



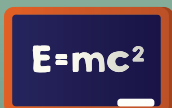
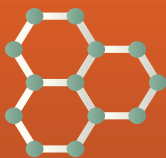
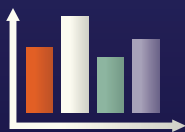
NEW JERSEY SOUTHERN

JSHS

JUNIOR SCIENCE AND
HUMANITIES SYMPOSIUM

FEBRUARY 7, 2025

LAKEHURST, NJ



go.ocean.edu/NJSJSHS



OCEAN
COUNTY COLLEGE

9th Annual New Jersey Southern Junior Science and Humanities Symposium



Welcome to our symposium. It is with great pride and honor that we at Ocean County College have the privilege of hosting these wonderful young students at this Symposium. For the second year as president of Ocean County College, I am pleased to be part of this auspicious event. Young minds are so creative and have the freedom to explore numerous topics and initiatives that allow them to forge new pathways and constructs that marry so well with current events. We have a number

of papers being presented here today that carry forth advances in environmental science, exploration of biomedicines, engineering, mathematics, chemistry and computer science. I am always impressed and ask myself, "What will they think of next?"

These students, with the help of their mentors, families and each other, have demonstrated the possibilities of our future. As years pass, there are new worldwide issues to resolve, new viruses, new environmental problems, and let's acknowledge the vast new field of Artificial Intelligence that we must harness for good use.

We are counting on you amazing representatives of our future to embrace those challenges and carry us on to a better future. For you, the future is expanding day by day. You have shown by your dedication and commitment that you are ready for the days ahead, which I am sure will be filled with even more astonishing advances in Science, Technology, Engineering and Mathematics. And we couldn't be more proud of you.

Congratulations for making it to this regional competition and my best wishes for your performance here today.

A handwritten signature in black ink that reads "Pamela Monaco". The script is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Dr. Pamela Monaco
President, Ocean County College

Program Contents

Agenda	04 - 06
Introductory Remarks	07
Guest Speaker	08
Reviewers, Mentors, and Judges of Student Papers	09 - 10
Acknowledgements	11 - 13
Director	14
Executive Committee	15
Student Presenters	17 - 26
Student Poster Presenters	27 - 33
Participating Schools	34
Students Submitting Research Papers	35 - 38



Friday, February 7, 2025

Location: Joint Base McGuire-Dix-Lakehurst Flight Deck
Community Center, Building 484

8:00-8:30am Arrival • Continental Breakfast

8:30-9:30am Introduction

Dr. Mary-Ellen Rada
Director, New Jersey Southern Junior Science and
Humanities Symposium at Ocean County College

Welcome Address

Dr. Pamela Monaco
President, Ocean County College

Introductory Remarks

Mr. Sean Brennan
Executive Director,
Naval Air Warfare Center Aircraft Division
(NAWCAD), Lakehurst, NJ

9:30-11:00am Session 1: Oral Presenters

Moderator: Mr. Thomas A. McGrath

9:35-9:50am

Zachary Ciappa, Marine Academy of
Technology and Environmental Science
*An Effective and Cost-Efficient Approach to
Removing Phosphate Ions from Water with the Use of
Crassostrea Virginica Shells*

9:50-10:05am

Lillian Boyd, Marine Academy of
Technology and Environmental Science
*An Assessment of the Health of Zostera Marina Under
Varying Ocean Acidification Simulations*

10:05-10:20am

Maggie Kelleher, Marine Academy of
Technology and Environmental Science
*Creating Durable, Low Carbon Emission Concrete
Through the Use of Recycled Materials*

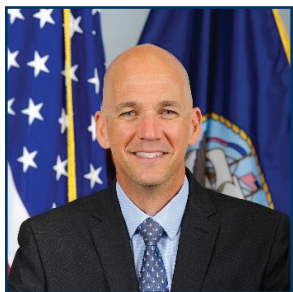
10:20-10:35am

Zoey Smith, Marine Academy of
Technology and Environmental Science
*Nutrient Uptake Ability of Zooxanthellae After
Temperature Acclimation*

- 10:35-10:50am** Vinil Polepalli, High Technology High School
Effects of Epigallocatechin Gallate (EGCG) and Piperine Compounds on the Regeneration of D. Tigrina
- 10:50-11:00am** **Ten-Minute Break**
- 11:00-12:15pm** **Session 2: Oral Presenters**
- 11:00-11:15am** Samhita Shriram, Princeton High School
Algorithmic Implementation of Habituation Learning in Artificial Neural Networks
- 11:15-11:30am** Amalie Werner, Marine Academy of Technology and Environmental Science
Wildfire and Prescribed Burn Effects on Pine Barrens Soils and Succession
- 11:30-11:45am** Maya Abdelaal, Marine Academy of Technology and Environmental Science
Examining Tannin Interference on Dimethyl Sulfide (DMS) Presence in Ocean County, NJ Salt Marshes
- 11:45-12:00pm** Divyam Dave, High Technology High School
Exploring Zingerone-Ampicillin Combination for Inhibition of S. Epidermidis
- 12:00-12:15pm** Morgan Zylinski, Marine Academy of Technology and Environmental Science
Determining the Presence of Ferulic Acid in S. Alterniflora and its Biogeochemical Influences within Salt Marshes at Barnegat Bay, NJ
- 12:15-1:00pm** **Lunch**
- 1:00-1:30pm** **Guest Speaker**
 Scuba Tech
- 1:30-2:30pm** **Session 3: Poster Presenters**
 Moderator: Ms. Carolyn Showalter
- 1:30-1:45pm** Aarthi Gunasekaran, High Technology High School
A Natural, Cost-Effective Solution to Pharmaceutical Contamination in Drinking Water

1:45-2:00pm	Amy Lin, Princeton High School <i>Predicting Compound Melting Temperature from Computationally Derived Properties via Machine Learning</i>
2:00-2:15pm	Jophy Lin, Manalapan High School <i>Advancing Diabetic Retinopathy Detection: Reducing Misdiagnosis Using Deep Ensemble Learning and Uncertainty Estimation</i>
2:15-2:30pm	Violet Fischer, Marine Academy of Technology and Environmental Science <i>Analysis of Ferulic Acid Concentrations on the Foraging Ability of <i>Nassarius Obsoletus</i></i>
2:30-2:45pm	Chloe Wnek, Marine Academy of Technology and Environmental Science <i>Quaternary Ammonium Cations' Environmental Effect on Local Water Bodies using Spectrophotometry</i>
2:45-3:00pm	Kyle Wlazlowski, Marine Academy of Technology and Environmental Science <i>An Examination of Dissolution Effects of Acetaminophen in Conjunction with Vitamin B₆ in a Simulated Stomach Environment</i>
3:00-3:15pm	Break
3:15-3:30pm	Awards Announcements Announcement of placings for poster winners Announcements of winners moving on to compete at the National Junior Science and Humanities Symposium • Fifth Place: Competing in the Poster Presentation • Fourth Place: Competing in the Poster Presentation • Third Place: Competing in the Poster Presentation • Second Place: Competing in the Oral Presentation • First Place: Competing in the Oral Presentation
3:45pm	Congratulations and Closing Remarks

Introductory Remarks



Sean Brennan
Executive Director
Naval Air Warfare Center
Aircraft Division (NAWCAD)
Lakehurst, NJ



On behalf of the United States Navy, Marine Corps, and the dedicated professionals at the Naval Air Warfare Center Aircraft Division (NAWCAD) at Lakehurst, it is both an honor and a privilege to again support the 2025 Annual New Jersey Southern Junior Science & Humanities Symposium. We are thrilled to be part of this distinguished event, which serves as a regional platform for high school students to explore their passion for Science, Technology, Engineering, and Mathematics (STEM) and present their innovative research.

For more than 60 years, this Symposium has fostered intellectual curiosity, allowing students to push the boundaries of knowledge and deepen their understanding of the world around them. It provides a valuable opportunity for you, the next generation of scientists, engineers, and leaders, to showcase your hard work and creativity. We are inspired by your dedication to research and the quality of the projects you have brought forward. Your work demonstrates a commitment to problem-solving, critical thinking, and a desire to make a meaningful impact.

At NAWCAD Lakehurst, we are proud to support and encourage students like you, who embody the spirit of discovery and innovation that is essential to our nation's continued advancement. Alongside our fellow co-sponsors from the Army, Air Force, Department of Homeland Security, National Oceanic and Atmospheric Administration, and fellow Navy organizations, we dedicate ourselves to supporting your educational journey.

As you take your next steps in education and beyond, we want you to know that your curiosity and drive are the foundation of a bright future. Whether you're presenting a poster or a final research paper, we are excited to see the diverse ways in which you engage with the world around you and contribute to its betterment.

We extend our congratulations to all the students, educators, and mentors who have made this event possible. The dedication you've shown in developing your research and preparing for this Symposium is commendable, and we are grateful to be part of this celebration of learning and achievement.

We look forward to seeing all of you continue to rise, shine, and make a difference as you move forward on your educational paths. Best of luck to each of you in this Symposium and in all your future endeavors. The Department of Defense stands behind you, ready to support your journey as you explore new frontiers in knowledge and discovery.

Guest Speaker



Scuba Tech

Our work is defined by three continuing goals, known as the Trident:

1. Increase community stewardship with our marine ecosystem — by bringing accessible oceanographic media content to viewers, and by running educational events to practice hands-on volunteering and field studies.
2. Promote fields of oceanography and marine biology — by mentoring future technologists and advocates through operational experience and classroom curriculum.
3. Research new digital workflows to combine historiography with technology — by investigating new methods to survey shipwrecks and marine biomes in 3D and 4D augmented reality, virtual reality, and finally by releasing all products and techniques as public open source.

Reviewers, Mentors, and Judges of Student Papers

U.S. Army Combat Capabilities Development Command, Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance and Reconnaissance (C5ISR) Center

David Arty	Robert Kimball
Karen Ashton	Christopher Krammer
Steven Barth	Mathew Limpert
Dr. Georgia Belesis, Ed. D.	Dr. Yi-Hsuan “Cindy” Lin, Ph.D.
Dr. Konstantinos Belesis, D. Eng.	Richard Lo
Glenn Briceno	Daris Lucas
Jake Burrows	Douglas Mayo
Alena Calm	Rinnetta McGhee
Laura Cristo	Thomas Newsome
Dawn Delp	William Porter
Jeffrey De Lucca	Charles Seal, AUSA
Danielle Duff, PMP	Mary Schurgot
Eric Gellasch	Charles Strimpler
Gayle Grant	Brandon Underwood
Linda Hammell	Stephen Wilkowski
Michael Hansen	David Wong, USAR COL (retired), SAME
Robert Jackson	Joseph Zaroff, ASPEN, AOC
Kerry Ann Kedzierski	
Thomas Kesolits	

Naval Air Warfare Center Aircraft Division, JB MDL, Lakehurst
(NAWCAD)

Bruce Brown	Kristina Jones
Gilbert Espinoza	Gaetan Mangano
Valerie Fabretti	Michael Rossini
Justin Garr	Payton Shaltis

Reviewers, Mentors, and Judges of Student Papers (Cont.)

Naval Surface Warfare Center: Indian Head DET Picatinny

Jonkristoffer Bisda
Forest Hinds
Eric Hoover
Michael Kelly

Liz Lee
Brian Scott
Nicholas Zecchino

NJ Sea Grant Consortium (NJSGC)

Michael Monzon
Rutgers Cooperative Extension
New Jersey Agricultural Experiment
Station

Charles Coriell
New Jersey Department of
Environmental Protection

Alice Belskis
New Jersey Department of
Environmental Protection

Chris Free
University of California

Jun Cheng
Kean University

Roy Messaros
Rutgers University Cooperative
Extension

Joel Pecchioli
New Jersey Department of
Environmental Protection

Heather Desko
New Jersey Water Supply Authority

Pat Heaney
The Watershed Institute

Carisa Davis
Kean University

Sasmita Mishra
Kean University

Brenna Levine
Kean University

Laura Lorentzen
Kean University

Jessica McDermott
Watershed Institute

Lucas Kirby
Kean University

Nicole Fahrenfeld
Rutgers University

Nancy LaFleur
Kean University

Ocean County College (OCC)

Dr. Jeremy Andreatta
Worcester State University

Heather Gass

Dr. Caterina Gibson, DC

Dr. Maria Hartwell, Ph.D.

Dr. Mary-Ellen Rada, DC

Nancy Rizzuto

Daniel Ward

Vijay Ramdeen
Broward College

Acknowledgements

The New Jersey Southern Junior Science and Humanities Symposium gratefully acknowledges the following for offering awards to the student paper presenters:

- The U.S. Army, Navy, and Air Force for undergraduate tuition scholarships that are distributed by The Academy of Applied Sciences for a total of \$4,500.
- Scholarships are awarded at \$2,000, \$1,500, and \$1,000 to the top three New Jersey Southern Junior Science and Humanities Symposium (NJSJSHS) finalists. Scholarships are payable upon matriculation and upon meeting the Junior Science and Humanities Symposium (JSHS) scholarship conditions.
- The National JSHS brings together over 400 participants in a program of educational and scientific exchange. (A list of JSHS national-level scholarships is available at www.jshs.org.)
- An invitation to present their original research investigation at the 2025 National Science and Humanities Symposium's Event will be extended to the top five NJSJSHS finalists; two will compete in an oral presentation and three will compete in a poster competition in their categories.
- National Scholarship.

AFCEA, Greater Monmouth Chapter awards gift cards for: 1st Place: \$500, 2nd Place: \$300, 3rd Place: \$200, 4th-10th place: \$100 (\$1,700).

AOC (Association of Old Crows), Garden State Chapter awards a \$140 gift card per presenter (\$1,400).

Aspen Consulting Group awards a \$75 gift card per presenter (\$750).

L3 Harris Technologies awards \$200 per presenter (\$2,000).

Naval Air Warfare Center Aircraft Division, Lakehurst Chapter of the Naval Civilian Managers Association awards plaques in recognition of their novel research and experimentation.

The New Jersey SAME (Society of American Military Engineers) awards \$50 per presenter (\$500).

New Jersey Sea Grant Consortium (NJS GC) awards \$500 to the Paper Presenter in Environmental Science category.

Ocean County College Foundation awards \$100 per presenter (\$1,000).

The Director of the New Jersey Southern Junior Science and Humanities Symposium gift to the 1st place winner.

The New Jersey Southern Junior Science and Humanities Symposium gratefully acknowledges the following for offering awards to the student poster presenters:

AOC (Association of Old Crows), Garden State Chapter awards a \$100 gift card per presenter (\$600).

Aspen Consulting Group awards a \$50 gift card per presenter (\$300).

AUSA (Monmouth Chapter of the Association of the U.S. Army) awards a \$100 gift card per presenter (\$600).

L3 Harris Technologies awards \$200 to each presenter (\$1,200).

Naval Air Warfare Center Aircraft Division, Lakehurst Chapter of the Naval Civilian Managers Association awards a plaque to each presenter.

The New Jersey SAME (Society of American Military Engineers) awards \$50 per presenter (\$300).

New Jersey Sea Grant Consortium (NJSGC) awards \$300 to the poster presenter in the Environmental Science category.

Ocean County College Foundation awards \$50 per presenter (\$300).

- All other scholarships and awards are funded independently of Ocean County College and are subject to change.
- To qualify for the regional and national scholarships, U.S. citizenship or proof of permanent residency will be required.
- U.S. Army, Navy, and Air Force scholarships are payable upon college matriculation, meeting the JSJS scholarship conditions, and are subject to the availability and release of government funding.

NJSJSHS gratefully acknowledges the following:

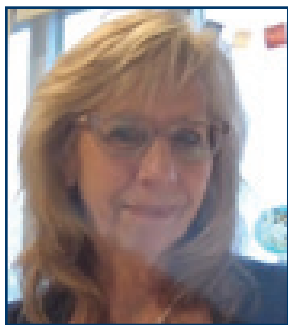
- The National Science Teaching Association, Arlington, Virginia, for all of their help and support in making this a successful program.
- The Junior Science and Humanities Symposium (JSHS) Program (www.jshs.org) is jointly sponsored by the United States Departments of Defense, Army, Navy and Air Force, in cooperation with leading research universities throughout the nation. The Department of Defense generously provides funding for the national symposium and JSHS scholarships.
- The Office of Naval Research, Arlington, Virginia, the U.S. Army Research Office, Research Triangle Park, North Carolina, and the Air Force Office of Scientific Research, Bolling AFB, Washington, DC for having joined forces to encourage and reward the next generation of scientific and engineering talent. Resulting from this tri-science partnership, scholarships will be annually awarded to outstanding high school students who compete in symposia affiliated with the Army/Navy-sponsored Junior Science and Humanities Symposium (JSHS). Additional tri-service sponsored awards include the faculty award and participant certificates.
- The National Association of Secondary School Principals (www.principals.org) has placed JSHS on its National Advisory List of Student Contests and Activities.

NEW JERSEY SOUTHERN JSHS

JUNIOR SCIENCE AND HUMANITIES SYMPOSIUM



Director



Dr. Mary-Ellen Rada

College Lecturer II: Chemistry,
Director of NJSJSHS,
Ocean County College

Dr. Mary-Ellen Rada is a graduate of Stockton University with a Bachelor of Science Degree in Biology. She is also a summa cum laude graduate of Sherman College of Chiropractic, where she attained her Doctor of Chiropractic degree and was awarded the Garfunkel Valedictory Award, the Academic Achievement Award, and the B.J. Palmer Philosophy Distinction Award. While at Sherman College, she was named to the National Dean's List, Outstanding Young Women of America, and was awarded the Philosophy Scholarship Award. Dr. Rada has since been named to Who's Who in Executives and Professionals. She maintained a private practice from 1990 to 2023 in Jackson, New Jersey.

In 2001, Dr. Rada was appointed by Governor Whitman to the New Jersey State Board of Chiropractic Examiners and served for ten years. She was elected as the first female president in 2003. Dr. Rada was a Delegate to the Federation of Chiropractic Licensing Boards representing the New Jersey State Board of Chiropractic Examiners. Her peers also elected Dr. Rada to serve on the Board of Directors for the National Board of Chiropractic Examiners and on their executive committee from 2006-2009. She served on the Sherman College of Chiropractic Board of Trustees 2010-2011 and has been a guest speaker at the Harvard/MIT Conference on Alternative Medicine and Yale University Medical School's Alternative Medicine Conference.

Dr. Rada began her tenure at Ocean County College as an Adjunct Professor in 2012 and was hired as a full-time College Lecturer II in 2014. She was named to Who's Who in Community College Educators in 2018. Dr. Rada teaches across two disciplines: Chemistry and Anatomy & Physiology. She also conducts Global Science Education through Study Abroad courses to Italy, The Science of the Renaissance and Ireland, The Science of Ireland. Dr. Rada was named Director of the New Jersey Southern Junior Science and Humanities Symposium in 2019. Dr. Rada is also an Adjunct Professor at Monmouth University, where she teaches Anatomy & Physiology.

Executive Committee

Dr. Mary-Ellen Rada

Director, New Jersey Southern Junior Science and Humanities Symposium, Ocean County College, Toms River, NJ

Michael Danko

Assistant Director of Extension, Marine Recreation Agent - Fisheries and Boating,
New Jersey Sea Grant Consortium, Sandy Hook, NJ

Pamela Dixon-Kuhn

Adjunct Professor, Ocean County College
President, Science Research for All

Gayle Grant

U.S. Army C5ISR Center AI&E Engineering Support Branch Chief,
Lakehurst, NJ,
AFCEA Greater Monmouth Chapter Past President,
AOC Garden State Chapter Past President

Gaetan P. Mangano

U.S Navy NAWCAD Lakehurst Education Outreach Site Lead
and Workforce Development Supervisor, Lakehurst, NJ

Thomas A. McGrath

Supervisor,
Naval Packaging, Handling, Storage, and Transportation Center,
NSWC IHEODTD Det,
Picatinny, NJ

Vijay Ramdeen

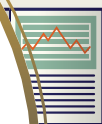
Assistant Professor,
Broward Community College,
Davie, FL

Carolyn Showalter

Assistant Dean, School of STEM,
Ocean County College,
Toms River, NJ



NEW JERSEY SOUTHERN
JSHS
JUNIOR SCIENCE AND
HUMANITIES SYMPOSIUM
2025



**Student
Paper
Presenters**

Student Paper Presenters (in alphabetical order)



Maya Abdelaal

Marine Academy of
Technology and Environmental Science
Stafford Township, NJ
Advisors: Dr. John Wnek

Examining Tannin Interference on Dimethyl
Sulfide (DMS) Presence in Ocean County, NJ
Salt Marshes

Maya Abdelaal is a senior at the Marine Academy of Technology and Environmental Science (MATES), participating in various extracurriculars and STEM-oriented activities. For instance, Maya partakes in Project Terrapin as one of the overall Care Division leaders, helping organize the Care Division to support the Northern Diamondback Terrapin species. Maya also serves as a Junior Beach Sweep Captain for Clean Ocean Action, which emphasizes the importance of citizen science to local coastal communities. Furthermore, Maya has recently completed the new engineering course path at MATES.

Attending a school like MATES has also allowed Maya to progress in her research endeavors. Maya has been recognized for her research at the Jersey Shore Science Fair, the Delaware Valley Science Fair, and the Regeneron 2025 Science Talent Search. Enjoying passing on her research knowledge to others, Maya also leads the Research Assistance and Development (RAD) team that assists first-year MATES students with their research projects. Outside of STEM, Maya is the senior class vice president and is a member of the Challenge Success student core team, brainstorming and organizing ways to improve her school's well-being and sense of belonging. Maya also plays varsity soccer and basketball at her home school in Toms River, partakes in club soccer, and works on the weekends at a local soap store.

In college, Maya hopes to continue research and plans to pursue a major in chemical or environmental engineering, finally merging her interests in chemistry, microbiology, engineering, and environmental science.

Lillian Boyd

Marine Academy of Technology and
Environmental Science
Stafford Township, NJ
Advisor: Dr. John Wnek

**An Assessment of the Health of
Zostera Marina Under Varying
Ocean Acidification Simulations**



Lillian Boyd is a Marine Academy of Technology and Environmental Science (MATES) junior. She is very passionate about biological and environmental sciences, specifically the health of her local environment. She has conducted independent research in botany for the past two years, receiving recognition at the local and regional Jersey Shore Science Fair and the Delaware Valley Science Fairs.

Lillian was class treasurer her sophomore year and currently serves as president. In this position, she coordinates fundraisers and represents the junior student body. She also volunteers for an outreach and care initiative at her school called Project Terrapin, which supports the local terrapin species. Furthermore, Lillian mentors underclassmen at MATES as part of the Research Assistance and Development (RAD) program, which helps foster a research culture.

Outside of school, Lillian has been an active member of Girl Scouts for the past eleven years, for which she was awarded Bronze, Silver, and Gold Awards. Her service projects showcased her interest and concern for the environment in restoring and maintaining pollinator habitats. She regularly volunteers for local nonprofits through Girl Scouts and was awarded The President's Volunteer Service Gold Award in 2024.

Lillian loves collecting trinkets, including Smiskis, and listening to music in her free time. Additionally, Lillian is an EMT cadette for Waretown's Volunteer EMT squad and hopes to become a registered EMT within the next year. She is hoping to pursue a career in the medical field.



Zachary Ciappa

Marine Academy of Technology and
Environmental Science
Stafford Township, NJ
Advisor: Dr. John Wnek

**An Effective and Cost-Efficient Approach to
Removing Phosphate Ions from Water with
the Use of Crassostrea Virginica Shells**

Zachary Ciappa is a Marine Academy of Technology and Environmental Science (MATES) junior. Ever since he was young, he was curious about the natural workings of the world. Throughout his years at MATES, he has explored research in the environmental sciences, where he researched microplastic and nutrient pollution. His research has been recognized at the Jersey Shore Science Fair. Zachary strives to share his scientific knowledge with others by aiding in completing research projects for underclassmen as a Research Assistance and Development (RAD) mentor at MATES.

Zachary is an active member and leader in Project Terrapin at MATES, where he participates in care and conservation efforts and attends events to reach out to the local community. In addition to this, Zachary is the president of the FCCLA chapter at Southern Regional High School. Through FCCLA, he plans many community service and fundraising initiatives to support local and international communities.

When Zachary is not in the lab or helping his community, you can find him editing videos for social media. He uses his social media skills to assist in the creation of posts for the Lighthouse International Film Festival. He also enjoys baking, sewing, and listening to music in his free time.

In the future, Zachary hopes to expand his research into biochemistry and nanotechnology, where he wishes to work with nanomaterials to create solutions in the medical field.

Divyam Dave

High Technology High School
Lincroft, NJ

Advisor: Mr. Craig Queenan

Exploring Zingerone-Ampicillin
Combination for Inhibition of *S. Epidermidis*



With a deep passion for understanding and innovation, Divyam Dave is dedicated to pushing the boundaries of scientific research. At High Technology High School, one of the nation's top STEM schools, he has focused on exploring the antibacterial potential of zingerone, aiming to develop novel approaches to combat antibiotic resistance. This research reflects his drive to address global challenges through science.

As co-captain of his school's VEX Robotics team, Divyam thrives on teamwork and problem-solving, leading his team in designing and refining robots for competitive success. He is also an active member of the Technology Student Association (TSA), where he collaborates on creative engineering projects and competitions that further fuel his passion for STEM.

Outside of academics and engineering, Divyam enjoys playing tennis and finding balance through the physical and strategic aspects of the sport. His diverse pursuits highlight his dedication to personal growth and excellence in every area he takes on.



Mags Kelleher

Marine Academy for
Technology and Marine Science
Stafford Township, NJ
Advisor: Dr. John Wnek

Creating Durable, Low Carbon Emission
Concrete Through the Use
of Recycled Materials

Mags Kelleher is a versatile student with mechanical engineering, biomimicry, sustainability, and the arts expertise. They have conducted independent research for three years and continue to do so this year—earning them national recognition twice thus far. Additionally, their sustainable concrete research received first prize in the Engineering category at the Jersey Shore Science Fair and various awards from the Delaware Valley Science Fair, including the Innovation@Malvern grand prize. Attending MATES has allowed Mags to become a leader in countless extracurricular activities and community service initiatives, and they continuously foster organizational, public speaking, and communication skills while striving to better themselves.

Mags hones their understanding of law, verbal defense, reasoning, and questioning as a Mock Trial competitor, mentors underclassmen through research endeavors as a part of the Research and Development team, and has independently won numerous contests for their poetry—which has since been nationally published twice. Moreover, they have helped shape young minds and inspire passion for STEM as a MATES summer camp assistant counselor and a National Honor Society peer tutor. Furthermore, they advocate for environmentalism and threatened species conservation as a Project Terrapin volunteer, the Envirothon Team's Wildlife Specialist, and co-founded the Wheels for Dusty Initiative to use their engineering talents to help restore a local goat's infection-compromised mobility.

Ultimately, as they grow as a researcher, engineer, and entrepreneur, Mags hopes their passion, interests, and experiences will set the tone for their future in prosthetic and orthotic system design and lifelong devotion to learning.

Vinil Polepalli

High Technology High School
Stafford Township, NJ
Advisor: Mr. Craig Queenan

**Effects of Epigallocatechin Gallate
(EGCG) and Piperine Compounds on the
Regeneration of *D. Tigrina***



With a strong passion for engineering and health, Vinil utilizes research as a tool to solve problems through innovation. In 2021, Vinil's grandmother sadly passed away due to the cancerous disease multiple myeloma. Ever since then, it has been his goal to make a lasting impact against cancer. With this project, he hopes to continue to strive for that goal. During Presidents' Day weekend, he will present this project at the American Junior Academy of Science conference in Boston.

Scientific research is a passion Vinil hopes to pursue in college and beyond. Vinil engages in other research work as well. As a research intern at StaciaCorp this past summer, Vinil led the development of an affordable autism detection app that can be deployed in underdeveloped areas in India.

He enjoys other STEM activities, including VEX robotics and the M3 Modeling Challenge. As the lead documentor, lead strategist, and builder in VEX Robotics this year, he helped his team earn the Excellence Award and Tournament Champion titles at state-level competitions.

Aside from STEM, Vinil is one of the top foil fencers in the country. He has fenced at numerous national competitions, such as Summer Nationals for the past two years, qualified for this year's Summer Nationals, and fenced at the Junior Olympics last year. His involvement in sports allows him to channel his energy into serving his school and the community. Vinil enjoys reading, watching sports, and listening to music in his free time.



Samhita Shriram

Princeton High School

Princeton, NJ

Advisor: Jayne Ricciardi (Teacher);

Shriram Ramanathan (Mentor)

Algorithmic Implementation of Habituation Learning in Artificial Neural Networks

Samhita (Sammie) Shriram is a freshman at Princeton High School. She has always been interested in science and started conducting research projects in chemistry and biology in middle school. Last year, she won first place at the Mercer County Science Fair and qualified for the Thermo Fisher's Junior Innovator Challenge. She presented a poster at the MIT Undergraduate Research Technology Conference this year.

Outside of research, Sammie is part of her school's Science Olympiad team and Odyssey of the Mind Club, which combines creative problem-solving with engineering. She is also learning about molecular biology and conducting bioinformatics research through her school's chapter of the Waksman Student Scholars Program. Sammie enjoys mentoring at hands-on STEM workshops for elementary school students at the Princeton Public Library. She is also part of her school's JV field hockey team and choir.

In her free time, Sammie enjoys watching musicals and having a book club with her friends, where they primarily read and discuss romance novels.

In the future, Sammie hopes to continue to conduct research, explore various fields of science, and expand her knowledge about them.

Zoey Smith

Marine Academy of
Technology and Marine Science
Stafford Township, NJ
Advisor: Dr. John Wnek

Nutrient Uptake Ability of Zooxanthellae After Temperature Acclimation



After an introduction to research during her freshman year at MATES, Zoey has become heavily involved in the research program by tackling her challenges and mentoring underclassmen as one of the Research Assistance and Development Team leaders. Research has allowed Zoey to develop an open and driven mindset about the world around her, as she consistently pushes her limits to explore topics she never would have imagined four years ago. Over the last three years, Zoey has received awards at various fairs, such as the Delaware Valley Science Fair, and was named a regional recipient of the Stockholm Junior Water Prize and a New Jersey Delegate to the National Junior Academy of Sciences.

Outside of research, Zoey emphasizes leadership in her school community as National Honors Society President and in the athletic community as an ambassador for diversity and mental health in her sports. She is captain of the varsity field hockey and lacrosse teams and plays lacrosse nationally as a US Women's National Development Team member.

Zoey will continue to pursue her academic and athletic career at Johns Hopkins University, majoring in biology and environmental science while playing Division I lacrosse. She hopes to continue working in various research departments in college, one day spearheading her research as a marine biologist.



Amalie Werner

Marine Academy of Technology and Marine Science

Stafford Township, NJ

Advisor: Dr. John Wnek

Wildfire and Prescribed Burn Effects on Pine Barrens Soils and Succession

Amalie has participated in numerous independent research projects throughout her career at MATES to grow her knowledge. Junior year, she was inspired by the wildfires in Canada, leading to her research of local wildfires and their little-known effects on the soils and Pygmy Pine forests of the Pine Barrens. For this work, she received first prize at the New Jersey Academy of Science and will attend the National American Association for the Advancement of Science symposium later this month.

In addition to Amalie's passion for learning, she is also heavily involved at school: she was elected class president freshman and sophomore year, has helped lead the MATES Envirothon A-Team to state and national recognition for two years, and her art and photography have been published in the Literary Magazine multiple times. She also mentors underclassmen as a member of MATES' National Honor Society and Research and Development programs, and she gives back to her community by volunteering at adaptive surfing events and fundraising at charity surfing competitions. Moreover, Amalie is a four-year varsity swimmer and was selected as team captain this season, and has also been a four-year surf team member. In her free time, she fosters her life-long passion for music and has played piano since the first grade.

Ultimately, she constantly seeks to learn more—through her research or a good book. She hopes all she has learned in high school will guide her through her Astrophysics major; Amalie will always be shooting for the stars.

Morgan Zylinski

Marine Academy of
Technology and Marine Science
Stafford Township, NJ
Advisor: Dr. John Wnek

Determining the Presence of Ferulic Acid
in *S. Alterniflora* and its Biogeochemical
Influences within Salt Marshes
at Barnegat Bay, NJ



Morgan Zylinski is a senior at MATES and has been pursuing research endeavors and competing in science symposiums since freshman year. Growing up on Barnegat Bay, Morgan focuses her research on her local environment, which she hopes to help and improve. In addition to her independent research, Morgan is a leader of the Research and Development (RAD) program, where she mentors MATES freshmen with their first-year research projects. During the school day, you can either find Morgan working in the school lab or assisting students and volunteers, as she is the Lead Coordinator of Project Terrapin, an initiative that supports the conservation of local terrapin species. Within her classes at MATES, Morgan enjoys everything from learning about the universe in Geo-Astrophysics to studying estuaries in Oceanography.

Outside of academics, Morgan is a competitive three-season varsity athlete in soccer, swimming, and softball. She also enjoys lifeguarding for Lavallette Beach Patrol during the summer and represents her beach in lifeguard tournaments across the Jersey Shore. She values serving her community whenever she has the opportunity.

Morgan loves listening to music, snowboarding, surfing, and spending time with friends. Morgan hopes to further her research and is interested in pursuing environmental engineering in college. Morgan is also exploring opportunities within attending a military service academy or joining an Army ROTC program following high school graduation.



NEW JERSEY SOUTHERN
JSHS
JUNIOR SCIENCE AND
HUMANITIES SYMPOSIUM
2025

**Student
Poster
Presenters**

Student Poster Presenters (in alphabetical order)

Violet Fischer

Marine Academy of
Technology and Environmental Science
Stafford Township, NJ
Advisor: Dr. John Wnek

**Analysis of Ferulic Acid Concentrations on
the Foraging Ability of *Nassarius Obsoletus***



Violet Fischer is a junior attending the Marine Academy of Technology and Environmental Science (MATES). Being immersed in a STEM-focused school has fueled Violet's love of science and ignited her passion for zoology-based research. She has been involved in her research of *Nassarius obsoletus* for the past two years and has competed in the Jersey Shore Science Fair and the Delaware Valley Science Fair with her projects. In addition to conducting independent research, Violet assists underclassmen with their research projects as a member of the Research Assistance and Development (RAD) program at MATES.

Within her school, Violet is the public relations specialist for Message in a Bottle, the school's literary magazine, and a member of Project Terrapin, an organization dedicated to conserving Northern Diamondback Terrapins. In Project Terrapin, she is an assistant coordinator of the Outreach Division, which involves planning and leading informational sessions for younger students from local school districts.

Outside of MATES, Violet plays field hockey for Southern Regional High School and has participated in the program since her freshman year. For the past three years, Violet has also volunteered at the Long Beach Island Historical Society, which has allowed her to discover her passion for local history and to learn more about one of her favorite periods of history, the Golden Age of Piracy.

In the future, Violet hopes to continue her research with gastropods at both the high school and college level.



Aarthi Gunasekaran

High Technology High School
Lincroft, NJ
Advisor: Dr. Dina Ellsworth

A Natural, Cost-Effective Solution to Pharmaceutical Contamination in Drinking Water

Aarthi is a junior at High Technology High School, a pre-engineering academy with a strong emphasis on STEM education. Driven by a deep passion for Environmental Science, she has focused on addressing the impending water crisis. Utilizing the principles of spectrophotometry, Aarthi has investigated natural, cost-effective solutions to pharmaceutical contamination in water. Her research has earned her awards at regional, state, and tri-state levels, as well as being selected as a delegate to the American Junior Academy of Science.

She has additionally been invited to professional water-related conferences affiliated with the WEF. Beyond her scientific pursuits, Aarthi is interested in videography and has achieved national recognition for her skills. As an active member of her school's VEX robotics team, Aarthi aspires to develop technology that will positively impact the environment.

Amy Lin

Princeton High School
Princeton, NJ

Advisor: Mr. Mark Eastburn

Predicting Compound Melting Temperature from Computationally Derived Properties via Machine Learning



Amy Lin is a senior at Princeton High School with a passion for math and science.

As a member of the PHS Research Program, she conducts research using machine learning to predict melting temperatures of chemical materials and understand animal sensing and behavior. Her research work was awarded at Regeneron STS and Mercer County Science Fair. She also worked with the PHS research team to build an AI-enabled social robot that speaks Mam to preserve the endangered language, a National Winner for the Samsung Solve for Tomorrow challenge.

Amy is an active member of her community. At school, she is a co-captain of the PHS Math Team and AI/CS Club and the founder of “Apps for Social Good,” an app development club. She organized summer STEM programs in the Princeton Public Schools District and at HomeFront NJ. She runs a nonprofit organization with her friends to promote STEM learning and provide opportunities to students from underrepresented groups.

Outside school, Amy enjoys playing piano, composing music, and ballet. She has been trained in classical piano for the past 11 years and has received the U.S. National Gold Medal Award from the Royal Conservatory of Music. She has performed music at veteran homes, local senior centers, Carnegie Hall, and Lincoln Center.

Amy is interested in a career in science and technology, using data and AI to solve global challenges in healthcare, environmental sustainability, and education.



Jophy Lin

Manalapan High School

Manalapan, NJ

Advisor: Jelena Komitas

**Advancing Diabetic Retinopathy Detection:
Reducing Misdiagnosis Using Deep Ensemble
Learning and Uncertainty Estimation**

Jophy Lin is a junior at Manalapan High School, attending the Science and Engineering Magnet Program and pursuing challenging coursework in science and engineering. She is particularly motivated to use her skills and knowledge to educate others and give back to the community.

As the co-lead of the Project CLERIS Research Course, Jophy helps democratize access to research resources, supporting students from underserved communities. Her leadership has helped the course reach over 4,000 students worldwide. Additionally, Jophy attended the International Science and Engineering Fair (ISEF) as a finalist and presented her research on diabetic retinopathy detection using ensemble learning there.

Jophy's dedication to research and STEM extends beyond her schoolwork. She was selected as one of just 45 girls to attend Cornell University's CURIE Academy, where she researched programmable plant systems. Her achievements have earned her recognition, including a national Honorable Mention award from the National Center for Women & Information Technology (NCWIT) as part of the Aspirations in Computing program. This award, given to only 360 women out of over 3,700 applicants nationwide, honors her exceptional accomplishments and potential in computing. Jophy was also one of only 10 recipients of the Community Pillar Award from the New Jersey Governor's Office of Volunteerism, which recognizes individuals whose extensive volunteer service across multiple areas has significantly impacted their community.

In addition to her academic and leadership roles, Jophy has interned at Harvard Medical School, contributing to computational biology research focused on spatial transcriptomics.

Kyle Wlazlowski

Marine Academy of
Technology and Environmental Science
Stafford Township, NJ
Advisor: Dr. John Wnek



An Examination of Dissolution Effects of Acetaminophen in Conjunction with Vitamin B₆ in a Simulated Stomach Environment

Kyle Wlazlowski is a junior at MATES and has spent the last three years enriching himself in STEM. Kyle has involved himself in research studies across his first two years, focusing on chemical reactions in the human body, the dissolution of medicine, and digestion. In addition, he enjoys aiding other students with their research projects through the Research Assistance and Developmental Team. He is an active member of multiple clubs at MATES, including Yearbook, Chemistry Olympics, Lab Assistant, Interact, and caring for hatchling and grown terrapins. Kyle is also the secretary of the Robotics Club. He organizes outreach events for the Project Terrapin initiative, which supports local terrapin species. Kyle finds giving back to the community important, and he regularly volunteers at beach cleanups and events with Project Terrapin.

Kyle is also an employee at Shore Brake Cyclery, a local bike shop where he spends his weekends and summers learning about mechanics and engineering with his hands. He makes time for leisure activities, his favorite being movie nights and time with family. He makes time to stay disciplined and active in fitness, regularly biking and weight training. Kyle hopes to further his research through the rest of his high school career, aspiring to become a member of the mathematics and science fields as a mechanical engineer.



Chloe Wnek

Marine Academy of
Technology and Environmental Science
Stafford Township, NJ
Advisor: Dr. John Wnek

Quaternary Ammonium Cations
Environmental Effect on Local Water Bodies
using Spectrophotometry

Chloe Wnek is a Marine Academy of Technology and Environmental Science junior. She has participated in independent research for six years, starting in sixth grade. Her most prominent fields include water quality as well as chemistry. She has furthered her research skills at MATES and has completed more in-depth chemistry projects there. She helps other research students with their projects as a Research and Development Team member. Besides research, Chloe spends a large portion of her time volunteering. She actively participates in beach cleanups run by Clean Ocean Action, for which she is a junior beach captain. She is a strong member of Project Terrapin LLC, which is involved in all five branches. She participates in and helps organize multiple events, including community outreach. She is a leader of the Hatchling division, where she runs the Hatchling Head Start division, which includes 15 New Jersey schools.

Chloe also participates actively in multiple clubs at MATES, including Morning Announcements, Envirothon, Chemistry Olympics, Yearbook, Interact, and Lab Assistance. She is the Treasurer of the Class of 2026 Student Council. Chloe has been participating in studio dance for 14 years outside of school. She dances lyrical, contemporary, ballet, hip-hop, and jazz. Chloe's hobbies include reading novels, baking cookies and Italian desserts, drawing, and painting. Chloe plans to further her research over her last two years in high school, focusing on chemistry. After completing her education, Chloe hopes to find a career in pharmaceuticals or biomedical engineering.

2025 NJSJSHS: Participating Schools

- Biotechnology High School
- High Technology High School
- Lenape High School
- Manalapan High School
- Marine Academy of Technology and Environmental Science
- Moorestown High School
- Princeton High School
- The Lawrenceville School
- The Peddie School
- Toms River High School South
- West-Windsor Plainsboro High School South

Complete List of Student Research Papers Submitted

Biotechnology High School

Pravanti Manikonda

The Efficacy of Salicylic Acid and the SNC1 Gene in Inhibiting Staphylococcus Epidermidis in CS69908 Mutant and Wild Type Arabidopsis Thaliana

Shriya Rao

The Impact of Aneuploidy Score and Mutation Number on the Prognoses of Different Types of Cancer

High Technology High School

Suchit Basineni

El Niño–Southern Oscillation and Atlantic Multidecadal Oscillation Impact on Hurricanes North Atlantic Basin

Sunkalp Chandra

Enhanced Predictive Modeling for Hazardous Near-Earth Object Detection: A Comparative Analysis of Advanced Resampling Strategies and Machine Learning Algorithms in Planetary Risk Assessment

Divyam Dave

Exploring Zingerone-Ampicillin Combination for Inhibition of S. Epidermidis

Surya Gedipudi

A Novel Approach to Fortifying Financial Security: Classification Algorithms and Ensemble Methods to Detect Fraudulent Behavior in Financial Transactions

Aarthi Gunasekaran

A Natural, Cost-Effective Solution to Pharmaceutical Contamination in Drinking Water

Ayon Hajra

Inhibition of Toxic Effects of Volatile Organic Compounds on Duckweed Through Use of Quaternary Ammonium Compounds

Niyel Hassan

An Ensemble Framework for Fall Detection Using Multivariate Wi-Fi Channel State Information (CSI)

Krishna Kovuri

Investigating the Effects of Sleep Deprivation on the Response of Drosophila Melanogaster to Chemical Stimuli

Vinil Polepalli

Effects of Epigallocatechin Gallate (EGCG) and Piperine Compounds on the Regeneration of D. Tigrina

Gajan Mohan Raj

Federated Learning for Diabetic Retinopathy Diagnosis: Advancing Accuracy and Generalizability to Prevent Blindness in Under-Resourced Regions

Ritwik Singh

Impact of Increased Soil Nitrogen Levels on Pogonomyrmex Occidentalis Mortality

Lenape High School

Krithik Alluri
Integrating EEG and Machine Learning for Assistive Mobility:
A Brain-Controlled Wheelchair for Neurological Rehabilitation

Manalapan High School

Jophy Lin
Advancing Diabetic Retinopathy Detection: Reducing Misdiagnosis Using
Deep Ensemble Learning and Uncertainty Estimation



Marine Academy of Technology and Environmental Science

Maya Abdelaal

Examining Tannin Interference on Dimethyl Sulfide (DMS) Presence in Ocean County, NJ Salt Marshes

Lillian Boyd

An Assessment of the Health of Zostera Marina Under Varying Ocean Acidification Simulations

Ava Boyle

Examining the Effect of Physical Parameters on Projectile Penetration in Ballistic Gelatin

Zachary Ciappa

An Effective and Cost-Efficient Approach to Removing Phosphate Ions from Water with the Use of Crassostrea Virginica Shells

Violet Fischer

Analysis of Ferulic Acid Concentrations on the Foraging Ability of Nassarius Obsoletus

Mags Kelleher

Creating Durable, Low Carbon Emission Concrete Through the Use of Recycled Materials

Abigail Jones

Impacts of Climate Change on Sea Ice Composition and Abundance, and the Effect on Physical and Mental Health

Isabella Morgan

Analysis of Atmospheric Bacteria Concentrations and Related Parameters in the Metedeconk River, NJ

Zoey Smith

Nutrient Uptake Ability of Zooxanthellae After Temperature Acclimation

Amalie Werner

Wildfire and Prescribed Burn Effects on Pine Barrens Soils and Succession

Kyle Wlazlowski

An Examination of Dissolution Effects of Acetaminophen in Conjunction with Vitamin B₆ in a Simulated Stomach Environment

Chloe Wnek

Quaternary Ammonium Cations Environmental Effect on Local Water Bodies using Spectrophotometry

Morgan Zylinski

Determining the Presence of Ferulic Acid in *S. Alterniflora* and its Biogeochemical Influences within Salt Marshes at Barnegat Bay, NJ

Moorestown High School

Aditya Khurana

A Low-Cost, App-Based Real-Time Alert System to Connect Seniors with Cognitive Disabilities to Their Caregivers

Sonia Leo

Low-Cost Real-Time Silent Communicator for Complete Quadriplegia (Paralyzed) Patients

Princeton High School

Amy Lin

Predicting Compound Melting Temperature from Computationally Derived Properties via Machine Learning

Yurai Gutierrez Morales

How the Lion Becomes a Lamb: Transfer of Bacterial Symbionts from Ant Larvae to Vegetarian Spiders Through Selective Predation

Katie Qin

Identification of Core Genes and Proteins in Progression of Melanoma

Samhita Shriram

Algorithmic Implementation of Habituation Learning in Artificial Neural Networks

The Lawrenceville School

Ganghun Kim

Explicit Algebraic Numbers Whose Integer Parts of Powers are Always Composite

The Peddie School

Iris Lin

Design and Analysis of a Dual-Tail Biomimetic Robotic Fish for Enhanced Stability and Efficient Data Collection in Complex Aquatic Environments

Kaibo Wang

SelenRover: Traditional Robot for Planetary Terrain Exploration Using SLAM

Toms River High School South

Bisola Fasakin

Comparison of Reproductive Health and Microbiome of Two Females

West-Windsor Plainsboro High School South

Aradhya Vijay

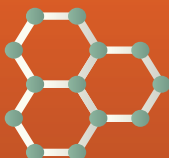
Nausea Drug Meclizine, an mTORC1 Inhibitor Thought to Increase Lifespan, Not Shown to do so in *C. Elegans*

Dhairya Mathur

Unraveling the Roles of BMS1, ZNF749 and miR-6726-5p in MODS Progression via Integrated Multiomics and ML-Based Approach



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