



Academy of Applied Science



52nd Annual

Southeastern Michigan

**Junior Science and
Humanities
Symposium**

Program
2016

**WAYNE STATE
UNIVERSITY**

**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

JSHS ADVISORY BOARD

Dr. Monica Brockmeyer

Assoc Provost Academic Success
VP Academic Affairs
Wayne State University

Dr. Christine Chow

Associate Dean and Professor, Chemistry
College of Liberal Arts and Sciences
Wayne State University

Dr. David Cinabro

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. Darin Ellis

Associate Dean, College of Engineering
Wayne State University

Dr. Russell L. Finley

Professor
Center for Molecular Medicine & Genetics
Wayne State University

Dr. John Goudie

Kalamazoo Area Mathematics and
Science Center

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

Ms. Alycia Meriweather

Director, Math/Science Center
Detroit Public Schools

Mr. Kevin Rashid

Honors College
Wayne State University



Welcome

from the JSHS Director
Dr. Maria Madalena Ferreira

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.

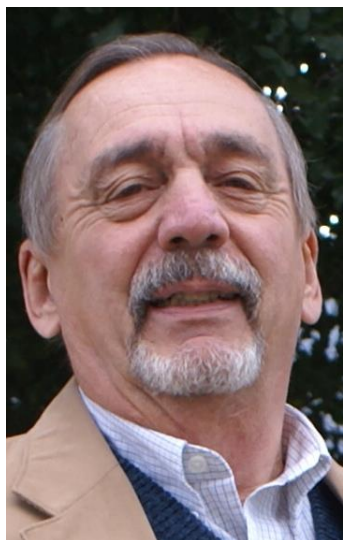
The primary aim of the JSHS is to promote research among high school students. Every year, more than 10,000 students and their teachers participate in forty-eight regional symposia held on university campuses across the country and in Alaska, Puerto Rico and the Department of Defense schools in Europe 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.

A handwritten signature in black ink, appearing to read 'M. M. F.' with a stylized flourish.

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.

Keynote Speaker



Dan Kashian, Ph.D.

**Assistant Professor
Biological Sciences
Wayne State University**

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.

Interlude with Music

Jaywaun Johnson, guitar/bass



Jaylyn Johnson, guitar/bass



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."

Campus Tour

Biological Sciences Department



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.

Undergraduate Research at Wayne State University

<http://undergradresearch.wayne.edu/index.php>



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*

TOPIC:

Ashley Lowery – *Where is She Now?*
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

Name	School	City
Ajay Arora	Novi High School	Novi
Savannah Crooks	Kalamazoo Area Math & Science Center	Kalamazoo
Preethi Gopal	Huron High School	Ann Arbor
Jordan Gregory	Cass Technical High School	Detroit
Aneesha Gummadi	Detroit Country Day	Beverly Hills
Halima Haque	Cass Technical High School	Detroit
Mathew Krinock	Kalamazoo Area Math & Science Center	Kalamazoo
Jamila Mckenzie	Kalamazoo Area Math & Science Center	Kalamazoo
Kiana Sadri	Detroit Country Day	Beverly Hills
Darrell Tubbs	Cass Technical High School	Detroit
Anuush Vejalla	Detroit Country Day	Beverly Hills
Priya Vijayakumar	Detroit Country Day	Beverly Hills
Catherine Xie	Detroit Country Day	Beverly Hills
JustinXu	Troy High School	Troy
Richard Yang	Troy High School	Troy
Michelle Zhang	Battle Creek Area Math & Science Center	Battle Creek

STUDENT PARTICIPANTS

Name	School	City
Ajay Arora	Novi High School	Novi
Redwan Binrouf	Cass Technical High School	Detroit
Savannah Crooks	Kalamazoo Area Math & Science Center	Kalamazoo
Preethi Gopal	Huron High School	Ann Arbor
Jordan Gregory	Cass Technical High School	Detroit
Aneesha Gummadi	Detroit Country Day	Beverly Hills
Halima Haque	Cass Technical High School	Detroit
Maggie Huber	Grosse Pointe South High School	Grosse Point
Casey Jackowski	Grosse Pointe South High School	Grosse Point
Mathew Krinock	Kalamazoo Area Math & Science Center	Kalamazoo
Jamila Mckenzie	Kalamazoo Area Math & Science Center	Kalamazoo
Kiana Sadri	Detroit Country Day	Beverly Hills
Darrell Tubbs	Cass Technical High School	Detroit
Anuush Vejalla	Detroit Country Day	Beverly Hills
Priya Vijayakumar	Detroit Country Day	Beverly Hills
Catherine Xie	Detroit Country Day	Beverly Hills
JustinXu	Troy High School	Troy
Richard Yang	Troy High School	Troy
Genevieve Yarema	Grosse Pointe South High School	Grosse Pointe Farms
Michelle Zhang	Battle Creek Area Math & Science Center	Battle Creek

TEACHER/SUPERVISOR/ADMINISTRATIVE PARTICIPANTS

Name	School	City
Carol Paxhia	Battle Creek Area Math & Science Center	Battle Creek
Dr. Sonya Buttler-Ross	Cass Technical High School	Detroit
Jane Cunningham	Cass Technical High School	Detroit
Dr. Marc Fazio	Detroit Country Day	Beverly Hills
Dr. Patricia Hanlan	Detroit Country Day	Beverly Hills
Jennifer Wilkening	Huron High School	Ann Arbor
Dr. John W. Goudie	Kalamazoo Math/Science Center	Kalamazoo
Rebecca Brewer	Troy High School	Troy
John Morrison	Troy High School	Troy
Daydawn Butler	West Side Academy	Detroit

Judges

Dr. Siddesh Aras
Molecular Biology
Wayne State University

Dr. Anna Boegehold
Biology Department
Wayne State University

Mr. Greg Chappelle
Engineer
TARDEC

Dr. Vladimir Chernyak
Chemistry Department
Wayne State University

Dr. Thomas Edwards
College of Education
Wayne State University

Dr. Russell Finley
School of Medicine
Wayne State University

Ms. Katrina Harris
Engineer
TARDEC

Dr. Dan Kashian
Biology Department
Wayne State University

Corey Krabbenhoft, Ph.D. Candidate
Biology Department
Wayne State University

Whitney Lee
School of Medicine
Wayne State University

Dr. Jyoti Nautiyal,
Biology Department,
Wayne State University

Dr. Karur Padmanabhan
Physics Department
Wayne State University

Dr. Douglas Rose
Physicist
TARDEC

Ms. Andrea Simon
Computer Scientist
TARDEC

Mr. David Thompson
Engineer
TARDEC

Dr. Jennell White
School of Medicine
Wayne State University

Whitney Lee, Ph.D. Candidate
School of Medicine
Wayne State University

Mr. Raymond Womack
Mechanical Engineer
TARDEC

Mr. Howard Weiss
Engineer
General Motors

SPECIAL ARRANGEMENTS AND ACKNOWLEDGMENTS

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

Wayne State University
World-Class Education in the Real World