



84th Annual

# Minnesota State Science & Engineering Fair

*STEM - Meeting Challenges with  
Community, Creativity & Change*



MARCH 23-30, 2021

The Minnesota Academy of Science  
[www.mnmas.org](http://www.mnmas.org)

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# State Science & Engineering Fair Team

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## About the Minnesota Academy of Science



Founded in 1873, the Minnesota Academy of Science (MAS) is a statewide 501(c)3 organization committed to advancing science, technology, engineering, and math (STEM) in Minnesota by connecting Minnesotans of all backgrounds with resources and opportunities to engage in STEM learning, research, and communication—and to recognize excellence in these areas.

To learn more about our programs, connect with us, volunteer, or make a donation to support our work, please visit [mnmas.org](http://mnmas.org).

# Welcome from the Minnesota Academy of Science

## Board President

On behalf of the Board, I would like to welcome everyone to the second (and hopefully last) Virtual Minnesota State Science & Engineering Fair.

This fair is about you, the students. We know you didn't have to participate in Science Fair. You wanted to. You had a question you wanted to answer. Or a cool new device or machine you thought might help people. Or you had an idea about a mathematical problem that had stumped everyone else. You took the time to create a presentation for all to see and that took courage.

Congratulations to all the Regional Fair winners. Remember that you are the best and brightest from your respective regions and schools. Be proud of that accomplishment!

I ask you to take the time to thank your teachers and advisors for their support. Don't forget to thank your parents and other family members for putting up with the late hours, interesting projects in the garage or living room or help with your video.

Those of us who will judge your presentations want to encourage your curiosity, enthusiasm and joy in learning about the world around you and how it works.

Remember that it's about the journey and what you learned, not about who "wins". No matter the outcome of the Fair this time, we hope that you will continue to pursue your dreams. The world is waiting for you.

Sincerely,

*Stephanie D. Yancey, Ph.D.*



[WATCH DR. YANCEY'S VIDEO](#)

President, Minnesota Academy of Science

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## About the Minnesota State Science & Engineering Fair

The mission of the Minnesota State Science & Engineering Fair (MSSEF) is to help Minnesota students become informed citizens who are well versed in the methods and ideas of science and to them to pursue careers in science, technology, engineering, and math (STEM).

An annual competition since 1938, MSSEF showcases the research of Minnesota's best and brightest STEM students. It is the culmination of our state's Regional Science Fairs. From approximately 2,500 regional participants, over 500 middle school and high school students qualify to advance and present their research at the state level. Students compete for prizes and awards worth a total of approximately \$25,000 sponsored by nearly 40 corporations, nonprofits, government agencies, and professional scientific societies.

MSSEF introduces students to new ideas, inspires them to research topics of personal interest, and encourages them to network with professional scientists and their peers.

# 2021 MSSEF Schedule

## Friday, March 26

Streaming STEM movies available until March 30.

Project judging begins at 8:00 am.

6:00 pm - *Minnesota's Get the Lead Out Program*, Kelly Amoth, Minnesota Pollution Control Agency

6:30 pm - *Wolves: An Apex Predator*, Maddy Witt, International Wolf Center

## Saturday, March 27

Judges continue reviewing projects.

11:00 am - *Youth Climate Change Action*, Na Choih, Youth Environmental Activists!, Climate Generation

12:00 pm - *Tips for students on making your project ISEF ready*, Travis Frey, experienced ISEF judge

12:30 pm - *Get the Lead Out Program*, Elizabeth Froden, Minnesota Green Corps

3:00 pm - *Solar Power for the Grid - How it works*, Pete Malamen, Consulting Engineers Group

4:00 pm - *Tips for teachers on making projects ISEF ready*, Travis Frey, experienced ISEF judge

**5:00 pm - *Listening session: Teachers' experience with distance learning and research***

6:00 pm - *Two Science Truths and a Lie Game*, Ally Milenkovic, Minnesota Academy of Science

## Sunday, March 28

11:00 am - *Traffic Engineering on Minnesota's Highways*, Melissa Barnes, MnDOT

12:30 - 4 pm - Judge question and answer session with students.

5:00 pm - *The Day in the Life of Scientists and Engineers at Medtronic*

5:30 pm - *Get the Lead Out Program*, Melisa Rodriguez, Minnesota Green Corps

**6:00 pm - *Listening Session: Students' Experience of Research during Distance Learning*, Katelyn Jo France, University of Minnesota- Duluth & Manashree Seth Padiyath, University of Minnesota**

## Monday, March 29

5:00 pm - *Owls Through the Ages*, Karla Bloem, International Owl Center

5:30 pm - *Get the Lead Out Program*, Steven Yang, Minnesota Pollution Control Agency

5:30 - 8:30 - Public Viewing

## Tuesday, March 30

Streaming STEM movie access ends.

5:00 pm - *Minnesota's Native Bees*, Sarah Foltz Jordan, Xerces Society

6:30 pm - Keynote Address & Virtual Awards Ceremony

LINK:

<https://us02web.zoom.us/j/88201643659?pwd=bjFwZGVHUVZDNytNSGdxWHI4L05tQT09>

8:00 pm (approximately) - All award winners announced online at [mnmas.org/2021-ssef-awards](http://mnmas.org/2021-ssef-awards).

(This page will be unlocked and made public immediately following the live virtual awards ceremony.)



## Wednesday, March 31

Last day for [extra activities](#) (coloring contest, STEM poetry contest, project showcase scavenger hunt, and social media contest).



# Workshops, Listening Sessions, Movies, & Games

## STEM - Meeting Challenges with Community, Creativity & Change

The 2021 workshops bring you numerous opportunities to explore our theme of *STEM - Meeting Challenges through Community, Creativity and Change*. We invite you to take full advantage of these unique opportunities to learn from statewide science and engineering professionals while engaging with your peers. **One student attendee at each workshop will win a \$40 target gift card!**

Workshops will occur over Zoom. Watch your inbox every morning from March 26-30 for daily schedule reminders from MAS communications specialist Emily Shepard. If you don't receive these daily reminders, links will also be posted on the workshop and movie schedule in Zfairs.

You will have the opportunity to record your attendance at workshops on the certificate of participation you will receive -- to serve as a lasting record of your engagement in the State Science & Engineering Fair.

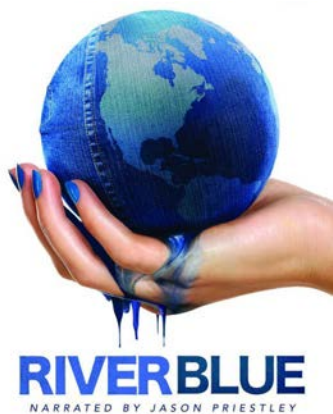
We are also pleased to offer a selection of streaming STEM movies, which will be available from March 26-30. Information on how to access these movies will be sent via email and will also be included in the workshop and movie schedule in Zfairs.

## Streaming STEM Movies

Relax with a bowl of popcorn and these STEM-themed movies, which can be streamed from March 26 - 30. Participants and observers will receive an email with access details, which will also be included in the workshop and movie schedule in Zfairs.

### RIVERBLUE

[Trailer](#)



Following international river conservationist, Mark Angelo, RIVERBLUE spans the globe to infiltrate one of the world's most pollutive industries, fashion. Narrated by clean water supporter Jason Priestley, this groundbreaking documentary examines the destruction of our rivers, its effect on humanity, and the solutions that inspire hope for a sustainable future. Through harsh chemical manufacturing processes and the irresponsible disposal of toxic chemical waste, one of our favorite iconic products has destroyed rivers and impacted the lives of people who count on these waterways for their survival. RIVERBLUE brings awareness to the destruction of some of the world's most vital rivers through the manufacturing of our clothing, but will also act as a demand for significant change in the textile industry from the top fashion brands that can make a difference.

### Big Dream

[Trailer](#)



Big Dream follows the intimate stories of seven young women who are breaking barriers and overcoming personal challenges to follow their passion in science, math, computing & engineering (STEM) fields. Through video diaries and verité moments, each of these girls defy the stereotype of what it means to be an over achieving woman in the fields of technology. From small town Iowa to the busy streets of the Middle East, Big Dream immerses viewers in a world designed by the next generation of girls. Big Dream follows the intimate stories of seven young women who are breaking barriers and overcoming personal challenges to follow their passion in science, math, computing & engineering (STEM) fields. Through video diaries and verité moments, each of these girls defy the stereotype of what it means to be an over achieving woman in the fields of technology. From small town Iowa to the busy streets of the Middle East, Big Dream immerses viewers in a world designed by the next generation of girls.



## FRIDAY 3/26/2021

One student attendee at *each* workshop will win a \$40 Target gift card!

- **6:00 PM: Get the Lead out Program, Minnesota Pollution Control Agency**



**Speaker:** Kelly Amoth

Kelly Amoth graduated from the University of Georgia with degrees in English and ecology. The first time she visited UGA was actually for the State Science Fair in her junior year of high school! She has been an environmental educator and naturalist for 15 years. She was a naturalist at Warner Nature Center for 10 years and her favorite place to be in the summer was on the nature center's two lakes teaching kids canoeing, kayaking, and fishing. As a program coordinator of the Get the Lead Out program, she is excited to continue educating Minnesotans of all ages about the dangers of lead fishing tackle to loon, other wildlife, water, and human health.

**Audience:** Everyone

**Workshop Description:**

Get the Lead Out is a program within the Minnesota Pollution Control Agency that is focused on education and outreach about the dangers of lead fishing tackle, especially for the common loon. An estimated 25% of loon deaths are caused by the ingestion of lead fishing tackle. The Get the Lead Out program also educates Minnesotans about the dangers of lead to human health, our water sources, and other wildlife, including bald eagles and trumpeter swans.

- **6:30 PM: International Wolf Center**



**Speaker:** Maddy Witt

Maddy is the Education Supervisor for the International Wolf Center in Ely, MN. She studied wildlife management and biology at the University of Minnesota Crookston and served as an intern at Brookfield Zoo, a research technician for the Isle Royale wolf-moose project, and an environmental educator at Riveredge Nature Center. She also previously served as an education intern at the International Wolf Center, where she fell in love with teaching others about wildlife and the natural world.

**Audience:** Everyone

**Workshop Description:**

Wolves are an apex predator that perform an important role in their ecological communities. We'll delve into the wolf's relationship with their ecosystem and talk about the impact that humans have on natural communities as well.

## SATURDAY 3/27/2021

One student attendee at *each* workshop will win a \$40 Target gift card!

- **11:00 AM: Youth Environmental Activists from Climate Generation**



**Speaker:** Na Choih

Na (they/them) works as Climate Generation's Youth Leadership Mentor. They provide support, resources, and mentorship for youth involved in YEA! (Youth Environmental Activists!) Network, and find inspiration and meaning from working with others who yearn for justice.

**Audience:** Students

**Workshop Description:**

This lecture will cover the basic science behind climate change and connect this to and address Line 3, a pipeline that is currently under construction in northern Minnesota. Also covered in this lecture will be what YEA! (Youth Environmental Activists!) Network members are fighting against Line 3, and how you can get involved.

- **12:00 PM: Tips For Making Projects ISEF Ready**

**Speaker:** Travis Frey, Ph.D. Calyxt Chief Technology Officer



Dr. Frey earned his Ph.D. in Plant Biology and Biotechnology. Prior to joining Calyxt, Dr. Frey was responsible for developing and championing scientific and technology endeavors for several large multi-national agriculture and biotech companies including Monsanto as well as a startup focused on developing organic fertilizers from recycled food waste. Travis has been involved in science fair beginning as an 8th grader continuing through his senior year where he achieved Grand Champion Status at his ISEF qualifier and Second Place overall winner in Botany at the International Science and Engineering Fair in 1996. Travis has served as an advisor for numerous students that have competed and placed at the ISEF fairs as well as on the board of the State Science and Technology Fair of Iowa and was inducted into their Hall of Fame in 2012. Travis also has served as a judge at several ISEF competitions over the years.

**Audience:** Students

**Workshop Description:**

Travis will present a brief summary of his experiences as a science fair student, his experiences at the ISEF both as a student and a Judge and discuss the aspects that judges look for at the local, state and international levels of competition. Following this short summary Travis will open up the floor for questions and answers.

## SATURDAY 3/27/2021 continued

One student attendee at *each* workshop will win a \$40 Target gift card!

- **12:30 PM: Minnesota Green Corps & Minnesota Pollution Control Agency**



**Speaker:** Elizabeth Froden

Elizabeth (she/her) is serving as a community readiness and outreach member for the Get the Lead Out program at the Minnesota Pollution Control Agency in Saint Paul.

**Audience:** Everyone

**Workshop Description:**

The Minnesota GreenCorps program, coordinated by the Minnesota Pollution Control Agency, aims to preserve and protect Minnesota's environment while training a new generation of environmental professionals. Get the Lead Out is a program within the Minnesota Pollution Control Agency that is focused on education and outreach about the dangers of lead fishing tackle, especially for the common loon.

- **3:00 PM: Solar Power for the Grid-How it works**

**Speaker:** Pete Malamen



Pete Malamen, PE, VP-Consulting Engineers Group (CEG), has been an engineer in the electric power industry for the past 40 years, first for a utility and then in industry. For the last 25 years Pete has been doing consulting and is currently with CEG in Lakeville. He has designed and supervised the construction of numerous substations, transmission and distribution lines from 4 kV to 345 kV. Pete has been involved with integrating wind and now solar power to the electric power grid since 2003. He has an undergraduate degree in Physics from St. Olaf and a master's degree in Electrical Engineering from the U of M. Pete is a registered professional engineer in Minnesota and other states.

**Audience:** Everyone

**Workshop Description:**

Pete will be talking about solar power for the electric grid. He will go over the wiring and talk about energy vs power and go into the economics of things.

## SATURDAY 3/27/2021 continued

One student attendee at *each* workshop will win a \$40 Target gift card!

- **4:00 PM: Tips For Making Projects ISEF Ready**

**Speaker:** Travis Frey, Ph.D. Calyxt Chief Technology Officer



Dr. Frey earned his Ph.D. in Plant Biology and Biotechnology. Prior to joining Calyxt, Dr. Frey was responsible for developing and championing scientific and technology endeavors for several large multi-national agriculture and biotech companies including Monsanto as well as a startup focused on developing organic fertilizers from recycled food waste. Travis has been involved in science fair beginning as an 8th grader continuing through his senior year where he achieved Grand Champion Status at his ISEF qualifier and Second Place overall winner in Botany at the International Science and Engineering Fair in 1996. Travis has served as an advisor for numerous students that have competed and placed at the ISEF fairs as well as on the board of the State Science and Technology Fair of Iowa and was inducted into their Hall of Fame in 2012. Travis also has served as a judge at several ISEF competitions over the years.

**Audience:** Teachers & Research Advisors

**Workshop Description:**

Travis will present a brief summary of his experiences as a science fair student, his experiences at the ISEF both as a student and a Judge and discuss the aspects that judges look for at the local, state and international levels of competition. Following this short summary Travis will open up the floor for questions and answers.

- **5:00 PM: Listening Session- Teachers and their experience with research and distance learning**



**Host:** Cindy Ward-Thompson

Cindy is a Title I Specialist for the Minnesota Department of Education and a Board Member of the Minnesota Academy of Science. She is the former Director of the Bdote Learning Center, an Ojibwe and Dakota Language Immersion Charter School in Minneapolis.

**Audience:** Teachers & Research Advisors

**Listening Session Description:**

In this listening session we will explore the challenges educators face while advising student research during distance and hybrid learning. We will ask them about their experiences and best practices. The Minnesota Academy of Science would like to learn more about our educators' roles and how best to support them.

## SATURDAY 3/27/2021 continued

One student attendee at *each* workshop will win a \$40 Target gift card!

- **6:00 PM: Game: Two Science Truths and a Lie**



**Host:** Ally Milenkovic

Ally Milenkovic (she/her) is the Assistant Program Director and Volunteer Coordinator with the Minnesota Academy of Science. She studied education and organic chemistry in college and graduate school, and now loves helping to host events like the State Science Bowl, JSHS, and of course the State Science Fair!

**Audience:** Students

**Game Description:**

The world is full of amazing and bizarre scientific phenomena, and sometimes the truth is stranger than fiction. Take a break from worrying about your projects with this simple and fun STEM trivia game, as you guess which of three weird science facts is a lie. All student participants can play, random guessing is always welcome, and there are gift card prizes for winners!

**SUNDAY 3/28/2021**

One student attendee at *each* workshop will win a \$40 Target gift card!

- **11:00 AM: Transportation Engineering with MnDOT's Metro District**



**Speaker:** Melissa Barnes

Melissa is the Principal Engineer and North Area Manager from MnDOT's Metro District. She is a Civil Engineer in Minnesota (University of Minnesota, Twin Cities graduate 2004). She is experienced in traffic engineering and safety and is particularly passionate about the safety of people walking and biking. She works for the Minnesota Department of Transportation (MnDOT) overseeing MnDOT's projects in Anoka and Ramsey Counties. Melissa has three kids in elementary school and enjoys sharing her passion for STEM, biking, and hiking!

**Audience:** Everyone

**Workshop Description:**

This presentation will walk through the effects of public involvement and communications skills on Minnesota highways. We will walk through how traffic and other concerns related to roadways are analyzed and solutions are identified. We will discuss traffic crashes, congestion, walking or biking barriers, and designing for people with disabilities. Information on walking audits you can do in your own community right now will be provided. These walking audits can make an impact and help anyone provide feedback to your City, County, and State.

- **5:00 PM: A Day In The Life Of A Scientist/Engineer At Medtronic**



**Speakers:** Mallika Kamarajugadda, Sr. Principal Scientist at Medtronic & four colleagues from Medtronic (panel)

**Audience:** Everyone

**Workshop Description:**

This workshop will feature a panel of four scientists/engineers with expertise in different areas such as modeling, chemistry, materials science, engineering and product development. Each speaker will give an overview of their educational background/training and their current role.



**SUNDAY 3/28/2021**

One student attendee at *each* workshop will win a \$40 target gift card!

- **5:30 PM: Get the Lead out Program, Minnesota Green Corps**



**Speaker:** Melisa Rodriguez

Melisa Rodriguez is currently a MN GreenCorps member with the Minnesota Pollution Control Agency's Get the Lead Out program. She graduated from the University of Minnesota - Twin Cities with a bachelor's in Fisheries, Wildlife, and Conservation Biology. Her interests in birds has allowed her to explore many opportunities working with them in varying settings from a lab, to wildlife rehabilitation centers and being out in the field. In her last field season, she conducted avian field surveys for breeding shorebirds and migrating raptors.

**Audience:** Everyone

**Workshop Description:**

The Minnesota GreenCorps program, coordinated by the Minnesota Pollution Control Agency, aims to preserve and protect Minnesota's environment while training a new generation of environmental professionals. Get the Lead Out is a program within the Minnesota Pollution Control Agency that is focused on education and outreach about the dangers of lead fishing tackle, especially for the common loon.

- **6:00 PM: Listening Session- Students and their experience with research and distance learning**

**Hosts:** Cindy Ward-Thompson, Katelyn Jo France, & Manashree Padiyath

**Audience:** Students



Katelyn Jo France is pursuing a B.S. in Biochemistry and will begin her Pharmacy program this fall at the University of Minnesota - Duluth. She is the founder and CEO of Scientists Making Your Life Easier (SMYLE) LLC, a medtech and mentorship-focused company that produces accessible life-saving medical equipment while also providing opportunities for networking and assistance for underserved students interested in pursuing STEM projects and careers. Katelyn began this mission after her involvement in science fairs in high school and now works to share the knowledge and support that helped her become the scientist she is today. She is currently working with Dr. Jacob Brown of the University of Minnesota - Duluth School of Pharmacy on several different pharmacogenomics projects and is also involved in the Clarke Lyme Disease Lab. Katelyn loves needlework and crocheting, drinking coffee, and hiking along the North Shore of Minnesota. You can find her on social media as @franceinyapants.



Manashree Padiyath is currently a Freshman at the University of Minnesota studying Political Science, Sociology, and Public Health. She has competed in various local, national, and international science fairs; most notably her patent-pending research on creating a sustainable filter material for communities affected by lead-contaminated water placed 1st at ISEF in Environmental Engineering. Apart from research, Manashree is determined to make a difference in the world and is in collaboration with organizers around the Twin Cities to work towards a more equitable society. She hopes to study the intersection of social justice and medicine by pursuing a career in health policy and law.

## MONDAY 3/29/2021

One student attendee at *each* workshop will win a \$40 target gift card!

- **5:00 PM: Owls Through The Ages**



**Speaker:** Karla Bloem - Executive Director at the International Owl Center



**Audience:** Everyone

**Workshop Description:**

Owls are found all around the world and cultures throughout time have had very strong opinions about them. In this program, learn how owls were and are viewed, travel back in time to the very first owl cave carving, and find out how people are changing negative stereotypes about owls around the world today.

- **5:30 PM: Minnesota Pollution Control Agency**



**Speaker:** Steven Yang

Steven Yang is a program coordinator for the Get the Lead Out program at the Minnesota Pollution Control Agency. He was born and raised in Golden Valley, Minnesota and recently graduated from Duke University with a Master of Environmental Management degree. His studies focused on subsistence fishing and communicating the potential health risks from consuming bioaccumulative contaminants in fish. He graduated from the University of Wisconsin-Madison in 2017 with a degree in political science and a certificate in environmental studies.

**Audience:** Everyone

**Workshop Description:**

Get the Lead Out is a program within the Minnesota Pollution Control Agency that is focused on education and outreach about the dangers of lead fishing tackle, especially for the common loon. An estimated 25% of loon deaths are caused by the ingestion of lead fishing tackle. The Get the Lead Out program also educates Minnesotans about the dangers of lead to human health, our water sources, and other wildlife, including bald eagles and trumpeter swans.

**TUESDAY 3/30/2021**

One student attendee at *each* workshop will win a \$40 target gift card!

- **5:00 PM: Minnesota's Native Bees**



**Speaker:** Sarah Foltz Jordan

Sarah Foltz Jordan, a Senior Pollinator Conservation Specialist with the Great Lakes Regional Office of the Xerces Society for Invertebrate Conservation, will present an overview of the fascinating biology of Minnesota's native bees. You will also learn why native bees are important and find out steps you can take in your community to protect these pollinators.

**Audience:** Everyone

## Keynote Speaker: Jayshree Seth, Ph.D.

Jayshree Seth is a Corporate Scientist at 3M, headquartered in St. Paul Minnesota. She currently leads Applied Technology Development projects for Industrial Adhesives and Tapes Division, one of the largest industrial businesses at 3M, and holds 72 patents for a variety of innovations.

In 2018 Dr. Seth was appointed as 3M's first ever Chief Science Advocate and is using her scientific knowledge, technical expertise and professional experience to advance science and communicate the importance and benefits of science in everyday life. A focus area is fostering a new generation of scientists and science advocates.

Seth has a PhD in Chemical Engineering from Clarkson University, NY, and a Bachelor's in Chemical Engineering from India. Jayshree was recently awarded Society of Women Engineers (SWE) highest Achievement Award for her "visionary, sustainability-focused contributions... for creating... new methodologies for product and technology development; and for deeply influential STEM advocacy." She was also honored as a Woman of Distinction by Girls Scout River Valley. In 2019 she was inducted into the Carlton Society which is the 3M Science and Engineering 'hall of fame.' Jayshree Seth became the 4th woman and 1st woman engineer to be inducted. She is also the author of the book [\*The Heart of Science – Engineering Footprints, Fingerprints, & Imprints\*](#), published by the Society of Women Engineers, with sales proceeds going to a scholarship for underrepresented minority women in STEM.



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## Awards Ceremony Emcee



### **Guy Brown, KARE 11 Meteorologist**

Guy Brown joined KARE 11 after forecasting for WKOW TV in Madison, Wisconsin. He hails from our nation's capital, where he started his career at ABC 7, WJLA TV. It was there he earned the respect of the team as a hardworking news production assistant.

Before moving to Madison, Guy worked at KGWN TV in Cheyenne, Wyoming, where he covered tornadoes, wildfires, blizzards, and Chinook winds.

Guy studied Electronic Media & Film along with Meteorology at Towson University, where he received his Bachelor of Science degree. He is an active member of the National Weather Association and the National Association of Black Journalists.

# Minnesota Academy of Science Awards



## Grand Awards

The Grand Awards recognize excellence in scientific research at the middle school and high school level.

The top 5% of projects presented at MSSEF receive the Gold Award.

The next 10% of projects receive the Silver Award.

The next 15% of projects receive the Bronze Award.

Projects are ranked according to judge scores and the competitiveness of the category in which students present.



## Regeneron International Science and Engineering Fair (ISEF) Award

The Regeneron ISEF Award recognizes up to five of the top high school projects. Winners typically receive an all-expense-paid trip to compete in ISEF. However, this year, ISEF will welcome finalists from around the world to compete in virtual Regeneron ISEF 2021. Judging will take place from May 3-6, 2021 via video conferencing. Official Regeneron ISEF events will take place May 16-21.

# Seagate Awards



## **MAS thanks Seagate Technology, Premier Sponsor of the State Science & Engineering Fair, for their continued support of STEM education in Minnesota.**

*Seagate is the global leader in data storage solutions, developing amazing products that enable people and businesses around the world to create, share and preserve their most critical memories and business data.*

### **Seagate Excellence in Science Mentoring Award**

The Seagate Excellence in Science Mentoring Award recognizes outstanding science teachers from around the state who find creative ways to nurture students' interest in scientific research and discovery.

The award acknowledges teachers who go above and beyond the classroom to promote science education in their schools and who encourage students to engage in hands-on projects and experiences outside the classroom.

Seagate Technology gives two awards – one for a teacher with less than 10 years of experience and another for teachers with 10 or more years of experience. Award recipients receive a \$1,000 award and a Seagate portable hard drive. The teachers' schools or science programs also receive a \$1,000 award.

### **Seagate Rising Star Award**

The Seagate Rising Star Award recognizes two emerging student scientists whose projects not only exemplify excellence in their category but also demonstrate high degrees of difficulty, thoroughness, complexity, creativity, innovation, and effective communication. One high school student receives a \$2,000 award, trophy, and a Seagate portable hard drive; one middle school student receives a \$1,500 award, trophy, and a Seagate portable hard drive.

### **Seagate Emerging Scientist Award**

The Seagate Emerging Scientist Award recognizes excellent scientific research conducted by students competing for the first time. The top 10% of first-year students receive trophies.



# Minnesota Academy of Science State Science & Engineering Fair

## Premier Sponsors



## Contributing Sponsors



## Friends of MAS



## Special Awards

The Minnesota Academy of Science thanks the following organizations for sponsoring awards for the State Science & Engineering Fair. (Awards are listed alphabetically by organization.)

Sponsoring Organization	Award(s)
3M Corporate Scientist Committee	<p>Most Innovative High School Project  <b>\$500 + Certificate + 3M Gift Box - First Place</b>  <b>\$300 + Certificate + 3M Gift Box - Second Place</b>  <b>\$200 + Certificate + 3M Gift Box - Third Place</b>  <b>3M Gift Box - Honorable Mention - up to 3 Projects</b></p> <p>Most Innovative Middle School Project  <b>\$500 + Certificate + 3M Gift Box - First Place</b>  <b>\$300 + Certificate + 3M Gift Box - Second Place</b>  <b>\$200 + Certificate + 3M Gift Box - Third Place</b>  <b>3M Gift Box - Honorable Mention - up to 3 Projects</b></p>
Acoustical Society of America - Upper Midwest Chapter	<p>Excellence in Acoustics  <b>\$100 - First Place Project</b>  <b>\$50 - Second Place Project</b>  <b>\$25 - Honorable Mention – up to 3 projects</b></p>
The Algae Foundation / CarlsonSV	<p>Algal Achievement Award  <b>\$200 - First Place High School</b>  <b>\$200 - First Place Middle School</b></p>
American Chemical Society - MN Section	<p>Outstanding Experimental Project  <b>\$100 + Certificate – 1 High School Student</b>  <b>\$50 + Certificate – 1 Middle School Student</b>  <b>Certificate + 1 Year Subscription - Honorable Mention – 3 High School &amp; Middle School Students</b></p>
American Fisheries Society, Minnesota Chapter	<p>Aquatic Sciences Excellence Award  <b>Book + Fishing Pole for 1 High School student</b>  <b>Book + Fishing Pole for 1 Middle School student</b></p>
American Meteorological Society	<p>Outstanding Achievement for Excellence in Atmospheric or Related Science  <b>Certificate + Weather Radio – 1 Student</b></p>

American Psychological Association	Outstanding Research in Psychological Science <b>Certificate - 1 Student</b>
ASM Material Education Foundation	Outstanding Exhibit in Materials Science <b>Certificate + Ribbon - 1 Student</b>
Association for Women Geoscientists	Student Awards for Geoscience Excellence <b>Certificate - 1 Female Student</b>
Beckman Coulter Foundation	Beckman Coulter Awards <b>\$350 - First Place High School Science Project</b> <b>\$200 - Second Place High School Science Project</b> <b>\$75 - Third Place High School Science Project</b> <b>\$350 - First Place High School Engineering Project</b> <b>\$200 - Second Place High School Engineering Project</b> <b>\$75 - Third Place High School Engineering Project</b>  <b>\$350 - First Place Middle School Science Project</b> <b>\$200 - Second Place Middle School Science Project</b> <b>\$75 - Third Place Middle School Science Project</b> <b>\$350 - First Place Middle School Engineering Project</b> <b>\$200 - Second Place Middle School Engineering Project</b> <b>\$75 - Third Place Middle School Engineering Project</b>
Broadcom Foundation	Broadcom Coding with Commitment Award <b>\$250 - 1 Middle School Project</b>
Broadcom Masters	Broadcom Masters Award <b>Certificate + Invite to apply to National Competition to top 10% of 6<sup>th</sup>, 7<sup>th</sup> &amp; 8<sup>th</sup> grade students. Winners must place 1<sup>st</sup> to 4<sup>th</sup> in overall judging.</b>
DiaSorin, Inc.	DiaSorin Inc. Merit Award Best independent work demonstrating the scientific method <b>\$100 - 5 Students</b>  Relativity Award Best project that involves the use of a family pet <b>\$30 + Certificate – 1 Project</b>
Ecolab	Water Vision Award <b>\$700 + Certificate – First Place High School Project</b> <b>\$700 + Certificate – First Place Middle School Project</b>  Ecolab Food Safety Award <b>\$700 + Certificate – First Place High School Project</b> <b>\$700 + Certificate – First Place Middle School Project</b>

Googol Bike Project	STEM the Stigma Award <b>\$500 – Up to 6 Projects</b>
Graduate Women in Science	Graduate Women in Science Award <b>\$25 + Certificate – 1 Female Student project in each grade, 6<sup>th</sup> – 12<sup>th</sup></b>
Institute of Food Technologists – MN Section	Institute of Food Scientists Award <b>\$200 – First Place High School</b> <b>\$150 - Second Place High School</b>  <b>\$200 – First Place Middle School</b> <b>\$150 - Second Place Middle School</b>
Land O’ Lakes	Land O’Lakes Award for Food Innovation <b>\$500 – 2 High School Projects</b> <b>\$500 – 2 Middle School Projects</b>
Lemelson Foundation / Society for Science & the Public	Lemelson Early Inventor Award <b>\$100 – 1 Middle School Project</b>
MN Environmental Health Association (MEHA)	MEHA Award for Excellence in Environmental Health Science <b>\$200 + Certificate – First Place High School</b> <b>\$100 + Certificate – Second Place High School</b> <b>\$50 + Certificate – Third Place High School</b>  <b>\$100 + Certificate – First Place Middle School</b> <b>\$50 + Certificate – Second Place Middle School</b>
Manashree Padiyath	Outstanding STEM Communicator <b>\$25 Gift Card – 1 Project</b>
Mortenson Environmental	Geoscience, Environmental, or Sustainability Excellence <b>Certificate + Fossils/Specimens - First Place – 1 Project</b> <b>Certificate + Fossils/Specimens - 2 Runner-Ups</b>
Mu Alpha Theta	Mu Alpha Theta Award <b>Certificate + Letter - 1 Project</b>
NASA	Earth Systems Science Award <b>Certificate – 1 Project</b>
NOAA	Taking the Pulse of the Planet Award <b>Certificate + Medal – 1 Project</b>

Pepperman-Alpert Memorial Scholarship Fund	Pepperman-Alpert Award for Cancer Research <b>\$100 – 1 High School</b>
Regeneron	Regeneron Biomedical Science Award <b>\$500 + Certificate – 1 Project</b>
Ricoh	Ricoh Sustainable Development Award <b>Certificate - 1 High School Project</b>
Science Museum of Minnesota	SMM Science Communication Award <b>1-year Museum Membership valued at \$139 – 3 High School Projects</b> <b>1-year Museum Membership valued at \$139 – 3 Middle School Projects</b>
Seagate Technology	Seagate Excellence in Science Mentoring Award <b>\$1,000 + Trophy + Hard drive + \$1,000 for research program – 1 Teacher w/ 1-10 yrs experience promoting science ed</b> <b>\$1,000 + Trophy + Hard drive + \$1,000 for research program – 1 Teacher w/ 11+ yrs experience promoting science ed</b>  Seagate Rising Star Award <b>\$2,000 + Trophy + Hard drive – 1 High School Project</b> <b>\$1,500 + Trophy + Hard drive – 1 Middle School Project</b>  Seagate Emerging Scientist Award <b>Trophy – Top 10% of First-Year Students</b>
The Society for In Vitro Biology	Outstanding Achievement for Ability and Creativity in In Vitro Biology <b>Certificate - 1 Project</b>
SPIE – The International Society for Optics & Photonics	SPIE Optics & Photonics Award <b>\$250 – First Place High School</b> <b>\$150 – Second Place High School</b> <b>\$100 – Third Place High School</b>  <b>\$150 – First Place Middle School</b> <b>\$100 – Second Place Middle School</b> <b>\$50 – Third Place Middle School</b>
U.S. Air Force	Air Force Achievement Award <b>Framed Certificate, Sling Pack of Swag - 4 Outstanding Projects, w/ preference for Air Force applicability</b>
U.S. Agency for International Development (USAID)	Science Champion Award <b>Certificate &amp; Social Media Toolkit - 1 Project</b>
U.S. Metric Association	Best Use of the International System of Units <b>Certificate – 1 Project</b>

U.S. Navy	Naval Science Award <b>\$75 + Medal + Certificate + Letter – 3 High School Projects</b> <b>Certificate + Medal + Letter – 3 Middle School Projects</b>
Water Environment Federation	Stockholm Junior Water Prize <b>Certificate + State Competition Entry, with state winner receiving paid trip to National Competition - 3 Projects</b>
Yale Science & Engineering Association, Inc.	Most Outstanding Exhibit in Computer Science, Engineering, Physics, or Chemistry <b>Certificate + Medallion + Possible trip to Regional Meeting – 1 Student</b>



# Middle School Projects by Category

<b>Animal Sciences</b>		
MS-ANIM-036	Ella Brinkman	Does Age of a Dog Affect Object Permanence
MS-ANIM-093	Aidan Moeller	A Crushing Eggsperiment
MS-ANIM-167	Chelsey Nelmark	If Dogs are Colorblind, will they choose specific colors?
MS-ANIM-168	Aubree Minier	Desensitizing Horses
MS-ANIM-175	Parker Sickmann	Infrared Alert: Using a Passive Infrared Sensor to Detect Motion
MS-ANIM-176	Aidan Anderson	Space Avocados: Creating a Game and Comparing Control Schemes
MS-ANIM-177	Josh Bleskacek	Loop-the-Loops or Zig-Zags: How do geothermal heat exchanger geometries affect heat transfer?
MS-ANIM-179	Garrett Jagelewski	Healthy Heart: What effect does age and activity level have on heart rate?
MS-ANIM-180	Johanna Bernu	Disinfectant Properties of Nuphar Advena: An Ethnopharmaceutical Approach
MS-ANIM-183	Jack Irving, Isabella Anderson, and Siiena Anderson	What soap removes germs most efficiently?
MS-ANIM-238	Henry Ahern	Coke Vs. Pepsi
MS-ANIM-239	Ian Fuls	What Type of Seed Do Local Birds Prefer?
MS-ANIM-240	Kaitlin Telep	A Hamster's Preference: Which Food Will it Pick?
MS-ANIM-241	Joseph Doebler	Do Dogs have a Color Preference?
MS-ANIM-242	Shreya Sekar	Reptile Recovery: How local actions can protect endangered species
<b>Biochemistry</b>		
MS-BCHM-122	Casey Nelson	Treatment on Wood vs. Time
MS-BCHM-172	Cadence Kramer	Why Food Turns Brown
MS-BCHM-205	James Summers	Does Adding Different Kinds of Yeasts to a Wort Affect the Overall Gravity of the Solution
<b>Behavioral and Social Sciences</b>		
MS-BEHA-037	Isy Kohler	Project Portion
MS-BEHA-038	Srinidhi Babu	Does color affect memory
MS-BEHA-039	Tiffany Kung	How Ya Doin'? with COVID-19
MS-BEHA-040	Nisha Wetter	The Effects of Exercise on Memory
MS-BEHA-041	Stella Haakenson	How does music affect memory?
MS-BEHA-123	Moraya Holleman	Cash for Cloth?
MS-BEHA-124	Adeenah Fahim	Does Colour Affect Memory
MS-BEHA-169	Brijette LaCore	You don't see as much color as you think you can
MS-BEHA-170	Breanna Southerton	Regular Routines: What effect does age and gender have on level of routine and stress level?

MS-BEHA-171	Nattie Butler	What effect does perception of happiness have on health, emotion and academic success?
MS-BEHA-206	Selamawit Tenaye	Videos and Heart Rate
MS-BEHA-208	Audrey Erickson	Do Children Who Read More Have Better Vocabularies?
MS-BEHA-209	Noelle Akins	How Does Age Affect Your Memory?
MS-BEHA-210	Ben O'Shaughnessy	How Does Cell Phone Usage Affect Reaction Time?
MS-BEHA-211	Jane Stangler	If Someone Smiles At You, Will You Smile Back?
MS-BEHA-213	Quinn Walsh and Samantha Palm	Smell vs. Taste
MS-BEHA-214	Morgan Johnson	Maple Syrup Candy
MS-BEHA-243	Elias DeCrans	Perception vs Reality
MS-BEHA-244	Kacia Caron	Ready, Set, Go; Does Age Affect Reaction Time?
MS-BEHA-245	Nathan Nguyen	Were You Lied To?
MS-BEHA-246	Eleanora Kucko	Does Your Zodiac Sign Predict Your Personality Type?
MS-BEHA-247	Ashley Vega	How Does Music Affect Your Mood?
MS-BEHA-248	Kayla Miller	How Does Color Affect Your Memory?
MS-BEHA-343	Sanjana Kollipara	Inside the Mind: Studying the Effect of Daily Tasks on Short Term Memory
MS-BEHA-344	Anneli Hagen	Do Different Oder's Move Your Motor
MS-BEHA-369	Michael Elfering	Top 5 Sleepy Activitiezzzzz
MS-BEHA-370	Christopher Sosa-Escobar	How Does Food Affect Taste and Thoughts?
<b>Biomedical and Health Sciences</b>		
MS-BMED-048	Dylan A. Murphy	How Temperature Affects Reaction Time
MS-BMED-049	Ammaar Rizvi	Wear a Mask, Save a Life
MS-BMED-050	Eric Yang	Does sugar erode your teeth?
MS-BMED-080	Josiah Copeland	Do You See What I See?
MS-BMED-092	Hazel Striker	Cover Your Cough: Effectiveness of Masks at Preventing the Spread of Particles
MS-BMED-215	Ian Johnson	What Types of Masks Are The Safest to Wear
MS-BMED-216	Maggie Kane	Does Acetazolamide Reduce the Amount of Electrical Activity in the Brain, as Measured by Spike-Wave Index, During Sleep for Children with a Specific Type of Epilepsy Called LKS
MS-BMED-249	Lila Martin	The Effects of Fast Acting Sugars on Diabetics and Non-Diabetics
MS-BMED-250	Olivia Hamann	Don't Fall Flat
MS-BMED-278	Coolsjes Singhvi	D-PREDICT: An Artificial Intelligence Model for Predicting Likelihood of Early Stage Diabetes
MS-BMED-346	Elizabeth Levinshteyn	Testing, Testing: Developing an All-Strain-Inclusive Test for SARS-CoV2
MS-BMED-347	Evelyn Danz	Stop the Clot: The Effect of Anticoagulants on Thrombosis
MS-BMED-348	Iona Heddle	Kids vs. Screens

MS-BMED-349	Carter Miedema	Do masks affect your oxygen levels and heart rate?
<b>Computational Biology and Bioinformatics</b>		
MS-CBIO-051	Emily Ma	Investigating the Correlation between Population Density and Coronavirus Cases
<b>Cellular and Molecular Biology</b>		
MS-CELL-044	Tej Bhagra	Goodbye Bacteria, Hello Self Cleaning: Do Mineral Nanocrystals kill bacteria?
MS-CELL-045	Maggie Huebert	Effects on Sanitization on Microbial Growth
MS-CELL-046	Chase Van Fossen	How's it Growing?
MS-CELL-047	Anders Gulbranson	Microorganisms vs. Metal
<b>Chemistry</b>		
MS-CHEM-052	Elizabeth Beyder	Which brand of toothpaste kills the most bacteria in the human mouth.
MS-CHEM-053	Take Liu	What is the best at removing rust ?
MS-CHEM-054	Keeli Meyer	Can Baking Soda Substitute for Baking Powder?
MS-CHEM-055	Hope Berse	Substituting and Modifying Cookies
MS-CHEM-056	Jillian Macon	The Effect of Fat Content on Ice Cream Melt Rate
MS-CHEM-077	Elizabeth Grace Smith	Dry Hands? No Problem!
MS-CHEM-083	John Biebighauser	Smore Science: The Effects of Materials on a Burning Marshmallow
MS-CHEM-091	Annika Frueh	Rethink Your Drink
MS-CHEM-097	Madison Pike	Flour Power
MS-CHEM-125	Sophia Iverson	Muffins with Egg Substitutes
MS-CHEM-126	Aaron McMullen	Acid Effects on Tooth Enamel
MS-CHEM-127	Jack Johnson	The Best Northern Minnesota Campfire
MS-CHEM-173	Aislee Grangruth	The Speed of Melting: Salt vs. Sugar
MS-CHEM-174	Avery Buschman	What Makes Gelatin Stronger?
MS-CHEM-251	Summer Nelson	Slime: A Scientifically Tangled Mess
MS-CHEM-252	Isaac Wening	Dissolving Sugar Cubes
MS-CHEM-253	Alex Sum	Sunscreen Panic
MS-CHEM-350	Lily Stel	On your mark, get set, bake
MS-CHEM-351	Avery Cantwell	Cookie Flour Power
MS-CHEM-352	Matthew Craig	Coin Cleaning
MS-CHEM-353	Lauren Craig	Exploding Experiments
MS-CHEM-378	Giselle Guasco Paucar	Does Temperature Affect a Volcano's Eruption?
<b>Earth and Environmental Sciences</b>		
MS-EAEV-057	Elise Weingarten	Hot and Salty
MS-EAEV-058	Quinn Williams	How do pesticides affect plants
MS-EAEV-059	Toby Weingarten	Survey of Rochester Topsoil Depths: Effects of Locations and Use

MS-EAEV-128	Aaron Collins	Shoreline Protection: The Effectiveness of Materials Used
MS-EAEV-145	Bridger Weekley	Earthworms Effects on Earth
MS-EAEV-255	Joseph Willaert	Natural Solutions for Dust Reduction
MS-EAEV-256	Liam Murphy	Is it nice to add spice to ice?
MS-EAEV-354	Shagun Shrivastava	100% Biodegradable Plastics!!! Is it true?
MS-EAEV-355	Mac Hoekstra	O2 Is For You! Why Oxygen Is Important To Fish Population
MS-EAEV-357	Quinn Hughes and Tyler Clair	Can Machine Learning Predict Hurricane Damage in a Changing Climate?
MS-EAEV-365	Sriram Sureshkumar	Impact of Chemicals and Pesticide residue on compost
<b>Energy: Sustainable Materials and Design</b>		
MS-EGSD-129	Ayeza Moheet	Constructing and testing a biodegradable packaging made from recycled eggshells to preserve fresh fruits
MS-EGSD-257	Grant Pilgrim	Solar Powered Phone Charger
MS-EGSD-258	Chipo Chinokoro	Citrus Battery
MS-EGSD-259	Edwin Portillo	Does the Temperature of a Battery Affect How Long It Lasts?
MS-EGSD-358	Brady Peterson	Picking metal up like nothing ; Will wire winding affect the strength of an electromagnet?
<b>Biomedical Engineering</b>		
MS-ENBM-130	Muhammed Ali Qureshi	Making a Heart Rate Monitor
<b>Environmental Engineering</b>		
MS-ENEV-131	Khadija Kouser	Designing and Testing an Automatic Watering System for Plants
MS-ENEV-217	Will Cunningham	Can Using Magnets as a Growth Stimulant Overcome Poor Plant Growing Conditions?
MS-ENEV-260	Minhphuong Le	Which Animal Manure Fire lasts the Longest?
MS-ENEV-261	Lillie Wagner	Recycled Material Floating Bio-Habitat
MS-ENEV-359	Mercy March	Purification with Desalination
<b>Engineering Mechanics</b>		
MS-ENMC-060	Annika Bartucz	Airfoil Efficiency
MS-ENMC-068	Micah Johnson	Firm Foundation
MS-ENMC-085	Luke Orth	Cozy Comfort: The Study of the Energy Efficiency of Homes
MS-ENMC-090	Sophie Hansen	Superior Sound
MS-ENMC-099	Rohan Sharma	Light without Sunlight
MS-ENMC-262	Audryn Hegewald	Rice Pack Holder
MS-ENMC-263	Olivia Farina	AmbidextriCut
MS-ENMC-277	Riddhi Singhvi	ICU Car Sentry: An Intelligent Car Safety System
MS-ENMC-360	Levi Abbring	Bridging the Gap: Determining the Factors that Affect a Suspension Bridge's Strength
MS-ENMC-361	Thomas Rewey	Gliding Through the Sky. How Stabilizers Affect Distance

<b>Mathematics</b>		
MS-MATH-132	Adam Jacobson	Absent Absences
<b>Materials Science</b>		
MS-MATS-061	Susannah Petersen	My Hair Project - Diameter, Elasticity, and Hair-Care Products
MS-MATS-062	Elizabeth Petersen	How do I make caramel stick to apple flesh?
MS-MATS-087	Hailey Frueh	Behind the Mask
MS-MATS-104	Madi Olson	As Par as the Eye Can See
MS-MATS-107	Mollie Rogness	To Burn or not to Burn: That is the question
MS-MATS-109	Annika Johnson	Hoop, There It Is!
MS-MATS-111	Ian Wood	Creating an Optimal Wi-Fi Network
MS-MATS-133	Raya Shaikh	Study of Light Intensity From Various Types of Light
MS-MATS-134	Maryam Shahkhan	H2O ROBOTICS: BUOYANCY MATERIALS OF THE UNDERWATER REMOTELY OPERATED VEHICLE (ROV): THE EFFECT OF DIFFERENT BUOYANCY MATERIALS INCORPORATED INTO AN ROV AND THE EFFICIENCY OF THE ROV IN WATER
MS-MATS-146	Tyler Loeb	Take the Cake
MS-MATS-218	Bud Brondum	Grip the Greatness? Do Football Gloves really help you catch better than bare hands?
MS-MATS-264	Liam McGlynn	Wood vs Composite Hockey Sticks
MS-MATS-362	Noah Bandstra	Feel The Pull
MS-MATS-363	Liam Gottsch	Hooked! Fishing Line Experiment
MS-MATS-372	Leslie Tepoxteco Reza	Let's paint the town
<b>Microbiology</b>		
MS-MCRO-043	Rathan Duggirala	Genetically Engineer E. Coli Cells
MS-MCRO-084	Jordin Kading	Preserve It!
MS-MCRO-265	Kari Yadeiny Chimbo	The Effect of Homemade Wipes Vs. Clorox Wipes
<b>Physics and Astronomy</b>		
MS-PHYS-063	Bergen Jacob	Tennis at Temperature
MS-PHYS-101	Henry Smentek	How does temperature affect a football
MS-PHYS-102	Brennan Glawe	Growing Green on the Red Planet
MS-PHYS-151	Jonathan Harms	Depth Perception
MS-PHYS-184	Aiden Blackwood	Bouncy Ball: What effect does temperature have on the how high a ball bounces off of Oobleck--a Non-Newtonian fluid?
MS-PHYS-185	Dane Mason	How do different amounts of fuel affect the shot distance of a potato cannon?
MS-PHYS-220	Mason Deegan	The Most Eggcellent Science Project
MS-PHYS-266	William Mattson	Temperature Magnets and Perpetual Motion Machines
MS-PHYS-267	John (Jack) Larson	Hydro Flask Versus Yeti - Which One Stays Hotter or Colder?

MS-PHYS-373	Elroi Beyene	The Strobe Effect of a Monitor
<b>Plant Sciences</b>		
MS-PLNT-064	Mohamad Ali Meroueh	How to ripen avocados with apples.
MS-PLNT-065	Ruby Lewis	Effects of Coffee on Plant Growth
MS-PLNT-066	Erica J Ruppert	Green Bean grow
MS-PLNT-135	Calvin haddix	Do Plants Stop Soil Erosion?
MS-PLNT-186	Tuuli Koivisto	Can you extract biofuel from algae?
MS-PLNT-268	Harper Burns	Does Salt Effect Cat Grass Growth?
MS-PLNT-269	Jack Kirchberg	Which Color of Light Makes Plants Grow the Tallest
MS-PLNT-270	Conor McCarthy	Which Liquid Helps Radish Seeds Grow Best?
MS-PLNT-271	Cassidy Gaston	The Great Wall of Plants: The Effect of Plants on Soil Erosion
MS-PLNT-272	Elizabeth (Ellie) Foley	pH and Plants!
MS-PLNT-273	Kayleigh Skjod	Sudsy Basils
MS-PLNT-274	Marco De Leon	The Effects of Music on Plants
MS-PLNT-275	Victor Carbajal Estrada	Does Saliva Affect the Growth Rate of A Bean Seed?
MS-PLNT-276	Isabelle Carlson	The effect of water temperature on plant growth
MS-PLNT-364	Hannah Grosser	If You Plant It, They Will Come: Planting for Pollinator Diversity in Your Home Garden
<b>Robotics and Intelligent Machines</b>		
MS-ROBO-136	Mariam Kashif	Light Tracking Bristlebot
MS-ROBO-221	Michael Nobrega	If the Use of Drones in Search and Rescue (SAR) Operations Affects the Efficiency of the Mission and the Likelihood of a Rescue
<b>Translational Medical Science</b>		
MS-TMED-042	Clare Fogelson	Fabric Face Off



# High School Projects by Category

<b>Animal Sciences</b>		
HS-ANIM-161	Grace Lavan	Human Effects on Gray Wolf ( <i>Canis lupus</i> ) Distance of Den Relocation in Northeastern Minnesota
HS-ANIM-163	Beau William Plante	Invasive Buckthorn: What effect does the Invasive Buckthorn: What effect does the presence of buckthorn leaves in the soil have on non-invasive plant growth (grass)?
HS-ANIM-164	Harmony Tracy	Tough Turkeys: What effect does climate change have on the home range of Wild Turkeys in Northeastern Minnesota?
HS-ANIM-165	Rowan Rock	Wastewater Treatment: The Use of Mealworm Gut Bacteria ( <i>Tenebrio molitor</i> ) to Isolate and Identify Bacteria that can Biodegrade Polystyrene
HS-ANIM-279	Ahlaam Abdulwali	The Effects of Artificial Food Colors on the Release of Neurotransmitters within Model Organisms
HS-ANIM-281	Simren Samba and Fiona Kinney	Fruit Fly Frenzy: Investigating the Development of Insecticide Resistance in <i>Drosophila melanogaster</i>
<b>Biochemistry</b>		
HS-BCHM-095	Katelin Flack	The importance of disposing yard waste properly
HS-BCHM-160	Emily Sapyta	The use of different concentrations of tannic acid (St. Louis River water) and non-resistant <i>Staphylococcus aureus</i> on the bioremediation of motor oil contaminated aquatic systems.
HS-BCHM-282	Madison Andrews	Safe Food: Developing a new detection method for <i>E. coli</i> using ammonia for adaptation to a field test
HS-BCHM-283	Annagrace Bricker	Effects of N-3 series fatty acids on the quantity and quality of pleopodal eggs and juveniles in freshwater crayfish
<b>Behavioral and Social Sciences</b>		
HS-BEHA-021	James Kung	Influence of Protective Factors and Resilience on Perception of the Police: A Survey
HS-BEHA-072	Maddie Johnson	Pavement Perils; A study on Distracted Driving
HS-BEHA-078	Sophia LeMire	Education in a Pandemic: Identifying Barriers to Learning Success of High School Students in Different Education Modalities in Response to the COVID-19 Pandemic
HS-BEHA-079	Abigail Zwilling	Observing Local Deer Traffic Patterns
HS-BEHA-094	Levy Sahoo	Riding the Pandemic Rollercoaster: Business Strategies for Valleyfair Amusement Park in the Midst of COVID-19
HS-BEHA-105	Ella Voges	Psyched up for Success!
HS-BEHA-106	Avery Voges	Does sleep affect mental health
HS-BEHA-113	Mariya Demaag	The Impact COVID-19 Has Produced on the Social Life of Children
HS-BEHA-159	Stella Harbson	Persuasiveness of Anecdotal versus Statistical Information on Beliefs about Gun Control
HS-BEHA-189	Naci Konar-Steenberg	Significant zero: the effect of personality questionnaires on identity-relevant choices
HS-BEHA-222	Ahream Ham	Pandemic Pragmatism: The impact of COVID-19 on sustainable living

HS-BEHA-223	Holly Restad	Harnessing Innovation in Healthcare: Solving Disparities and Inequities in Minnesota's Healthcare Services Using Creative Solutions Proposed by Medical Providers
HS-BEHA-286	Elin Wellmann, Camille Witherspoon, and Corinne Moran	Facts vs Anecdotes and how they persuade
HS-BEHA-287	Lena Pak	Mixed people in violation of race: can mixed people debunk the race myth?
HS-BEHA-288	Nathan DeMichaelis	Learning in the Living Room: What Skills Contribute to Success in Distance Learning?
HS-BEHA-289	Peyton Crest	Investigating the effect of the severity of activity based anorexia in <i>Drosophila melanogaster</i> on the gut microbiome
HS-BEHA-291	Abirami Rajasekaran and Harini Senthilkumar	Predicting compensatory exercise behaviors from anxiety symptomatology in patients with eating disorders
HS-BEHA-292	Tori Thomas	Saving Lives Through Legislation: Addressing Gaps in Coverage for Breast Cancer Screening
HS-BEHA-293	Lily Nothom	Defeating the Divide: Creating sustainable partnerships in global healthcare between academic institutions and the communities they serve
HS-BEHA-294	Greta Goldade	More than Just a Runner's High: Single-bout exercise and its lasting effects on cognition in the brain
HS-BEHA-295	Ramira Ambrose	Women and Women of Color in College Coaching: A Quantitative Report on Head Coach Composition and Turnover for NCAA Division-I Soccer.
HS-BEHA-386	Mahdi E. Khamseh	The effects of Tamarkoz (R) meditation on adolescents aged 15-18
HS-BEHA-387	Lorien Zhao	Change, Opportunity, Vision, Innovation, and Decision-making (COVID): Business and Personal Strategies for Surviving a Global Pandemic
<b>Biomedical and Health Sciences</b>		
HS-BMED-022	Christine Song	Cure of Breast Cancer - Year 4: First Discovery of New Target Therapy for Aggressive Hormonal Breast Cancer using Clinical Database and 3D Model
HS-BMED-023	Isha Kapoor	Menopausal hormone therapy: setting the record straight
HS-BMED-069	Audrey Tumberg	Study of the Correlation Between Water Bottle Materials / Styles and Bacterial Growth
HS-BMED-070	Clara Tangen	Not All Sun and Games: A Study on the Effectiveness on Sun Preventatives
HS-BMED-074	Aurora Sauer	A Study of the Effects of the Combined Use of Antibiotics
HS-BMED-075	Elayna Kawlewski	The Study of Bacterial Growth on Different Face Masks
HS-BMED-076	Lily Aakre	Mask Analysis: The Study of Mask and The Effects On Human Physiology
HS-BMED-114	Paige Jacobson	COVID-19 and Lyme Collide
HS-BMED-187	Evelynn Shero	The Effect Different Forms of Sugar Have on Glucose Levels During Metabolization
HS-BMED-190	Divya Bhargava	No Change? Impact of FDA Warning on the Use of Opioids and Benzodiazepines and Their Effects in Older Allogeneic Hematopoietic Stem Cell Transplant Patients
HS-BMED-224	Tenkir Liyu	Extracting Iron from Breakfast Cereal
HS-BMED-296	Ming Ying Yeoh	A better approach to treating Alzheimer's? Multi-drug combination therapies in a <i>C. elegans</i> model

HS-BMED-297	Rushil Khadilkar	Impact of Nutritional and Human Factors on Blood Glucose in Diabetic and non-Diabetic Subjects
HS-BMED-298	Hubert He	Analysis of Gene Expression Changes Influenced by Various Severe COVID-19-associated Single Nucleotide Polymorphisms
HS-BMED-299	Quentin Xander Hughes	An Active Role for Machine Learning in the Diagnosis of Cardiac Arrhythmias, Year 2
HS-BMED-300	Vaughn Hughes	Using Artificial Intelligence and Electronic Health Records to Build a COVID-19 Testing Model
HS-BMED-366	Maxanne Millerhaller	The In Vitro Digestion of Animal-based Meat versus Plant-based Meat Alternatives
HS-BMED-381	Elisa Guo	CD8 T cell epitope generation toward the mutating SARS-CoV-2 spike protein in genetically diverse human population: Implications for disease control and prevention
HS-BMED-392	Sarayu Goduguchinta	Successful Cessation: Thwarting Tobacco Addiction Using Very Low Nicotine Content Cigarettes without Exacerbating Depression Symptoms
<b>Computational Biology and Bioinformatics</b>		
HS-CBIO-025	Gwen Eichfeld	Determining the Relationship Between Cross-Cultural Interpersonal Distance Preferences and Early COVID-19 Case Frequency Using Multivariable Regression Analysis
HS-CBIO-227	Rahul Balaji	Betting on Bioinformatics: A fight to the death for SARS-CoV-2! Decoding the effectiveness of the SARS-CoV-2 vaccines against its many variants
HS-CBIO-393	Sydney Peng and Johnny Yue	Upsurge of the Glycolytic Pathway in Cancer: A Dynamic Network Analysis of Oncogenic Mutations in Phosphofructokinase-1
<b>Cellular and Molecular Biology</b>		
HS-CELL-301	Adelyn Diaz	Examination of serotonin levels in crayfish exposed to high ambient temperatures
HS-CELL-302	Fazila Mohamed Prem Navaz	Mitigating Metastasis: Utilizing cancer-associated fibroblasts to stop the spread of cancer
HS-CELL-388	Arnav Gupta	In the nick of time: Determining the positive and negative regulators of nickase Cas9
<b>Chemistry</b>		
HS-CHEM-096	Kiera Kirchner	Alcohol Levels of Kombucha
HS-CHEM-304	Benjamin Kroul and Dominic Greco	Mighty MOFs: Using Novel Catalysts to Produce Components of Recyclable Plastics
HS-CHEM-383	Maisy Scheuneman	How do different pH levels and different nail coatings affect the formation of rust on nails?
<b>Earth and Environmental Sciences</b>		
HS-EAEV-028	Hans Xu	The Effect of Microplastics on Radish Growth
HS-EAEV-116	Muminah Mohammed and Noor Omar	One Seed, Infinite Plants
HS-EAEV-117	Omar Elkhateeb	Emulating 100 Years of Climate Change
HS-EAEV-143	Jaxon Bain	Investigation on the Correlation of Dreissena polymorpha and Scirpus acutus in Aquatic Ecosystems

HS-EAEV-162	Emaleigh Olesiak	Air Air Everywhere
HS-EAEV-191	Gavin Kimmel	Examining the Relationship Between Socioeconomic Status and Soil Macronutrient Levels
HS-EAEV-192	Isabel Medrano	The Impact of Elapsed Burn Time on Restored Prairie Plant Biodiversity and Soil Nutrient Content
HS-EAEV-193	Will Sedo	Identifying the Growth Window for <i>Didymosphenia geminata</i> : A Method for In-lab Growth
HS-EAEV-194	Rashmi Raveendran	The Effect of Ammonium Nitrate Concentration on <i>Escherichia coli</i> Temperature Resistance
HS-EAEV-305	Anna Geldert	Using mycoremediation as a treatment technique to reduce heavy metal concentration in model mine effluent
HS-EAEV-307	Amrit Menon and Ivy Ferstan	Pulling Apart Plastic: Measuring the effectiveness of wax worms, bacteria, and fungus in breaking down biodegradable plastic
HS-EAEV-382	Pilar Saavedra-Weis	The Effect of Rising Temperature on the Polystyrene Degradation Rate of the Superworm, <i>Zophobas atratus</i>
HS-EAEV-384	Irshad Moalim	The effect of sunlight on the salinity of water and the impact of black and white construction paper on the amount of desalinated water.
HS-EAEV-389	Tessa Lundheim	Seasonal analysis of human impact on ammonia oxidizing archaea in soil microbial communities within a suburban area
HS-EAEV-390	Adithi Rupireddy	A Breath of Fresh Air: Characterizing changes in atmospheric carbon monoxide in the United States to mitigate climate change
<b>Embedded Systems</b>		
HS-EBED-196	Levi Mellin and Nikolas Liepins	SPYGLASS: Eye-controlled camera glasses
HS-EBED-309	Zachary Levy	Development of an affordable ultrasonic array for recording and analysis
<b>Energy: Sustainable Materials and Design</b>		
HS-EGSD-030	Nathan Dietz	Triboelectric Nanogenerator
HS-EGSD-073	Nicholas Swanson	A Study of How Light Amounts Affect Algae Growth
HS-EGSD-197	Maggie Banks	Salt and Paper: Using Papermaking Techniques to Engineer a Plant-Based Piezoelectric Transducer with Rochelle Salt to Generate a Resilient, Eco-Friendly Source of Voltage
HS-EGSD-310	Trisha Samba	Easy Piezy Electricity
HS-EGSD-311	Kyla Fung	Pathway to a Sustainable Future: Economic and technical feasibility of hydrothermal carbonization (HTC) processing plants
HS-EGSD-312	Grace Kaung	Comparison of energy output levels of the upper Mississippi River sediment using sediment microbial fuel cells
HS-EGSD-314	Benjamin Rex and Grayson Roberts	Growing Fuel: Enhancing Phytoplankton Growth with Ferrous Sulfate to Reduce the Cost of Biofuel
<b>Biomedical Engineering</b>		
HS-ENBM-024	Richard Xiong	The Development of a Rapid, Scalable, and Low-cost Home Test Kit for COVID-19
HS-ENBM-315	Kareem Eldahshoury	Prosthetic Index Finger Operated by Surface Electromyography

HS-ENBM-316	Lauren Benoit	The impact of green tea on bacterial nanocellulose's biomedical properties
<b>Environmental Engineering</b>		
HS-ENEV-032	Tanmay Iyer and Ian Seremet	The Automation of Shinkei jime
HS-ENEV-033	Jennifer Oettinger	Where the Rubber Meets the Road: The Development of an Innovative, Reusable, and Energy-Efficient Filter for Microplastics Created Through Tire Wear
HS-ENEV-119	Mohammed Omer and Abdullah Saidi	Designing an Autonomous Solar Powered Robot Capable of Filtering out Excess Phosphorus and Nitrogen from Waterways to Naturalize the Process of Eutrophication
HS-ENEV-198	Jack Hlavka	Treatment of Acid Mine Drainage with Desulfovibrio desulfuricans
HS-ENEV-317	John Cardwell	Testing the Waters: Engineering an Innovative Method of Water Health Analysis Year II
<b>Engineering Mechanics</b>		
HS-ENMC-082	Brynlee Christianson	The Treble With Keys
HS-ENMC-098	Mitchel Masters	Do the number of blades on a wind turbine affect its power output?
HS-ENMC-120	Billal Saidi	Engineering A Cost-Effective Ventilator
HS-ENMC-199	Will Anderson	A Comparison of Three Wing Configurations at Different Heights in Ground Effect
HS-ENMC-230	Nickolas Zander	The Engineering Behind Theme Park Rides: Creating and Coding a Model Theme Park Ride
HS-ENMC-319	George Richards and Will Sweeney	A.L.M.E. Assistive Lifting Machine for Elders: Engineering a solution to fall-recovery-related injuries in seniors and caregivers
<b>Mathematics</b>		
HS-MATH-081	Brenner Spaeth	The Birthday Paradox
HS-MATH-086	Nathan Krause	Investigations in Topdrops
<b>Materials Science</b>		
HS-MATS-200	Benjamin Chen	Incorporation of Recycled Plastics In Road Materials
HS-MATS-320	Kendall White	Everlasting Elastics
HS-MATS-321	Nick Carver	The potential application of super elastic Nitinol alloy for use in type III body armor
HS-MATS-322	Rebekah Thomasson	The formation of edible packaging from food waste streams and its applications as alternative packaging to low density polyethylene and oriented polypropylene
<b>Microbiology</b>		
HS-MCRO-231	Ellen Guo	Distinctive mutation profiles of SARS-CoV-2 spike protein in different geographic regions of the United States
HS-MCRO-232	Audra Johnson	The Effects of Disinfectants on Escherichia Coli Bacteria
HS-MCRO-323	Ava Chen	Analyzing the effects of Lactobacillus Rhamnosus as an alternative to antidepressants on Caenorhabditis elegans model organisms by determining its impact on locomotion, lifespan, and pharyngeal pumping rates
HS-MCRO-324	Alison Crandell	Effects of methoxsalen and UV radiation on subcutaneous P. destructans infections through the use of S. cerevisiae and G. mellonella as models
HS-MCRO-325	Isabelle Murillo	Small But Mighty: The Power of Silver Nanoparticles

HS-MCRO-385	Ava Drobnick	Killing Bacteria: Green vs. Mean
<b>Physics and Astronomy</b>		
HS-PHYS-112	Jonah Bieger	Testing the Magnus Effect in Water
HS-PHYS-234	Justin Draheim and Todd France	Optical Tweezers
HS-PHYS-235	Jacob Johnson	The Result of Common Building Materials on the Strength of a Radio Signal
HS-PHYS-236	Tarun Kota	Detection and Characterization of Astronomical Dwarfs using CatWISE
HS-PHYS-237	Cade J Bunnell	Correlation between type of glove and catch performance
HS-PHYS-326	Austin Hunter	Analyzing the impact of drafting in cross country skiing with computational fluid dynamics
<b>Plant Sciences</b>		
HS-PLNT-103	Grace Moeller	How do Different Natural Dyes react with variations in fabric and pH?
HS-PLNT-121	Isaac Mauch	Studying the Effects of Ridged Soil on Dry Beans and Applying it to Commercial Farming
HS-PLNT-166	Emelyn Beaster	Using Phytoaccumulation to End Mineral Deficiencies
HS-PLNT-202	Eleanor Chen	The Effects of Storage Temperature and Exogenous Ethylene Exposure on the Ripening Rate, Quality, and Glucose Level of Postharvest Ripened Tomatoes ( <i>Solanum lycopersicum</i> )
HS-PLNT-203	George Montague	The effect of UVC exposure on germination rate, time until germination and growth rate in radishes ( <i>Raphanus sativus</i> )
HS-PLNT-204	Isabel Toghramadjan	Optimizing photoperiod to improve drought resistance in <i>Arabidopsis thaliana</i>
HS-PLNT-327	Isabella Escalante	The Elucidation of a Novel Laccase-Producing Fungal Strain with an Alkaline pH
HS-PLNT-328	Maya Silver	Applied natural selection: the effect of sethoxydim on lipid production in algae
HS-PLNT-330	Christina Radichel and Ayres Warren	You Are My Soil-Mate: The Effects of Fertilizer Composition on Radish Plant Growth
HS-PLNT-374	Elizabeth Genis	Survival of the Plants
<b>Robotics and Intelligent Machines</b>		
HS-ROBO-034	Stephen Wu	Autoplay onwards: Musical Genre Classification using Deep Learning
HS-ROBO-035	Pramod Anandarao	A Novel Deep Learning Approach for Low Cost Mobile Diagnosis of Diabetic Retinopathy
HS-ROBO-331	Julian Byrne	Training Machine Learning Models to Determine Archery Scores
HS-ROBO-332	Eli Hooker Reese	Teaching Manufacturing Robots with Kinesthetic Learning from Demonstration in a Miniature Replication of the Work Environment
HS-ROBO-333	Kevin Armstrong	Robotic Arm Plants for Climate Change
HS-ROBO-334	Ananyaa Arvind	Innovative Chatbot Solutions: Designing a conversational agent to promote student success during distance learning
HS-ROBO-335	Steven Wang	Examination of Natural Language Processing for Courtroom Semantic Analysis

<b>Systems Software</b>		
HS-SOFT-027	Margaret Hu and Jenny Yan	Enhancing Precision Medicine: Developing a Computational Tool to Identify Treatment Candidates for Carcinogenic Mutations.
HS-SOFT-336	Alex Soltau	Artificial Neural Network News Sentiment and Keyword-Based Stock Price Prediction
HS-SOFT-337	Kiefer Miskiw	Rapid development of 3D worlds
HS-SOFT-338	Jack Wherry	Improving the efficiency of sanitizer-guided fuzzing through libFuzzer-style in-process mechanisms
HS-SOFT-340	Sahana Mangipudi and Caroline Pirtle	A Schedule a Day Keeps the Doctor Okay: An algorithmic and user-friendly approach
HS-SOFT-341	Shreshth Shrivastava	WI-CARE: Wifi Computer-Assisted Remote Eldercare (Year 2)
<b>Translational Medical Science</b>		
HS-TMED-342	Atreyus A. Bhavsar	The Spread of Macroscopic Droplets from a Simulated Cough with and without the Use of Masks or Barriers

# Extra Contests

MAS invites you to participate in a few totally optional activities - perhaps something to keep you occupied between workshops or while waiting for the award ceremony to begin? *The decision to participate or not in this contest will have no effect on how your project or presentation is judged and is completely voluntary.*



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