Welcome to the 54th Annual

TENNESSEE REGIONAL

FEBRUARY 28 - March 1, 2019

Crowne Plaza Hotel
401 W Summit Hill Dr SW
Knoxville, TN 37902

The Junior Science and Humanities Symposium, Tennessee Regional, is sponsored by the United States Departments of the Army, Navy, and Air Force, and is administered by the Academy of Applied Science in cooperation with the University of Tennessee, Knoxville.
54th Junior Science and Humanities Symposium - Tennessee Regional
Program and Agenda

THURSDAY, FEBRUARY 28

7:30 AM – 9:30 AM
Check-in
Summit 2 Room

7:30 AM – 9:30 AM
Breakfast
Summit 2 Room

9:30 AM – 9:45 AM
Board Bus to Oak Ridge National Lab (ORNL)
Crowne Plaza Knoxville Downtown
401 W. Summit Hill Drive SW
Knoxville, TN 37902

11:00 AM – 4:00 PM
ORNL Tour

5:00 PM
Arrive back at the Crowne Plaza
Knoxville Downtown

6:00 PM – 8:00 PM
Mardi Gras Barbeque Dinner
Summit 2 Room

FRIDAY, MARCH 1

7:00 AM – 9:00 AM
Breakfast
Summit 2 Room

7:15 AM – 7:50 AM
Student Presenters Check-in and Poster Set-up
Salon AB Room

8:00 AM – 8:10 AM
Welcome and Opening Remarks
Salon AB Room

8:10 AM – 10:10 AM
Session I – Oral Presentations
Salon AB Room

10:10 AM – 10:20 AM
Break

SESSION II
10:20 AM – 12:20 PM
Session II – Oral Presentations
Salon AB Room

12:20 PM – 1:00 PM
Lunch
Summit 2 Room

SESSION III
1:00 PM – 3:20 PM
Session III – Oral Presentations
Salon AB Room

3:20 PM – 3:30 PM
Break

3:30 PM – 5:15 PM
Closed Poster Session with Judges

5:15 PM – 6:00 PM
Open Poster Session

7:00 PM – 9:00 PM
Awards Banquet and Dinner

SATURDAY, MARCH 2

6:00 AM
Breakfast
Voucher for Mahogany's

12:00 PM
Hotel Check-out
Student Presentations
Crowne Plaza Knoxville Downtown

FRIDAY, MARCH 1

8:00 AM – 8:10 AM
Salon AB Room
Welcome and Opening Remarks
Presentation of our Nations Colors
by the University of Tennessee
Army ROTC Dragoons

SESSION I – ORAL PRESENTATION

8:10 AM
Vijay Ananthula, University School
Characterizing the Role of the SIP-428 Protein in Abiotic Stress Pathways of Nicotiana tabacum

8:30 AM
Samaya Baljepally, Bearden High School
Mathematical Model to Predict Mortality from Early Onset Pneumonia in Acute Myocardial Infarction

8:50 AM
Ethan Brady, Oak Ridge High School
Foraging Behavior of a Black Soldier Fly Larva: An Agent-Based Modeling Simulation Study

9:10 AM
Srikrishna Dasari, White Station High School
Using Foraminifera Shell Analysis to Correct Climate Reconstruction Methods

9:30 AM
Oliver Eagan, Hillsboro High School
Building a Low-Cost “Harmonic Percolator” Effects Pedal for Guitar

9:50 AM
Hannah Fleming, Hillsboro High School
Investigating the Neurological Effects of Juul on C. elegans

10:10 AM
BREAK

SESSION II – ORAL PRESENTATIONS

10:20 AM
Sarah Ruth Froning, Homeschool, Oak Ridge
A Statistically Significant Difference in Native and Nonnative Plant Species in East Tennessee and its Effect on Vanessa cardui

10:40 AM
David Joy, Oak Ridge High School
Development of an Efficient Radiobiokinetic Calculation Method Using Matrices and Vectors

11:00 AM
John Lazenby, Chattanooga School for the Arts and Science
Calculating the pH of Streams Damaged by Acid Mine Drainage for Extended Periods of Time

11:20 AM
Mason Alexander Lee, University School of Nashville
Molecular Characterization of Thyroid Cancer Cells

11:40 AM
Sara McKay, Cleveland High School
Investigation of further application of dolphin, Delphinus, thunniform swimming style onto human underwater dolphin kick

12:00 PM
Richa Nathan, Webb School of Knoxville
The Incidence of the Leptin Receptor Mutation Glu223Arg in Obese Pediatric Patients in Rural East Tennessee

12:20 PM – 1:00 PM
LUNCH
Summit 2 Room
SESSION III – ORAL PRESENTATIONS

1:00 PM
Kathryn Isabella Parks
Chattanooga School of the Arts and Science
The Genetic Variation of Flowers

1:20 PM
Dorothy Perkins, Central Magnet
The Impact of Oral Antibiotics on Lactobacillus Populations: A Potential Risk Factor for Depression Susceptibility

1:40 PM
Steven Qu, Oak Ridge High School
Using Deep Learning to Detect Multiple Cancers From a Blood Test

2:00 PM
Jude Raia, The McCallie School
Glial Ensheathment of Axons from Aurelia aurita Medusa Primary Cultures

2:20 PM
Warsame Said, Hillsboro High School
Effect of Microarchitecture of Bone on Breast Cancer Cell Gene Expression

2:40 PM
Joseph Watson, Cleveland High School
Soil organism biodiversity near a human-altered stream ecosystem.

3:00 PM
Melanie York, Hillsboro High School
Assessing Indicators of Water Quality in Richland Creek

3:20 PM – 3:30 PM
BREAK

3:30 PM – 5:15 PM
Closed Poster Session – Judges Only
Salon AB Room

5:15 PM – 6:00 PM
Open Poster Session
Salon AB Room

7:00 PM – 9:00 PM
AWARDS BANQUET AND DINNER
Summit 2 Room

STUDENT POSTER PRESENTATIONS

Matthew Carr
Hillsboro High School
Studying The Effects of Varying Concentrations of Caffeine on C. elegans

Katie Coward and Caton Taylor
Central Magnet School
Shall we play a game?

Maggie Harris
Central Magnet School
Sex Differences in Communication

Katherine Hausladen
Oak Ridge High School
Using Image Processing to Map Cell Wall Morphology of Diatoms

Xiang Lin
Chattanooga School of the Arts and Science
How the Shape of Combustion Chamber in a Cannon affects Muzzle Velocity

Sofia McDonough
Chattanooga School of the Arts and Science
The Synthesis of Aspirin Using an Alternate Catalyst

Henry Shen
Oak Ridge High School
Using Molecular Dynamics and Deep Learning to Explore Conformational Binding States Between a Small Molecule and Disordered Proteins
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<th>SCHOOL</th>
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<td>Kelly Davis</td>
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<td>Mitchel Witt</td>
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<td>University School</td>
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JUDGING PANEL

TESSA BURCH-SMITH, PhD - ASSISTANT PROFESSOR

Tessa Burch-Smith is an assistant professor in the Department of Biochemistry & Cellular and Molecular Biology at the University of Tennessee, Knoxville. She competed her graduate and post-doctoral work at Yale University and the University of California at Berkeley, respectively. Her research focuses on intercellular communication in plants, particularly on structures called plasmodesmata that allow trafficking between cells. Her research uses a variety of molecular and cell biological approaches including advanced light and electron microscopy and plant viruses. Her lab also investigates chloroplast gene expression and how signals from the nucleus can control expression of nuclear genes. She is the author of numerous scientific articles and has received funding for her research from the National Science Foundation and the Defense Advanced Research Projects Agency. She is also a senior editor at the scientific journal Molecular Plant-Microbe Interactions.

WILFRED M. POST, PhD - RESEARCH PROFESSOR (Emeritus)

Wilfred M. Post retired in 2013 as a senior scientist in the ORNL Environmental Sciences Division, a staff member of ORNL’s Climate Change Science Institute (CCSI), and an adjunct professor of ecology and evolutionary biology at the University of Tennessee, Knoxville. He is a recognized expert on soil carbon dynamics, nutrient relationships between soil and vegetation, and the impact of species composition on ecosystem processes. He has developed approaches to representing the impact of land-use change and climate change in terrestrial biogeochemistry models and also developed global data sets for the evaluation of global terrestrial biogeochemistry models. He has more than 100 peer reviewed open literature publications and co-authored two books. Post has a PhD in ecology from the University of Tennessee, Knoxville, and an MS in botany and a BS in mathematics from the University of Wisconsin, Madison.

SATYABRATA SEN, PhD - RESEARCH SCIENTIST, WIGNER FELLOW

Satyabrata Sen is a senior research scientist in the Computational Sciences and Engineering Division at Oak Ridge National Laboratory (ORNL). He leads research efforts in developing efficient signal processing techniques using innovative statistical data analytics, multivariate statistics, machine learning, and optimization theory. He is the recipient of the 2016 Sidney D. Drell Academic Award from the Intelligence and National Security Alliance (INSA), and the Eugene P. Wigner Fellowship from ORNL/DOE. He is also a senior member of IEEE. He received his PhD in electrical engineering from Washington University in St. Louis, Missouri.

JUNIOR SCIENCE AND HUMANITIES SYMPOSIUM, TENNESSEE REGIONAL

ADMINISTRATIVE STAFF:

Nita Ganguly, PhD
Director, Program Administrator
Clinical Associate Professor
UT College of Education, Health, and Human Sciences
and the UT College of Arts and Sciences

Dianna Beeler
Business Manager
UT Department of Political Science
College of Arts and Sciences Administration
**TENNESSEE SPONSORS AND SUPPORTERS**

The Junior Science and Humanities Symposium, Tennessee Regional, is hosted by the University of Tennessee, Knoxville, and is administered through the College of Arts and Sciences. Judges are provided by the College of Arts and Sciences and the Oak Ridge National Lab.

**ACADEMIC DEANS**
The University of Tennessee, Knoxville

*Theresa M. Lee, Dean*
College of Arts and Sciences

*Mark Dean, Interim Dean*
College of Engineering

**NATIONAL SPONSORS**
The Junior Science and Humanities Symposium, Tennessee Regional, (JSHS-TN) is jointly sponsored by the research offices of the United States Departments of the Army, Navy, and Air Force in cooperation with leading research universities throughout the nation. The Department of Defense generously provides funding for the National Symposium and the JSHS-TN scholarships. The JSHS-TN program is administered nationally through the Academy of Applied Science.

**FINANCIAL SUPPORT**
The Junior Science and Humanities Symposium, Tennessee Regional, is provided by a grant from the Academy of Applied Science. The UT College of Arts and Sciences provides supplementary support.

*Other organizations that helped make the 54th Annual Junior Sciences and Humanities Symposium, Tennessee Regional, a success:*

Oak Ridge National Labs (ORNL)

The University of Tennessee, Army ROTC Dragoons for Presenting our Nations Colors
57th National Junior Science & Humanities Symposium
U.S. Army, Navy, and Air Force sponsored

April 24-27, 2019, Albuquerque, NM

NATIONAL SYMPOSIUM
The 57th National JSHS will be held April 24-27, 2019, in Albuquerque, New Mexico. This symposium brings together 230 high school students who qualify by submitting and presenting original scientific research papers in regional symposia held at universities nationwide. Approximately 130 high school teachers, mentors, university faculty, ranking military guests, and others also attend and join in encouraging the future generation of scientists and engineers and celebrating student achievement in the sciences.

2019 National JSHS registration opens February 2019
All participants in the National JSHS must register through the National JSHS registration website. Participants include students; teachers; DoD/STEM professionals- invited officials, judges, presenters, speakers, volunteers; JSHS staff and all other guests- family members and friends.

The Competition
All regional symposia student finalists are invited to present their research at the National JSHS. The top two regional delegates will present their research in the oral session to compete for military-sponsored undergraduate, tuition scholarships. All other regional delegates will present their research in the poster session to compete for cash awards. Sessions will be organized by categories that are selected by the students during the registration process.

The Scientific and Educational Program
All students will participate in interactive activities to enrich their JSHS experience and to engage with Department of Defense (DOD) researchers, laboratories, and related STEM organizations and professionals. Unique opportunities for JSHS students include:

• The Student Research Presentations, the highlight of the National JSHS, feature the STEM achievements of outstanding students representing the United States, Puerto Rico, and the DOD Dependents Schools of Europe and the Pacific.
• DoD STEM Experiences allow students and teachers to engage with DoD’s world-class STEM professionals and provide exposure to the department’s cutting-edge research and technologies.
• Banquet and awards ceremony recognizes all participants and announces scholarships awarded to students in each competition category of the oral session categories of the National JSHS competition.

The University of Tennessee is an EEO/AA/Title VI/Title IX/Section 504/ADA/ADEA institution in the provision of its education and employment programs and services. All qualified applicants will receive equal consideration for employment and admission without regard to race, color, national origin, religion, sex, pregnancy, marital status, sexual orientation, gender identity, age, physical or mental disability, genetic information, veteran status, and parental status.

CAS JOB 19-023