

# **Missouri Academy of Sciences 60th Annual Meeting**



**Junior Division**

**Missouri Western  
State University  
April 12, 2024**

# MISSOURI ACADEMY OF SCIENCE JUNIOR DIVISION OFFICERS

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**Missouri Southern State University**

**Dr. Teresa Boman**  
**Missouri Southern State University**

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### Mastodon Region

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Welcome to the 2024 Missouri Junior Academy of Science Annual Meeting at Missouri Western State University. Congratulations! We are thrilled to have you here today. Your participation speaks volumes of your interest in, and dedication to, your education and your future. Please see this as an opportunity to demonstrate your knowledge, share ideas, and build your network.

As you engage with other participants, your teachers, and the meeting volunteers, please do not hesitate to ask about the opportunities and programs available to you as you plan the next steps of your academic journey.

Good luck to each of you. Again, we are so happy and honored to have you on the campus of Missouri Western State University!

Sincerely,  
Dr. Joel Hyer  
Interim Provost



Dr. Joel Hyer  
Interim Provost, Missouri Western State University

# Institutional Sponsor

Missouri Western State University is a student-centered learning community preparing individuals for lives of excellence. As Missouri's official applied learning institution, Missouri Western is committed to providing 100% of students with an opportunity to use course content and skills in real-world, hands-on settings to support career readiness, including internships, mentored research, performances, service-learning and more.

Missouri Western offers more than 50 majors and 30 minors as well as 13 master's degrees. The institution is accredited by the Higher Learning Commission, a commission of the North Central Association of Colleges and Schools.

The scenic 723-acre campus features a prairie restoration project—the John Rushin Teaching and Research Prairie—as well as walking trails and nine ponds. It is home to the 6,000-square-foot Walter Cronkite Memorial and since 2010 has been the summer training camp home of the Kansas City Chiefs.



# Awards and Sponsors

## Student Awards

All finalist awards sponsored by the Missouri Western State University Foundation

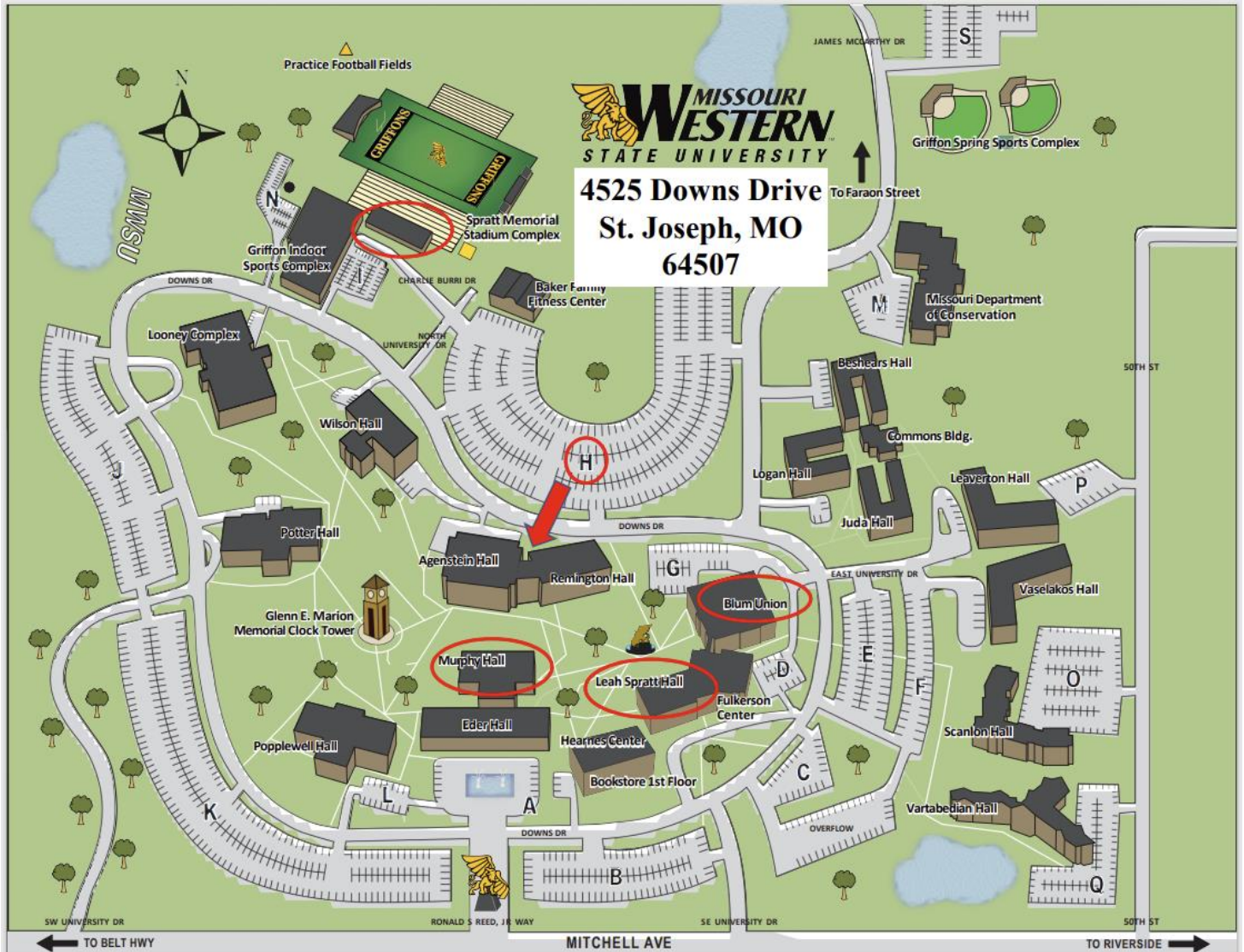
Agriculture and Plant Science  
Behavioral and Social Science  
Biology and Environmental Science  
Chemistry and Biochemistry  
Computer Science and Mathematics  
Engineering and Physics  
Medicine and Human Health  
Microbiology and Cell/Molecular Biology

## Teacher Awards

All teacher awards sponsored by the Missouri Western State University Foundation

Outstanding Middle School Teacher  
Outstanding High School Teacher

# CAMPUS MAP



## Locations for Missouri Junior Academy of Science

Remington Hall/Agenstein Hall  
 Murphy Hall  
 Blum Union

Check-in and Orientation  
 Morning presentation sessions  
 Dining Hall

## SCHEDULE OF EVENTS

**Friday, April 12, 2024**

8:30 AM – 10:00 AM	General Registration <b><i>Remington Hall/Agenstein Hall Atrium</i></b>
10:00 AM – 10:30 AM	Welcome and Student Orientation <b><i>Agenstein Hall 324</i></b> Drs. Teresa Boman and Mary Kilmer, State Co-Directors
10:00 AM – 10:30 AM	Welcome and Judges Orientation <b><i>Agenstein Hall 224</i></b> Drs. Teresa Boman and Mary Kilmer, State Co-Directors
10:30 AM - 12:30 PM	Middle/High School Concurrent Paper Sessions <b><i>Murphy Hall</i></b> Specific rooms and schedule on following pages
12:30 PM – 1:45 PM	Lunch <b><i>Blum Union or Off-Campus</i></b>
2:00 PM – 3:00 PM	Early Awards and Announcement of Finalists <b><i>Agenstein Hall 324</i></b>
3:00 PM – 5:00 PM	Middle School Finalists' Presentations <b><i>Agenstein Hall 124</i></b> High School Finalists' Presentations <b><i>Agenstein Hall 224</i></b>
6:00 PM – 6:30 PM	Middle and High School Finalist Awards Ceremony <b><i>Agenstein Hall 324</i></b>



# MIDDLE SCHOOL

**Chemistry and Biochemistry  
Biology and Environmental Science  
Agriculture and Plant Science**

*Murphy Hall 107*

10:30 Audrey Tellman  
10:45 Lyla Naslund  
11:00 Bella Munn  
11:15 Myresa Medsker  
11:30 Anniston Alvarez  
11:45 Jackson Bruns

**Engineering and Physics**

*Murphy Hall 105*

10:30 Antonio Leon  
10:45 Jakob Fischer  
11:00 Paul Woodley  
11:15 Cooper Self  
11:30 Connor Boyle  
11:45 James Bhend  
12:00 Matt Kelley  
12:15 Cayden Patterson

**Microbiology and Cell/Molecular Biology  
Behavioral and Social Science  
Medicine and Human Health**

*Murphy Hall 108*

10:30 Indigo Dillahay  
10:45 Brooke Hayes  
11:00 Alton Tellman  
11:15 Julia Elder  
11:30 Ryan Radlund  
11:45 Ellyn Harden

# HIGH SCHOOL

**Agriculture and Plant Science  
Biology and Environmental Science  
Microbiology and Cell/Molecular Biology**

***Murphy Hall 110***

10:30 Michael Owen  
10:45 Kasey Hicks  
11:00 Tessa Wilson  
11:15 Anna Barnhart  
11:30 Brenden Fain  
11:45 Zoe Martonfi  
12:00 Erin Holly  
12:15 Emma Fetterhoff

**Engineering and Physics  
Behavioral and Social Science**

***Murphy Hall 112***

10:30 Christian Cavener  
10:45 Jonah Visser  
11:00 Anna Herman  
11:15 Warda Morsy  
11:30  
11:45 Simon Wibbenmeyer

**Medicine and Human Health**

***Murphy Hall 114***

10:30 Varsha Manikandan  
10:45 Caroline Erisman  
11:00 Lily Smith  
11:15 Eshal Janjua  
11:30 Olivia McGruder  
11:45 Shrivats Manikandan

# MIDDLE SCHOOL Presentations

**MIDDLE SCHOOL**  
**CHEMISTRY AND BIOCHEMISTRY**  
**BIOLOGY AND ENVIRONMENTAL SCIENCE**  
**AGRICULTURE AND PLANT SCIENCE**

**Murphy Hall 107**

**Chemistry and Biochemistry**

10:30 AM     **Audrey Tellman, Tuscumbia Middle School**  
*Egg-cellent Preservation! Investigating Different Egg Preservation Methods*  
Sponsoring Teacher: Constance Wyrick

**Biology and Environmental Science**

10:45 AM     **Lyla Naslund, Camdenton Middle School**  
*Slow Mo*  
Sponsoring Teacher: Amy Larrington

11:00 AM     **Bella Munn, South Middle School**  
*Collecting Bacteria From Different School Hallways*  
Sponsoring Teacher: Abbie Durr

11:15 AM     **Myresa Medsker, St. Patrick's Catholic School**  
*The Effect of Different Places on a Bird's Choice of Birdseed*  
Sponsoring Teacher: Didi Fischer

**Agriculture and Plant Science**

11:30 AM     **Anniston Alvarez, St. Patrick's School**  
*The Effect of Different Types of Water Resulting in Plant Health*  
Sponsoring Teacher: Didi Fischer

11:45 AM     **Jackson Bruns, Camdenton Middle School**  
*Earth's Invisible Farmers*  
Sponsoring Teacher: Amy Larrington

# MIDDLE SCHOOL ENGINEERING AND PHYSICS

Murphy Hall 105

## Engineering and Physics

- 10:30 AM     **Antonio Leon, St. Patrick's School**  
*Come on, Feel The Noise. The Effect of Different Cup Materials on Homemade Speaker Amplification of Sound*  
Sponsoring Teacher: Didi Fischer
- 10:45 AM     **Jakob Fischer, St. Patrick's School**  
*The Effect of Different UV Protectors on the Intensity of UV-A Light*  
Sponsoring Teacher: Didi Fischer
- 11:00 AM     **Paul Woodley, St. Patrick's School**  
*The Effect of Different Materials on the Interference of Radio Waves*  
Sponsoring Teacher: Didi Fischer
- 11:15 AM     **Cooper Self, Camdenton Middle School**  
*Slick Pistons*  
Sponsoring Teacher: Amy Larrington
- 11:30 AM     **Connor Boyle, Camdenton Middle School**  
*Holy Guacamole*  
Sponsoring Teacher: Amy Larrington
- 11:45 AM     **James Bhend, South Middle School**  
*Soak it Up-Testing the Liquid and Weight Absorbency of Different Diaper Brands*  
Sponsoring Teacher: Abbie Durr
- 12:00 PM     **Matt Kelley, Camdenton Middle School**  
*Takedown*  
Sponsoring Teacher: Tim Mulford
- 12:15 PM     **Cayden Patterson, Tuscumbia Middle School**  
*Parching Paper: Investigating Different Methods to Restore Wet Documents*  
Sponsoring Teacher: Constance Wyrick

**MIDDLE SCHOOL**  
**MICROBIOLOGY AND CELL/MOLECULAR BIOLOGY**  
**BEHAVIORAL AND SOCIAL SCIENCE**  
**MEDICINE AND HUMAN HEALTH**

**Murphy Hall 108**

**Microbiology and Cell/Molecular Biology**

10:30 AM     **Indigo Dillahay, South Middle School**  
*It's Alive!: Is there bacteria living in my yogurt?*  
Sponsoring Teacher: Abbie Durr

**Behavioral and Social Science**

10:45 AM     **Brook Hayes, Tuscumbia Middle School**  
*Against the Clock: Investigating the Effects of a Visual Task on Time Perception in Students of Different Ages*  
Sponsoring Teacher: Constance Wyrick

**Medicine and Human Health**

11:00 AM     **Alton Tellman, Tuscumbia Middle School**  
*Making Sense of Muscle Sense: Investigating The Effects of Proprioceptive Training on Agility, Balance, and Dribbling in Basketball*  
Sponsoring Teacher: Constance Wyrick

11:15 AM     **Julia Elder, Montgomery County Middle School**  
*SPF, Is It Just A Number?*  
Sponsoring Teacher: Lori Farrar

11:30 AM     **Ryan Radlund, Camdenon Middle School**  
*SOS (Save Our Soles)*  
Sponsoring Teacher: Tim Mulford

11:45 AM     **Ellyn Harden, St. Patrick's School**  
*The Effect of Different Liquids on Tooth Enamel*  
Sponsoring Teacher: Didi Fischer

**HIGH SCHOOL**

**Presentations**

**HIGH SCHOOL**  
**AGRICULTURE AND PLANT SCIENCE**  
**BIOLOGY AND ENVIRONMENTAL SCIENCE**  
**MICROBIOLOGY AND CELL/MOLECULAR BIOLOGY**

**Murphy Hall 110**

**Agriculture and Plant Science**

- 10:30 AM **Michael Owen, Lebanon High School**  
*The Effect of Cytoplasmic Material on Rosa 'ZARrefre' Rate of Decay: A Novel Approach to Preservation*  
Sponsoring Teacher: Ryne Emerick
- 12:15 PM **Emma Fetterhoff, Perryville Senior High School (VIRTUAL)**  
*Exploring the impact of PFAS on Phaseolus vulgaris and Curcubita pepo in vegetable gardens*  
Sponsoring Teacher: Leanne Thele

**Biology and Environmental Science**

- 10:45 AM **Kasey Hicks, Lebanon High School**  
*Assessing the Impacts of Lead-Loaded Biochar Degradation on Caenorhabditis elegans Population Growth*  
Sponsoring Teacher: Ryne Emerick
- 11:00 AM **Tessa Wilson, Liberty High School**  
*Honeybees as Bioindicators of Environmental Pollution*  
Sponsoring Teacher: Daniel Evans
- 11:15 AM **Anna Barnhart, Joplin High School**  
*A Hydrobiological Perspective: Effects of Pharmaceutical Pollution on Reproductive Dynamics and Behavioral Responses in Daphnia magna*  
Sponsoring Teacher: Karisa Boyer
- 12:00 PM **Erin Holly, Perryville Senior High School (VIRTUAL)**  
*Can natural Bryophyta gardens affect air quality and overall health and possibly put forth new ways to rid the atmosphere of greenhouse gasses? A small piece of the bigger picture*  
Sponsoring Teacher: Leanne Thele



**HIGH SCHOOL**  
**AGRICULTURE AND PLANT SCIENCE**  
**BIOLOGY AND ENVIRONMENTAL SCIENCE**  
**MICROBIOLOGY AND CELL/MOLECULAR BIOLOGY**

**Murphy Hall 110**

**Microbiology and Cell/Molecular Biology**

- 11:30 AM     **Brenden Fain, Joplin High School**  
*Effects of Dominant Microbe on Practical Characteristics of Sourdough Starters*  
Sponsoring Teacher: Karisa Boyer
- 11:45 AM     **Zoe Martonfi, Eldon High School**  
*Laying Groundwork for the Development of an RNAi-Based Herbicide for Invasive Lonicera (Honeysuckle)*  
Sponsoring Teacher: Jennifer Wellman

**HIGH SCHOOL  
ENGINEERING AND PHYSICS  
BEHAVIORAL AND SOCIAL SCIENCE**

**Murphy Hall 112**

**Engineering and Physics**

- 10:30 AM      **Christian Cavener, Joplin High School**  
*Various Quantitative Relationships between In-Situ Parameters of a Sample of Quasars and Variables Associated with the Emitted Electromagnetic Radiation of this Sample*  
Sponsoring Teacher: Karisa Boyer
- 10:45 AM      **Jonah Visser, Miller County R-III High School**  
*Investigating the Effectiveness of Ferrofluids for Removal of LDPE and PVC Microplastics From Water*  
Sponsoring Teacher: Brett Morris
- 11:45          **Simon Wibbenmeyer, Perryville Senior High School (VIRTUAL)**  
*Efficiency of a 3D-Printed Pico-Hydroelectric Generation System Using a Fused Deposition Modeling Printer*  
Sponsoring Teacher: Leanne Thele

**Behavioral and Social Science**

- 11:00 AM      **Anna Herman, Holt High School**  
*The Effects of a Compression Vest on Salivary Cortisol Fluctuation in Canines during Nail Trimming Procedures*  
Sponsoring Teacher: Jennifer Hess
- 11:15 AM      **Warda Morsy, Thomas Jefferson Independent Day School**  
*The Effects of Organic Wellness on Mental and Emotional Wellness*  
Sponsoring Teacher: Chris Rupar

**HIGH SCHOOL  
MEDICINE AND HUMAN HEALTH**

**Murphy Hall 114**

**Medicine and Human Health**

- 10:30 AM     **Varsha Manikandan, Kirksville Senior High School**  
*Evaluating BMX-001 Efficacy: A SOD2 Mimetic Approach to Mitigate Myocardial Ischemia-Reperfusion Damage*  
Sponsoring Teacher: Daniel Floyd
- 10:45 AM     **Caroline Erisman, Joplin High School**  
*Novel Utilization of Blood Work Monitoring (NavDx) for Early Detection of Cervical and Anal Cancers*  
Sponsoring Teacher: Karisa Boyer
- 11:00 AM     **Lily Smith, Joplin High School**  
*The Effect of Oral Contraceptives on the Prevalence/Incidence of Ovarian Cancer*  
Sponsoring Teacher: Karisa Boyer
- 11:15 AM     **Eshal Janjua, Timberland High School**  
*The Effect of Clostridium Butyricum on the Stimulation of Parkinson's Disease in Transgenic Caenorhabditis elegans*  
Sponsoring Teacher: Theresa Cordonier
- 11:30 AM     **Olivia McGruder, Lebanon High School**  
*Effects of Sodium Bicarbonate On Methotrexate Affected Livers in Danio rerio: An Embryological study*  
Sponsoring Teacher: Ryne Emerick
- 11:45 AM     **Shrivats Manikandan, Kirksville Senior High School**  
*Methamphetamine's Influence on the Blood-Brain Barrier: Dissecting Changes in Microvascular Endothelial Cell Structure and Function*  
Sponsoring Teacher: Daniel Floyd