52nd Annual

Southeastern Michigan

Junior Science and Humanities Symposium

Program
2016

McGregor Memorial Conference Center
Detroit, Michigan

March 10 and 11, 2016
52nd Annual

SOUTHEASTERN MICHIGAN

JUNIOR SCIENCE AND HUMANITIES
SYMPOSIUM

Thursday and Friday, March 10 and 11, 2016

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. Maria Madalena Ferreira, Director and Coordinator of JSHS
Associate Professor and Coordinator of the Science Education Program
College of Education, Wayne State University

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Dr. Daniel Kashian
Assistant Professor, Biological Sciences
Wayne State University

Ms. Alycia Meriweather
Director, Math/Science Center
Detroit Public Schools

Mr. Kevin Rashid
Honors College
Wayne State University

Dr. Russell L. Finley
Professor
Center for Molecular Medicine & Genetics
Wayne State University
Dear Students, Teachers, Parents and Colleagues,

It is my great privilege to welcome you to the 52nd 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 every year help make this event possible: the members of the Advisory Board, judges, speakers and the administration of the College of Education at Wayne State University.

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. Every 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.

Maria Madalena Ferreira, Director JSHS
Welcome from the Dean

Thomas Edwards, Ph.D.
Associate Dean and Professor
College of Education
Wayne State University

Dr. Thomas Edwards joined the faculty of the College of Education at Wayne State University in 1994, where he is the Associate Dean of Research and Professor of mathematics education.

In his many roles, Dr. Edwards oversees the operation of the Research Office in the College of Education, teaches graduate courses in the mathematics education program, and advises doctoral students.

Dr. Edwards's primary research interests are teaching school mathematics in the context of real world problems, the integration of technology, especially graphing calculators, and the means by which students of all ages acquire mathematical understanding. He has published articles that address these issues across a number of grade levels, as evidenced by his publications in *Teaching Children Mathematics, Mathematics Teaching in the Middle School, Mathematics Teacher*, and the *College Mathematics Journal*.

Dr. Edwards will provide the welcome remarks at the dinner banquet on Thursday.
Dr. Dan Kashian is an Associate Professor in the Biology Department at Wayne State University, where he teaches a variety of courses in the Environmental Science program that require students to study and learn in the field.

Originally from Detroit, Dr. Kashian earned a Bachelor of Science (BS) degree in Natural Resources from the University of Michigan, a Master of Science (MS) degree in Forest Ecology from the University of Michigan, a Ph.D. in Zoology and Forest Ecology and Management from the University of Wisconsin, and conducted postdoctoral research at Colorado State University. Dr. Kashian’s research focuses on forest and landscape ecology, especially the effects of disturbances on forest structure and ecosystem processes. He has worked extensively on forests recovering from wildfire in Yellowstone National Park and in Colorado. Presently Dr. Kashian is doing research on the dynamics of jack pine forests near Grayling and the ecological effects of the emerald ash borer in the Metro Detroit area.

At the dinner banquet on Friday Dr. Kashian will discuss the successful recovery of Michigan’s most endangered species, the Kirtland’s warbler, and its impact on the ecosystems to which it belongs.
Where is She Now?

Ashley Lowery
Past JSHS Finalist

Ashley Lowery was a 2013 JSHS finalist from Troy High School. Presently she is a senior in the College of Nursing at Michigan State University, East Lansing, where she is studying to complete a Bachelor of Science in Nursing. Since the summer before her freshman year, Ashley has worked as a research assistant at Borgess Medical Center in Kalamazoo, Michigan. Working with a variety of primary investigator physicians, Ashley’s projects have included assisting in clinical drug trials for patients with Alzheimer’s disease, diabetes mellitus, and rheumatoid arthritis. Ashley enjoys the patient interaction of clinical research.

Ashley has also a passion for assisting laboring women and newborns and is currently working on her DONA international birth doula certification. As a birth doula, Ashley provides emotional, physical, and educational support to expecting and laboring mothers. After completing her undergraduate degree, Ashley plans to pursue a Master’s in nurse-midwifery to become a Certified Nurse Midwife. This summer Ashley will be traveling to Sri Lank for an elective nursing placement focused on the cultural differences of nursing and midwifery care along with the use of holistic Ayurveda or ‘tree medicine.’

Ashley is an active member of the MSU Nurse Student Association and a trained volunteer hotline crisis counselor. In her free time, she enjoys Spartan football games, watching Netflix shows, and skiing.
Brothers Jaywaun and Jaylyn Johnson are two accomplished musicians who can frequently be seen performing at Detroit’s Eastern Market and other venues putting their entrepreneurial and performance skills to the test. They enjoy playing crowd-pleasing songs such as “Old Joe Clark,” “Swallow Tail Jig” and “Cripple Creek.”
The Biological Sciences Department at Wayne State University offers a wide selection of programs suited to students with different educational goals. The Bachelor of Arts (BA) in Biological Sciences is for students who desire a broad liberal arts education specializing in biology. The Bachelor of Science (BS) in Biological Sciences is designed for those wishing to pursue a career in science or to enter graduate or professional schools. The Master of Arts (MA) is best for students who want deeper formal training in biology, whereas students interested in research may consider graduate research degrees such as the Ph.D. and M.S. in Biological Sciences and M.S. in Biotechnology.

For more information visit: http://clas.wayne.edu/biology/

On Friday morning, students and guests will be able to visit some of the research labs in the Biological Sciences Department where they will become familiar with particular research projects that are currently taking place.
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.

At the luncheon on Friday Jasmine Roberson from the College of Engineering will discuss research opportunities for undergraduate students at WSU and Christian Oliver Avila, a senior in the Biomedical Engineering Program will speak about some of his research projects.
PROGRAM

THURSDAY AND FRIDAY, MARCH 10th AND 11th, 2016

THURSDAY, MARCH 10th, 2016

2:30 p.m.- 3:30 p.m.

REGISTRATION
Lobby
McGregor Memorial Conference Center
Wayne State University

3:30 p.m. - 4:00 p.m.

OPENING SESSION
Room BC, First Level, McGregor Conference Center

WELCOME/OVERVIEW OF WAYNE STATE UNIVERSITY:

Dr. Maria Madalena Ferreira, JSHS Director
Associate Professor of Coordinator of Science Education
College of Education
Wayne State University

ORIENTATION:

Dr. Maria Madalena Ferreira
JSHS Director

4:00 p.m.- 5:30 p.m.

PRESENTATION OF STUDENT PAPERS
McGregor Conference Center
STUDENT PRESENTATIONS

SECTION I ROOM E, McGregor

MODERATOR: Dr. Jennell White, School of Medicine – Wayne State University

STUDENT PRESENTERS:

Annush Vejalla
Potential Role of Let-7d in Pericyte Differentiation

Mckenzie, Jamila
The Effects of Anthropogenic Noise on Calling by Spring Peepers

Tubbs, Darrell
Investigation of Nanoparticles to Optimize SERS Substrates for Aerosol Particle Studies

Ajay Arora
Using Atomic Force Microscopy to Discover the Importance of Calponin in the Mechanical Properties of Muscle Cells

JUDGES:

Dr. Jennell White, School of Medicine – Wayne State University
Dr. Jyoti Nautiyal, Biology Department, Wayne State University
Dr. Vladimir Chernyak, Chemistry Department, Wayne State University
Mr. Raymond Womack, TARDEC
SECTION II ROOM F, McGregor

MODERATOR:  **Dr. Dan Kashian**, Biology Department – Wayne State University

STUDENT PRESENTERS:

**Priya Vijayakumar**  
*The Creation of a Novel Vector that Differentiates iPSCs into Neurons*

**Michelle Zhang**  
*Expression of the Violacein Biosynthetic Gene Cluster Using a Broad-Host Range*

**Jordan Gregory**  
*Electrochemical Studies of a Catalyst System for Hydrogen Production*

**Savannah Crooks**  
*Screen Printed Capacitance Pressure Sensor for Use in Soccer Head Gear*

JUDGES:

**Dr. Dan Kashian**, Biology Department, Wayne State University  
**Ms. Whitney Lee**, Center for Molecular Medicine and Genetics, Wayne State University  
**Ms. Katrina Harris**, TARDEC  
**Mr. Thomson David**, TARDEC
SECTION III ROOM I, McGREGOR

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

STUDENT PRESENTERS:

Catherine Xie,
Clinicopathological Features of Primary Bone Marrow Mature T and NK Cell Neoplasms in Elderly Adults

Kiana Sadri
The Effect of Green and Black Tea Polyphenols on Baker’s Yeast

Mathew Krinock
Design Strategies for Novel Nanoparticles that Overcome Antibiotic Resistant Bacterial Threats

Richard Yang
Producing Fresh Water via Heat Pipe without Power Usage

JUDGES:

Dr. Russell Finley, School of Medicine – Wayne State University
Dr. Corey Krabbenhoft, Biology Department, Wayne State University
Ms. Andrea Simon, TARDEC
Mr. Gregory Chappelle, TARDEC
SECTION IV ROOM J, McGregor

MODERATOR: Dr. Karur Padmanabhan, Physics Department, Wayne State University

STUDENT PRESENTERS:

Aneesha Gummadi
The Effects of Exercise on Bone Morphology in AJ and B6 Mice

Preethi Gopal
Changes in Microglial Density and Intracellular Accumulations in the Basal Ganglia during Normal Aging

Halima Haque
Electrochemical Catalysts for Nitric Oxide Production

Justin Xu
Identifying the Pareto-Optimal Solutions for Multi-point Distance Minimization Problem in Mattan Space

JUDGES:

Dr. Siddhesh Aras, Center Molecular Medicine and Genetics, Wayne State University
Corey Krabbenhoft, Biology Department, Wayne State University
Dr. Karur Padmanabhan, Physics Department, Wayne State University
Dr. Douglas Rose, Physicist, TARDEC
Mr. Howard Weiss, General Motors
5:15 p.m.- 6:00 p.m.

INTERLUDE – McGregor Lobby

- Student Poster Session
- Music by Brothers Jaywaun and Jaylyn Johnson, Detroit musicians

6:00 p.m.- 8:30 p.m.

BANQUET SESSION
Room LM – Lower Level, McGregor Conference Center

PRESIDING: Dr. Maria Madalena Ferreira
Director, JSHS

WELCOME: Dr. Thomas Edwards
Associate Dean of Research, College of Education

KEYNOTE SPEAKER: Dr. Dan Kashian, Biological Sciences, WSU

TOPIC: The Trials and Tribulations of Saving Michigan’s most Endangered Songbird - Kirtland’s Warbler

ANNOUNCEMENT OF FRIDAY’S STUDENT PAPERS:

Dr. Maria Madalena Ferreira, Director, JSHS
FRIDAY, MARCH 6, 2015

8:30 a.m. - 9:00 a.m.
**CONTINENTAL BREAKFAST**
Lobby - McGregor Memorial Conference Center
Wayne State University

9:00-11:45 a.m.
**CAMPUS TOUR:**
*(Wait in breakfast area for directions)*

9:30 a.m. - 11:30 a.m.
Final Judging
McGregor Conference Center, Room J

*Moderator:* Dr. Thomas Edwards, Associate Dean of Research and Professor, Mathematics Education - Wayne State University

*Judges:* Dr. Siddhesh Aras, Center Molecular Medicine/Genetics, WSU
Dr. Anna Boegehold, Biology Department, Wayne State University
Dr. Thomas Edwards, Mathematics Education, Wayne State University

11:45 p.m. - 1:30 p.m.
**LUNCHEON BANQUET**
Room BC – First Level, McGregor Conference Center

*PRESIDING:* Dr. Maria Madalena Ferreira
College of Education

*WELCOME:* Dr. Thomas Edwards
Associate Dean of Research, College of Education

*SPEAKERS:*

Jasmine Roberson, College of Engineering, Wayne State University
*Undergraduate Research Opportunities Program (UROP) – WSU*

*TOPIC:* Ms. Roberson will discuss research opportunities for undergraduate students at WSU.

Christian Oliver Avila: *Research Biomedical Engineering*

Ashley Lowery – *Where is She Now?*

*TOPIC:* Ashley Lowery, a 2013 JSHS finalist, will speak about her research experiences during high school and how her participation in the JSHS impacted her college experiences and future research interests.
1:30 p.m. - 2:15 p.m.

CLOSING SESSION

PRESIDING:  Dr. Maria Madalena Ferreira
Director, JSHS

AWARDS:  Presentation of Student Speaker Awards
Dr. Maria Madalena Ferreira, Director

PRESENTATION FROM STUDENT FINALIST
## STUDENT RESEARCH PAPERS

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## TEACHER/SUPERVISOR/ADMINISTRATIVE PARTICIPANTS

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## Judges

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<td>Molecular Biology</td>
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<td>Mechanical Engineer</td>
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Ms. Doris Cousens, Director  
National Junior Science & Humanities Symposium  
Academy of Applied Science

Dr. Dan Kashian, Associate Professor  
Biology Department  
Wayne State University

Dr. Thomas Edwards  
Associate Dean of Research  
College of Education  
Wayne State University

Ms. Jasmine Roberson  
Undergraduate Research Program  
College of Engineering  
Wayne State University

Ms. Audrey Richardson  
Office of Science  
Detroit Public Schools

Mr. Greg Chappelle  
Tank-Automotive Research, Development, and Engineering Center (TARDEC)

Dr. Sandra Yarema, Incoming Director  
College of Education  
Wayne State University

***********************************************************************

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World-Class Education in the Real Word