE SIGNED



CALIFORNIA SCIENCE & ENGINEERING FAIR
SCIENCE FAIR STUDENT OF THE YEAR 2018
APPLICATION

APPLICATION DEADLINE: Received by Thursday, April 12

NAME OF APPLICANT (LAST NAME, FIRST NAME)	SCHOOL PHONE NUMBER
NAME OF SCHOOL	

Description: The California Science & Engineering Fair Student of the Year is selected from 12th grade students who are entrants in the Fair and who submit this completed application and an essay. Applicants will be judged on their science project, academic excellence, ability to communicate, community service, and breadth of activities and interests.

Directions: The complete application consists of

- this completed form, including names and phone numbers of three references, and
- a separate essay, *no longer than 600 words*, which explains your Science Fair Project. Since the judging panel will consist of people who may not be experts in your topic area, make sure that your essay is written for a general audience.

There is no separate fee associated with this application.

The application and essay should be typed. Use a type size no smaller than 10 point. (This is 10 point type.) Any other additional materials submitted with this application will **not** be given to the judges.

Procedure: Based upon this application form and essay, semi-finalists will be selected by the judges on the morning of the Fair. Semi-finalists will be interviewed about their project on the floor of the Science Fair during the regular category judging period. Three to five finalists will then be selected and announced at the end of the category judging period. During the afternoon, in-depth interviews will deal with issues set out in this application, and may include, but will not be limited to, the scope of your specific project.

This form may be scanned and emailed or sent by US Mail to:

California Science & Engineering Fair Science Fair Student of the Year Award Evelyn Serrano eserrano@cscmail.org 213-744-7587	California Science & Engineering Fair Science Fair Student of the Year Award California Science Center 700 Exposition Park Drive Los Angeles, CA 90037
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1. Describe your high school scholastic achievements.

2. Describe your involvement in extracurricular activities.

3. Describe your involvement in community service work.

4. Describe your other interests and hobbies and why these are important to you.

REFERENCES

List the names and daytime phone numbers of three personal references who can evaluate your activities listed in this application. Family members are not permitted as references.

NAME OF REFERENCE	AREA CODE	DAYTIME PHONE NUMBER



CALIFORNIA SCIENCE & ENGINEERING FAIR

SCIENCE FAIR TEACHER OF THE YEAR 2018

DIRECTIONS

NOMINATION DEADLINE: Received by Thursday, April 5

Description: The California Science & Engineering Fair Science Fair Teachers of the Year are the science teachers who have been most inspirational to 6th - 12th grade students participating in the California Science & Engineering Fair by encouraging students to develop a science fair project and to pursue their interest in science as a career. One award will be presented in each division (Junior and Senior).

Eligibility:

- The nominee must have been a teacher during the current academic year at the 6th - 12th grade level at a public or private school in California.
- The teacher must have counseled a student at his/her school and provided resource support on a science project that is entered in the current California Science & Engineering Fair. This teacher must be named on at least one nominating student's application to the Fair as his/her advisor.

Directions: A completed nomination for this Award consists of:

- The nomination form filled out by a student who is an accepted participant in the California Science & Engineering Fair and whose named advisor is the nominee;
- The teacher statement form filled out by the nominee; and
- A letter of recommendation written by the school principal or department chair. This statement must be no longer than one page and should focus on the teacher's commitment to science education, ability to motivate students, and special efforts demonstrated to advance excellence in science education. The letter should also address the nominee's specific contribution to promoting positive science fair participation.

These forms and recommendation may be submitted either together or separately. Incomplete nominations (*e.g.* missing one or more of the above items) will not be considered. All documents must be received by the Nomination Deadline given above. Regional or county fair coordinators may also encourage the nomination of teachers but must have the nomination form filled out by a student entered in the California Science & Engineering Fair. Both forms and the recommendation may be sent by email or US Mail:

California Science & Engineering Fair Science Fair Teacher of the Year Award Heather Barbaria Hall HBarbaria@cscmail.org 213-744-7516	California Science & Engineering Fair Science Fair Teacher of the Year Award California Science Center 700 Exposition Park Drive Los Angeles, CA 90037
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Procedure: Based upon the completed materials submitted, a maximum of three finalists from each division will be chosen. All finalists will be notified by phone and listed on the fair's web site in advance of the Fair. Other nominees who are not selected as finalists will not be directly notified.

Teachers selected as finalists must be available for a personal interview in Los Angeles on the day of the California Science & Engineering Fair. These interviews will be conducted by a panel representing the California Science Teachers Association, the California Science Center, The MUSES, and educators.

Winners will be announced at the California Science & Engineering Fair Awards Ceremony.



CALIFORNIA SCIENCE & ENGINEERING FAIR
SCIENCE FAIR TEACHER OF THE YEAR 2018
NOMINATION FORM

NAME OF TEACHER BEING NOMINATED	NAME OF STUDENT MAKING THIS NOMINATION	GRADE
NAME OF SCHOOL		
SCHOOL ADDRESS		
CITY	ZIP	COUNTY
NAME OF PRINCIPAL	SCHOOL PHONE NUMBER	
SUBJECT(S) NOW TEACHING	TEACHER'S EMAIL ADDRESS	

- How has this teacher helped prepare you for the California Science & Engineering Fair?

- In what other activities is your teacher involved outside of normal teaching duties?

- What impact has this teacher had in encouraging you and fellow students to pursue your interests in science beyond the classroom?



- What specifically did you do in support of the student (or students) who nominated you for this award other than what would be routinely expected (*e.g.*, setting deadlines, periodic reminders, etc.)?
- How important do you feel science fair participation is for your students compared to other science-related activities? What unique benefits do your students get from science fairs not available elsewhere?
- If you could change anything about your county's science fair, what would you do?

LOCAL HOUSING ARRANGEMENTS

Major hotel chains within Los Angeles are listed below. **Listing here does not constitute an endorsement.** Since rooms are limited, you should make reservations as early as possible. Other hotels in the area will be identified on the Fair's Web site.

Hotel	Notes	Telephone
Best Western		800-452-4888
Hampton Inn & Suites		800-426-7866
Holiday Inn Express		800-821-8277
Radisson		800-333-3333
Ramada Inn		800-228-3344
Travelodge		800-644-0807

FOOD SERVICE

The California Science & Engineering Fair will not be providing any meals to students at the Fair. However, there are many commercial food vendors located both inside the California Science Center and within walking distance (just across the street). A map and list of eating establishments in the immediate vicinity will be included in your Registration Packet. Discounts have also been arranged with a number of local food vendors.

LOCAL TRANSPORTATION

The California Science & Engineering Fair does not provide transportation within the greater Los Angeles area for participants. However, there are a number of van services you may contact for transportation from the local airports to the Fair. (Alternatively, all major car rental agencies have offices at LAX and Burbank.) Mention of these services is not an endorsement.

Service	phone
Super Shuttle	(800) 554-3146 (818) 558-3177
Prime Time Shuttle	(800) RED-VANS
Express Shuttle	(800) 606-RIDE (800) 427-7483

CALIFORNIA SCIENCE & ENGINEERING FAIR

2018 AWARDS PROGRAM

Awards at the California Science & Engineering Fair are distinguished as either Fair Awards, which are determined by judges working for the Fair itself, or Special & Recognition Awards, which are presented by organizations external to the Fair in additional recognition of student achievements.

Fair Awards

Category Awards

The California Science & Engineering Fair awards the top four projects within each subject category and each age division as First Place, Second Place, Third Place, and Fourth Place. One project, and only one project, receives each award — there are no ties. In the case of awards given to a team project with two or more students named as co-authors, the cash award is divided equally among each co-author. All category award winners receive a medallion in recognition of their achievements. Category Award winning projects receive the following cash awards:

Category Awards	Junior Division	Senior Division
First Place	\$250	\$500
Second Place	\$125	\$250
Third Place	\$75	\$125
Fourth Place	\$50	\$75

In addition, the judges may elect to name a small number of projects of outstanding quality as Honorable Mentions. These projects will be recognized at the Awards Ceremony and on the Fair's web site.

Project of the Year

Following the selection of Category Awards, two special committees of category judges (one for each age division) review every first place winning project in each subject category in order to select the best project in each division. These awards are \$5,000 in the Senior Division, and \$2,500 in the Junior Division.

Broadcom MASTERS

In the Junior Division, most (if not all) category award winners who have not already been qualified by another fair, will be qualified to the Broadcom MASTERS, a national competition for students in grades 6-8, with a top prize of \$25,000. The deadline for applying to this competition is June 13, 2018, 5:00 pm PDT.

California Science & Engineering Fair Student of the Year

See page 19

This \$1,000 award is given to a high school senior on the basis of his/her project and other activities.

California Science & Engineering Fair Teachers of the Year

See page 21

In each age division one teacher will be awarded \$2,000. Be sure to nominate your teacher.

CALIFORNIA SCIENCE & ENGINEERING FAIR

2018 AWARDS PROGRAM

Special and Recognition Awards

Special and Recognition Awards are presented by various professional scientific and engineering associations, businesses, volunteer groups, and private individuals in recognition of outstanding achievement through science fair projects. Judging for the awards is done by the presenting organizations themselves, and is entirely separate from the judging for category awards and all other awards presented by the Fair which are listed on the previous page.

Special Awards

Special Awards are single awards valued at \$1250 or more and will be presented at the Awards Ceremony along with all of the Fair Awards.

In recent Fairs Special Awards have also been presented by the American Chemical Society; the American Heart Association; Dr. Arnold O. and Mabel Beckman; California 4-H; the California Energy Commission; California Fuel Cell Partnership; California Sea Grant; California Shore and Beach Preservation Association; the Cardinal and Gold Award of Excellence; Chemical Waste Management; Institute for the Advancement of Engineering; Edwards Lifesciences; Five Star Legal and Wells Fargo; Hefni Technical Training Foundation; Sheila Kar Health Foundation; Lucky Stores; Los Angeles Biomedical Research Institute; Los Angeles County Department of Public Works, California Disposal Association, and Walmart; MLIM; MUSES of the California Science Center; the Neurology Award; Center for Plant Cell Biology at the University of California, Riverside; Rotary Club of Los Angeles; the Silicon Boule Award; SPIE – The International Society for Optical Engineering; Tau Beta Pi Engineering Association; UCLA Brain Research Institute; the University of California, Riverside; the University of Southern California; and ZACA, Inc.

Recognition Awards

Recognition Awards are single awards valued under \$1250. Recognition Awards are presented to winners at their projects during the second session of category judging from 11:00 am - 12:30 pm, **not** at the Awards ceremony.

Recognition Awards at recent Fairs have been presented by the American Chemical Society; American Heart Association; American Institute of Aeronautics and Astronautics (Orange County and Los Angeles County sections); American Vacuum Society; Association for Women Geoscientists; Biophysical Society; Bone Clones, Inc.; California Association of Professional Scientists; California Council of Geoscience Organizations; California Energy Commission; California Energy & Environmental Education Forum; California Environmental Health Association; California Native Plant Society; California Shore and Beach Preservation Association; California Science Center Volunteer Groups: Docents, MOSAIC, and MUSES; Center for Scalable and Integrated Manufacturing (SINAM); Hauta Wissmann Foundation; Health Physics Society; Institute for the Advancement of Engineering; NASA/JPL; Los Angeles Council for Scientists and Engineers; Santa Monica College; Science Buddies; Sierra Club; Society of Petroleum Engineers; Southern California Chapter of the Health Physics Society; SPIE, the International Society for Optical Engineering; Stockholm Junior Water Prize, Tau Beta Pi Engineering Association; the Tom Reside Memorial Award; TRW; University of California, Irvine, Dept. of Earth System Science; UCLA Earth & Space Sciences Faculty; University of Southern California.; and US Fish & Wildlife Service.

WHAT TO EXPECT DURING THE JUDGING

What Should You Do?

- You should prepare an oral summary of the important points in the project which you can present in no more than 60 seconds. Your judges will already have read your abstract, so if you've done a good job there your summary will remind them of questions that occurred to them earlier.
- Following your summary, you may find it useful to prepare several short capsule descriptions of important aspects of your project. You know your project better than anyone, so you should have the best ideas of what is important, but you could prepare answers for such questions as "Where did you get the idea for this project?" "What is special or distinctive about your project?" "What is the next thing you would do with your results?" "What questions has your project now generated?" You might also explicitly prepare for the question you hope the judges will ask.
- If yours is a team project, one person should act as the team spokesman at the beginning and present the oral summary. This summary should include the rationale for the project being a group, rather than an individual, enterprise, and how each member contributed. Each member of the group should be fully knowledgeable about the project and be prepared to then discuss his/her part.
- You will be provided with a list of judges for your category and their qualifications. Special and Recognition Awards judges will not be included. Be sure to have each judge initial the front of your project placard in the space provided at the conclusion of each interview. This is your record of your project's judges.

What Should You Expect The Judges To Do?

- At the beginning of the judging period the chair of your category's panel may assemble and speak to the entire group of students. Watch for this.
- You should be interviewed by at least five different judges for your category who will spend about 8 minutes discussing your project with you. It is difficult to space these interviews equally, so don't get discouraged if there is a long wait between judges. Don't worry about comparing the number of your judges with your neighbors. You, or they, may be getting Special and Recognition Awards interviews.
- Many judges prefer to learn about your project by asking questions. Be prepared for them to interrupt your presentation.

What Other Things May Happen During The Judging?

The California Science & Engineering Fair is a major event. You may find that your interviews with the judges will be competing with newspaper reporters (some with photographers), radio reporters, TV cameras (with their bright lights) and other video recorders for possible promotions of future Fairs.

This is a major event for the California Science Center, and they are proud to give publicity to you as a promising scientist or engineer. Although it may interrupt a judging interview as officials and VIPs come through the exhibits, please recognize it also as an honor for you and your fellow participants.

Finally, during the second session of judging, Recognition Awards will be presented to students at their project displays. (Special Awards are presented at the Awards Ceremony later in the day.) These Award presentations will often be modest and quiet, but some will involve a sizeable number of presenters who may be accompanied by the media.



CALIFORNIA SCIENCE & ENGINEERING FAIR

2018 SCHEDULE OF ACTIVITIES

All activities and events will take place within the California Science Center.

Monday, April 23, 2018

10:00 a.m.	Registration Opens
1:00 - 3:00 p.m.	Affiliated County and Regional Fairs Conference Location: California Science Center Administrative Offices, Conference Room 3 (Fourth Floor)
1:30 - 2:30 p.m.	Public Seminar: <i>How to Talk with a Judge</i> , Location: Admin East
3:00 - 4:30 p.m.	* Public Viewing of Fair Projects Students requested to be present at their displays
3:30 p.m.	Registration closes
5:00 - 6:00 p.m.	* Opening Ceremony and Keynote Address Location: Big Lab, Wallis Annenberg Building Keynote Speaker: Dr. Linda Spilker, <i>Jet Propulsion Laboratory Project Scientist for the recently completed Cassini mission directing the exploration of Saturn, its rings, and its moons.</i>

Tuesday, April 24, 2018

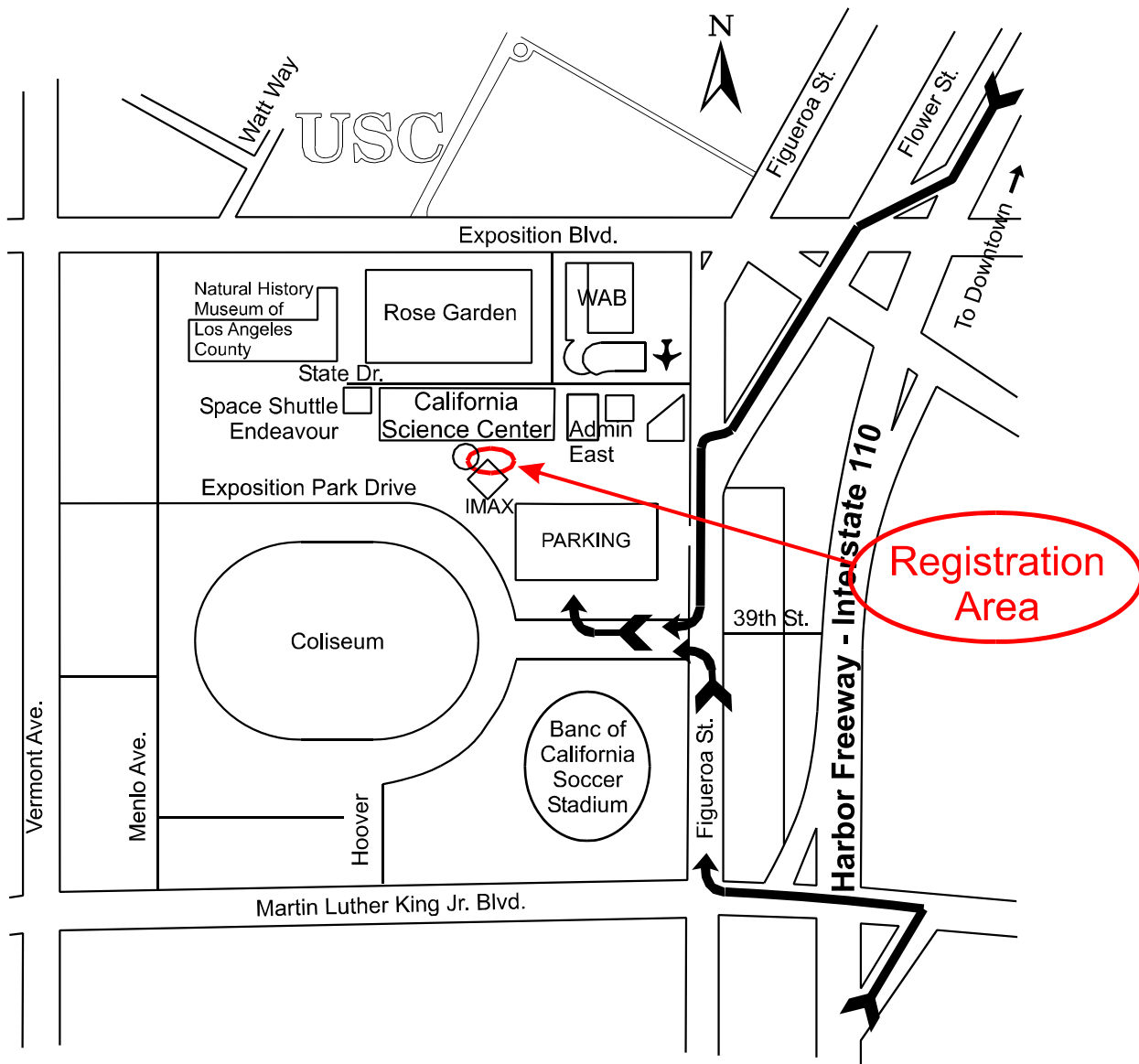
7:00 a.m.	Science Center opens for judges and participants only
8:00 a.m.	* Student Orientation Location: Big Lab, Wallis Annenberg Building
8:00 a.m.	All judges examine project displays before the First Judging Session. No interviews will be conducted at this time because students should <i>not</i> be present until 8:30 a.m.
8:30 - 10:30 a.m.	* First Session of Judging for all awards, in parallel. Includes: All Category Awards, All Special and Recognition Awards, Science Fair Student of the Year project reviews
9:00 a.m. - 12:00 p.m.	California Science & Engineering Fair Teacher of the Year Interviews Location: California Science Center Administrative Offices, Conference Room 3 (Third Floor)
10:30 - 11:00 a.m.	Scheduled Break in Judging. Students are free to leave the display area now. No interviews by any judges (for either Fair or external awards) will be conducted during this time.
11:00 a.m. - 12:30 p.m.	* Final Session of Judging for Category and Special Awards. Recognition Awards presented to winners at their projects.

Tuesday, April 24, 2018

12:30 p.m.	Judging Ends. All participants must exit the Science Center. All displays must remain in place until the Removal Time (below).
12:30 p.m.	Students are now free. First among the local opportunities is the Science Fair Seminar at 2:00 p.m. Other sites include California Science Center and IMAX Theater, Natural History Museum of Los Angeles County, California African American Museum, and USC.
12:30 p.m.	California Science & Engineering Fair Student of the Year Finalists Announced Location: Under the Rotunda, outside Science Center south doors
1:30 p.m.	California Science & Engineering Fair Student of the Year Interviews Location: California Science Center Administrative Offices, Conference Room 3 (Third Floor)
1:30 - 3:30 p.m.	Project Removal No projects may be removed before this time. All projects must be removed during this time. Unclaimed projects will be discarded.
2:00 - 3:00 p.m.	Science Fair Seminar for Everyone <i>How to Do a Better Science Fair Project</i> <i>Telling a Scientific Story: Presenting Data</i> Location: Admin East
4:00 - 5:30 p.m.	* Awards Ceremony Location: Big Lab, Wallis Annenberg Building <i>Closed to the public.</i> Only participants and award presenters will be admitted to the ceremony. Awards Ceremony Viewing Locations IMAX Theatre for Junior Division ticket holders Admin East for Senior Division ticket holders Only persons holding a ceremony viewing ticket will be admitted to these viewing rooms. Each CSEF participant will be given one division-specific ticket for distribution to an accompanying guest.

* Photographs will be taken, and press interviews (newspaper, radio, and TV) may be held at these times. Fair photographs will be posted to the World Wide Web. Please dress appropriately.

Map of Exposition Park and Vicinity





CALIFORNIA SCIENCE & ENGINEERING FAIR SIGNATURE CARD

Each participant must complete his/her own Signature Card. This includes each member of a team project.

Both the participant and a parent/guardian must sign the Signature Card.

In the first line, include the Application Confirmation Code which was provided to you when you completed your online application.

NAME OF APPLICANT (printed)	APP CONFIRMATION CODE E
BRIEF TITLE OF PROJECT (for confirmation of identification)	

In consideration of your permitting the undersigned student to take part in the California Science & Engineering Fair, we waive all claims against CSEF and all sponsors for injury to or death of persons or loss or damage of property in any way occurring in connection with CSEF, and we agree to indemnify and hold them harmless against all such liability. By the undersigned applicant's participation in the California Science & Engineering Fair, we agree that the applicant and applicant's project may be photographed, filmed, or taped, and that the California Science Center Foundation may use such photographs, film, or tape, and applicant's name and project description in connection with the California State Science Fair and the promotion of CSCF, and that we will not make any claim for invasion of privacy or any other legal right in connection with such uses by CSCF. We acknowledge and agree that CSCF may identify applicant's grade level and school. We have read and understood the regulations governing the California Science & Engineering Fair and agree to abide by them.

SIGNATURE OF APPLICANT	DATE SIGNED
SIGNATURE(S) OF PARENT(S)/ GUARDIAN(S)	DATE SIGNED



CALIFORNIA SCIENCE & ENGINEERING FAIR

APPLICATION FEE FORM

The 2018 Application Fee is \$45. Include this form with your payment.
Each participant must submit his/her own Application Fee. This includes each member of a team project.

In the first line, include the Application Confirmation Code which was provided to you when you completed your online application.

NAME OF APPLICANT (printed)	APP CONFIRMATION CODE E
BRIEF TITLE OF PROJECT (for confirmation of identification)	

METHOD OF PAYMENT:

☐ Check (or Money Order). Make payable to “California Science Center Foundation.”

Check (or Money Order) number: _____

☐ Cash. *Not Recommended.*

☐ Credit Card. Type: ☐ Visa ☐ Mastercard ☐ American Express ☐ Discover

CREDIT CARD NUMBER	EXPIRATION DATE
NAME AS PRINTED ON CREDIT CARD	
SIGNATURE OF CREDIT CARD HOLDER	DATE SIGNED

☐ Application Fee Waiver Request. Must include one (1) of the following to be approved:

- ☐ Letter from school showing applicant receives free/reduced price lunch
- ☐ Copy of applicant’s Medi-Cal card
- ☐ 2016 or 2017 tax form (1040, 1040EZ, etc) showing applicant’s name

Households with income at or below the following levels may be eligible:

Household Size	Year	Month	Twice Per Month	Every Two Weeks	Week
1	\$ 22,311	\$ 1,860	\$ 930	\$ 859	\$ 430
2	\$ 30,044	\$ 2,504	\$ 1,252	\$ 1,156	\$ 578
3	\$ 37,777	\$ 3,149	\$ 1,575	\$ 1,453	\$ 727
4	\$ 45,510	\$ 3,793	\$ 1,897	\$ 1,751	\$ 876
5	\$ 53,243	\$ 4,437	\$ 2,219	\$ 2,048	\$ 1,024
6	\$ 60,976	\$ 5,082	\$ 2,541	\$ 2,346	\$ 1,173
7	\$ 68,709	\$ 5,726	\$ 2,863	\$ 2,643	\$ 1,322
8	\$ 76,442	\$ 6,371	\$ 3,186	\$ 2,941	\$ 1,471
For each additional family member, add:					
	\$ 7,733	\$ 645	\$ 323	\$ 298	\$ 149