Lowcountry Regional Science and Engineering Fair

Educator’s Guidebook

an affiliate of the International Science and Engineering Fair
and the Broadcom MASTERS Competition

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Sponsored by:

Charleston Defense Contractors Association
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Charleston County Project Impact
The Lowcountry Regional Science and Engineering Fair (LSF) is the International Science and Engineering Fair (ISEF) and Broadcom MASTERS Competition affiliate for Berkeley, Charleston, Colleton, Dorchester, and Georgetown counties in South Carolina. The LSF is held annually in early April with registration due at the beginning-middle of March. At the LSF, students compete for national, regional, and local awards, as well as the opportunity to advance to the aforementioned competitions. The College of Charleston is the title sponsor for the LSF.

**Mark your Calendars**
- Tues, March 8, 2016: Registrations due; List of Participants due
- Tues, April 5, 2016: LSF Competition & Awards Ceremony

**Reminders for 2016**
- Competition & Awards Ceremony to be held same day*
- Groups arriving by bus should contact the fair director by March 2016 regarding parking
- Location: College of Charleston’s TD Arena, 301 Meeting Street, Charleston
- Dinner to be provided for students & 2 chaperones per school/home school association
- Senior Division Team Projects may have only 2 members

**Contents**
- **LSF Logistics (pgs 2-4)**
  - Dates
  - Schedule of Events
  - Location
  - Parking
  - Awards
- **LSF Rules (pgs 5-9)**
  - Eligibility
  - Divisions & Categories
  - Review Boards
  - Display & Safety Regulations
  - Identifying Marks
- **LSF Registration (pgs 10-12)**
  - Pre-Registration
  - List of Participants
  - Registration Packets
  - Registration Fees
  - Grades 5-8
  - Grades 9-12
**LSF Logistics**

**Dates**

Due to a full calendar (PASS testing, public and private school Spring Breaks, and religious holidays), the 2016 LSF competition and awards ceremony will be held on the same day. The LSF is scheduled for Tuesday, April 5, 2016 at the College of Charleston’s TD Arena (301 Meeting Street, Charleston, SC 29401). We realize this date is not ideal for everyone; however it was necessary to choose this date due to CofC basketball events.

Registration forms are due Tuesday, March 8, 2016. Refer to page 9 for more information.

**Schedule of Events**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:30</td>
<td>Check-in and set up exhibits (enter TD Arena on Meeting Street)</td>
</tr>
<tr>
<td>12:30</td>
<td>Category &amp; Special Awards Judges meeting in McAlister Hospitality Suite</td>
</tr>
<tr>
<td>1:00</td>
<td>Category and Special Award Judging</td>
</tr>
<tr>
<td>3:30</td>
<td>Break</td>
</tr>
<tr>
<td>3:30</td>
<td>Final Interview Judges meeting in McAlister Hospitality Suite</td>
</tr>
<tr>
<td>4:00</td>
<td>Announcement of 1st place category winners</td>
</tr>
<tr>
<td>4:15</td>
<td>Final Interviews to determine overall winners</td>
</tr>
<tr>
<td>6:00</td>
<td>Dinner for students in Finals Judging</td>
</tr>
<tr>
<td>6:00</td>
<td>Robotics Demo</td>
</tr>
<tr>
<td>7:00</td>
<td>Awards Ceremony</td>
</tr>
<tr>
<td>1.</td>
<td><strong>The LSF will be able to provide dinner for all student participants and two chaperones per school/home school association.</strong></td>
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</tbody>
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**Location**

The College of Charleston’s TD Arena is located at 301 Meeting Street, Charleston, SC 29401. Enter TD Arena through the main doors located on Meeting Street.

**Directions to TD Arena**

**From Eastbound Interstate 26**

Take I-26 East into Charleston until the freeway comes to an end. Take Exit 221-B (exits to the left) and follow the signs to Meeting Street. Bear right from the exit ramp on to Meeting Street (at the light). Proceed south 0.85 miles down Meeting Street. The TD Arena is on the right, just past the Calhoun Street/Meeting Street intersection.

**From Northbound Hwy 17**
Go southbound into Charleston over Cooper River Bridge, follow signs to Meeting Street. Proceed south exactly 0.85 miles down Meeting Street. The TD Arena is on the right, just past the Calhoun Street/Meeting Street intersection.

From Southbound Hwy 17
Go northbound across the Ashley River Bridge bearing right onto Lockwood Blvd, staying in the left hand lane. At the first light, after the overpass, turn left onto Calhoun Street. Turn right at the corner of Meeting Street and Calhoun Street. (Intersection - BP Station, hotel, First Citizens Bank). The TD Arena is on your right.

Parking
Any groups planning to arrive by bus should notify the fair director late March 2016 so parking arrangements can be made.

The map below shows the TD Arena (marked as the Carolina First Arena) with nearby parking. Please note that payment is required for each of these garages and lots.

Resizable map |

C of C Parking Garages
1. Gaillard Garage - Located on Alexander Street between Calhoun and George
2. St. Philip Street Garage - Located on St. Philip St. between George and Liberty
3. Wentworth Street Garage - Located on corner of St. Philip and Wentworth
4. CofC PG Garage - Located on St. Philip St. between Vanderhorst and Calhoun

Additional PUBLIC Parking
5. Francis Marion Garage - Located on King Street just off Marion Square
6. George Street Surface Lot - Located between Meeting and King
7. Wentworth/Renaissance Garage - Located on Wentworth between Meeting and King
8. Camden Exchange Garage - Located on John Street between Meeting and King
9. Aquarium Garage - Located on Calhoun Street between Washing and Concord

There are a number of city owned metered spaces around the TD Arena. Please observe all signage on parking areas to avoid being ticketed or towed.
Awards
Each student receives a signed Certificate of Participation. The following awards will be given at the LSF Awards Ceremony:

• A variety of national, regional, and local special awards
• First, Second, and Third Place Category Awards for each Division
• Overall First, Second, and Third Place for each Division
• Overall First Place Teacher Award for each Division
• Advancement to Broadcom MASTERS Competition for Middle School Students
• Advancement to ISEF for the 1st Place Overall Winner in the Senior Division and his/her teacher
LSF Rules

Eligibility

The LSF is open to public, private, and home school students in grades 5 - 12 from Berkeley, Charleston, Colleton, Dorchester, and Georgetown counties. Students are selected on the basis of excellence in their school/ home school association science fair or by the school's science department.

There is no limit to the number of projects a school or home school association can advance to the LSF.

Students not affiliated with a participating school or home school association science fair must submit a Pre-Registration Approval Form to the LSF director by Monday, February 15, 2016. This is only for students that have not had the opportunity to participate in a school or home school association science fair prior to the LSF. The LSF director will approve the project for participation by Friday, February 26, 2016, and the student may then register by Tuesday, March 8, 2016.

Pre-Registration Approval Form | http://lhsm.cofc.edu/lowcountry-science-fair/lsf-document.php

All students must register by Tuesday, March 8, 2016. Please see the registration requirements on page 9.

Divisions & Categories

Projects are divided into divisions and categories based on the student’s grade level and project theme.

Students in grades 5 & 6 compete against each other in the Junior 1 Division, and students in grades 7 & 8 compete in the Junior 2 Division. Students in grades 9 - 10 compete in the Senior 1 Division and grades 11-12 compete in the Senior 2 Division. The registration requirements are different for the Junior & Senior Divisions.

Each division is broken into 8 categories: Behavioral & Social Sciences, Biological Sciences (including Biomedical and Health Sciences), Chemistry & Biochemistry, Earth & Environmental Sciences, Engineering, Embedded Systems, & Mathematics (including Computer Science), Physics & Astronomy, Problem-Based, and Team Projects. Both Problem-Based and Team Projects may cover any discipline but are judged against other projects of the same category. A whole class can do problem-based efforts, but classes may send only 2-3 representatives to the fair. Teams may have up to 3 members for the Junior Divisions and 2 members for the Senior Division.

Please use the descriptions on the next page to help determine the best category for a project. In many cases, a project may fit into two different categories. The fair director reviews each project to ensure they are in the best category. A detailed project description helps determine which a category a project belongs.
Determining Project Categories

Behavioral & Social Sciences
• Human behavior
• Clinical, developmental, cognitive, & physiological psychology
• Sociology
(Does not include animal behavior)

Biological Sciences
• Animal sciences (development, ecology, husbandry, pathology, physiology, populations genetics, systematics)
• Plant sciences (agriculture, development, ecology, genetics, photosynthesis, physiology, systematics, evolution)
• Cellular & Molecular biology (genetics, immunology)
• Microbiology (antibiotics, antimicrobials, bacteriology, microbial genetics, virology)
• Biomedical and Health Sciences (disease diagnosis & treatment, epidemiology, physiology & pathology)

Chemistry & Biochemistry
• Analytical, inorganic, organic, physical chemistry
• Metabolism
• Structural biochemistry

Earth & Environmental Sciences
• Climatology & weather
• Geochemistry
• Mineralogy
• Paleontology
• Geophysics
• Tectonics
• Bioremediation
• Ecosystems management
• Environmental engineering
• Land resource management, forestry
• Recycling, waste management
• Air pollution & air quality
• Soil contamination & soil quality
• Water pollution & water quality

Engineering, Embedded Systems, and Mathematics
• Electrical & mechanical engineering (robotics, thermodynamics, solar)
• Materials & bioengineering (civil & construction engineering)
• Chemical engineering
• Industrial engineering
• Material science
• Aerospace and aeronautical engineering (aerodynamics)
• Alternative Fuels, Fossil Fuel Energy, & Renewable Energies
• Vehicle Development
• Applied mathematics
• Probability & statistics
• Algorithms & data bases
• Artificial intelligence
• Networking & communications
• Computational science & computer graphics
• Software engineering (programming languages)
• Computer system (operating system)
• Networking and data communication
• Optics and sensors

Physics & Astronomy
• Atoms, molecules, and solids
• Biological physics
• Instrumentation and electronics
• Magnetics & electromagnetics
• Nuclear and particle physics
• Optics, lasers, masers
• Theoretical physics
• Theoretical or computational astronomy
• Planetary science

Problem-Based Learning
• Whole, team-based, and individual projects
• Relevant problems to students and community
• Climate change, sea level rise, water pollution, etc.

Team Projects
• May cover any topic but work is complete by two students
**Review Boards**
Projects involving human subjects (including surveys and questionnaires), non-human vertebrates, pathogenic agents, controlled substances, recombinant DNA, or human/animal tissue must be approved by either an Internal Review Board or the Scientific Review Committee prior to experimentation.

Each school or home school association should have an **Internal Review Board** (IRB) to evaluate the potential physical or psychological risk of a project involving human subjects. All human research must be reviewed and pre-approved by the IRB before experimentation. This includes any surveys or questionnaires to be used in a project. The IRB should include:

- a science teacher,
- a school administrator,
- and one of the following: a psychologist, psychiatrist, licensed social worker, medical doctor, physician’s assistant, or a registered nurse.

The **Scientific Review Committee** (SRC) is appointed by the LSF director to review and preapprove experimental procedures for projects involving non-human vertebrates, pathogenic agents (including bacteria from the environment that is potentially pathogenic), controlled substances, recombinant DNA, and human/animal tissue to make certain they comply with the ISEF rules and any pertinent laws. Senior Division students (grades 9-12) should review the ISEF rules and forms prior to experimentation and submit any necessary paperwork to the LSF director for SRC approval. **These forms must be submitted prior to the fair review board meets in order to ensure eligibility.**

*ISEF rules and forms* | [https://student.societyforscience.org/international-rules-pre-college-science-research](https://student.societyforscience.org/international-rules-pre-college-science-research)

**Display & Safety Regulations**
The Exhibit Hall will be set up with six-foot tables and chairs. For the Junior Divisions, each six-foot table will hold two individual projects. The 3-foot allotted space will accommodate a standard tri-fold display board. Each team project will have a six-foot table.

Each Senior Division project will have its own six-foot table. Senior Division project must adhere to the ISEF maximum project size requirements:

- Depth (front to back): 30 inches or 76 centimeters
- Width (side to side): 48 inches or 122 centimeters
- Height (floor to top): 108 inches or 274 centimeters (including table height of 36 inches or 91 centimeters)

Students needing electricity for their display (120/220-volt AC only) may request it during the online registration. Students are responsible for bringing their own Underwriters Laboratories-approved cord of proper load-carrying capacity, which is at least nine feet long and equipped with a standard grounded plug.
Items not allowed:

- Living organisms, including plants
- Soil, sand, rock, cement and/or waste samples, even if permanently encased in a slab of acrylic
- Taxidermy specimens or parts
- Preserved vertebrate or invertebrate animals
- Human or animal food as part of the exhibitor demonstration of the project.
- Human/animal parts or body fluids (for example, blood, urine)
- Plant materials (living, dead, or preserved) that are in their raw, unprocessed, or non-manufactured state (Exception: manufactured construction materials used in building the project or display)
- All chemicals including water (Projects may not use water in any form in a demonstration)
- All hazardous substances or devices (Example: poisons, drugs, firearms, weapons, ammunition, reloading devices, and lasers)
- Items that may have contained or been in contact with hazardous chemicals (Exception: Item may be permitted if professionally cleaned and document for such cleaning is available)
- 3-D Printers
- Dry ice or other sublimating solids
- Sharp items (for example, syringes, needles, pipettes, knives)
- Flames or highly flammable materials
- Batteries with open-top cells or wet cells
- Glass or glass objects unless deemed by the Display and Safety Committee to be an integral and necessary part of the project (for example, glass that is an integral part of a commercial product such as a computer screen)
- Any apparatus deemed unsafe by the Scientific Review Committee, the Display and Safety Committee, or Society for Science & the Public (Example: large vacuum tubes or dangerous ray-generating devices, empty tanks that previously contained combustible liquids or gases, pressurized tanks, etc.)
- **Awards or medals from previous competitions.**
- Photographs or other visual displays of vertebrate animals in surgical techniques, dissections, or other lab procedures
- Any photograph, visual image, chart, table, and/or graph that is deemed offensive or inappropriate by the Fair Director and Judge Coordinator.

Other Information

- A project data book is not required but highly recommended.
- Project sounds, lights, odors, and other display items must not be distracting.
- The Fair Director and Judge Coordinator reserve the right to remove any project or item for safety reasons or to protect the integrity of the LSF and its rules and regulations.
- The LSF Display and Safety Regulations are based on the International Science & Engineering Fair Regulations. While planning their display, Senior Division (grades 9-12) students should review all ISEF Display & Safety Regulations.


**Identifying Marks**

Personal identifying markers such as last name and school name, including in display photographs, are not allowed on the front of the display. Students’ and school names may be written on the back of the display board.
Students should not wear clothing with their school name. This rule is to eliminate potential bias on the part of the judges. Exception: The LSF will concede to school rules regarding dress. Therefore, if a participating school requires uniforms to be worn during school outings, uniforms will be permitted. However, any identifying logos or names should be covered. Opaque tape will be available.
**LSF Registration**

**Pre-Registration**
Only students not affiliated with a participating school or home school association science fair must submit a Pre-Registration Approval Form to the LSF director by **Monday, February 15, 2016**. This is only for students that have not had the opportunity to participate in a school or home school association science fair prior to the LSF. The LSF director will approve the project for participation by **Friday, February 26, 2016**, and the student may then register by **Monday, March 8, 2016**.

⇒ Pre-Registration Approval Form | http://lhsm.cofc.edu/lowcountry-science-fair/lsf-document.php

**List of Participants**
A List of Participants must be submitted for each participating school or home school association by or on **Tuesday, March 8, 2016**. This is to ensure that all participants are correctly registered.

⇒ List of Participants (Word or PDF file) | http://lhsm.cofc.edu/lowcountry-science-fair/lsf-document.php

**Registration Packets**
The following registration packets were created for you to print, copy, and hand out to students to guide them through the registration process. Please use the appropriate packet for your students’ grade level. If the school is paying the registration fee, please use the packet that states “school pays fee”.

Registration Packets contain the following:

- Registration Checklist *(details all steps of the registration process)*
- Sample of Online Registration Questions
- Approval Form *(to be signed by the student, teacher, and parent/guardian)*
- Research Plan *(Junior Division only)*
- Category Descriptions
- LSF Logistics *(includes information on dates, schedule, location, parking, display & safety regulations, and identifying marks)*

⇒ Junior Divisions (grades 5-8) | http://lhsm.cofc.edu/lowcountry-science-fair/lsf-document.php
⇒ Junior Divisions (grades 5-8); school pays fee | http://lhsm.cofc.edu/lowcountry-science-fair/lsf-document.php
⇒ Senior Division (grades 9-12) | http://lhsm.cofc.edu/lowcountry-science-fair/lsf-document.php
⇒ Senior Division (grades 9-12); school pays fee | http://lhsm.cofc.edu/lowcountry-science-fair/lsf-document.php

**Registration Fees**
Registration fees are $25 per individual project and $30 per problem-based or team project. Registration fees are due with the paperwork on **Tuesday, March 8, 2016** and are non-refundable. Checks should be made payable to the “College of Charleston”. Payment online is preferred –

Please note when registering a team project, each team member will receive an automated invoice for $30. However, team members should split the cost of the fee and only send a check for his/her portion of the fee. Each team member should not pay the entire fee of $30.

A limited number of fee waivers are available based on need. Please contact the fair director for a fee waiver form.

**Registration for Students in Grades 5-8 (Junior Divisions)**

Students in the Junior Divisions should complete the online registration, and submit a hard copy of the Approval Form and Research Plan along with the registration fee by or on Tuesday, March 8, 2016.

For team projects, each student should submit their own online registration and Approval Form. Research Plans may be submitted jointly. During the online registration, select “Team Project” under the Category heading. To avoid confusion, each team member should enter the same project title and description.

The link to the online registration is http://blogs.cofc.edu/lowcountryhall/lowcountry-science-and-engineering-fair-registration/.

**Registration Students in Grades 9-12 (Senior Division)**

Students in the Senior Division should complete the online registration, and submit a hard copy of the Approval Form, ISEF Forms 1, 1A, and 1B, and any other appropriate ISEF forms along with the registration fee by or on Tuesday, March 8, 2016.

It is recommended that students use the ISEF Rules Wizard to identify the appropriate ISEF forms for their project.


For team projects, each student should submit their own online registration and Approval Form. Research Plans may be submitted jointly. During the online registration, select “Team Project” under the Category heading. To avoid confusion, each team member should enter the same project title and description.

The link to the online registration is http://blogs.cofc.edu/lowcountryhall/lowcountry-science-and-engineering-fair-registration/.