54th Annual
Southeastern Michigan
Junior Science and Humanities Symposium

Program
2018

Wayne State University

McGregor Memorial Conference Center
Detroit, Michigan

March 9th, 2018
54th Annual

SOUTHEASTERN MICHIGAN

JUNIOR SCIENCE AND HUMANITIES
SYMPOSIUM

Friday, March 9th, 2018

SPONSORED BY

WAYNE STATE UNIVERSITY
College of Education

In cooperation with

U.S. Army Research Office - Research Triangle, NC

U.S. Naval Research Office

U. S. Air Force Research Office

U.S. Army Tank - Automotive Command
Research, Development, and Engineering Center
Warren, MI

Academy of Applied Science - Concord, New Hampshire

National Association of Secondary School Principals
OBJECTIVES OF THE
JUNIOR SCIENCE AND HUMANITIES
SYMPOSIUM PROGRAM

1. To promote research and experimentation in the sciences, mathematics and engineering at
   the high school level.

2. To recognize the significance of research in human affairs and the importance of humane
   and ethical principles in the applications of research results.

3. To search out talented youth and talented teachers; recognize their accomplishments at
   symposia and encourage their continued interest and participation in the sciences, mathematics,
   and engineering.

4. To expand the horizons of research-oriented students by exposing them to opportunities in
   the academic, industrial, and governmental communities.

5. To increase the number of future adults capable of conducting research and development.

In order to accomplish these objectives, we enlist the active participation of our local
communities in improving the education of our children.

Publishing Opportunity

Students who submitted a paper for presentation at this year’s JSHS are encouraged to submit
their paper for publication in JOURNEYS – Journal of Youths in Science. Students planning to
submit their paper for publication should first consult with their research mentor(s) and anyone
else who collaborated in their research.

Before submitting a paper for publication in JOURNEYS students should check the journal’s
website at http://www.journys.org/ and closely follow the instructions under “Submission.”
**ADMINISTRATION OF JSHS**

**Dr. Sandra Yarema**, Director and Coordinator of JSHS  
Assistant Professor and Coordinator of the Science Education Program  
College of Education, Wayne State University

**JSWS ADVISORY BOARD**

<table>
<thead>
<tr>
<th>Name</th>
<th>Position and Affiliation</th>
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| **Dr. Monica Brockmeyer**     | Associate Provost Academic Success  
                             | VP Academic Affairs  
                             | Wayne State University |
| **Dr. Christine Chow**        | Professor, Chemistry  
                             | College of Liberal Arts and Sciences  
                             | Wayne State University |
| **Dr. David Cinabro**         | Chair, Professor, Physics  
                             | Wayne State University |
| **Mr. Jeff Conn**             | Senior Lecturer, Physics  
                             | Wayne State University |
| **Dr. Thomas Edwards**        | Associate Dean of Research  
                             | College of Education  
                             | Wayne State University |
| **Dr. Maria M. Ferreira**     | Associate Professor, College of Education  
                             | Wayne State University |
| **Dr. Russell L. Finley**     | Professor  
                             | Center for Molecular Medicine & Genetics  
                             | Wayne State University |
| **Ms. Kristie Ford**          | Detroit Public Schools Community District  
                             | Director of Science Curriculum |
| **Dr. Stanislav Groysman**    | Professor, Chemistry  
                             | Wayne State University |
| **Dr. Patricia Hanlan**       | Detroit Country Day |
| **Dr. Padu Karur**            | Associate Professor, Physics  
                             | Wayne State University |
| **Dr. Daniel Kashian**        | Assistant Professor, Biological Sciences  
                             | Wayne State University |
| **Mr. Kevin Rashid**          | Honors College  
                             | Wayne State University |
| **Mr. Brandon Schroeder**     | Michigan Sea Grant Extension Educator  
                             | Michigan State University |
| **Dr. Jennell White**         | Post-Doctoral Fellow  
                             | Pediatrics, Children’s Hospital of Michigan  
                             | Wayne State University |
| **Mr. Brandon Zeigler**       | Kalamazoo Area Mathematics & Science  
                             | Center |
Dear Students, Teachers, Parents and Colleagues,

It is my great privilege to welcome you to the 54th annual Junior Science and Humanities Symposium (JSHS) of Southeast Michigan. Once again we have a group of very talented young men and women from schools in southeast Michigan who will share their research with us. I would like to thank the teachers and mentors for the guidance they provided students throughout the research process and their parents for the support that such activities entail.

An event such as this one cannot be accomplished by one person alone and I would like to express my gratitude to those who help make this event possible every year: the members of the Advisory Board, judges, speakers and the administration of the College of Education at Wayne State University. A special thanks to Ms. Marion Tate for her help in the planning and running of the symposium.

I would like to take this opportunity to give you a short overview of the history of the JSHS, for those of you who might not be familiar with this wonderful program. The JSHS was established in 1958 by the U. S. Army Research Office. In 1995 the Office of Naval Research and in 1997 the U. S. Air Force joined the army in funding the symposium. However, the Academy of Applied Sciences administers the funds and organizes the National Symposium every year.

The primary aim of the JSHS is to promote research among high school students. Each year, more than 10,000 students and their teachers participate in forty-eight regional symposia held on university campuses across the country and in Alaska, Puerto Rico and the Department of Defense schools in Europe and the Pacific. Students presenting at the regional symposia have the opportunity to receive significant awards in the form of scholarships, payable to the university of their choice. The first, second and third student finalists at each of the regional symposium receive $2000, $1500, and $1000 respectively, and all five finalists are invited to attend the National JSHS free of charge. The two finalists from each regional symposium also present their research at the National JSHS where they have the opportunity to receive additional awards. The three finalists in each of the categories at the National JSHS receive $12,000.00, $8,000.00 and $4,000.00 respectively in scholarships. For additional information about the JSHS please visit: http://coe.wayne.edu/ted/science/jshs/

Thank you for participating in this year’s symposium. I hope your experience is a memorable one.

Sandra Yarema, Director JSH
Dr. Kathryn Roberts has been with the Wayne State University College of Education since 2010, and is currently serving as the Interim Assistant Dean of Education. She is also an associate professor of Reading, Language, and Literature, and teaches classes at all degree levels on literacy teaching and learning.

Dr. Roberts primary research interest is reading comprehension, particularly in the content areas and as it relates to the integration of verbal and visual systems. In addition, she researches family literacy engagement and the use of graphic novels in elementary classrooms. Her publications on these topics can be found in journals such as The Reading Teacher, Literacy Research and Instruction, Social Studies Research and Practice, Reading Psychology, and The Journal of Visual Literacy.

Dr. Roberts will provide the welcome remarks at the opening session.
Kevin Rashid coordinates the Wayne State University Honors College’s first-year curriculum and manages Research@Honors and the Detroit Fellows Tutoring Project—a large-scale, long-term service-learning effort to support basic literacy in the Detroit Public Schools. He is also a poet and facilitates creative writing workshops in nontraditional places. Kevin knows Wayne State “from the grounds-up,” having worked for many years as a full-time university groundskeeper while earning his master’s in English and teaching composition, creative writing and American Studies.

Alaa Al-Makhzoomy, 37, works as an Instructional Tech Designer at the Irvin D. Reid Honors College at Wayne State University. He received a second Master's degree in Learning Design and Technology from Wayne State University in Winter 2017. He received his first Master’s in Computer and Information Science from Cleveland State University in 2010. He has been teaching many disciplinary subfields of Computer Science and Information Systems since then at various institutes in Jordan and the U.S. He is a Ph.D. candidate in the Learning Design and Technology program at Wayne State and expected to defend his dissertation between May and August 2018. His research is focused on investigating the effects of Game-Development Based Learning on students learning computer programming in high-level languages, such as C++ and Java.
Where is She Now?

Ashi Arora is a 2015 JSHS finalist, who is currently a junior at Wayne State University in the MedStart BS/MD program, earning a Bachelors in Science in Public Health and in Biological Sciences, and a certification in Entrepreneurship and Innovation.

Ashi has been doing research with Dr. Robert Akins in the Department of Microbiology, Immunology, and Biochemistry at the WSU School of Medicine since 2012, studying antifungal drug resistance and exosome-mediated adaptive stress responses in Candida albicans. She has presented her research at Wayne State’s Undergraduate Research Conference, at the National Conference on Undergraduate Research, at the undergraduate research conference at the University of Maryland, Baltimore County, and will be presenting in the upcoming New England Science Symposium at Harvard Medical School.

In addition to pursuing her passion for her research, she has immersed herself in the public health field. She is a menstrual health activist, and recently received funding through Optimize Wayne’s Social Innovation Challenge to create a chapter of PERIOD at Wayne State and to initiate research to understand homeless women’s experiences with menstruation and their access to water and health resources. Ashi’s goal is to break down the social stigma surrounding menstruation and to provide menstruators in need with the resources they need through service, advocacy, and education.

Finally, Ashi serves as the American Medical Student Association’s Gender and Sexuality Chair in which she is working with a team to create materials and programming relevant to deepening future-physicians’ knowledge regarding the health of women and the LGBTQ+ community and advocating for their rights.
Stephanie Brock grew up in the Pacific Northwest, where she attended the University of Washington as an undergraduate (B.S. Chemistry, 1990). It was there that she first got a taste of original research, working in the laboratory of Prof. James Mayer. She enjoyed the work so much, she decided to pursue a Ph.D. degree, which she did at the University of California at Davis. There she moved from looking at how to manipulate molecules to the study of extended solids, under the direction of Prof. Susan Kauzlarich. She graduated in 1995 and then moved east to the University of Connecticut to do postdoctoral training under Prof. Steve Suib. There, she developed expertise in nanomaterials synthesis.

In the fall of 1999, Brock began a tenure-track position in the Department of Chemistry at Wayne State University and was promoted to Associate Professor with tenure in 2005 and Full Professor in 2009. She is a Fellow of the American Association for the Advancement of Science and of the American Chemical Society (ACS). She also serves as an Associate Editor for the ACS journal *Chemistry of Materials*.

Dr. Brock’s research interests lie in the synthesis, properties and applications of nanomaterials to address challenges facing energy, the environment, and health.

In her presentation, Dr. Brock will explain what nanomaterials are, why we should care about them, and how we can use them to achieve a brighter technological future.
Sposa String Quartet is made up of four current music students, majoring in music performance and composition at Wayne State University. Sposa String Quartet is based in Detroit and plays weddings, parties, corporate events, and any other opportunity that can use musicians.

Sean O'Connell-Violin
Emily Paye-Violin
Gabriele Paese- Viola
Christian Sands- Cello
On Friday afternoon, students and guests will be able to visit the Department of Chemistry in the A. Paul Schaap Chemistry Building and Lecture Hall.

With a research pedigree dating to well before the 1944 establishment of the Ph.D. program by Neil E. Gordon, and a teaching mission embracing diversity and modern methodology, the department of Chemistry provides a supportive yet competitive atmosphere for faculty and students alike. We have over 150 graduate students and 30 postdoctoral fellow researchers in the Department. In the last three years nearly 60 Ph.Ds. and 150 Bachelor's degrees in Chemistry have been awarded.

For more information visit: http://chem.wayne.edu/
The Office of Undergraduate Research (OUR) at Wayne State University provides funds to undergraduate students from disciplines across the university – hard sciences, social sciences, performing arts and humanities – to participate in undergraduate research. Undergraduate research puts theory into practice as students work on projects and are mentored by full-time faculty who are leaders in their field. The funds help cover students’ research activities as well as travel expenses to present their research at local, regional and national conferences.
PROGRAM

Friday, MARCH 9th, 2018

8:00 a.m. - 9:30 a.m.

REGISTRATION & CONTINENTAL BREAKFAST
Lobby
McGregor Memorial Conference Center
Wayne State University

9:30 a.m. - 10:00 a.m.

OPENING SESSION
Room BC, First Level, McGregor Conference Center

PRESIDING:

Dr. Sandra Yarema Director - JSHS
Science Education Faculty
College of Education
Wayne State University

WELCOME/OVERVIEW OF WAYNE STATE UNIVERSITY:

Dr. Kathryn Roberts
Interim Assistant Dean, Teacher Education, College of Education

ORIENTATION:

Dr. Sandra Yarema
JSHS Director and Coordinator

10:00 a.m. - 11:30 a.m.

PRESENTATION OF STUDENT PAPERS
McGregor Conference Center
STUDENT PRESENTATIONS

SECTION I ROOM E, McGregor: Medicine and Biomedical Health Science

MODERATOR: Dr. Russell Finley, School of Medicine- Wayne State University

STUDENT PRESENTERS:

Asthana Dalal
Effectiveness of Radiation via Tumor Interstitial Fluid Pressure

Alex Wu
Gene Selection and Risk Prediction on Breast Cancer with High-Dimensional Machine Learning Algorithms

Katharine Shao
The Effect of Mechanical Compression on Cancer Cell Proliferation

Shriya Reddy
Evaluation of the Contrast Enhancing Effects of Different Size Gold Nanoparticles Using Optical Coherence Tomography in the Early Diagnosis of Melanoma

JUDGES:

Dr. Russell Finley, School of Medicine- Wayne State University
Mita Asgari, Biology- Wayne State University
Lt. Colonel David Centeno Jr., Biology, TARDEC
Kimberly Derryberry, Psychology-TARDEC
Christopher Scott, Electrical/Automotive Engineer-TARDEC
SECTION II ROOM F, McGregor: Chemistry & Molecular Cellular Sciences

MODERATOR: Dr. Christy Chow, Chemistry Department – Wayne State University

STUDENT PRESENTERS:

Maria Cheriyan
Demystifying Desicants

Sridula Kallakuri
Effects of Heparin Conjugated Hyaluronic Acid on Sustained Release and Bioavailability of FGF-2: An In Vitro Study

Nikhil Mantana
The Evolutionary Change in the T58 Phosphorylation Site of Cytochrome c

Madeleine Yang
Efficient Incorporation of Matrix Protein M2 into Influenza Virus-like Particles (VLPs) to Improve Future Vaccine Production and Immunogenicity

JUDGES:

Dr. Christy Chow, Chemistry Department – Wayne State University
Thomson David, Electrical Engineer-TARDEC
Emmett Fox, Chemist- TARDEC
Ms. Katrina Harris, Mechanical Engineer, TARDEC
SECTION III ROOM I, McGregor: Math & Computer Sciences/Computer Engineering

MODERATOR: Mr. Greg Chappelle, STEM Coordinator/Scientist/Electrical Engineer-TARDEC

STUDENT PRESENTERS:

Sai Anantapuantula
Resiliency of the Shuffle-Cube in the face of link deletion

Ajay Arora
Computational Modeling of Spatio-temporal Calcium Signal Propagation in Three-dimensional Reconstructions of Liver Lobular Architecture

Xiomara Brammer-Gonzales
Bringing Xzy to Life Using Stop Motion Animation

JUDGES:

Mr. Greg Chappelle, STEM Coordinator/Scientist/Electrical Engineer-TARDEC
David Brown, Computer Scientist/Adjunct Professor, TARDEC
David Daniszewski, Computer Scientist/Adjunct Professor, TARDEC
Andrew Kosinski, Mechanical Engineer/Robotics-TARDEC
Dr. Ravi Thyagarajan, Mechanical Engineer, TARDEC
SECTION IV ROOM H, McGregor: Life Sciences, Biomedical

MODERATOR: Dr. Anna Boegehold, Biology Department, Wayne State University

STUDENT PRESENTERS:

Saaz Malhotra
Engineering PD-L1 specific diabodies for ImmunoPET imaging

Girish Muthumula
Evaluation of SMYD2–SAH–PARP1 protein complex: Uncovering essential peptides for chemotherapeutic applications

Akash Rathod
Investigating the role of biotic factors in host responses to rhizobia in the system Medicago truncatula

Jason Zhang
Maspin-associated RUNX1, PLAU, and CDH3 as novel biomarkers of early lung adenocarcinoma

JUDGES:

Dr. Anna Boegehold, Biology, Wayne State University
Brandon Schroeder, Biology- Michigan Sea Grant Extension
Dr. Adrian Vasquez, Physiology- Wayne State University
Abby Wicks, Biology- Wayne State University
SECTION V ROOM J, McGregor: Physics, Engineering & Technology

MODERATOR: Dr. David Cinabro, Physics Department – Wayne State University

STUDENT PRESENTERS:

Runxuan Jiang
A Better Model for the Simulation of Rare Gas Adsorbates with Metal Organic Frameworks

Finsam Samson
Factors Influencing Muon Flux and Lifetime: An Experimental Analysis Using Cosmic Ray Detectors

Genevieve Yarema
The Speed of Muons from Different Angles

JUDGES:

Dr. David Cinabro, Physics Department, Wayne State University
Vijay George, Mechanical Engineer-TARDEC
Michael Shen, Mechanical Engineer, TARDEC
Shaheen Shidfar, Mechanical Engineer, TARDEC
11:45 p.m. – 1:30 p.m.

LUNCHEON BANQUET
Room LM – Lower Level, McGregor Conference Center

PRESIDING: Dr. Sandra Yarema
College of Education

WELCOME: Dr. Kevin Rashid
Honors College, Wayne State University

SPEAKERS: Ashi Arora – Where is She Now?

TOPIC: Ashi Arora, finalist at the 2015 JSHS will talk about her research experiences during high school and how her participation in the JSHS impacted her college experiences and future research interests.

ANNOUNCEMENT OF FINAL STUDENT PAPERS

1:30-3:45 p.m. CAMPUS TOUR: including A.Paul Shaap Chemistry Building and Lecture Hall
(Wait in lobby area for directions)

3:45 p.m. - 5:00 p.m.

INTERLUDE – McGregor Conference Center Lobby

Student Poster Presentations

Music by WSU students from the Sposa Strings Quartet
5:00 p.m. - 6:30 p.m.

Final Judging
Room BC, Main level McGregor Conference Center

Moderator: Dr. Karur Padmanabhan, Physics Department- Wayne State University

Judges:

Dr. Karur Padmanabhan, Physics Department, Wayne State University
Dr. Roger Pique-Regi, Center Molecular Medicine/Genetics- WSU
Brandon Schroeder, Biology/ Environmental Science- MI Sea Grant

6:30 p.m.

BANQUET SESSION
Room LM – Lower Level, McGregor Conference Center

PRESIDING: Dr. Sandra Yarema
Director, JSHS

KEYNOTE SPEAKER: Stephanie L. Brock, Ph.D.,
Department of Chemistry, WSU

TOPIC: Nanomaterials: what they are, why we should care about them, and how we can use them to achieve a brighter technological future

AWARDS: Presentation of Student Speaker Finalist Awards
Dr. Sandra Yarema, Director
Student Participants – Evaluation Questionnaire Invitation

Dear JSHS participant,

Evaluators from Purdue University are conducting a study to learn about student experiences in Junior Science & Humanities Symposium (JSHS). We are asking you to fill out this survey because you participated in JSHS. Your feedback will be used to help us improve JSHS for students in the future and provide important information about your experiences. The sponsor of JSHS, the Army Educational Outreach Program (AEOP), is paying for this study. In 2017, more than 7000 students and 1000 adults will participate in JSHS and evaluators from Purdue University want to hear from you and your research mentor.

Here’s how you can help:

1) Complete the JSHS Regional Survey using the hyperlink below. Your parent or guardian has already provided permission for us to ask you to participate in the survey. Now, it is up to you to decide whether you want to participate or not. The survey takes 25-30 minutes to complete on average.

JSHS Regional Student Survey Link:

https://www.cvent.com/d/6tq3pb

JSHS Mentor Survey Link:

https://www.cvent.com/d/ctq3py

If you have any questions about these surveys or your participation in the evaluation study please contact the AEOP Evaluation team at Purdue University – Dr. Carla C. Johnson – carlacjohnson@purdue.edu or at (765) 494-0780.

Thank you so much for your participation in the evaluation of JSHS!
## STUDENT RESEARCH PAPERS

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<tr>
<th>Name</th>
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<td>Sai Anantapantula</td>
<td>Northville High School</td>
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<td>Ajay Arora</td>
<td>Novi High School</td>
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<td>Xiomara Brammer-Gonzales</td>
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<td>Jason Zhang</td>
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## STUDENT POSTER PARTICIPANTS

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STUDENT GUEST OBSERVERS
Loyola High School
Kenneth Beard
Jordan Copeland
Jeffrey Gary
Davis Greene
Kwesi Henry
Denauti Herman
Christian Kimble
Mark Mayberry
Timmy McDonald
Gabriel Watts

TEACHER/SUPERVISOR/ADMINISTRATIVE PARTICIPANTS

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<td>Marc Fazio</td>
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<td>Richard Fitzner</td>
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<td>Dr. Sandra Gonzales</td>
<td>Wayne State University</td>
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<td>Dr. Patricia Hanlan</td>
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<td>Amber Holcomb</td>
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<td>Dr. Stephanie Kokoszka</td>
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<td>Karin Nelson</td>
<td>Northville High School</td>
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 Judges

Mita Asgari  
Graduate Teaching Assistant  
Biological Science  
Wayne State University

Dr. Anna Boegehold  
Biology Department  
Wayne State University

Mr. David Brown  
Computer Scientist/Adjunct Professor  
U.S. Army TARDEC/DoD Personnel

Lt. Colonel David Centeno Jr.  
Biology  
U.S. Army TARDEC/DoD Personnel

Mr. Greg Chappele  
STEM Coordinator/Scientist/Electrical Engineer  
U.S. Army TARDEC/DoD Personnel

Dr. Christine Chow  
Chemistry Department  
Wayne State University

Dr. David Cinabro  
Physics Department  
Wayne State University

Mr. David Daniszewski  
Computer Scientist/Adjunct Professor  
U.S. Army TARDEC/DoD Personnel

Thomson David  
Electrical Engineer  
U.S. Army TARDEC/DoD Personnel

Kimberly Derryberry  
Psychology/Public Affairs  
U.S. Army TARDEC/DoD Personnel

Dr. Russell Finley  
School of Medicine  
Wayne State University

Emmett Fox  
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U.S. Army TARDEC/DoD Personnel

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