

Registration Deadline: 12/09/09
Research Paper Deadline: 01/08/10



**48TH INTERMOUNTAIN
Junior Science & Humanities
Symposium**

University of Utah

**March 3-6, 2010
Salt Lake City, Utah**

DIRECTOR: MATEO REMSBURG

COORDINATORS: MARTI FRUEH AND TONY GONZALES

EXECUTIVE JUDGING COMMITTEE:

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STEPHAN LEBOHEC, PH.D.

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Intermountain Junior Science & Humanities (IJSHS) Website:


<http://web.utah.edu/newstudents/IJSHS.htm>

National Junior Science & Humanities Symposium (JSHS) Website:

<http://www.jshs.org>

Hundreds of volunteers, including teachers, mentors, university faculty administration, representatives of the Army, Navy and Air Force, and others, contribute their time and talent to the JSHS and the encouragement of science among the nation's best and brightest secondary school students. If we can be of assistance, please contact us.

Sponsored by the U.S. Army, Navy and Air Force, and

 **THE UNIVERSITY OF UTAH**

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INTERMOUNTAIN JUNIOR SCIENCE & HUMANITIES SYMPOSIUM

PROGRAM GENERAL INFORMATION AND GUIDELINES

SPONSORSHIP

The Intermountain Junior Science and Humanities Symposium (IJSHS) has been sponsored by the United States Department of the Army since its inception in 1958, and additionally joined by the Departments of the Navy and Air Force after 1995. Resulting from this sponsorship and the cooperative effort of the University of Utah, the Intermountain Junior Science and Humanities Symposium is now in its 47th year.

The Academy of Applied Science, a non-profit educational organization in Concord, New Hampshire, administers the National JSHS Program in cooperation with other educational institutions throughout the United States, as well as Department of Defense Schools of Europe and the Pacific. JSHS annually reaches about 10,000 high school students and teachers at regional and national symposia.

PROGRAM OBJECTIVES

The primary aim of the IJSHS is to promote original research and experimentation in the Sciences, Engineering, and Mathematics at high school level, and to publicly recognize students for outstanding achievements. Each of the forty eight regional symposia, as well as the National Program, provide a forum for high school students to present the results of their original research in the Sciences, Engineering, Mathematics, Psychology and the Social Sciences. Students who participate in the symposium also have the opportunity to meet and exchange ideas, interact with practicing researchers, and explore future academic and career opportunities.

INTERMOUNTAIN REGION

The IJSHS will commence **March 3, 2010**, and conclude the morning of **March 6, 2010** at the **University of Utah**. This year the students will be staying at **The University Guest House in Heritage Commons**. The four-day program brings together approximately 125 students and teachers from five intermountain states. The symposium provides its participating students with three night accommodations, meals and local transportation. Travel expenses to and from Salt Lake City, and registration fees are the responsibility of the student/teacher participant, their school, school district or other private agency.

The Intermountain Region consists of 5 states: Utah, Idaho, Montana, Western Colorado and Nevada.

SYMPOSIUM PARTICIPATION

Students participating in the symposium gather from various high schools in the intermountain region. Teachers who accompany their students are expected to chaperone and oversee student participation in **ALL** symposium activities. Presentations, scheduled group activities (including lectures, tours of research and educational facilities) will occupy the majority of the time. ***Your registration is your agreement to attend all scheduled activities while you are at the IJSHS.*** A detailed schedule will be sent in mid February before the symposium begins. Delegates wishing to sightsee on their own in Salt Lake City should plan to arrive before or stay after the symposium.

Generally, students who wish to apply to the symposium must be prepared to: (1) submit a written report prepared in accordance with the symposium's guidelines (**see the national website www.jshs.org**); and (2) if requested, deliver a concise oral or poster presentation to the symposium. The written and oral reports should present the results of the student's own work. The report should include ideas and data

obtained by the student. Students are encouraged to obtain assistance from teachers, mentors, parents, or other students. If outside assistance is rendered, it should be properly acknowledged and clearly stated. Winning students may be asked to provide notebooks and/or other documentation detailing their research.

High school students who have conducted original research in the Earth and Space Sciences, Engineering or Technology, Physical Sciences, Behavioral Science, Mathematics, Computer Science and the Biological Sciences are invited to apply to the regional JSHS serving their state or region. Through a competitive review process, qualifying students may advance from the regional level, to the National Symposium, and perhaps even on to the London International Youth Science Forum.

Due to time constraints, only a limited number of papers will be selected for presentation at the regional symposium. Some students will be selected to present their research orally, while others will be asked to present at the poster session(s).

TEAM PROJECTS

Students should report on their individual contributions to research. If students are part of a larger group, the presentation should focus on individual contributions to the larger research project and properly acknowledge the contributions of other students, mentors, and/or teachers. For team research that cannot be divided into individual presentations, a team leader should be selected to present the results of the group work. In this case, all JSHS directives applying to individual research investigations will apply to the group research investigations. In the event the group presenter of the winning regional group is unable to present at the National level, this opportunity will be passed on to the next ranking project. This decision is made since the judges' evaluations and scores pertain to the individual presenter.

COMPETITION

Students submitting papers must state on their registration the major discipline and the sub-discipline of their research. The designation will be used to place the student in the correct judging category for the competition. If no discipline is designated the paper will be placed randomly in the competition. The major disciplines and sub-disciplines include but are not restricted to:

EARTH AND SPACE SCIENCE, including astronomy, environmental science, geology, marine science, meteorology

ENGINEERING OR TECHNOLOGY

PHYSICAL SCIENCES, including chemistry, energy, engineering, and physics

BEHAVIORAL SCIENCE

MATHEMATICS AND COMPUTER SCIENCE

BIOLOGICAL SCIENCES, including biochemistry, general biology, forestry, genetics, medicine and health, microbiology and physiology

The research presentations of the IJSHS participants are divided into two or three concurrent sessions. Awards are given to 1st – 3rd place presenters. The top five finalists will be eligible for a trip to the National Symposium.

The top five presenters will be named at the awards banquet. They will attend the National JSHS in Bethesda, MD which is scheduled for April 28 – May 2, 2010.

JUDGING PANEL

The IJSHS Judging Panel includes individuals who hold either a Ph.D. or equivalent experience in the general fields of research that are represented by the National student presenters. Judges are selected also for their interest in encouraging the students' interests and future development in the Sciences, Engineering, Mathematics, and Social Sciences.

All of the written reports (e.g. abstract and paper) are read by at least two research specialists. The paper is used as supporting documentaion during the judging

process. The oral presentations are evaluated by each member of the judging team for their assigned session. The questioning period which follows the oral presentations aids judges in clarifying the student's depth of understanding, the amount of work and level of effort, and the individual contributions to the research problem. Following the sessions, the individual session assessments are used by the Executive Judging Committee to select finalists.

JUDGING CRITERIA

General criteria used to judge the research presentations follows:

Statement and identification of research problem (15)

- Clarity in stating problem under study;
- Demonstrated understanding of research problem;
- Understanding of background information relevant to research problem

Acknowledgement of sources and major assistance received (10)

Creativity and originality (15)

- Student demonstrates originality, or creativity in approach to research or engineering study
- Student demonstrates problem-solving skills

Research design, procedures (materials & methods)/results (15)

1) Science, or

- Student's involvement in designing the investigation
- Appropriateness of research design and procedures
- Identification and control of variables
- Reproducibility
- Level of effort

2) Engineering, computer science, technology

- Workable solution that is acceptable to a potential user
- Recognition of economic feasibility of solution
- Recognition of relationship between design and end product
- Tested for performance under conditions of use
- Results offer a significant improvement over previous alternatives
- Level of effort

Discussion/Conclusions (25)

- Clarity in stating conclusion; conclusions are supported by 1) data (science), or 2) results of testing of design (engineering)
- Recognizes limitations and significance of results
- Evidence of student's understanding of the scientific or technological principles
- Theoretical or practical implications recognized or understood
- What was learned? New questions introduced? Future research needed?

Oral Presentation and written report (20)

- Skill in communicating research results to non-specialized audience and to judges
- Definition of terms as necessary
- Appropriate use of audio-visuals
- Response to questions from audience and judges

Criteria are added together to equal a maximum total of 100 points.

SESSION ASSIGNMENTS

In an attempt to achieve a balance in the number of presenters in each session, it may be necessary to organize sessions that encompass more than one of the above disciplines. The Executive Judging Committee will make this decision. If the student presenter does not agree with this decision, then he or she may follow the appeals procedure shown below. The student's appeal must be made prior to the conduct of the IJSHS paper presentations.

COMPLAINTS

The IJSHS office, and the Executive Judging Committee recognizes the enormous effort that students undertake in conducting their research. Therefore, our objective is to ensure an equitable competition by selecting qualified judges and by communicating the rules of the competition to both students and judges. We realize that in any competition of this nature, differences of opinion about the judges' interpretations may occur. It is the policy of the IJSHS, as well as the Academy of Applied Science, and the sponsors of the JSHS Program (e.g. the Army, Navy, and Air Force) to support the interpretations and final decisions of the judges. Recommendations regarding the future conduct of the IJSHS judging process, or requests to clarify the rules of competition can be directed to the attention of the Director, Mateo Remsburg IJSHS Program, University of Utah, 200 S Central Campus Dr. Rm 80, SLC, UT 84112.

APPEALS PROCEDURE

The IJSHS office will inform student presenters of their session assignment approximately ten days prior to the IJSHS paper presentations.

If the student presenter disagrees with the session assignment, he or she must immediately contact the IJSHS office at 801-585-8824 to request reconsideration.

The IJSHS office will request that the Chair of the Executive Judging Committee contact the student to discuss the request for reconsideration.

At the conclusion of the above discussion, the student must decide whether or not to pursue an appeal to the full Executive Judging Committee. If an appeal is requested, a conference call will then be scheduled between the student, the student's teacher or mentor (if requested), and the Executive Judging Committee. The student must be prepared to verbally present their rationale for a change in the session assignment.

Within 24 hours of hearing the appeal, the Executive Judging Committee will reach a decision and contact the student, or the student's teacher/mentor (as designated) with that decision.

If the student disagrees with the final decision of the Executive Judging Committee, he or she may choose not to compete at the IJSHS. If a student does not compete at the IJSHS, he or she should be advised that no further review will be conducted by the IJSHS judging panel. Therefore by not competing, the student relinquishes eligibility for any awards.

AWARDS

Significant awards are available to IJSHS student finalists. The Department of the Army, Navy and Air Force jointly sponsor the following awards (subject to the availability and release of government funding). The University of Utah sponsors particular awards for the Intermountain Region contingent upon available funding.

FOR STUDENTS WHO PARTICIPATE IN THE SYMPOSIUM

- Public recognition and certificates, honoring achievement and interest in research pursuits
- Attain a sense of achievement and self-confidence resulting from interaction with students from other schools and regions and with professional researchers and educators.

FOR TEACHERS WHO PARTICIPATE IN THE SYMPOSIUM

— \$500 award to the teacher of the 1st place winning student, honoring the individual teacher and his or her school's contribution to advancing student's participation in research.

FOR THE REGIONAL FINALISTS

An expense-paid trip to the National JSHS, awarded to the regional 1st place finalist and the 4 runners-up.

An invitation to orally present original research at the National JSHS, awarded to the regional 1st and 2nd place oral finalists; and to the 3rd place finalist an invitation to do a poster presentation.

A total of \$4,500 in undergraduate, tuition scholarships, awarded at \$2000, \$1500, and \$1000 to each of three regional symposium finalists (scholarship payable upon matriculation and upon meeting the JSHS scholarship conditions.)

University of Utah Student Affairs sponsors 4-year in-state tuition to the highest ranking senior in the competition.

Various Departmental Awards (contingent upon available funding)

FOR THE NATIONAL FINALISTS

— Six \$12,000 undergraduate, tuition scholarships, awarded to each of the 1st place finalists in the National research paper competition.

Lindsey Denison of Paonia, Colorado, was the IJSHS first place winner in 2009. She also won first place in Life Sciences at JSHS and a trip to London!

— Six \$8,000 undergraduate, tuition scholarships, awarded to each of the 2nd place finalists in the National research paper competition.

— Six \$4,000 undergraduate, tuition scholarships, awarded to each of the 3rd place finalists in the National research paper competition.

— An expense-paid trip to the London International Youth Science Forum, an exchange program bringing together over 400 participants from 60 nations. The London trip is awarded to each of the 1st place finalists; the runner-ups are alternate winners.

Students must be a citizen or permanent resident of the United States to be eligible for the government-sponsored scholarship awards. Additionally, scholarships are awarded to only one student. Student presenters who are part of a team must notify the JSHS of which student finalist will receive scholarship funding should the team presenter earn regional or national awards.

INTERMOUNTAIN REGION SPECIFICS

DEADLINES

- November 10, 2009; Nomination letters due
- December 9, 2009: Completed registration form along with fees and payment due in IJSHS office.
- January 08, 2010: Research papers with abstracts attached and Electronic version of abstract sent by e-mail. Research Application Form must be attached to all five copies of the research paper.
- February 10, 2010: Notification of presenter status

4 Copies of your research paper with the research application form (which is found in this packet), must be received in our office no later than 5:00pm on January 8, 2010 as well as an electronic copy of your abstract sent to mfrueh@sa.utah.edu.

REGIONAL DIFFERENCES FROM NATIONAL GUIDELINES

- Abstract does not need to be on the official form
- Additional abstract to be submitted via e-mail by the deadline.
- 4 copies of paper must be sent to IJSHS office
- Use units of measure in your studies that are in common use for the professional working in your area. Color figures are appropriate if applicable to research- no permission needed.
- Poster session may be run concurrently with the oral sessions
- Presenters in oral category only send a photo and a biographical sketch
- Poster presenters should follow the JSHS guidelines at www.jshs.org.

OFFICIAL PARTICIPANTS

High School students from the 9th, 10th, 11th and 12th grades are eligible to participate. Preference will be given to those students who submit a research paper, have been nominated and completed registration by the deadlines. Seniors and other students who have attended a previous IJSHS are *required* to submit a paper as a condition of their acceptance. Women and minority students are strongly encouraged to apply. Permission to attend may be granted to eligible persons only by the IJSHS Director upon receipt of the registration from the sponsoring high school.

PAYING PARTICIPANTS

Based on availability of space a teacher that is not supporting a student research project from their school, or a student who is not submitting a research project may be able to attend as a paying participant. Permission of the IJSHS Director will be required upon receipt of registration from the sponsoring high school. These spaces will only be given if there is room left from the Official Participant designation. The cost for attending the symposium as a paying participant is \$50. This amount covers food, lodging and all IJSHS activities. Paying participants (or their sponsoring schools) are responsible for paying travel expenses to and from Salt Lake City in addition to the cost of attending the IJSHS.

REGISTRATION

All participants must register for the IJSHS; there is a \$50 registration fee, which is non-refundable after January 08, 2010. Registration forms are found on the IJSHS Web site. Once participants have registered and been accepted by the IJSHS Director, substitutions are discouraged. The IJSHS Director must approve substitutions. A written request must be received by February 5, 2010 for substitutions. Refunds will not be given to participants who cancel after January 8, 2010.

ABSTRACT FORMAT

The abstract, and heading are single spaced, flush left. The heading includes:

- 1st line – your name, home address, city, state, zip
- 2nd line – name of your school, city, state, zip
- 3rd line – title of your abstract – the title should be in upper and lower case
- 4th line – teacher/mentor name, and his/her organization if different than your high school. Precede the person's name with a subheading –teacher and/or mentor name, return twice after the heading, and begin your abstract. Return twice after each paragraph, 175 words maximum in abstract content only (200 including every word on the page including all four lines above for national competition).

Abstracts will not be retyped or edited. The submitted abstract will be reproduced as sent; IJSHS will reformat to fit into abstract book. Send by e-mail to mfrueh@sa.utah.edu. This does not replace the abstract that must be part of your paper.

ACCOMMODATIONS & MEALS

All participants will stay at the University Guest House at the University of Utah. Meals will be provided by the IJSHS beginning with dinner on Wednesday, March 4th and ending with breakfast Saturday, March 7th. Meals on the way to and from the IJSHS will be at the expense of the delegate.

STUDENT ACCOMMODATIONS: Four students of the same gender will be assigned to each room. Each room has two queen size beds.

TEACHERS/CHAPERONE ACCOMMODATIONS: Two teachers of the same gender will be assigned to share a room. Each room has two queen size beds. Teachers desiring a private room should indicate on the registration form, and depending on availability of rooms, we will attempt to accommodate these requests. *Please note there is an additional charge of \$100 for a private room.* These arrangements must be made by January 8,2010.

If a spouse or other guest will be attending who is not an official participant or chaperone and plans to attend any or all of the IJSHS functions they will be invited to participate as a paying guest for \$200 and this must be arranged and paid for before January 8,2010. They must also fill out a registration form for our records. These are on a space available basis only.

TRAVEL

Travel expenses to and from the IJSHS must be paid by the individual delegate or sponsoring school. Please note; **student participants may not drive individual automobiles to, from, or during the IJSHS** due to insurance liability. Parking is available for teachers who plan to drive. While at the symposium, participants will be provided transportation for all scheduled activities.

DRESS

In March, the weather in Salt Lake City is unpredictable. It can range from 70 degrees to blizzard snow conditions. Attendees should plan for inclement weather. Comfortable shoes and casual clothes are recommended for most of the daytime activities. Everyone is encouraged to wear appropriate professional attire for the presentations. The awards banquet will be semi-formal, meaning no jeans or t-shirts.

MANDATORY ATTENDANCE

All symposium participants (students, parents and teachers) are required to remain for the entire symposium, and to attend **all** meetings, and activities, unless prior arrangements have been made with the IJSHS Coordinator.

For participants with a long distance to travel, we will allow for early departures, but attendees must notify the IJSHS office **a week prior** to symposium if they will be departing before the final Awards Banquet on Friday night. This is necessary to get an accurate meal count.

Parents and Guests are welcome to attend the awards banquet on Friday March 5, 2010; however they must inform the IJSHS office at **least one week** in advance **and will need to pay \$35 each for the meal in advance.** No exceptions.

NOTICE OF NON-DISCRIMINATION

The Intermountain Junior Science and Humanities Symposium in conjunction with the University of Utah is fully committed to affirmative action and to its policies of nondiscrimination and equal opportunity in all programs, activities, and employment with regard to race, color, national origin, sex, age, status as a person with a disability, religion, sexual orientation, and status as a veteran or disabled veteran. The University seeks to provide equal access to its programs, services and activities for people with disabilities. Reasonable prior notice is needed to arrange accommodations. Evidence of practices not consistent with these policies should be reported to the Office of Equal Opportunity and Affirmative Action, (801) 581-8365 (V/TDD).

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