87TH ANNUAL

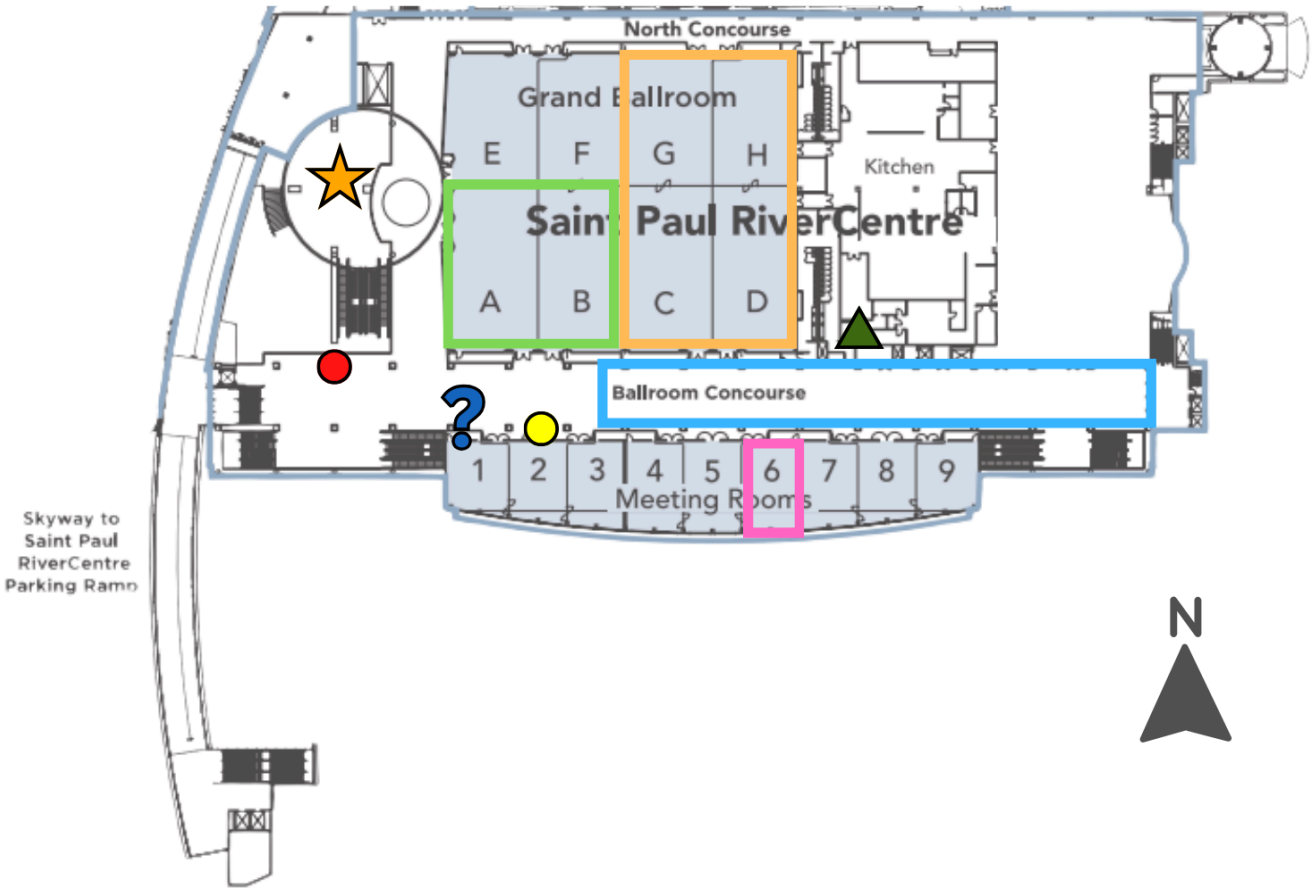
MARCH 22, 2024

at the **SAINT PAUL RIVERCENTRE**

Presented by the Minnesota Academy of Science

Map of St. Paul RiverCentre

All activities will occur on the RiverCentre's second floor



Help Desk
Meeting Room 1

ExploraDome

Student Check-in
West end of Ballroom Concourse

Chaperone Check-in
Outside of Meeting Room 2

Bathrooms

Judge Check-in & Headquarters (10 am - 4 pm)
Keynote & Awards Reception (5 - 6:30 pm)
Grand Ballrooms A & B

Project Presentation Hall
Grand Ballrooms C, D, G & H

Exhibitor Showcase
East end of Ballroom Concourse

Multifaith/Quiet space
Meeting Room 6

Program cover design by Vunley Long

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We need your feedback!

We want to hear what you think about this year's event—and what our priorities for next year should be! Your input also helps us evaluate this program and let our supporters know how important science fair participation is to you. **Please participate in the interactive feedback options available in the exhibit hall this year—and complete your survey, which is available either PRINTED or ONLINE.** Scan a QR code below or visit mnmas.org/2024-state-science-fair-details to access online surveys.

Student Survey

Teacher/Parent/Advisor Survey

Judge/Volunteer Survey

The MAS Staff and Board care deeply that all Science Fair student participants and supporting adults feel **safe and welcome** at our event.

To report an incident or concern,

go to bit.ly/ssef-incident or e-mail info@mnmas.org.

87th Annual Minnesota State Science & Engineering Fair (MSSEF) Schedule

Friday, March 22, 2024

8:00 am - 10:00 am: Student Check In & Project Set Up Time | *Ballrooms C, D, G & H*

10:30 am - 11:00 am: Event Kick Off & Morning Announcements | *Ballrooms C, D, G & H*

10:00 am - 10:30 am: Judge Check In | *Ballrooms A & B*

10:30 am - 10:45 am: **Judge Welcome & Announcements** | *Ballrooms A & B*

11:30 am - 12:00 pm: **Educator Reception** | *Meeting Room 3*
Calling all Regional Directors, Teachers, and Project Mentors! Grab a snack & share your insights with MAS Board Members.

11:00 am - 2:00 pm: Lunch on your own | *St. Paul RiverCentre*
Deli cart available in the Ballroom Concourse. Headwaters Cafe located on the first floor of the RiverCentre.

10:00 am - 4:00 pm: Exhibitor Showcase, Science Museum, & Exploradome | *Ballroom Concourse*
Visit interactive exhibits, the Science Museum, the Bell Museum's traveling planetarium, the MAS photo booth -- and more!

11:00 am - 1:00 pm: Odd Number Projects Judging | *Ballrooms C, D, G & H*
Project Presentation Hall remains closed for judging all ODD numbered projects. Student and judge access only.

1:30 pm - 3:30 pm: Even Number Projects Judging | *Ballrooms C, D, G & H*
Project Presentation Hall remains closed for judging all EVEN numbered projects. Student and judge access only.

3:30 pm - 4:30 pm: Public Viewing | *Ballrooms C, D, G & H*
All are welcome in the Project Presentation Hall to explore student projects in person.

4:30 pm- 5:00 pm: Student Networking and Prizes | *Ballrooms C, D, G & H*
Students take a break, network, and complete surveys and thank you cards to enter a fun prize drawing

5:00 - 6:30 pm: MSSEF Keynote Address by Jazmine Darden & Special Awards Reception | *Ballrooms A & B*
Food and beverage provided for student participants. Medtronic, Ecolab, Broadcom, ISEF awards and more follow keynote.

The core of Jazmine Darden's mission is to inspire the next generation of doers, creators, and thinkers. She is the founder of SPARKZ3D, a STEM educational outreach program centered around design and 3D printing. For the last 6 years, she taught multiple courses as an adjunct instructor at Dunwoody College and recently started her new role as an Applications Engineer with GoEngineer. She has served on the Works Museum Board of Directors, the Minnesota NASA Space Grant Advisory Board, the Dunwoody College Board of Alumni and the MINNDEPENDENT STEM Advisory Committee. Her many professional accomplishments include providing the commencement keynote for Dunwoody College and being selected as a 2022 Women in Business Honoree by the Minneapolis/St. Paul Business Journal.

6:30 pm - 6:45 pm: Photos & Project Disassembly | *Ballrooms C, D, G & H*
Students may take awards photos and then remove all project materials from the Project Presentation Hall.

Sunday, March 24

2:00 pm: Virtual Awards Ceremony | Zoom
All remaining awards announced live via Zoom. Check zFairs or mnmas.org/2024-state-science-fair-details for links and info.

Welcome from the Minnesota Academy of Science Board of Directors

On behalf of the Minnesota Academy of Science Board of Directors, I welcome you to the 2024 Minnesota State Science and Engineering Fair!

Congratulations on earning your place as one of Minnesota's elite student scientists. Being here shows everyone that you are hardworking, dedicated, creative, and intelligent. At its root, Science Fair is a program for gifted students, and you have earned your spot. Whether you win fifteen awards or none, you are a winner. Please use this time to get feedback from the judges, meet your fellow student scientists, and showcase your amazing project. The Minnesota State Science Fair is likely to be an event you will never forget.

Thank you to the parents, teachers, advisors, and volunteers. Without your support the Minnesota State Science Fair wouldn't exist. We appreciate your willingness to devote many hours of time filling out paperwork, sectioning off areas of your home for research, and helping to ensure the fair runs smoothly. I'm looking forward to hearing your stories this year.

To our students, please know that we are all very proud of you. We are excited to see where your creativity takes all of us in the future. I hope Science Fair is all you expect it to be and more!

Have a passion for STEM in MN?

The MAS Board is accepting applications for Directors!

Connect with Kailey Soller in the Judge Quarters or apply online at: mnmas.org/board-of-directors.

Sincerely,

Dr. Cindy Ward-Thompson
President, Minnesota Academy of Science

Message from the Governor of Minnesota

Check out Governor Walz's video message of welcome and congratulations!

About the Minnesota Academy of Science

Minnesota Academy of Science Staff

Liz Buhmann, *MSSEF Program Manager / Events Manager*

Kris Fowler, *Science Bowl Manager; Winchell Coordinator*

Alyse Tainter, *Volunteer Engagement Assistant*

Evangeline Holley, *FORSE Program Manager*

Jennifer Schuetz Hadley, *Operations Director*

Marcella McClain, *IT Support*

Lara Maupin, *Executive Director*

Emily Shepard, *Communications Specialist*

Hillary Umland, *MSSEF Assistant Program Manager*

MSSEF Event Sponsors

Premier Sponsor: **Medtronic**

Contributing Sponsors:

Broadcom Foundation

Good Chemistry / Illume

Barr Engineering · Cibus

Marathon Petroleum · Mayo Clinic

Stageberg Family Foundation

Beckman Coulter · Barbara Lunde, PhD

MAS Contributing Sponsors

MN Alliance for Volunteer Advancement / Americorps Volunteer Generation Fund

MN Department of Education · Ecolab

Saint Paul & Minnesota Foundation

Hardenbergh Foundation

H.B. Fuller · Verizon

Collins Aerospace / Raytheon

3M · CVS Health

About the Minnesota Academy of Science

The Minnesota Academy of Science (MAS) is a statewide 501(c)(3) nonprofit organization. We serve K-12 and undergraduate students, educators, and schools as well as STEM graduates and professionals seeking to network and volunteer. Our programs and operations are funded through the state of Minnesota, corporate sponsorships, foundation grants, registration fees, and individual donations.

OUR MISSION

We are not just focused on science! MAS remains 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.

OUR BELIEFS & CORE VALUES

We believe STEM literacy benefits our entire community and that all students deserve access to meaningful and fulfilling STEM activities throughout their education. We strive to conduct ourselves in keeping with our core values of innovation, equity, integrity, and community.

OUR PROGRAMS & RESOURCES

We create opportunities for access and engagement through our five core programs—*State Science Bowls, State Science Fair, Junior Academy, Winchell Symposium, and FORSE Mentoring & Enrichment*—and through our online resources and communications. Visit **mnmas.org** to learn more!

OUR HISTORY

MAS has been promoting STEM in Minnesota for more than 150 years! Visit mnmas.org/history to explore our interactive timeline and digital archives and learn more about our history.

MINNESOTA ACADEMY OF SCIENCE
EST. 1873

OUR MEMBERS

Our membership structure builds a stronger community of STEM enthusiasts. MAS is giving 2024 memberships to *all* donors as well as *all* students, educators, and volunteers participating in our programs and events. *Yes, this means YOU!* MAS invites you to stay connected to MAS throughout the year.

@MNAcademyofScience @MinnesotaAcademyofScience @MNAcademyofScience @Minnesota Academy of Science

Connect - Learn - Register - Donate - Volunteer

mnmas.org

Exhibits & Activities

The Minnesota Academy of Science thanks the following organizational partners—dedicated supporters of the STEM education and Minnesota State Science & Engineering Fair!

Exhibitor Showcase

The Exhibitor Showcase is located on the east end of the Ballroom Concourse. Swing by to participate in hands-on STEM activities, meet Minnesota STEM professionals, provide Science Fair feedback, pick up free tickets to the Science Museum for today, and much more!

3M Visiting Wizards

3M Visiting Wizards come from a wide range of roles, not all of them technical. What they all share, though, is a passion for inspiring the next generation to consider all the ways that STEM can be a part of their future.

Come by their table for hands-on demonstrations about color, light, perception, and data collection and analysis.

Minnesota Chapter of the American Society of Plumbing Engineers

The Minnesota Chapter of the American Society of Plumbing Engineers is a local networking community of Plumbing Engineers. We continue to try and find ways to continue learning and give back to our industry and community.

Stop by their table to check out a working display showing engineering at work in a plumbing application along with computer software demonstrating how to design a plumbing system.

Beckman Coulter

A global leader in clinical diagnostics, Beckman Coulter Diagnostics has challenged convention to elevate the diagnostic laboratory's role in improving patient health for more than 80 years. Our mission is to Relentlessly Reimagine Healthcare, One Diagnosis at a Time – and we do this by applying the power of science, technology and the passion and creativity of our teams. Our diagnostic solutions are used in complex clinical testing, and are found in hospitals, reference laboratories and physician office settings around the globe. We exist to deliver smarter, faster diagnostic solutions that move the needle forward from what's now to what's next. We do this by accelerating care with an extensive clinical menu, scalable lab automation technologies, insightful clinical informatics, and optimize lab performance services.

Headquartered in Brea, Calif., with more than 11,000 global team members, Beckman Coulter Diagnostics is proud to be part of Danaher. Danaher's science and technology leadership puts Beckman Coulter Diagnostics' solutions at the forefront of the industry, so they can reach more people. Being part of Danaher means we can offer unparalleled breadth and depth of expertise and solutions to our customers. Together with Danaher's other businesses across Biotechnology, Diagnostics and Life Sciences, we unlock the transformative potential of cutting-edge science and technology to improve billions of lives every day.

At the Beckman Coulter table, talk with professionals and get to know what they do. Take home a branded giveaway of your choice.

Bell Museum

The Bell Museum, Minnesota's official natural history museum and planetarium, is now located on the University of Minnesota Twin Cities campus in Saint Paul. Take amazing journeys from the far reaches of the cosmos to deep inside the human brain in the Whitney and Elizabeth MacMillan Planetarium. Explore the origins of the universe, the diversity of life on earth, and take a walk through the state of Minnesota, featuring our world famous wildlife dioramas. Engage all your senses in our Touch & See Lab with 10,000-year-old fossils, living plants and animals, and more. Wander outside on our green roof and observation deck, and explore the learning landscape of native plants, geology gardens, and a solar station.

Stop by their table to view a selection of museum specimens, take home giveaways, and learn about their programming.

Empowering Women in Science

EWIS is an organization of woman identified, non-binary, ally scientists and working professionals, including postdocs and graduate students, at the University of Minnesota. Our objective is to enable and empower women to fulfill their career goals and to reach the highest level of leadership while advocating gender equality for all in science, technology, engineering and mathematics (STEM) fields. By connecting, we can establish collaborations, support, mentoring and share insights to promote women and gender minorities in science. We welcome participation from non-women-identified allies who are looking for ways to improve experiences for all people in STEM.

Stop by their table to learn about the importance of oxygen to Earth and on different planets. Measure your own saturated oxygen levels using a pulse oximeter, and check out battery-powered microscopes and pre-set slides to explore microscopic biology.

Medtronic

Medtronic stands as a global leader in the field of medical devices, dedicated to crafting innovative solutions that alleviate pain, restore health, and extend life. With a proud track record of impacting over 70 million lives last year alone, we're committed to pushing the boundaries of healthcare. Today, we're thrilled to join forces with the MN State Science Fair, recognizing the vital role of STEM Scholars in shaping our future. We firmly believe that investing in these bright minds is investing in tomorrow's breakthroughs.

If you're curious about our mission, our work, or envisioning a career path with us, swing by our booth to engage with our team. We're eager to connect, share insights, and explore potential opportunities together. Looking forward to meeting you!

Minnesota Academy of Science

The Minnesota Academy of Science (MAS) is a statewide nonprofit and the proud organizer of the Minnesota State Science and Engineering Fair. Each year, our STEM programs and resources impact thousands of Minnesotans, including students, educators, families, and STEM professionals.

Stop by our table to chat with MAS representatives, make a State Science Fair button, take a picture in our photobooth, learn about the Junior Academy, and give us your feedback about Science Fair!

Minnesota Department of Transportation

The Minnesota Department of Transportation (MnDOT) develops and implements policies, plans and programs for aeronautics, highways, motor carriers, ports, public transit and railroads.

The AR sandbox is a hands-on, interactive tool that utilizes 3D visualization applications that allow you to mold sand by hand and watch the digital topography map of your model react in real time. Learn how land surveyors use advanced technology to gather essential land measurement data needed for MnDOT's transportation projects.

Minnesota Valley National Wildlife Refuge

Visit Minnesota Valley National Wildlife Refuge any time of the year to enjoy natural habitats of Minnesota wildlife. Prairies, wetlands, bottomland forests and other woodlands provide a peek at wildlife on the edge of the Twin Cities urban community.

Come by the Minnesota Valley National Wildlife Refuge table for a pollinator seed ball activity and a bird banding tool demonstration.

Pavek Museum

The Pavek Museum educates and inspires people about the science, history, art, and technology of electronic communication, through unique educational programs, distinctive artifact collections, extraordinary events, and exceptional experiences for our supporters.

Join the Pavek Museum in learning the history behind the science and technology of electronic communication through engaging, hands-on activities!

Raspberry Pi

Raspberry Pi Foundation North America is a 501(c)(3) non-profit organization with the mission to empower young people from all backgrounds to realize their full potential through the power of computing and digital technologies. We support schools to implement computing, computer science, and AI literacy through curricula, resources, and teacher CPD. Additionally, we inspire young people to get hands-on with technology through Code Club. We also undertake original research into the teaching and learning of computer science and related subjects. They are committed to supporting young people from all backgrounds, particularly focusing on creating opportunities for young people who experience educational disadvantage or who come from backgrounds that are currently underrepresented in technology industries.

Science Museum of Minnesota

The Science Museum of Minnesota is one of the state's most beloved museums, with a reach that extends well beyond its riverfront location in downtown Saint Paul. Along with serving hundreds of thousands of people each year through its unique combination of technology, hands-on STEM exploration, and world-class collection of fossils and artifacts, the museum reaches schools in all 87 Minnesota counties; provides critical STEM workforce development and leadership training for youth; and conducts research on water quality, climate change, paleontology, and archaeology in locations around the world. Equity work is in the Science Museum's DNA, demonstrated through its commitment to being a resource to the entire community at a time when science and scientific learning, and equitable access to STEM and STEM careers is more critical than ever.

Stop by the MAS Helpdesk to pick up your free wristband to visit the Science Museum, valid today (March 22) only. *Wristbands are available to all students participating in Science Fair. Each group of 10 or fewer minors must include an adult chaperone.*

UMN College of Pharmacy

The University of Minnesota College of Pharmacy is nationally recognized for excellence in preparing pharmacists and pharmaceutical scientists, occupational therapists, and medical laboratory scientists to tackle society's toughest problems in Minnesota and across the globe.

Stop by their table for hands-on activities for students as well as trivia about all of the programs offered at the College of Pharmacy (PharmD, Occupational Therapy, and Medical Lab Sciences).

UMN Department of Bioproducts & Biosystems Engineering

The Department of Bioproducts and Biosystems Engineering (BBE) discovers and teaches solutions for the sustainable use of renewable resources and the enhancement of the environment. We offer undergraduate and graduate degree programs. BBE and SSM degrees bring together science, engineering, business and technology to prepare students to solve real-world problems. Our graduates enter the workforce with an understanding of the interconnected systems that impact everything from renewable energy to food security and environmental protection so they can advance and engineer a more sustainable future.

Stop by their booth to learn more!

UMN Masonic Cancer Center & Institute for Engineering and Medicine

The University of Minnesota Masonic Cancer Center (MCC) and the Institute for Engineering and Medicine (IEM) often collaborate on opportunities for students.

Come by their table to learn about the conferences, programs, and resources available at the University of Minnesota for high school researchers! They will have an interactive poster about careers in cancer work as well specimens donated from pathology that show examples of healthy vs. cancerous tissues. In addition they will have information about our programs and plenty of giveaways.

Young Environmental Consulting Group

Young Environmental is an environmental consulting firm committed to helping clients execute projects in environmentally responsible ways. The company was founded in 2016 to specialize in water and natural resources management and planning, water resources engineering, stormwater and environmental compliance, and stakeholder engagement.

Stop by their booth for a "Water is Life" sticker and to participate in a citizen science voting activity.

Bell Museum's ExploraDome

Join the Bell Museum for an immersive and unique show in their traveling planetarium, the ExploraDome! The ExploraDome travels throughout the state of Minnesota visiting classes, school fairs, and community events. You can find more information about how to book the ExploraDome for your school or event on the Bell Museum website (bellmuseum.umn.edu/exploradome).

ExploraDome shows available today:

Seasons, Phases, Eclipses*:* Observe the changes in the Sun-Earth-Moon system that create seasons, phases and eclipses. What causes the changes in moon phases and seasons? What causes solar and lunar eclipses? Join us as we uncover how the sun and moon impact our daily lives on Earth.

Minnesota in the Cosmos: Explore the formation of the universe from a uniquely Minnesotan perspective, investigating the deep cosmic and geological history of the land beneath our feet as seen through the eyes of a boy on a field trip to Interstate State Park in Taylors Falls, Minnesota. Following the recorded production, the presenter takes you on a live tour of the night sky, with a guide to the planets, stars, and constellations you can see from Minnesota.

Awards

About the Minnesota State Science & Engineering Fair

The mission of the Minnesota State Science & Engineering Fair is to encourage Minnesota students to become informed and engaged citizens who are well versed in the practices and ideas of science and to support them as they pursue pathways in science, technology, engineering, and math (STEM). MSSEF introduces students to new concepts, inspires them to research topics of personal interest, and provides opportunities for networking with professional scientists and their peers. The Minnesota Academy of Science is proud to offer this annual event.

An annual competition since 1938, MSSEF showcases the research of many of Minnesota's most curious, persistent, and engaged STEM students. Each year, hundreds of middle school and high school students qualify to advance from Regional Science Fairs across Minnesota to present their research at the state level. Students compete for prizes and awards worth more than $20,000, sponsored by dozens of corporations, nonprofits, government agencies, and professional scientific societies. Learn more in the pages that follow.

This year, several top awards including the Medtronic Awards, Ecolab Awards, and ISEF Finalists, will be announced in a special in-person awards reception at the end of the day on March 22. All other awards will be announced live in a virtual awards ceremony held March 24 and online at mnmas.org. See the schedule for details.

Minnesota Academy of Science Awards / Regeneron ISEF

GRAND AWARDS: GOLD, SILVER, BRONZE

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, and 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.

STATE SCIENCE FAIR ADVOCACY AWARDS

The Minnesota Academy of Science State Science Fair Advocacy Award is given to one student and one adult in recognition of outstanding and highly impactful advocacy on behalf of the MN State Science & Engineering Fair.

MINNESOTA JUNIOR ACADEMY OF SCIENCE

MAS will invite top-scoring high school presenters from the Minnesota State Science & Engineering Fair to join the Minnesota Junior Academy of Science (MJAS), an honorary society and leadership group of high school and college students from Minnesota who have demonstrated excellence in scientific research. As members of the MJAS, students will have opportunities to network and become leaders and ambassadors for STEM and STEM education at the local, state, and national levels. All inducted MJAS members have the opportunity to attend the American Junior Academy of Science (AJAS) Annual Meeting and become AJAS Lifetime Fellows. Learn more at mnmas.org/junior-academy or stop by the MAS booth for more information. Interested students may also apply!

Regeneron International Science and Engineering Fair Award

The Regeneron International Science and Engineering Fair (ISEF) Award recognizes up to four of the top high school projects. Winners receive an expense-paid trip to compete in ISEF, the world's largest pre-college STEM competition. This year, ISEF, will take place May 11-17 in Los Angeles, California. Regeneron ISEF 2024 will be a fully in-person event complimented by a virtual site where finalists will share their projects online. Learn more: **societyforscience.org/isef/**

REGENERON ISEF
A PROGRAM OF SOCIETY FOR SCIENCE

Medtronic Awards

Medtronic
Engineering the extraordinary

2024 PREMIER SPONSOR

Medtronic is a global leader in healthcare technology. Six powerful words have inspired Medtronic to do the extraordinary for 75 years and counting:
Alleviate Pain, Restore Health, and Extend Life.

MAS thanks Medtronic's Technical Fellows and Global Technology & Innovation Sustainability Development, Premier Sponsors of the State Science & Engineering Fair, for their critical support of STEM education in Minnesota. All Medtronic award winners will receive cash prizes, certificates, and an invitation to spend a day at Medtronic with a Technical Fellow.

✷ Medtronic Innovation Award

The Medtronic Innovation Award recognizes students whose projects exemplify excellence through innovative outside-the-box ideas, self-motivated independent work, passion for discovery and science, and the potential to impact their category or the world.

For High School and Middle School there will be 1st, 2nd, and 3rd place awards which respectively come with $750, $500, and $250 cash prizes.

✷ Medtronic Technical Achievement Award

The Medtronic Technical Achievement Award recognizes students whose projects demonstrate excellence through imagination and inventiveness, tackling a challenging technical question, rigorous scientific inquiry and execution, and the potential to solve a technical problem.

For High School and Middle School there will be one award in each of these areas: Biomedical Applications, Science & Engineering, and Sustainability which will come with a $500 cash prize.

Sponsored Awards

MAS thanks the following organizations and individuals for sponsoring awards as part of the Minnesota State Science & Engineering Fair. For award details and prize information, visit mnmas.org/state-science-fair-awards. All awards and award winners will be showcased at mnmas.org/2024-ssef-awards following the March 24 virtual award ceremony.

3M | Young Inventor Recognition & Science Applied to Life Award
American Chemical Society – Minnesota Section | Outstanding Experimental Project in Chemistry
American Fisheries Society – Minnesota Chapter | Aquatic Sciences Excellence Award
American Heart Association | The American Heart Association Community Impact Award
American Institute of Professional Geologists | Geology, Earth Science, Environmental Science, and Sustainability Excellence
American Psychological Association | Outstanding Research in Psychological Science
American Society of Plumbing Engineers (ASPE) | Best Display of Mechanical Engineering
Association for Women Geoscientists | Student Awards for Geoscience Excellence
Beckman Coulter | Excellence in Science Awards & Excellence in Engineering Awards
Bolton & Menk | Bolton & Menk Young Inventor Award
Broadcom Foundation | Broadcom Coding with Commitment Award
Milan Darji | Outstanding Experimental Design Award
DiaSorin | DiaSorin Merit Award & DiaSorin Relativity Award
Ecolab | Ecolab Food Safety Award & Ecolab Water Vision Award
Emerson Women's Impact Network | Female in STEM Excellence Award
Empowering Women in Science (EWIS) | Rosalind E. Franklin Perseverance in STEM Award
Gateway Fiber | Data Visionary Award
Good Chemistry | Good Chemistry Prize for Creativity
Hamline University Department of Physics | Excellence in Renewable Energy and Sustainability Award
Institute of Food Technologists – Minnesota Section | Institute of Food Technologists Food Science Award
Land O' Lakes | Land O'Lakes Award for Food Innovation
Lemelson Foundation | Lemelson Early Inventor Prize
LHB Corporation | LHB Outstanding Engineering or Building Science Award & LHB Outstanding Sustainability Award
Minnesota Academy of Science Board of Directors | Aspiring Scientist Award and Inspiring Scientists Award
Minnesota Environmental Health Association (MEHA) | MEHA Award for Excellence in Environmental Health Science
Mortenson Environmental | Mortenson Environmental Excellence Award
National Aeronautics and Space Administration (NASA) | Earth Systems Science Award
National Oceanic and Atmospheric Administration (NOAA) | Taking the Pulse of the Planet Award
Regeneron | Regeneron Biomedical Science Award
Ricoh | Sustainable Development Award
Science Museum of Minnesota | Science Museum of Minnesota Science Communication Award
Society for In Vitro Biology | Outstanding Achievement for Ability and Creativity in In Vitro Biology
Society for Science | Community Innovation Award
Society for Science & Thermo Fisher | Thermo Fisher Scientific Junior Innovators Challenge
Kailey Soller | Woman in Science - Impact Award
Thompson Family | Excellence in Obstacle Navigation
Twin Cities Meteorological Society | Twin Cities Meteorological Society Award
University of Minnesota College of Biological Sciences | College of Biological Sciences Budding Scientist Award
University of Minnesota Department of Bioproducts and Biosystems Engineering at the | Bioproducts and Biosystems Engineering Sustainable Product Design Award
U.S. Agency for International Development (USAID) | Science Champion Award
U.S. Air Force | Air Force Achievement Award
U.S. Metric Association | Best Use of the International System of Units
U.S. Navy | Naval Science Award
U.S. Stockholm Water Environment Federation | Stockholm Junior Water Prize
Yale Science & Engineering Association | Most Outstanding Exhibit in Computer Science, Engineering, Physics, or Chemistry
Young Environmental Consulting | Collaboration in STEM Award

Middle School Projects by Category

Animal Sciences (ANIM)

MS-ANIM-008, Gabe Bradley & Easton Matthews: The Seasonal Movement of Wolves on the Fond du Lac Reservation

MS-ANIM-060, Gabrielle Zoller: The Effect of Splint Boots

MS-ANIM-090, Nicholas Lazaridis, Jack Noseworthy & Luke Sellon: A Fruity Fruit Fly

MS-ANIM-095, Juliette Beyder & Katherine King: Sugar or Sweetener

MS-ANIM-144, Grady O'Brien: Dog's Reaction to Petting in Different Body Areas

MS-ANIM-302, Adlai Jeevanathan: Spectrum of Feathers: Analyzing Bird Behavior and Color

Behavioral and Social Sciences (BEHA)

MS-BEHA-007, Izzy Christensen-Macor & Gianna Stahl: What effect does sleep have on a middle school student's mental health, activity level, and academic success?

MS-BEHA-013, Bristol VanGuilder: What effect does a service dog in a middle school classroom have on student stress level and mood?

MS-BEHA-018, Annastyn Hagen: What effects educating middle school students on the effects on illegal substances have on the likelihood they would try them?

MS-BEHA-023, Kalli Buskala & Peyton DeMenge: What effect does music have on spatial memory skills?

MS-BEHA-028, Anna-Sofia Bocanegra & Aili Wilkinson: Examining the effects of cancer on patients and their families

MS-BEHA-100, Samantha Saiki: Does age affect an adults ability to complete a middle school test

MS-BEHA-106, Claudia Elmer & Esme Gargollo: How does phone notifications affect academic distractions?

MS-BEHA-112, Cecilia Le, Amelia Mills & Dylan Raukar: Does education affect the comfort level in the administration of life saving techniques?

MS-BEHA-119, Audrey Schilling & Lauren Strum: Is the Pink Tax Real?

MS-BEHA-124, Sia Sood: Does High Technology Use Correlate With Stress in Middle School Students?

MS-BEHA-130, Colleen Mahr: Do 7th graders have motor dexterity comparable to that of practicing surgeons?

MS-BEHA-140, Janet Njeru: Do middle school students prefer the taste of organic or non-organic fruits?

MS-BEHA-155, Laura Hansen: Music Magic: Using electroencephalography and surveys to investigate the therapeutic value of music

MS-BEHA-165, Cecelia Leitner: How Does the Offer of Rewards Affect the Behavior and Time Efficiency of Different Age Groups of Kids?

MS-BEHA-167, Lucy Johnson: Furry Friends Decrease Stress

MS-BEHA-170, Helen Summers: Which Method Works Best For Memory Recall In Elementary School Students

MS-BEHA-175, Maddy Miley: How Do Teaching Methods Affect Student Comprehension?

MS-BEHA-181, Fiona Smith: Are Elementary, Middle, or High School teachers more likely to be Introverts?

MS-BEHA-318, Claire Carlson: How Does Lyrical, non Lyrical, or No Background Music Affect Memory When Learning New Content?

MS-BEHA-343, Kaitlyn Mulle: If you can see it, you can clean it.

Biochemistry (BCHM)

MS-BCHM-109, Momo Hitosugi: How much sugar is on different fruits?

MS-BCHM-150, Jai Nair: Comparative analysis of calcium content in plant based foods for dietary recommendations

MS-BCHM-314, Abdurahman Hassen & Touathar Ly: How Does Meat Shrink

Biomedical and Health Sciences (BMED)

MS-BMED-122, Aditi Sriram: How Does Motion Artifact Affect the Accuracy of a Photoplethysmogram

MS-BMED-127, Jai Olson, Diya Kapoor & Yash Parikh: Contents of Energy Drinks Affecting Growth and Development of Tetrahymena Thermophila

MS-BMED-134, Natalie Nase: Impact of Common Drinks on Teeth

MS-BMED-173, Maren Fahlin: Dry Skin? Time to Moisturize!

MS-BMED-177, Baylee Martinez Ortiz: How Does The Hand Cleaning Method Impact The Amount Of Bacteria
MS-BMED-179, Grace Chinokoro: Trace Amounts of Sugar: How is Your Blood Pressure Affected?
MS-BMED-180, Mena Severt: Does our Echinacea tincture effectively kill bacteria compared to over-the-counter antibacterial medication?
MS-BMED-184, Saee More: The Fight Against Cardiovascular Disease
MS-BMED-185, Ruth Minke: Which Mask is More Hydrating?
MS-BMED-191, Amy Robles: The Effects of Caffeine According to Your Age
MS-BMED-345, Violet Johnson: What Hydrates the Skin Best?
MS-BMED-346, Bethel Senay: Blood Sugar High? Why?

Biomedical Engineering (ENBM)
MS-ENBM-093, Samuel Christopher Kaspar: Transforming Radiology Patient Experiences using Cloud Machine Learning

Cellular and Molecular Biology (CELL)
MS-CELL-104, Avanti Duggirala: Transforming Yeast with a Jellyfish Gene using a Plasmid Vector and Determining Gene Expression

Chemistry (CHEM)
MS-CHEM-049, Callan Rutherford: EGGstra Salty Buoyancy: Cracking the Floatation Code
MS-CHEM-054, William Dagg: What is the Best Activator for Slime
MS-CHEM-097, Oscar Scheid: Different Bio Plastics and their Strength, Flexibility, and Puncturability
MS-CHEM-111, Evan Melnyczenko & Raana Cassady: Eco-Friendly Bio Plastic Experiment
MS-CHEM-147, Lydia Rieke: Flour Power: The Effect of Gluten Free Flour on Cupcake Rise
MS-CHEM-152, Lila Foster: Where'd All the Bubbles Go?
MS-CHEM-156, Olivia Zhou: Growing Marshmallows
MS-CHEM-204, Divora Adhanom & Lola Currier: An osmotic method for the determination of coordination numbers of simple sugars
MS-CHEM-210, Faye Nation: How Do Different Yeast Strains Impact on the Flavor and Aroma of Distillers Fermented Beer?
MS-CHEM-216, Leah Moore: How does the amount of butter affect the diameter and force it takes to break a cookie!
MS-CHEM-279, Gianna Kimaiga & Natalie Mwaga: Bath Bomb Fizz Time
MS-CHEM-283, Lola Dixon: Science behind the laundry fairy
MS-CHEM-288, Samuel Edson: Destroying Science: Building Materials and Deterioration
MS-CHEM-293, Audrey Strehler: Brillant Bath Bombs
MS-CHEM-303, Gavrila Boakye-danquah & Adebola Ogunsina: How High Will it RIse?
MS-CHEM-308, Isha Secka: Across A Cookie
MS-CHEM-311, Kallie Heath: Jiggly Jell-O
MS-CHEM-316, Amerey Lee: Ice Breaker
MS-CHEM-326, Leah Benoit: Influence of Veganism on the Qualities of Traditional Dairy Products: Type of Plant-Based Milk and Density of a Pudding Dessert
MS-CHEM-330, Samantha Morales: Balloon Power!
MS-CHEM-333, Candice Kararu: Muff Everest
MS-CHEM-337, Hayden Smith: Soap Boat

Computational Biology and Bioinformatics (CBIO)
MS-CBIO-139, Erik Willman & Jonas Brown: Analysis Of Offensive Skill Positions Lower Extremity Injuries Turf Versus. Grass Numbers

Earth and Environmental Sciences (EAEV)
MS-EAEV-017, Jeremiah Bents & Finley Holz: Gray Wolf (Canis lupus) Movement Before, During, and After Deer Season On and Around The Fond Du Lac Reservation
MS-EAEV-022, Raelynn Wuollet: Lemnoideae and Acetaminophen
MS-EAEV-027, Melanie Buhs: What effect does water quality education and different water quality parameters have on the occurrence of algal blooms on Eagle Lake?
MS-EAEV-094, Mia Zoghby: Will the addition of salt boost plant growth?
MS-EAEV-098, Bhavya Yerriboyina: Eco-Flow: Water Solutions for Third World Country Contamination
MS-EAEV-116, Winnie Niu: The Effect of Sunscreen on the Growth of Green Algae (Eudorina elegans)

MS-EAEV-125, Shyam Christensen: Solar Panel Sustainability
MS-EAEV-126, Dhara Kannan & Jocelyn Rowley: How earthquakes effect different building shapes
MS-EAEV-129, Sanvitha Vallurupalli: Now You See It, Now You Don't! - How Does Acid Rain Affect Different Building Materials?
MS-EAEV-133, Lauren Arnold: Impact of essential oils on the rate of mold growth on bread
MS-EAEV-138, SaiSudeeksha Kusampudi: The affects on acid rain on different types of rocks
MS-EAEV-162, Vinetta Strelchuk: Ice Advice
MS-EAEV-166, Batoul Taha: Measuring Tap Water Qualities In Different Cities (Fridley, Blaine, New Brighton, Brooklyn Park, Columbia Heights) From Public Facilities (Library, Clinic, Schools)
MS-EAEV-219, Keagan Corcoran: How Do Microplastic Levels in the Ocean Impact the Penguin Population?
MS-EAEV-222, Noah Nguyen: Spinning Pinwheel by Steam: Energy From the Earth
MS-EAEV-223, Jake Olson: How Does Air Quality Differ in Urban and Rural Areas
MS-EAEV-228, Ferran Peckosh: Filtering Fire

Embedded Systems (EBED)
MS-EBED-031, Caleb Striker: Come Ohm: Creating a Dog Door Opener
MS-EBED-037, Dominik Fortin & Aleksander Kokotovich: Pickup Game Starter (PUG)

Energy: Sustainable Materials and Design (EGSD)
MS-EGSD-107, Kianna O'Marro: Wet vs. Dry: does wet insulation work as effectively as dry?
MS-EGSD-198, Sebastian DeLeo: Different Angles of Polarizing Light
MS-EGSD-203, Sandor Pratt: Sour Power! Testing how the acidity of certain foods impact how much power they can generate if they are put in a lemon battery-like form
MS-EGSD-229, Lilly Bilek: Factors affecting anode performance in an alga I metal II carbon I ferric chloride circuit
MS-EGSD-233, Shea Bohl: The Power of Rust: A Study of Electrolytes in Iron-Air Batteries

Engineering Technology: Statics and Dynamics (ETSD)
MS-ETSD-012, Patrick Hill: Making the “Perfect” propeller
MS-ETSD-050, Ally Johnson: DIY Crystal Radio
MS-ETSD-110, Jay Van Buren: Which Wire Records Best?
MS-ETSD-115, Aditi Kattamuri, Margarita Nikulina & Natalia Wojcik: Safety MN
MS-ETSD-271, Hannah Steines: How the Shape of a Car Affects Aerodynamics
MS-ETSD-275, Espen Duncan: What Car Shape is the Most Aerodynamic?
MS-ETSD-281, Sam Kessler: Windy Day how does Windspeed impact Drag and Lift?
MS-ETSD-286, Logan Ford: Molecular Motion in Magnets
MS-ETSD-291, Zabir Dagal: Can a 3D Printed Water Filter Match the Filtration Quality of a Commercial Water Filter
MS-ETSD-296, Edward Ginter: Pick the Right Pickleball: Examining Varying Pickleball Bounce Heights
MS-ETSD-301, Jared Griffiths: Shapes and Quakes: The Stability of Architectural Shapes During an Earthquake

Environmental Engineering (ENEV)
MS-ENEV-121, Corinne Duquaine: Hot vs. Cold Magnets: Which Will Work Better
MS-ENEV-242, Norah Bergerson: Glitter, a Million Pieces of Litter: Quantifying microplastics in laundry effluents released from textiles during washing
MS-ENEV-250, Emaan Moheet: Developing and Testing Permeable Pavement Material to Prevent Urban Flooding
MS-ENEV-254, Jack Gao: The Impact of Electric Vehicle Adoption and Electrification
MS-ENEV-255, Taher Taha: How to generate water out of air?
MS-ENEV-260, Luqman Ibrahim, Hamza Salem & Zakariya Shikder: Building a miniature Greenhouse

Materials Science (MATS)
MS-MATS-096, Selene Cornish, Siena Johnson & Eliza Brown: The Best Way To Purify Water
MS-MATS-102, Whitley Quimby & Claire Wilking: The Best Moisturizer for Water Retention of the Skin
MS-MATS-108, Elizabeth Brewer, Matilde Cabrera Bellolio & Calyn Ehlers-Wilbur: This Girl's Not On Fire: Flammability of Clothing
MS-MATS-114, Lukas Rysavy: Does the Amount of Infill in TPU Change its Ability to Bounce Objects?

MS-MATS-131, Alma Feldman-Chicoma & Grace Pickering: Soundproofing/Insulation Materials for Shared Wall Housing
MS-MATS-136, Sophie Ginder: What makes the best type of firestarter?
MS-MATS-280, Nolan Rosenberger: Testing 3D Printing Infill Patterns for Strength, Deformation and Printing Time.
MS-MATS-285, Mary-Grace Dobie: How Playground Material and Surfacing Affect Safety
MS-MATS-290, Claire Young: What are the Effects of Playing Softball on Different Types of Fields
MS-MATS-295, Agustin Orezzoli Robinson: Best Model Airplane Material
MS-MATS-315, Grace Hunt: Powder Prints
MS-MATS-327, Easton Graber: Fridges and Freezer and Ice Baths - O' My!
MS-MATS-332, Cora Finck: Our Sun In Color

Mathematics (MATH)
MS-MATH-053, George Spaeth: That Hit Me Square in the Head: The Study of the Average Ratio Between the Area and Perimeter of a Square.
MS-MATH-143, Simon Riska: Dungeons and Dragons Max Damage

Microbiology (MCRO)
MS-MCRO-113, Hannah Rudzik: Hand dryer cleanliness
MS-MCRO-157, Fahtima Komara: Strawberry militaries
MS-MCRO-164, Vivienne Kane, Kimaya Shah & Kinaari Shah: The 5 Second Rule

Physics and Astronomy (PHYS)
MS-PHYS-029, Simon Langer: What effect does the voltage of a battery have on the revolutions per minute?
MS-PHYS-030, Carly: Potato Battery
MS-PHYS-032, Claire Nelson: Picture This
MS-PHYS-118, Samuel Soma & Liam Michel: How Does Thickness of Rubber Affect Vertical Jump
MS-PHYS-206, William Voigt: Soar With Paper Planes
MS-PHYS-211, Breckon Sand: Confliction of Friction
MS-PHYS-221, Logan Hovanetz: Weight A Second
MS-PHYS-261, Liam O'Keefe: Effects of Temperature on Hitting Home Runs
MS-PHYS-265, Grace Braun: More Bounce For Your Basketball

Plant Sciences (PLNT)
MS-PLNT-051, Katie Mousel: Pumpkin Seeds vs Weeds: Seed Priming in Pumpkin Seeds
MS-PLNT-117, Riddhi Patel: How much bacteria grows on plants?
MS-PLNT-123, Emma Maleszewski: How the Color of Light Affects How Plants Grow
MS-PLNT-128, Peter Takahashi: The Effect of Light upon the Growth of Mung Beans in a Controlled Experiment
MS-PLNT-132, Anwar Jilaow & Jose Jimenez-Trejo: what works better homemade fertilizer or store bought?
MS-PLNT-231, Josephine Nnadi: How do different light sources impact the growth of a plant?
MS-PLNT-236, Amelia Dyrstad: Microplastics Effect On Plant Growth
MS-PLNT-240, Lalistu Nejo: Can we grow more vegetables indoors under grow lights or in natural light?
MS-PLNT-243, Isaiah Kron: CofFEe, Iron (Fe), or FErtilizer. Which -FE- will it be?
MS-PLNT-248, Siri Westberg: Everlasting Lettuce
MS-PLNT-253, Faith Mick: Digging Deep to get to the Root of the Issue: The Effect of Fertilizers on Plant Root Growth
MS-PLNT-317, Amari Hughes: How different color of light affects plants through photosynthesis

Robotics and Intelligent Machines (ROBO)
MS-ROBO-058, Nora Fay: Light Timer
MS-ROBO-137, Rowan Kolbe & Jett Hull: How realistic can AI be
MS-ROBO-141, Zoe Zhang: Tracking Adult Zebrafish Locomotion: Machine Learning vs Traditional Algorithms.
MS-ROBO-142, Nhyal Berntson & Logan Corbin: The Trash Terminator

Systems Software (SOFT)
MS-SOFT-092, Arav Goyal: Is your Password Safe?

Technology Enhances the Arts (TECA)
MS-TECA-319, Shagun Shrivastava: In Search of Sound: Creating Solutions for Sound Localization Challenges Using MicroBit Architecture to Aid Spatial Hearing Loss

Translational Medical Science (TMED)
MS-TMED-347, Sienna Granquist: Which Lip Product Moisturizes for the Longest

High School Projects by Category

Animal Sciences (ANIM)

HS-ANIM-065, Grayson Fister: The Solitary Bees' Diet: An Exploration of Megachile Campanulae

HS-ANIM-146, Lam Le: The Microplastic Butterfly Effect: Effects of dietary microplastic on survival and fitness of Cabbage White butterflies (Pieris rapae).

HS-ANIM-307, Elin Wellmann: Staying Alive: Mitigating the challenge of overwintering bees in Minnesota's harsh climate; a study of beehive wraps, their insulative properties, ability to modulate thermal extremes, and preserve bee populations

HS-ANIM-340, Isabella Wang: Staying Alive: Mitigating the challenge of overwintering bees in Minnesota's harsh climate; a study of beehive wraps, their insulative properties, ability to modulate thermal extremes, and preserve bee populations

Behavioral and Social Sciences (BEHA)

HS-BEHA-004, Alayna Strandberg: The Stroop Effect

HS-BEHA-006, Ethan Lavan: Effects of the Pandemic/Food Supply Chain, City Populations, and time on Minnesota Urban Chicken Keeping

HS-BEHA-011, Madison Klar: The five word test

HS-BEHA-014, Alexander Ren: Effect of Pandemic On American Volunteering: A Comparative Analysis of Pre and Post COVID-19 Formal Volunteer Engagement Across Demographics in the United States

HS-BEHA-016, Makenzie Lange: Does Music Affect Your Mood

HS-BEHA-021, Jaden Mishler: How do people learn better, digitally or audibly?

HS-BEHA-026, Isabelle Richter: Can Humans Identify AI?

HS-BEHA-057, Téo Lecoustre: The Effects of Varying Genres of Instrumental Music on Student Performance During Testing

HS-BEHA-059, Alexis Scheid: The Power of Suggestion: A Study of the Placebo Effects of Caffeine on Short-Term Memory

HS-BEHA-063, Maddilynn Nelson: Paper vs online test

HS-BEHA-064, Avah Anderson: Learning Style Knowledge

HS-BEHA-071, Julia Wang & Yufei Zhou: Lights Out, Insights In: illuminating the effects of screen time on sleep

HS-BEHA-149, Yuchen Shi: The effects of music on one's attention and relaxation levels while doing a task.

HS-BEHA-154, Henry Sabo: An Analysis of the Relationship Between IQ and Academic Performance at Breck School

HS-BEHA-160, Ameya Bhaskar: Beyond Numbers: Investigating the Relationship Between Socioeconomic Status and Big 5 Personality Traits Through Metadata Analysis

HS-BEHA-163, Henry Miller: Examination of EEG-derived interhemispheric data in predicting emotional and attentive responses to film

HS-BEHA-169, Vanlyda Bun: Do people believe others with authority more than their own memory?

HS-BEHA-187, Annie Zhang: The Effects of Stimulants as a Treatment for Autism using the Drosophila model

HS-BEHA-193, Oliver Chan: Examining the Impact of Positive Affirmations on the Confidence Perception and Academic Performance of High School Students

HS-BEHA-324, Abigail Endres & Vivian Kinney: Find Your Way: Design and construction of multiple T-maze to assess spatial memory

HS-BEHA-331, Noah DeMichaelis: Music and the Mind (Year Two): the Interaction of Reading Readiness and Musical Proficiency

HS-BEHA-336, Alexander Augustine: Comparing speed chess with and without increment

HS-BEHA-339, Abigail Getnick & Veda Rao: Food Frenzy: An Investigation on Lunch Popularity and Early Arrival to Lunch

Biochemistry (BCHM)

HS-BCHM-034, Aidan Moeller: Optimizing Algae

HS-BCHM-158, Annika Lillegard: The Effect of Trans-Resveratrol on the Longevity of Caenorhabditis Elegans

HS-BCHM-342, Becker Curry: Identification of bisphenol A and bisphenol S endocrine effects through analyzation of the male Procambarus clarkii vitellogenin gene

Biomedical and Health Sciences (BMED)

HS-BMED-019, Johanna Bernu: Disinfectant Properties of Nuphar advena: An Ethnopharmaceutical Approach

HS-BMED-024, Eliah Eaves: Do headphones cause hearing loss?

HS-BMED-033, Rohan Sharma: Wearable devices and Artificial Intelligence (AI) in the prediction of heart attacks Imagining the future with a HealthWatch

HS-BMED-047, Isabella Wimmer: The Effects of Valeriana officinalis Compared to Melatonin on REM Sleep, General Health, and Sleep Quality

HS-BMED-083, Albert Hu: Using CNN to Differentiate Between Healthy and Cirrhotic Liver Scans

HS-BMED-084, Alexandre Zoghby: Understanding Pandemic Dynamics: A Python Simulation Approach
HS-BMED-153, Samantha Gilats: Exploring Potential Effects of Theobromine on Girardia tigrina Regeneration
HS-BMED-194, Samantha Dvorak & Matthew Manacek: Catching the Culprit: Western blot analysis of the relationship between Alzheimer's related proteins Aβ*56 and ΔTau303 in APP transgenic mice
HS-BMED-197, Riddhi Singhvi: Beyond Scans: Predicting Alzheimer's through MRI-Graphology Fusion
HS-BMED-199, Cerena Karmaliani: The Absorbency of Home-Compounded Transdermal Pain Medication in Comparison to Industrially Manufactured Voltaren Gel
HS-BMED-200, Bersy Yonas: Optimizing stent design geometry using macro models
HS-BMED-201, Kyra Martin: The effect of ubiquitination deubiquitinases on breast cancer metastasis
HS-BMED-207, Corinne Moran: Deciphering DUX4 (Year II): Is transient expression of the DUX4 gene sufficient to cause muscular dystrophy?
HS-BMED-214, Arjav Krishna: Analyzing the correlation between aerobic and anaerobic capabilities in high school aged individuals
HS-BMED-220, Brayden Diethelm: Examination of effects of gamma-secretase inhibitors and methylthioninium chloride in Caenorhabditis elegans modeling of human Alzheimer's disease
HS-BMED-225, Kathy Quito: From Pixels to Proteins: Utilizing Deep Learning to Denoise Images for Enhanced Accuracy in Fluorescence Microscopy and Protein-Protein Interaction Studies
HS-BMED-230, Snigdha Tungtur: Lineage-Tracing of Cardiac Fibroblasts that are Reprogrammed to Endothelial Cells

Biomedical Engineering (ENBM)
HS-ENBM-218, Michael Setterberg & Charlotte Vasicek: Refining the Ring: Engineering Nanobodies for a Faster Path to CSAN Cancer Immunotherapy
HS-ENBM-226, Anna Iordanoglou: Problematic Packaging: Optimizing a method for dissolving alginate sheaths from cell fibers for 3D bioprinting
HS-ENBM-239, Anaya Gokarn: Looking through the PriSM for Improved Cancer Treatment: Using a Position-Specific Enrichment Ratio Matrix to Score Fibronectins Used in Protein Small Molecules (PriSMs) to Inhibit Carbonic Anhydrases
HS-ENBM-245, Fernanda Arreola-Lucio: Needles in a blood sac? Polymerization of methacrylic anhydride, fibrinogen, and zeolite coagulation agents into Gelatinous Microneedle Adhesive (Gel MNA) to eliminate axial body frame hemorrhage.

Cellular and Molecular Biology (CELL)
HS-CELL-005, Noah Hickle: Microbial Growth On Public Versus Private Surfaces (Board title shortened to Microbes Grow Fast)
HS-CELL-048, Stella Strong & Elsa Bieger: The Effects of Different Substances and Concentrations on Candida albicans
HS-CELL-072, Rohil Patel: Inhibition of GPRC5A in human airway smooth muscle cells and its effects on calcium handling and cell proliferation
HS-CELL-251, Jasmine Goldsmith: Scurvy to stage IV cancer: the efficacy of intravenous vitamin C therapy in combination with paclitaxel and cispaltin treatment on non-small cell lung cancer strain A549
HS-CELL-256, William Zhong: Circadian rhythm correlated gene expression due to phr1 gene removal in Halobacterium salinarum NRC-1
HS-CELL-263, Tyseer Nabi: The effect of gut micro bacteria on the SNCA gene and release of alpha-synuclein and dopamine
HS-CELL-268, Keegan Feeley: Examination of cytokine levels in the peripheral blood mononuclear cells of people with Ankylosing Spondylitis
HS-CELL-273, Georgia Constantin: Using iron and graphene oxide nanoparticles to induce targeted apoptosis in cancerous cells.

Chemistry (CHEM)
HS-CHEM-010, Ava Blowers: How fast do pain relievers dissolve in hydrochloric acid
HS-CHEM-068, Colin Chen: A Changing pH's Effects on Drug Disintegration Rates
HS-CHEM-088, Rayah Schempp: Hyaluronic Acid Affects on Evaporation
HS-CHEM-215, Alyssa Wang: Development of Novel Biodegradable Bioplastics Using Mango Peels Intended for Packaging Film

Computational Biology and Bioinformatics (CBIO)
HS-CBIO-076, Karthik Anand: A hybrid deep learning model for automated image analysis of von Willebrand factor multimer gels in a clinical laboratory setting

HS-CBIO-205, Deling Chen: A Novel Electrocardiogram-Based Model for Prediction of Dementia—the Atherosclerosis Risk in Communities (ARIC) study
HS-CBIO-235, Alexander Bartholomew: Analysis of machine learning techniques on electroencephalography data to detect mild traumatic brain injury in humans
HS-CBIO-241, Savanna Larson: Evaluating the effects of sympatry on Lynx canadensis and Lynx rufus population dynamics in Minnesota
HS-CBIO-246, Milan Darji: A novel use of RFdiffusion, an AI denoising diffusion probabilistic model, to design scaffold proteins

Earth and Environmental Sciences (EAEV)
HS-EAEV-020, Grace Lavan: Meet the New Neighbor: Can Gray Wolves (Canis lupus) Establish Territories in Areas of Higher Human and Road Density Than Expected
HS-EAEV-052, Skyler Weekley: A Definitive Study of a Silicified Lignite layer from the Golden Valley formation of western North Dakota
HS-EAEV-078, Ella Brinkman: The Effects of Temperature on Daphnia Magna
HS-EAEV-171, Owen Barhoover: The Effect of Silicate Minerals on Soil Sequestration
HS-EAEV-176, Molly O'Neill: The Exploration of Bio-sealants to Assist the Longevity of Degradable Pineapple Fabric
HS-EAEV-182, Abigail Bendt: The impact of atmospheric carbon dioxide on crop yield and growth in Fragaria x ananassa
HS-EAEV-186, Jos Buffington: Paleoenvironmental and paleoceanographic changes across Ocean Anoxic Event 2 indicated by a southwest Minnesota core section
HS-EAEV-190, Sanjana Kollipara: Meteorological Measurement Mysteries:Quantifying the variability of precipitation and snow depth based on measurement location and wind dynamics as it impacts flood prediction modeling
HS-EAEV-195, Adithi Rupireddy: Prescribed Burn Management Strategies: A Longitudinal Analysis of Decision-Making and Burn Efficacy in Pinus Resinosa Stands at the Cloquet Forestry Center
HS-EAEV-224, Olivia Hamann: I Didn't Start the Fire
HS-EAEV-232, Talia Cairns: Rhizofiltration of Nitrate and Phosphate by Elodea Canadensis in Varying Temperatures
HS-EAEV-238, David Schumacher: Bioremediation of Nickel with Chlorella Vulgaris and Chlorella Pyrenoidosa

Embedded Systems (EBED)
HS-EBED-244, Rishi Bhargava & Humza Murad: Project WASP: Atmospheric Water Capture for Autonomous Sustainable Agriculture in Freshwater Scarce Regions

Energy: Sustainable Materials and Design (EGSD)
HS-EGSD-036, Megan Lawver: Keep The Heat
HS-EGSD-041, Mitchel Masters: Are Tesla Turbines worth it? A deep dive into Tesla turbines in the hydroelectric industry
HS-EGSD-082, Erik Hill, Ardashir Kocer & Ezra Weldegabriel: An Investigation of Alternative Lithium Ion Battery Anodes
HS-EGSD-208, Evelyn Engebretson: Carbon neutral biofuels: the fermentation of Sargassum macroalgae using Clostridium beijerinckii to create butanol
HS-EGSD-212, Yash Dagade: SkyWindFarm Harnessing High Altitude Wind Power in a Scalable Manner
HS-EGSD-237, Sarah Zamudio: Composting Inputs and Outputs.
HS-EGSD-249, Jacob Colton: Effect of Annealing Time on Electrodeposited Zinc Samples for Use in Dye Sensitized Solar Cells

Engineering Technology: Statics and Dynamics (ETSD)
HS-ETSD-061, Sophie Hansen: Detective of Deception: A Study into the Engineering of an Accurate Polygraph
HS-ETSD-086, Ethan Brasel: The Design and Theoretical Parameters of a Beta Type Stirling Engine
HS-ETSD-252, Justin Ma: Design and Implementation of A Public Water Area Swimming Safety Monitoring System Based on UAV
HS-ETSD-306, Caleb Li: Optimizing School Traffic During Morning Drop Off
HS-ETSD-310, Maximus Ren: A New High-Impedance-Fault Detection Method to Prevent Power-Line-Induced Wildfires

Environmental Engineering (ENEV)
HS-ENEV-062, Daniel Dietrich: Full of Drip: Designing an automatic plant watering system
HS-ENEV-066, Ella Holleran: Filtering Microplastics in Fresh Waterways with Easily Obtainable Supplies Using Iron Ore Tailings for Filter Housing
HS-ENEV-247, John Liu: The Use of Sustained Releasing Technology to Reduce Deicing Salt Pollution
HS-ENEV-259, Milan Mishra: Usage of a Convolutional Neural Network in Drone-Based Algae Bloom Monitoring
HS-ENEV-264, McKinley Garner: The Effectiveness of Aspergillus niger as a Remedy to Microplastic-Contaminated Soil

HS-ENEV-266, Tyler Clair: Food waste-based biocoagulants: a novel approach to sustainably remove polystyrene microplastics for future alternatives in water treatment
HS-ENEV-272, Ellison Stroh: A potential dike for the Savannah, Georgia region to mitigate storm surge
HS-ENEV-276, Sabrina Pietrafitta: Excess nutrient removal in estuaries - dead zone prevention

Materials Science (MATS)
HS-MATS-038, Jasmine Fleming: Wet and Dry Gluten Percentage in Whole Wheat Flour by Brand
HS-MATS-055, Paige Jacobson & Adam Jacobson: Fantastic Bioplastic
HS-MATS-070, Rathan Duggirala: A Novel Approach to Synthesis of Biopaint in Toto; Analysis of Spectral Trends and Comparison to Commercial Paints
HS-MATS-148, Lara Granucci: Characterization of starch-based films by mechanical and compostability testing
HS-MATS-151, Vick Tan: A Revolutionary Material for Medical and Environmental Applications, Scalable Synthetic Mucins
HS-MATS-305, Humza Jameel: Investigating The Effects of Rubber Aggregate as a Substitute for Natural Aggregate on the Strength of Concrete
HS-MATS-335, Lillian Kowal: Using food waste to produce the bioplastic polyhydroxybutyrate (PHB) with the bacteria Cupriavidus necator DSM 545

Microbiology (MCRO)
HS-MCRO-056, Bridger Weekley: The Germinator: A Study on Lactobacillus acidophilus Resistance to Penicillin
HS-MCRO-067, Srinidhi Babu: A Novel Approach to Antibiotic Resistance: Testing The Effectiveness of Natural vs Synthetic Antibiotics on E.coli
HS-MCRO-168, Isaac Jasper: Genetic Modification as a Method of Biofilm Inhibition in Proteus mirabilis
HS-MCRO-172, Noah Khemakhem: The effect of heavy metals on the expression of antioxidant enzymes in Caenorhabditis elegans as a model for humans
HS-MCRO-178, Mars Moberg: An investigation of bacteriophage function using E. coli k-12 as a model host organism
HS-MCRO-183, Leander Harrold: Examination of ethylene producing activity in bacteria Pseudomonas putida
HS-MCRO-188, Isabella Tobin: Degrading plastic with fungi: The effect of pretreating polyester polyurethane on the rate of biodegradation by Pestalotiopsis microspora
HS-MCRO-192, Campbell DeLuca: The effects of Glyphosate on the neurological, behavioral and reproductive behaviors of aquatic organisms
HS-MCRO-196, Henry Good: Effects of orchid mycorrhizal inoculation in spring wheat
HS-MCRO-257, Ella O'Hanlon: Sunscreen Showdown

Physics and Astronomy (PHYS)
HS-PHYS-025, Emmalyn Richter: What color gets to the highest temperature the fastest?
HS-PHYS-075, Dima Al-Kaisi & Sreyoli Bhattacharya: Flat Planes Effect on Drag Coefficient
HS-PHYS-269, Garrett Garms & Dylan Tate: The Required Distance between the Fluxonium Qubit and the Ground Plane for Optimal T1 Times

Plant Sciences (PLNT)
HS-PLNT-080, Aidan Steele: Investigating Water Conservation through hydrogel and a moisture sensor
HS-PLNT-258, Emily Bodeau: Variability in capsaicinoid content of commercially available Kashmiri peppers
HS-PLNT-267, Anna-Sofia Pedersen: The impact of varying electroporation voltages on cell viability and growth in model brown alga Ectocarpus sp. protoplasts
HS-PLNT-270, Quinn Hughes: Mars or Bust! A Method to Build a Martian Regolith-Based Substrate for Sustainable Agriculture on Mars
HS-PLNT-274, Ilsa Lemke: Is a Blanket Good or Bad?
HS-PLNT-277, Finn Emerson: Killing Buckthorn While They Sleep: a Method to Identify and Clear Rhamnus Cathartica During Winter
HS-PLNT-278, Sriram Sureshkumar: The effectiveness of biochar as an amendment on the growth of Raphanus Sativus on MGS-1 (Mars Global Simulant) and the development of a model for regeneration of water and oxygen for Life Support Sustenance on Mars.
HS-PLNT-284, Selena Qiao: Turf Trouble: Does the DEET in bug repellent really kill grass?

Robotics and Intelligent Machines (ROBO)
HS-ROBO-042, Vivian Collins: Exploring knowledge representation in AI: Unraveling the language of machines
HS-ROBO-045, Casen Neal & Kyler Van Genderen: Aquatic Delivery Device (ADD)
HS-ROBO-046, Maddox Wagner: Can ChatGPT Program a robot
HS-ROBO-282, Efrata Eshete: Accuracy of Artificial Intelligence Detection

HS-ROBO-287, Emily Zhou: The Tom and Jerry Algorithm for Nonholonomic robots: Optimized and adaptive path planning and dynamic obstacle avoidance based on A* and mathematical predator and prey insights for real-life simulations
HS-ROBO-292, Ethan Finch: Evaluating the Efficiency of Different Machine Learning Models in Locating the /s/ Phoneme
HS-ROBO-294, Noah Getnick & Evan Johnstone: Collision-Free Commutes: Designing a Blind Spot Detection System for Cyclists Using an Ultrasonic Sensor and Computer Vision
HS-ROBO-300, Jaden Cai: Situational recognition and ensemble learning in the stock market
HS-ROBO-304, Neel Kashyap: Recurrent neural networks and sentiment analysis to predict stock movement
HS-ROBO-309, Anthony Pu: Neuroevolution of spiking neural networks using HyperNEAT
HS-ROBO-320, Adam Ebert & Andy Wells: PENGUIN: A Innovative Robotics Platform Assisting Healthcare Workload
HS-ROBO-325, Finn Cairns: ViABL: Visual Assistant for the Blind with VLMs

Systems Software (SOFT)
HS-SOFT-073, Reva Patel: Comparative Analysis of Answer Accuracy between Artificial Intelligence Versions
HS-SOFT-297, Lakshika Nanda Kumar Reddy: Exploring Acetylcholinesterase Inhibitors through QSAR, Molecular Docking, and Structural Analysis
HS-SOFT-313, Sarah Gedi: Glucate: Redefining Diabetes Management for a Healthier Tomorrow.
HS-SOFT-329, Finn Miller-Fimpel & Oliver Thompson: Fisher-MN: Using a Mobile Application to Increase Accessibility to Minnesota's Lakes While Mapping Invasive Species and Diseases Among Fish Populations
HS-SOFT-334, Bora Mandic: SignalGrab: A Machine Learning Approach to Helping Color Blind Drivers
HS-SOFT-338, Huxley Westemeier: Project Calliope: Quantum Resistant Encryption using a Novel Asymmetric-Numeral-Systems-Based Approach

Technology Enhances the Arts (TECA)
HS-TECA-044, Aaron Goskesen: Beauty is in the Eye of the Bot

Translational Medical Science (TMED)
HS-TMED-323, Amanda Webster: Effect of cholesterol concentration in liposomes on transfection efficiency of mRNA in model blood brain barrier cells
HS-TMED-328, Shreshth Shrivastava: AccuCellAI: A transformative tool for diagnosing and classifying hematological diseases using convolutional neural networks that demonstrates improved speed, accuracy, and transportability

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