SCIENCE FAIR

JUDGES GUIDELINES
Welcome to the Ventura County Science Fair

With nearly 500 students participating, we have come a long way since a handful of students competed in our first county science fair in 1955.

This year California Lutheran University is coordinating the Technology, Engineering and Mathematics (STEM) Expo, an interactive expo with a strong focus on local industry including biotechnology and agriculture.

With categories from Animal Behavioral and Social Sciences to Zoology, the science fair is designed to promote, encourage, showcase and reward the achievements of our students in the various fields of science. By developing skills in science, technology, engineering and mathematics, students are laying the groundwork for their future success.

Spreading the excitement of science is a cooperative education effort. Without the help and support of our sponsors, volunteers, parents, and teachers, this worthwhile event would not be such a great success. On behalf of my office and the Ventura County Science Fair, I thank you for your participation and hard work, and look forward to a fun, successful, and educational event.

Sincerely,

John E. Tarkany, Coordinator
Ventura County Office of Education
Judging Schedule:

8:00-9:00: Judges’ Breakfast and Orientation

9:00-10:00: Judges survey project displays. Begin scoring the projects at this time using the Scoring Worksheet. No students present. (No students, parents or advisors)

10:00-Noon: Meet with student groups at their project displays for Oral Presentations. (Students and Judges only, no parents or advisors)

Noon-1:00 Lunch Served and Project Viewing

1:00-3:00 Meet with the other judging teams in your category and division to come to a consensus on 1st, 2nd, 3rd, and Honorable Mention awards for all projects in the division and category (1 project per place please) utilizing the Project Comparison & Ranking Worksheet. Record your 1st, 2nd, 3rd, and Honorable Mention winners on the Ranking Worksheet. Lead Judge should turn this in as soon as possible to the Judges’ Station. Turn in materials at Judges’ Station when finished.
Science Fair Project Categories:

**Life Sciences:**
**Animal Behavioral and Social Sciences:** Animal behavior, social and community relationships—psychology, sociology, linguistics (ie. Dolphin communication), learning, perception, etc.

**Human Behavioral and Social Sciences:** Human behavior, social and community relationships—psychology, sociology, anthropology, archaeology, ethnology, linguistics, learning, perception, urban problems, reading problems, public opinion surveys, educational testing, etc.

**Amgen® Biochemistry:** Chemistry of life processes—molecular biology, molecular genetics, enzymes, photosynthesis, blood chemistry, protein chemistry, food chemistry, hormones, etc.

**Botany:** Study of plant life—agriculture, agronomy, horticulture, forestry, plant taxonomy, plant physiology, plant pathology, plant genetics, hydroponics, algae, etc.

**Human Biology:** Study of diseases and health of humans— genetics, physiology, dentistry, pharmacology, pathology, ophthalmology, nutrition, dermatology, allergies, speech and hearing, etc.

**Microbiology:** Biology of microorganisms—bacteriology, virology, protozoology, fungi, bacterial genetics, yeast, etc.

**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.

**Zoology:** Study of animals—animal genetics, ornithology, ichthyology, herpetology, entomology, animal ecology, paleontology, cellular physiology, circadian rhythms, animal husbandry, cytology, histology, animal physiology, invertebrate neurophysiology, studies of invertebrates, etc.

**Physical Sciences:**
**Chemistry:** Study of nature and composition of matter and laws governing it—physical chemistry, organic chemistry (other than biochemistry), inorganic chemistry, materials, fuels, pesticides, metallurgy, soil chemistry, etc.

**Earth, Space and Environmental Sciences:** Study of earth and celestial bodies with regard to geology, mineralogy, physiography, oceanography, meteorology, climatology, astronomy, speleology, seismology, geography, study of pollution (air, water, and land) sources and their control; ecology etc.

**HAAS® Engineering:** Technology; projects that directly apply scientific principles to manufacturing and practical uses—civil, mechanical, aeronautical, chemical, electrical, photographic, sound, automotive, marine, heating and refrigerating, transportation, environmental engineering, etc.

**Mathematics, Computer Science and Electronics:** Development of formal logical systems, numerical and algebraic computations, and their applications, semiconductors, development of hardware and/or software for communications, graphics, simulations, and information theory...

**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.

**Physics:** Theories, principles, and laws governing energy and the effect of energy on matter—solid state, optics, acoustics, particle, nuclear, atomic, plasma, superconductivity, fluid and gas dynamics, thermodynamics, semiconductors, magnetism, quantum mechanics, biophysics, etc.
The Judge/Student Relationship:
Do not ask students for their phone numbers, contact a student without going through the Science Fair Committee, or make inappropriate comments of a personal nature. Such behavior is sufficient grounds for barring a judge from future fairs. It is important to remember that students participating in the Ventura County Science Fair are of junior high school and high school age. They are not adults. The relationship of student to judge is that of a minor to an adult in a position of authority. It is the responsibility of all judges to ensure that all interactions between themselves and the students are in the best interests of the students.

Treat each student with respect. This should be self-evident, but is sometimes overlooked. While these students are young, they are aspiring, although inexperienced, scientists. Acknowledge them and their projects with due consideration, even if the science is flawed. Introduce yourself, be polite, and try to put the student at ease. Be encouraging and make it fun.

The Judging Process:
In order to make the best use of your time we will be using the following procedure:
1. You will sit with all of the judges for your division and category. Example: Junior (grades6-8): Physics.
2. Decide upon a “Category Judging Team Leader”.
3. Each Project Notebook on average contains 10 projects for your division and category to be judged.
4. Your task is to evenly distribute your Project Notebooks to judging teams. For example, here is what you might do:
   A. On your table will be the Project Notebooks you are to assign judging teams to.
   B. Count the number of judges present for your category and division. Example: 12 judges.
   C. Divide the number of judges by 2 or 3. The result will be the number of teams. Example: 12 judges/3 = 4 teams of 3 judges or 12/2 = 6 teams of 2 judges.
   D. Each “Judging Team” should then be assigned a specific Project Notebook. If this does not work out evenly for your Division and Category let someone know at the judges’ desk and we will come around to your table to insure that the Project Notebooks are evenly distributed.
5. Some general parameters:
   A. If at all possible, try to have each student speak to all of the judges on the team. This is a very difficult goal to achieve. Try to be creative.
   B. If there are college student judges present, try to place no more than one college student judge per team of judges.
6. Make a general plan of action for the day. Due to time constraints, judging must be completed by 4:00 P.M.
7. Review all projects to which your team is assigned.
8. Form an idea about the top four projects from those you were assigned in your Division and Category.
9. Use the Individual Project Scoring Worksheet (sample on Page 8) as your evaluation tool in the judging process. This can also be used to help you fill out the Individual Project Feedback Forms. You will have the opportunity to place the Individual Project Feedback Forms with the projects between 2:30 and 3:00 P.M. These are very important feedback forms for the students. This is your opportunity to share your expertise and knowledge with the student.
10. Collaborate with the other judging teams in your Division and Category to develop mutual consensus on the 1st, 2nd, 3rd and honorable mention winners (Revisit the top projects if you need to). Use the Final Four Ranking Worksheet (sample on page 10), PICK-UP FROM JUDGES STATION to do this. All judges must sign or initial this Final Four Ranking Worksheet.
11. The category team leader will then turn in the Final Four Ranking Worksheet at the JUDGES STATION along with the Project Notebook and Individual Project Scoring Worksheets. Judges will then place their Individual Project Feedback Forms with the projects between 2:30 and 3:00 P.M.

What to Expect from the Students
Judges should expect the students to be able:
- To define scientific or engineering terms and describe any methodology or equipment used during the course of the project.
- To explain the thought processes and steps taken at each stage. The depth of these descriptions and explanations should be commensurate with the age of the student and the level of sophistication of the project.
What Students Expect:
- The students want feedback from you about their projects, and judges are encouraged to give the students constructive criticism.
- While a student may use the information learned from one judge in responding to another, this usually becomes apparent during the team deliberations as judges compare student interviews.

Project Evaluation
The projects represent a wide range of student abilities and sophistication. The quality of the student abstracts and project displays should be judged together with the student interview. Each project should be judged against other projects in the category, not against projects from other years, or in other categories.

Students will usually prepare a statement or speech for the judges describing their project. The students may use note cards and visual aids. These aids might help to alleviate nervousness and organize thoughts. Occasionally these statements can go on for several minutes and judges will have to interrupt the student to ask questions. Some judges prefer to start by asking questions from the abstract or the project display itself.

Many judges will interrupt the student once a question has been answered to their satisfaction. While this is a common technique, judges should be aware that students competing for the first time, in particular, may be upset by this interruption. An interruption may be taken by the student as an indication that the judge is not interested in what they have to say. Some assume (occasionally correctly) that the judge does not understand the project since they were not given a chance to give a complete explanation. This is less likely to occur if judges are patient and polite.

Judging the Science
It is important that judges keep in mind that all projects, regardless of the number of participants, are to be evaluated primarily on the quality of the personal contribution(s) of the student(s) to the science in evidence. In order for the judge to be able to evaluate the level of science of a team project, it is essential that all students in the team participate in the interview (unless otherwise acknowledged). All students on the team, like the individual, should have general and specific knowledge of the project, such as how the question was conceived and subsequently attempted to be answered. The judge has the freedom to ask a question of anyone on the team. However, the judge should be aware that team members have the equivalent freedom to choose a spokesperson and may refer a particular question to a specialist.

- The only written records required from each judge are his or her initials and/or signature where appropriate on the Final Four Ranking Worksheet, that will be turned in at the judges table at the end of the day, and the comments on the Individual Project Feedback Form to be left at the student’s project.

Guidelines for Judging the Interviews
Two of the purposes of the Ventura County Science Fair are to stimulate an active interest in science and engineering in students, and to provide an educational experience through exposure to expert judges. This year, projects are to be set up in clusters to allow for easier movement, viewing, sharing, and judging. If we have enough judges, then most judging teams can stay at the cluster for the orals and will not have to move outside. Should the groups be too large to stay at the cluster and need to move outside, please be sure all of the students are present before leaving the area. It is very difficult to find the judging groups once they leave.

Include all students in all discussions. Each student presentation should last three to four minutes and then be open for questions from judges and peers. This format results in a win-win situation:
- It ensures that each project is seen by all judges to ascertain its potential for winning.
- It generates a mix of judges’ knowledge and personalities.
- As judges interview all students, they will be able to more accurately determine the quality of projects in the category. It ensures that each judge interviews each finalist in order to come to a consensus regarding placement awards.
- Students have an opportunity to meet with and learn from professional scientists and engineers. They benefit from comments from both judges and peers, regardless of the caliber of the project.
- Students respond better in a group; they get involved and learn more.
- These discussion/interviews multiply and diversify the experiences of students and judges.

While your group of students gives their oral presentations, there are some general guidelines that must be followed:
1. If your team stays in the building for presentations, then all teams in that category need to do the same in order for the judging to be fair.
2. Your group of students must stay together and not wander around.
3. If your group of students is through with their oral presentations before the scheduled dismissal time, you may dismiss them to the designated waiting area. This will cut down on wandering students.

Logistically, time must be limited and controlled in most categories. Brief interviews may not satisfactorily determine the extent of a student’s knowledge of a project, while extended interviews can slow the judging process and result in some students not being given adequate time to present.

**Criteria and Standards for Judging:**

**Scientific Research Projects** should demonstrate the Scientific Method. Students should design projects that produce quantitative data through experimentation, followed by an analysis of that data. The Scientific Method may be described differently in different sources but the underlying approach has these steps:

1. State the problem.
2. Research the topic.
3. Form a hypothesis.
4. Test the hypothesis.
5. Collect and record observations.
6. Summarize your observations and data into charts, tables, and graphs.
7. Form a conclusion.
8. Communicate the findings.

**Engineering projects** which involve designing and developing a device or process with specific objectives should demonstrate the Engineering Goals. Engineering Goals involve repeated testing and refining as the final goal is approached. A good engineering project should

1. Identify the potential user’s needs and state the objective(s) clearly.
2. Research what has already been done.
3. Prepare preliminary designs and a materials list considering costs, manufacturing and user requirements.
5. Analyze the performance and compare it the original objectives.
6. Improve design or construction and retest as necessary.
7. Document the results of each step and compile into a report.

The following numerical guidelines should be taken as indications of the importance of each criterion. Always remember, the project is being judged as a whole. Written and oral communication describing the project should clearly demonstrate the depth and breadth of the student’s understanding of the topic and his or her conclusions, based on sound scientific investigation.

30%: **Research:** Originality of the problem, content, logical presentation, support of hypothesis and bibliography.

30%: **Experimental Procedure:** Procedure and materials, illustrations, data collection, data analysis and conclusion.

15%: **Oral Presentation:** Expressed knowledge of subject and background information. Stated value of the project. Demonstrates understanding of scientific or technical procedure. Overall quality of presentation and ability to answer questions effectively.

15%: **Display:** Creatively designed. Complete. Neat and organized.

10%: **Completeness and Overall Quality:** Written and oral communication describing the project. Clearly demonstrates the depth and breadth of the students understanding of the topic and his or her conclusions based on sound scientific investigation.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Subtotal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall Quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Original Hypothesis Addressed and Future Research</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Word Processing, Spreadsheets</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagrams, Illustrations, Photos</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Procedure/Questions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value &amp; Applications</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge/Vocabulary</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conclusion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Analysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of Data</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagrams, Illustrations, Photos</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variables, Constants, Controls</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Procedure &amp; Material List</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bibliography</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypothesis or Engineering Goal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clarity and Organization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scope of Research</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depth of Research</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Originality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

Special Thanks to Steve Johnson for Scoring Rubric Design.
**Determining the Winners:**

- Maintain balance in evaluating the project and the student's accomplishments.
- Judges should agree on a method of choosing the winner. It is suggested that you use the CRITERIA AND STANDARDS FOR JUDGING listed above as a guideline.
- After the orals, judges should meet together to decide on the winners.
- One trophy is available for each place and medals for honorable mention in each category. Ties are difficult to manage. Should the category feel strongly that there is a tie, the production of another trophy may be considered.
- Every judge in your category and division must initial the final, *Final 1st-4th Place Ranking Worksheet*. This should be turned in at the Judges' Station as soon as it is completed.
- Winners should not be told. They will be announced at the Awards Ceremony on Monday.
- Please make sure every student in your category gets at least one *Individual Project Feedback Form*.
- The Individual Project Feedback Form asks the following 2 questions for you the judge to answer and leave with the project:
  1. Identify any key strengths that the student demonstrated in their science fair project presentation:
  2. What would you as a judge like to see the student do further research on for next year?
### Final 1<sup>st</sup> - 4<sup>th</sup> Place

**Division Grade Level**

**Project Category**

**Project #’s:**

<table>
<thead>
<tr>
<th>Place</th>
<th>1&lt;sup&gt;st&lt;/sup&gt;</th>
<th>2&lt;sup&gt;nd&lt;/sup&gt;</th>
<th>3&lt;sup&gt;rd&lt;/sup&gt;</th>
<th>4&lt;sup&gt;th&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project ID:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>