

# 2010 OKLAHOMA SCIENCE & ENGINEERING FAIR

## FOREWORD

The Oklahoma Science & Engineering Fairs and the Oklahoma Junior Academy of Science competitions will involve students in dynamic scientific experiences. The participating students will be able to view the world through the eyes of science and develop skills needed to exist in today's increasingly technological society.

The format of the activities provides students with tools to reach their full potential in leadership, creativity, critical thinking and problem-solving skills. The State Department of Education appreciates the efforts of students and teachers who participate in the Oklahoma State Science and Engineering Fair (OSSEF), affiliated regional science fairs and the Oklahoma Junior Academy of Science.

Sandy Garrett  
State Superintendent of Public Instruction

## OSSEF BOARD OF DIRECTORS

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## OKLAHOMA SCIENCE FAIR COMPETITIONS

In the Oklahoma Science and Engineering Fair programs the main emphasis is on individual scientific research. These programs help students to learn how to conduct research activities and how to explain the results of their work through both written and oral presentations. Science and engineering fairs in Oklahoma are progressive in that students earn the opportunity to move from local level events at individual schools to competitions at regional, state, and international levels. Students who participate in the fairs have the opportunity to win numerous awards that include cash awards, scholarships and exciting trips.

A good way to begin is to visit with a science teacher at your school about a research project of your

own. You may also want to contact the director of the regional science fair in your area for more information. You can find information concerning the regional science fair competitions and the state level competition known as the Oklahoma State Science and Engineering Fair (OSSEF) in this brochure and on the Internet at <http://ossef.ecok.edu> .

## ISEF RULES AND REQUIREMENTS

The OSSEF and the regional science and engineering fairs in Oklahoma are affiliated with the International Science and Engineering Fair (ISEF) conducted by the *Society for Science and the Public* ( <http://www.societyforscience.org/index.html> ). All students who participate in the OSSEF and all affiliated fairs must comply with the current year's rules set forth by the *Society for Science and the Public* which are normally available well in advance of the OSSEF and ISEF competitions. Highlights are available at <http://www.societyforscience.org/isef/rules/rules5.pdf>

In order to comply with ISEF Rules, all participants must adhere to the following rules. Forms mentioned in these requirements can be found in the publication described in the previous paragraph and as separate documents on the *Society for Science and the Public* website. The website also includes a "Rules Wizard" to help students determine which forms are required for their projects.

- 1) Every student must meet with his or her Adult Sponsor to complete the Checklist for Adult Sponsor (Form 1) before beginning any experimentation.
- 2) Certain projects require additional forms. Experiments that involve human subjects, vertebrate animals, potentially hazardous biological agents including pathogenic microorganisms and biological tissues or hazardous chemicals, activities or devices must receive pre-approval from an Institutional Review Board (IRB) or Scientific Review Committee (SRC) before experimentation begins.
- 3) This project year includes research conducted over a maximum continuous 12-month period between January 2009 and May 2010. All domestic and international students competing in an ISEF-affiliated fair must adhere to all of the rules.
- 4) Each student should display a project data book and a research paper.
- 5) All signed forms, certifications, and permits must be available for review by a SRC before each fair that a student enters. We recommend these be kept in a notebook or folder.
- 6) Any proposed changes in the Research Plan by the student after initial IRB/SRC approval must have subsequent IRB/SRC approval before experimentation begins/resumes.
- 7) Any continuing project must document that the additional research is new and different from prior work. Include a copy of the previous year's abstract and Research Plan and attachments along with a completed Continuation Project Form (7) as described in ISEF rules and guidelines.
- 8) Certain types of research studies and activities are prohibited including: induced toxicity studies on vertebrate animals, behavioral experiments involving operant conditioning of vertebrate animals with aversive stimuli, projects which cause more than momentary pain or suffering to vertebrate animals or which are designed to kill vertebrate animals, pain studies, predator/prey experiments, studies involving work at Biosafety Levels 3 or 4, production or genetic engineering of bacteria with multiple antibiotic resistance and others.
- 9) Experimentation with potentially hazardous biological agents including Biosafety Level 1 organisms is prohibited in a home environment.

**COUNTIES SERVED BY REGIONAL SCIENCE FAIRS**

|                       |  |
|-----------------------|--|
| Adair                 | Muskogee Science and Engineering Fair          |
| Alfalfa               | Northwestern State Univ. Regional Science Fair |
| Atoka                 | Eastern Oklahoma Regional Science Fair         |
| Beaver                | Northwestern State Univ. Regional Science Fair |
| Blaine                | Northwestern State Univ. Regional Science Fair |
| Canadian              | Central Oklahoma Regional Science Fair         |
| Cherokee              | Muskogee Science and Engineering Fair          |
| Choctaw               | Eastern Oklahoma Regional Science Fair         |
| Cimmaron              | Northwestern State Univ. Regional Science Fair |
| Cleveland             | Central Oklahoma Regional Science Fair         |
| Coal                  | East Central Oklahoma Regional Science Fair    |
| Craig                 | Northeastern A&M Science Fair                  |
| Creek                 | Tulsa Regional Science and Engineering Fair    |
| Delaware              | Northeastern A&M Science Fair                  |
| Dewey                 | Northwestern State Univ. Regional Science Fair |
| Ellis                 | Northwestern State Univ. Regional Science Fair |
| Garfield              | Northwestern State Univ. Regional Science Fair |
| Grady                 | Central Oklahoma Regional Science Fair         |
| Grant                 | Northwestern State Univ. Regional Science Fair |
| Harper                | Northwestern State Univ. Regional Science Fair |
| Haskell               | Eastern Oklahoma Regional Science Fair         |
| Hughes                | East Central Oklahoma Regional Science Fair    |
| Kay                   | Central Oklahoma Regional Science Fair         |
| Kingfisher            | Central Oklahoma Regional Science Fair         |
| Latimer               | Eastern Oklahoma Regional Science Fair         |
| LeFlore               | Eastern Oklahoma Regional Science Fair         |
| Lincoln               | Central Oklahoma Regional Science Fair         |
| Logan                 | Central Oklahoma Regional Science Fair         |
| Major                 | Northwestern State Univ. Regional Science Fair |
| Mayes                 | Northeastern A&M Science Fair                  |
| McClain               | Central Oklahoma Regional Science Fair         |
| McCurtain             | Eastern Oklahoma Regional Science Fair         |
| McIntosh              | Muskogee Science and Engineering Fair          |
| Muskogee              | Muskogee Science and Engineering Fair          |
| Noble                 | Central Oklahoma Regional Science Fair         |
| Nowatta               | Bartlesville Regional Science Fair             |
| Okfuskee              | East Central Oklahoma Regional Science Fair    |
| Oklahoma              | Central Oklahoma Regional Science Fair         |
| Oklahoma City Schools | Oklahoma City Science and Engineering Fair     |
| Okmulgee              | Muskogee Science and Engineering Fair          |
| Osage                 | Bartlesville Regional Science Fair             |
| Ottawa                | Northeastern A&M Science Fair                  |
| Pawnee                | Central Oklahoma Regional Science Fair         |

## 2010 OKLAHOMA SCIENCE & ENGINEER

|              |  |
|--------------|--|
| Payne        | Central Oklahoma Regional Science Fair         |
| Pittsburg    | Eastern Oklahoma Regional Science Fair         |
| Pontotoc     | East Central Oklahoma Regional Science Fair    |
| Pottawatomie | East Central Oklahoma Regional Science Fair    |
| Pushmataha   | Eastern Oklahoma Regional Science Fair         |
| Rogers       | Bartlesville Regional Science Fair             |
| Seminole     | East Central Oklahoma Regional Science Fair    |
| Sequoyah     | Muskogee Science and Engineering Fair          |
| Texas        | Northwestern State Univ. Regional Science Fair |
| Tulsa        | Tulsa Regional Science and Engineering Fair    |
| Wagoner      | Muskogee Science and Engineering Fair          |
| Washington   | Bartlesville Regional Science Fair             |
| Woods        | Northwestern State Univ. Regional Science Fair |
| Woodward     | Northwestern State Univ. Regional Science Fair |

### **Northwestern State Univ. Regional Science Fair:**

Beaver, Harper, Woods, Alfalfa, Grant, Ellis, Woodward, Major, Garfield, Dewey, Cimarron, Texas, Blaine

### **Bartlesville Regional Science Fair:**

Nowata, Osage, Rogers, and Washington

### **Central Oklahoma Regional Science Fair:**

Kingfisher, Logan, Payne, Lincoln, Canadian, Pawnee, Grady, Kay, Noble, Oklahoma (except OKC), Cleveland, McClain

### **Northeastern A & M Science Fair:**

Craig, Ottawa, Mayes, Delaware

### **Muskogee Science & Engineering Fair:**

Adair, Cherokee, Wagoner, Okmulgee, Sequoyah, Muskogee, McIntosh

### **Oklahoma City Science & Engineering Fair:**

Oklahoma City Schools

### **East Central Oklahoma Regional Science Fair:**

Pottawatomie, Pontotoc, Coal, Hughes, Okfuskee, and Seminole

### **Tulsa Regional Science & Engineering Fair:**

Tulsa and Creek

### **Eastern Oklahoma Regional Science Fair:**

Atoka, Choctaw, Haskell, Latimer, LeFlore, McCurtain, Pittsburg, Pushmataha

## FAIR DATES AND CONTACT INFORMATION

### **Oklahoma State Science and Engineering Fair:**

ADA - March 25-27, 2010. Director: Dr. Doug Weirick, Department of Environmental Science, East Central University, Ada, OK 74820, <http://ossef.ecok.edu> , 580-559-5548, (Fax) 580-559-5606, e-mail: [dweirick@ecok.edu](mailto:dweirick@ecok.edu)

### **Northwestern State Univ. Regional Science Fair:**

ALVA - To be announced. Directors: Dr. Steven Thompson and Mr. Steven Maier, Department of Natural Science, Northwestern Oklahoma State University, 709 Oklahoma Blvd., Alva, OK, 73717, <http://ranger3.nwosu.edu/science/fair/>, 580-327-8566 and 580-327-8562, (Fax) 580-327-8556, email: [sdthompson@nwosu.edu](mailto:sdthompson@nwosu.edu) and [sjmaier@nwosu.edu](mailto:sjmaier@nwosu.edu)

### **Bartlesville District Science Fair:**

BARTLESVILLE - To be announced. Director: Mr. Lee Carvell, Bartlesville District Science Fair, Chevron Phillips Chemical Company, 201-H ARB, Plastics Technical Center, Bartlesville, OK 74004, <http://www.bartlesville.org/sciencefair/> , 918-661-3450, (Fax) 918-661-0311, e-mail: [CARVELA@cpchem.com](mailto:CARVELA@cpchem.com)

### **Central Oklahoma Regional Science Fair:**

EDMOND - To be announced. Director: Dr. Elizabeth Allan, University of Central Oklahoma, 100 N. University Drive, Box 89, Edmond, OK 73034-5209, <http://cms.ucok.edu/ScienceFair/> , 405-974-5775, (Fax) 405-974-3824, e-mail: [eallan@uco.edu](mailto:eallan@uco.edu)

### **Northeastern A & M Science Fair:**

MIAMI - To be announced. Director: Julie Rohde, Northeastern OK. A & M College, 200 I Street N.E., Miami, OK 74357, <http://www.neo.edu/> , 918-540-6271, (Fax) 918-540-6270, email: [jrohde@neo.edu](mailto:jrohde@neo.edu)

### **Muskogee Science and Engineering Fair:**

MUSKOGEE - To be announced. Director: Mr. James Wilson, The Best Center, 202 West Broadway, Muskogee, OK 74401, (Fax) 918-684-3777. e-mail: [jim-wilson@mpsi20.org](mailto:jim-wilson@mpsi20.org)

### **Oklahoma City Science and Engineering Fair:**

OKC - To be announced. Director: Dr. Terry Conley, Oklahoma City University, 2501 N. Blackwelder, Oklahoma City, OK 73106, <http://www.okcu.edu/biology/fair.aspx>, 405-208-5482, (Fax) 405-208-5447, email: [tconley@okcu.edu](mailto:tconley@okcu.edu)

### **East Central Oklahoma Regional Science Fair:**

SEMINOLE - To be announced. Director: Mr. Dave Helseth, Seminole State College, 2701 Boren Blvd., Seminole, OK 74868, <http://www.sscok.edu/sciencefair.htm>, 405-382-9235 , e-mail: [d.helseth@sscok.edu](mailto:d.helseth@sscok.edu)

### **Tulsa Regional Science and Engineering Fair:**

TULSA - To be announced. Director: Mr. Dick Mattes, 6018 S. 74th East Avenue, Tulsa, OK 74145-9322, 918-622-3947, e-mail: [trsefd@cox.net](mailto:trsefd@cox.net)

### **Eastern Oklahoma Regional Science Fair:**

WILBURTON - To be announced. Director: Mr. Maurice Hawthorne, Eastern Oklahoma State College, 1301 West Main, Wilburton, OK 74578, [http://www.eosc.edu/academic/science\\_div.html](http://www.eosc.edu/academic/science_div.html), 918-465-1816, (Fax) 918-465-4475, e-mail: [mhawthorne@eosc.edu](mailto:mhawthorne@eosc.edu)

## CATEGORIES OF COMPETITION

### Regional Science and Engineering Fairs

At the regional competitions, the categories of competition may vary but will be similar to those at the state or international competition. You should contact your regional science fair director for this information.

### Oklahoma State Science and Engineering Fair

Students will compete in either Division I (Grades 10 - 12) or Division II (Grades 7 - 9) and in one of the following categories within the appropriate Division:

**Behavioral and Social Sciences**  
**Biochemistry, Medicine, and Health Sciences**  
**Microbiology**  
**Earth and Space Sciences**  
**Engineering**

**Environmental Science**  
**Mathematics and Computer Science**  
**Physical Science**  
**Zoology and Botany**  
**Team Projects**

Projects in all subject areas that are conducted by two or a maximum of three students compete in the Team Projects category in Division I or Division II. To compete in the Division II Team Projects category, all team participants must be in grades 7 - 9. Team projects are eligible for competition at the International Science and Engineering Fair (ISEF) and must comply with all ISEF rules and limitations.

## PLACING YOUR PROJECT IN THE APPROPRIATE CATEGORY

The following information may help in selecting the proper category for your project but the director of your regional fair will have the final authority on categories.

**Behavioral and Social Sciences:** All projects that primarily involve studies of behavior or mechanisms of a social system.

**Biochemistry, Medicine, and Health Sciences:** All projects that primarily involve molecular biology or investigations of proteins, nucleic acids, or other biological molecules, blood or food chemistry, as well as projects related to the fields of medicine and health such as medicine, dentistry, optometry, speech, and hearing.

**Microbiology:** All projects that primarily involve investigations of microorganisms.

**Earth and Space Sciences:** All projects that primarily involve investigations in geology, astronomy, weather, aviation and aerospace.

**Engineering:** All projects that primarily involve technical and utilitarian applications in aeronautical, biomedical, chemical, civil, electrical, mechanical and other engineering areas.

**Environmental Science:** All projects that primarily involve investigations of the quality of the human or natural environment.

**Mathematics and Computer Science:** All projects that primarily involve investigations in mathematics, such

as number systems and/or their properties. All computer projects that primarily deal with the study and development of hardware, software, communications, graphics, networking or computational science including data structures, encryption, coding and information theory.

**Physical Science:** All projects that primarily involve investigations in physics and chemistry.

**Zoology and Botany:** All projects that primarily involve investigations in animal and plant life.

**Team Projects:** All studies in any of the above categories that are conducted by 2 or 3 students.

## STATE SCIENCE & ENGINEERING FAIR AWARDS

### Category Awards

Category awards are made to the first, second, third and fourth place projects in both divisions. All exhibitors in grades 9 -12 will compete for a trip to the ISEF. Special award winners are selected without consideration of grade level unless otherwise specified by the sponsor.

1. Each participant in the Oklahoma State Science Fair will receive a certificate of participation and a medal.
2. In each division, first, second, third and fourth place awards for each of the ten categories will be given. These awards consist of a certificate, a medallion, and a cash award as indicated below. The fourth place award is a certificate.

| <b>Division I</b> |                 | <b>Division II</b> |                |
|-------------------|-----------------|--------------------|----------------|
| <b>1st Place</b>  | <b>\$100.00</b> | <b>1st Place</b>   | <b>\$75.00</b> |
| <b>2nd Place</b>  | <b>\$75.00</b>  | <b>2nd Place</b>   | <b>\$50.00</b> |
| <b>3rd Place</b>  | <b>\$50.00</b>  | <b>3rd Place</b>   | <b>\$25.00</b> |

3. Contingent upon funding, participants from two projects (individual or team) at the OSSEF will win a trip to the International Science and Engineering Fair.
4. One participant will receive a \$500 cash award for the best project in Division I.
5. One participant will receive a \$500 cash award for the best project in Division II.

### Special Awards

The following corporations, companies, and organizations sponsor awards for the Oklahoma State Science Fair. We thank them for their generous donations.

**Adams Biomedical**  
**American Fidelity**  
**American Chemical Society**  
**American Institute of Professional Geologists**  
**American Meteorological Society**  
**Central Oklahoma Chapter of the American Meteorological Society**  
**American Psychological Society**  
**American Society for Materials**  
**American Vacuum Society-New Mexico Chapter**

**Association for Women Geoscientists**  
**East Central University Scholarship Award**  
**Intel Corporation**  
**International Society for Optical Engineering**  
**National Society of Professional Engineers**  
**New Mexico Chapter of the American Vacuum Society**  
**Northrop Grumman**  
**Oklahoma Consortium of Clinical Laboratory Science Affiliates**  
**Oklahoma Chapter of the American Statistical Association**  
**Oklahoma Corporation Commission**  
**Oklahoma Department of Commerce**  
**Oklahoma Gas & Electric**  
**Oklahoma City Geological Society**  
**Oklahoma Optometric Association and NSU Optometric Student Associations**  
**Oklahoma Science Teachers Association**  
**Oklahoma Society of Clinical Laboratory Educators**  
**Oklahoma Water Resources Board**  
**Pontotoc County Conservation District**  
**Ricoh**  
**Society for In vitro Biology**  
**Southwestern Oklahoma State University**  
**United States Air Force**  
**United States Army**  
**United States Environmental Protection Agency**  
**US Metric Association Award**  
**United States Navy/Marine Corps**  
**US Public Health Service**  
**Yale Science & Engineering Association**

## **CRITERIA FOR JUDGING SCIENCE FAIR PROJECTS**

All participants in the Oklahoma State Science & Engineering Fair will be judged on the basis of the following criteria. Participants should study this material carefully. Judges are to interview all participants before final decisions are made. Projects in the Team Category will be judged in accordance with ISEF rules for judging this category. The following point distribution is intended to convey the relative importance of each area of judging.

### **I. Creative Ability, Total points 30**

How much work appears to show originality of approach or handling? Judge that which appears to you to be original regardless of the expense of purchased or borrowed equipment. Give weight to ingenious uses of purchased or borrowed equipment. Give weight to unusual uses of materials. Consider collections creative if they seem to serve a purpose.

### **II. Scientific Thought, Total points 30**

Does the exhibit disclose organized procedures? Is there a planned system classification, accurate observation, or controlled experiment? Does the exhibit show a verification of laws or a cause and effect, or present by models or other methods a better understanding of scientific facts or theories? Give weight to probable amount of real study and effort that is represented in the exhibit. Guard against discounting for what might have been added, included, or improved.

**III. Thoroughness**, Total points 15

Score for how completely the story is told. It is not essential that step-by-step elucidation of construction details be given in models.

**IV. Skill**, Total points 15

Is the workmanship good? Under normal working conditions, is the exhibit likely to demand frequent repairs? How skilled is the handling, preparation, mounting or other treatment in a collection?

**V. Clarity**, Total points 10

In your opinion, will the average person understand what is being displayed? Are guide marks, labels, and descriptions neatly yet briefly presented? Is there a sensible progression of the attention of the spectator throughout the exhibit?

## **OSSEF RULES AND REQUIREMENTS**

- 1.** All participants must comply with the current International Science and Engineering Fair (ISEF) rules. Failure to comply with these rules may result in disqualification from the OSSEF competition.
- 2.** All participants must submit all OSSEF and ISEF paperwork so that it is received no later than 5:00 p.m. March 5, 2010. Failure to comply may result in disqualification.
- 3.** All participants must pay a non-refundable \$15.00 registration fee at the time they check in on Thursday, March 25, 2010. School purchase orders will be accepted.
- 4.** All participants must be certified by the director of the regional fair which they attended.
- 5.** Participants must do all of the work on their projects. Adults may advise but must not do any of the experimental work necessary to complete the project. Adults also must not compose or write any part of the material exhibited at the fair.
- 6.** No exhibit may be displayed that is a duplicate of an exhibit displayed by a participant in any previous year. Continuation projects must document that the additional research is new and different.
- 7.** Participants must supply all materials, tools and equipment needed for installation of their projects at OSSEF. All exhibits requiring electricity must operate on 110 volts AC.
- 8.** Two copies of a typed abstract limited to 250 words which describes the project must be submitted with the ISEF paperwork due March 5, 2010. It is recommended but not required that the participants use the ISEF Abstract Form found in the ISEF Rules and Guidelines Booklet.
- 9.** All exhibits must conform to the ISEF rules for safety and display set forth in the current year ISEF rules. All names or other identification marks, except those approved by the fair director must be removed from the exhibit. Exhibits must not exceed 76 centimeters (30 inches) deep and 122 centimeters (48 inches) wide. It may be no more than 274 centimeters (108 inches) high, floor to top. (Tables are about 78 cm in height.)
- 10.** Certain materials are not allowed to be displayed. For clarification see the Display and Safety Regulations in the ISEF rules.

11. Participants must be present at their projects and available for interview during the judging.

**OKLAHOMA STATE SCIENCE & ENGINEERING FAIR  
and  
OKLAHOMA JUNIOR ACADEMY OF SCIENCE  
TENTATIVE SCHEDULE OF EVENTS**

**Thursday:**

- 8:30 am - 2:00 pm: OSSEF Registration and project set up in Kerr Center.
- 12:00 pm: OJAS Registration in Physical & Environmental Science Building
- 1:00 pm - 5:00 pm: OJAS judging in Physical & Environmental Science Building
- 10:00 am - 5:00 pm: Final clearance of exhibitor's projects.
- 6:00 pm - 7:00 pm: OJAS Board Meeting at Holiday Inn.

**Friday:**

- 8:30 am - 12:00 pm: Judging of Division II (Grades 7 - 9) OSSEF projects.
- 8:00 am - 12:00 pm: OJAS Judging in Physical & Environmental Science Building
- 1:00 pm - 4:30 pm: Judging of Division I (Grades 10 - 12) OSSEF projects.
- 4:30 pm - 6:30 pm: Dinner available in Taff Cafeteria.
- 6:00 pm - 10:00 pm: Exhibits open to the public.
- 7:00 pm - 8:30 pm: Special Awards Ceremony in the Ataloo Theatre of the Hallie Brown Ford Fine Arts Center.
- 8:30 pm - 10:00 pm: Special Awards Reception in Hallie Brown Ford Fine Arts Center.
- 10:00 pm - 12:00 pm: Activities in University Center

**Saturday:**

- 8:15 am - 9:15 am: OSSEF Board of Directors meeting in Rm 262, Physical & Environmental Sciences Building.
- 9:30 am - 11:30 am: OSSEF/OJAS awards presentation in the Ataloo Theatre of the Hallie Brown Ford Fine Arts Center.
- 11:30 am - 1:00 pm: Take down and remove projects.