

33rd Annual Blue Ridge Highlands Regional Science Fair

March 1-2, 2024
Radford University



*Celebrating the 200th anniversary of the first
formal naming of a dinosaur – Megalosaurus .*



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**SAVE THE
DATE!**

**34th Annual
Blue Ridge Highlands
Regional Science Fair
March 7 – 8, 2025**

SCHEDULE OF EVENTS**Friday, March 1, 2024**

4:00 p.m. – 6:00 p.m. Student registration – Center for the Sciences lobby, next to Planetarium Setup and SRC approval - CS M56, M57, M58, M59, M65, M70

Saturday, March 2, 2024

7:30 a.m. – 8:00 a.m. Final adjustments to exhibits by student exhibitors – Center for the Sciences M56, M57, M58, M59, M65, M70

7:30 a.m. – 8:00 a.m. Judges arrive and breakfast – Curie 237, 238, and 242

8:00 a.m. – 8:30 a.m. Student check-in – Reed atrium; Students wait in Curie 142

8:00 a.m. – 8:15 a.m. Judges briefing – Curie 237, 238

8:15 a.m. – 9:00 a.m. Survey of exhibits and examination of assigned exhibits by judges – Center for the Sciences M56, M57, M58, M59, M65, M70

9:00 a.m. Students go to projects – Center for the Sciences M56, M57, M58, M59, M65, M70

9:00 a.m. – 11:30 a.m. Judge interviews with student exhibitors – Center for the Sciences M56, M57, M58, M59, M65, M70

11:30 a.m. All judge sheets must be turned in – Curie 244
Judge lunch – Curie 237, 238, 242

11:30 a.m. – 12:00 p.m. Judge interview with Grand Award finalists – Center for the Sciences M56, M57, M58, M59, M65, M70

12:00 p.m. Student lunch – Curie 142 and Atrium
Dr. Webster's Magic of Chemistry

1:00 p.m. – 2:45 p.m. Exhibits open to public – Center for the Sciences M56, M57, M58, M59, M65, M70

3:00 p.m. Awards Ceremony --
Bondurant Auditorium, Preston Hall

After awards Take down projects – Center for the Sciences M56, M57, M58, M59, M65, M70



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Artis College of Science
and Technology

March 1, 2024

Dear Student Scientists and Guests,

On behalf of the Artis College of Science and Technology (ACSAT) and Radford University, we are thrilled to host the 33rd Annual Blue Ridge Highlands Regional Science Fair! We are excited to see the next generation of scientists present their projects within our facilities.

The Artis College houses eight departments and offers undergraduate degrees across the sciences, along with a Master's Degree in Data and Information Management. The key element of our College is the opportunity for students to engage in authentic research as early as the freshman year. Many students make presentations at regional and national conferences, and some graduate as co-authors in peer-reviewed publications. If you are interested in a degree in Anthropology, Biology, Chemistry, Computer Science, Cybersecurity, Geospatial Science, Geology, Mathematics and Statistics, or Physics, in a program that offers you hands-on experience with state-of-the-art instrumentation taught by professors who care about you as a person and as a student, please consider applying to Radford University.

I hope that you find the events of the Science Fair exciting, invigorating, and inspirational. Know that the faculty and staff of the Artis College are inspired by your work and presentations today. I welcome you to come back and visit the campus, take a tour, sit in on a class, and really see what Radford University and the Artis College of Science and Technology have to offer you.

Sincerely,

Steven M. Bachrach
Dean



Dear Participants and Families,

On behalf of Radford University, welcome to the 33rd Blue Ridge Highlands Regional Science Fair. I am thrilled to see the dedication and enthusiasm displayed by students from Southwest Virginia as they engage in this forum for scientific exploration and innovation.

At Radford, we are deeply committed to fostering a culture of undergraduate research and experiential learning. Our faculty members are passionate about both teaching and research. From our beginnings in 1910 as the State Normal and Industrial School for Women, to our present status as a vibrant coeducational institution, science education has remained central to our mission. The Artis College of Science and Technology stands as a testament to our dedication to scientific excellence and plays a pivotal role in shaping the next generation of scientists and innovators. Our state-of-the-art facilities, including the Center for the Sciences and Reed and Curie Halls, provide students with unparalleled opportunities for hands-on learning and research.

We believe in the power of close relationships between students and faculty at Radford University. Our dedicated educators provide mentorship and guidance and empower students to achieve both personal and professional success. This nurturing environment is what sets Radford apart and allows our students to thrive in their chosen fields.

To all participants of the science fair, I commend you for your dedication to scientific curiosity. Your willingness to pursue original research and present your findings is a testament to your passion for learning and discovery. As you showcase your projects, I sincerely hope you find inspiration, expand your knowledge, and deepen your enthusiasm for scientific exploration.

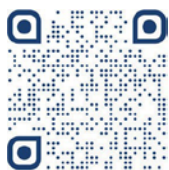
I wish each of you a rewarding experience at the Blue Ridge Highlands Regional Science Fair. Thank you for being part of this exciting event and know that Radford University is ready to support you in your future scientific journey.

Warm regards,

Bethany Usher, Ph.D.
Provost and Senior Vice President for Academic Affairs
Professor of Anthropology
Radford University

HIGHLANDER RESEARCH ROOKIES

Research Rookies offers high-achieving, highly motivated students great opportunities for hands-on research during their first and second years at Radford.



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jiworgau@radford.edu
www.radford.edu/rookies

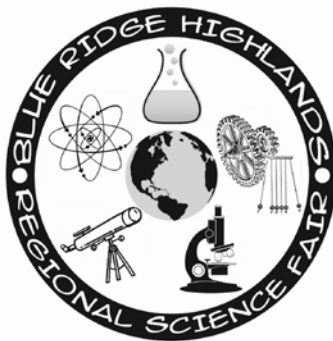
19 **R** 10

Benefits of Research Rookies

- Earn a \$4,000 stipend over 2 years
- Develop career readiness
- Work alongside experienced faculty
- Learn about research in your area of interest
- Find opportunities to present your research

Eligibility requirements

- Incoming or transfer undergraduate status
- Commitment to participate in both fall and spring semesters
- 3.50 GPA
- Curiosity, independence and reliability



INTRODUCTION

Science fairs have roots that go back to the 1940s, when they were used to encourage talented high school seniors to pursue a career in science or engineering and to expose the public to scientific work. Today, science fairs are still used to nurture an interest in the sciences, but have expanded to include younger students.

Through poster displays and oral presentations, young scientists present the results of their hard work in the fields of animal sciences, behavioral and social sciences, biochemistry, biomedical and health sciences, biomedical engineering, cellular and molecular biology, chemistry, computational biology and bioinformatics, earth and environmental sciences, embedded systems, energy: chemical, energy: physical, engineering mechanics, environmental engineering, materials science, mathematics, microbiology, physics and astronomy, plant sciences, robotics and intelligent machines, systems software, and translational medical science. This stimulates an active interest in science and engineering in young students, provides an unparalleled experience in research and presentations, and exposes the public to the hard work these students are performing.

With the 33rd Annual Blue Ridge Highlands Regional Science Fair, we are continuing a long-standing tradition of scientific exploration and promotion. Geographically, our fair includes the counties of Bland, Buchanan, Carroll, Dickenson, Giles, Grayson, Lee, Montgomery, Pulaski, Russell, Scott, Smyth, Tazewell, Washington, Wise, Wythe and the cities of Bristol, Galax, Norton, and Radford. Students will compete in either the Junior (6th through 8th grades) or Senior (9th through 12th grades) Division.

The Grand Award winners (the top two Senior Division projects) will participate in the International Science and Engineering Fair (ISEF) to be held in Los Angeles on May 11 - 17, 2024. ISEF will be held in person. The Grand Award winners will compete against 1,800 high school students from over 75 countries for approximately \$9 million in prizes.

The First Place winners in each senior category will receive an invitation to participate in the Virginia State Science and Engineering Fair at Old Dominion University on April 12 – 13, 2024.

The First Place winners in the junior category will receive an invitation to submit an application to compete in the Thermo Fisher Junior Innovators Challenge, with the national finalists competing on October 2024.

Christine K. Hermann

Dr. Christine Hermann

Kimberly J. Lane

Dr. Kimberly Lane

SPECIAL AWARDS AND SCHOLARSHIPS

American Association of University Women Awards

Top two females will be awarded \$50 in one of the following categories: Biochemistry, Chemistry, Medicine & Health, Microbiology (Senior Division).

American Chemical Society, North Eastern Tennessee Section Awards

Best three individual projects exhibiting the best and most extensive use of chemistry in any category will be awarded a monetary prize [\$100 (1st), \$75 (2nd), and \$50 (3rd)] (Senior Division).

American Chemical Society, Virginia Blue Ridge Section Award

This award will recognize the best project in chemistry or a related field in each division. One \$100 gift card will be given in the Junior Division and one \$200 award will be given in the Senior Division.

American Psychological Association Award

This award will be given for the best individual project with outstanding achievement in research in psychological sciences under the category of Behavioral and Social Science or any category relating to psychology (Senior Division).

American Red Cross Award – New River Valley; Science in Service to Our Communities

This award will be given for the best individual project that meets one of the following criteria: blood or biomedical research, community health initiative, or disaster prevention or research.

American Society of Mammalogists Awards

The best projects, whose primary focus is the study of mammals, whether wild, domesticated, or lab, will be given this award.

American Society of Biochemistry and Molecular Biology Award

This award is to be awarded to a high school student based on their performance in the area of biochemistry and molecular biology. A \$50 check will be mailed to the student (Senior Division).

Association of Women Geoscientists Award

The top individual female who most exemplifies high standards of innovativeness and scientific excellence in the geosciences will receive this award (Senior Division).

Biomedical Engineering Award - Virginia Tech

The best individual or group project that displays ingenuity, creativity, and detailed design in a project that has application to helping the human body will receive this award. Although the Biomedical Engineering category will be judged thoroughly, the award can be given to a project in any category. The award is given by the Biomedical Engineering Chapter at Virginia Tech (Senior Division).

Genius Olympiad

Two awards (two individual awards or two-person team) will be given for individual excellent work on environment, such as ecology and biodiversity, environmental quality, resources and energy, and human ecology. Winners have the opportunity to compete in the GENIUS OLYMPIAD, June 2024 (Senior Division).

Iota Sigma Pi Awards

Iota Sigma Pi is a national honor society for women in chemistry. Its major objectives are to promote interest in chemistry among women students; to foster mutual advancement in academic, business, and social life; and to stimulate personal accomplishment in chemical fields. This award is to recognize an outstanding project by a female student in the areas of chemistry, biochemistry, or a related science. One \$25 award will be given in the Junior Division and one \$50 award will be given in the Senior Division.

Lemelson Early Inventor Prize

The award winner will have to demonstrate the creation of an invention. An invention is a novel or unique device, process, or method. It could be an improvement on an existing product or a new process for creating a tangible product. A \$100 check will be mailed to the winning student or team (Junior Division).

Mount Tabor Ruritan Club Awards

These awards will be given to an environmentally related research project with the potential for the most direct impact on the local New River Valley. Two \$50 awards will be given in the Junior Division and two \$100 awards will be given in the Senior Division.

National Aeronautics and Space Administration Earth System Science Award

The award will be presented to the student whose individual project incorporates studies including different spheres of the Earth system, their interactions and change over time. It should include cause-effect relationships based on evidence and demonstrate a clear understanding of how those relationships affect Earth as a system (Senior Division).

National Oceanic and Atmospheric Administration Award

The National Oceanic and Atmospheric Administration Award will be awarded to the best individual project focused on ecosystems, climate, weather and water, and commerce and transportation.

National Weather Service Award

A rain gauge will be awarded for the best individual project that is best geared towards the National Weather Service's mission. Provide weather, water and climate data, forecasts, warnings, and impact-based decision support services for the protection of life and property and enhancement of the national economy.

Office of Naval Research Awards Distinguished Achievement Awards

Two medallions will be given in the Junior Division and three medallions will be given in the Senior Divisions for the best individual projects in the disciplines of science and engineering. Winners in the Senior Division will also receive \$50.

Radford University Sigma Xi Chapter Distinguished Awards in Science

These awards recognize outstanding application of the scientific method to address a research problem. One \$50 award will be given in the Junior Division and one \$50 award will be given in the Senior Division. This award is sponsored by the Sigma Xi Chapter at Radford University.

Regeneron Biomedical Science Award

The winning individual project should demonstrate an impressive command of the biomedical sciences and Regeneron's core values. The judging criteria includes a) Lead with Science, b) Take on Big Ideas, c) Make it Happen, d) Be Great Together, and e) Do What's Right. The winner will receive \$375 (Senior Division).

Ricoh Corporation Sustainable Development Award

This individual award recognizes the project with the best outstanding effort in addressing issues of environmental responsibility and sustainable development in a science and engineering project. The award recognizes a quest for new discoveries and to work with the community to inspire a vision of a more sustainable future (Senior Division).

Society for In Vitro Biology

This award is presented to the most outstanding 11th grade student exhibiting in the areas of plant or animal in vitro biology or tissue culture.

Thermo Fisher Scientific Junior Innovators Awards

The Thermo Fisher Scientific Junior Innovators Challenge (JIC) is the nation's premier STEM research competition for 6th, 7th and 8th grade students. The top 10% of students competing here today have the honor of continuing their science fair journey by applying to compete in the Thermo Fisher JIC. From the entrants, the Top 300 Junior Innovators will be selected and will receive a prize of \$125. From the Top 300, thirty finalists will be selected and compete for more than \$100,000 in prizes, including a top prize of \$25,000 and scholarships for STEM summer camps. Additionally, each of the finalists' schools receive \$1,000 (Junior Division).

United States Agency for International Development Award

The award is given to the best individual project that shows the extent to which the project is relevant to international development programming and priorities. This may include projects in 1) agriculture and food security; 2) democracy, human rights, and governance; 3) economic growth and trade; 4) education; 5) environment, energy, and infrastructure; 6) gender equality and women's empowerment; 7) global health; 8) humanitarian assistance; 9) innovation, technology, and research; 10) nutrition; 11) water and sanitation (Senior Division).

United States Air Force Award

Four outstanding science or engineering individual projects will receive a sling pack, power bank, USB flash memory drive, USB car charger, and official Air Force certificate (Senior Division).

United States Environmental Protection Agency

A letter will be given to students who have projects in the areas of environmental sciences and environmental engineering. This letter is not considered an award, but information to these students (Senior Division).

United States Metric Association Award

This award will be given to the student whose individual project involves a significant amount of quantitative measurement and should use the units of the SI metric system for those measures. The subject of the project should not be the SI system itself (Senior Division).

United States Stockholm Junior Water Prizes

The award is for the three best water-related individual science projects at the high school level. The competition is open to science projects aimed at enhancing the quality of life through the improvement of water quality, water resource management, or water and wastewater treatment. Research projects are assessed based on six different criteria: relevance, creativity, methodology, subject knowledge, practical skills, and report / presentation. The National SJWP winner receives \$10,000, a trophy, and an all-expense paid trip to Stockholm, Sweden to compete in the international competition. The international winner receives a cash prize of \$15,000, a cash prize of \$5,000 for their school, and the international trophy. First place winner will receive \$200 and second place winner will receive \$100 (Senior Division).

VCOM-Virginia Public Health and Healthcare Award

The awards are for individual projects that exhibit innovation in identifying and treating health related problems in rural populations. For the Senior Division, certificates and cash awards of \$150 (1st), \$100 (2nd), \$50 (3rd), and \$25 (Honorable Mention) will be awarded for the top winners. For the Junior Division, certificates and cash awards of \$100 (1st), \$75 (2nd), \$50 (3rd), and \$25 (Honorable Mention) will be awarded for the top winners.

Virginia Lakes and Watersheds Award

Awards are offered to individual earth/environmental individual science projects related to watershed and water resource management, and/or stormwater projects as they relate to water quality investigations. The senior division winner will receive a \$150 gift card and the junior division winner will receive a \$75 gift card.

Yale Science and Engineering Association Award

This award will be given to the most outstanding 11th grade student exhibiting in the areas of Computer Science, Engineering, Physics or Chemistry.

Emory and Henry Scholarship

A \$1000 scholarship will be awarded to a student.

Ferrum College Scholarship

A \$1000 scholarship will be awarded to a student.

New River Community College Scholarship

A \$1000 scholarship will be awarded to student living in Giles, Floyd, Pulaski, or Montgomery Counties or Radford City, 12th grade only.

Radford University Scholarships

Two \$2000 renewable scholarship will be awarded to residents of Virginia. The scholarship is renewable for three years with a 3.2 GPA at Radford University.

Wytheville Community College Scholarship

A \$2000 scholarship will be awarded to a senior from the Wytheville Community College service area (Bland, Carroll, Grayson, Smyth, and Wythe counties).



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GRAND AWARD WINNERS

2023 Jesse Dulaney Southwest Virginia Governor's School Davis Reitzel Southwest Virginia Governor's School	2013 Jordan Kuhn and Eric Chang Christiansburg High School Southwest Virginia Governor's School Thomas Grey Quesenberry Southwest Virginia Governor's School	2002 Thomas Berenato Blacksburg High School Shelly Cecil Tazewell High School
2022 Jacqueline Hou Blacksburg High School Brock Duma Blacksburg High School	2012 Kevin Kabaria Richlands High School Jiyun Chang and Jeremy Kuhn Christiansburg High School Southwest Virginia Governor's School	2001 Courtney Cecil Tazewell High School Bradford Malbon Blacksburg High School
2021 Shoshana Elgart Blacksburg High School Katelyn Collett Southwest Virginia Governor's School	2011 Taylor Hay Southwest Virginia Governor's School Heming Zhao Southwest Virginia Governor's School	2000 Joel R. L. Meeks-Matous Giles County High School Nisha Nagarkatti Blacksburg High School
2020 Claire Morton Blacksburg High School Virginia Worrell Southwest Virginia Governor's School	2010 Alex Granata Southwest Virginia Governor's School Biyuan Zhao Southwest Virginia Governor's School	1999 Nisha Nagarkatti Blacksburg High School David W. Rakestraw Southwest Virginia Governor's School
2019 Brandon Fan Blacksburg High School Ainsley LaPlante Southwest Virginia Governor's School	2009 Jacob Harvey Southwest Virginia Governor's School Tian Zhou Southwest Virginia Governor's School	1998 Jessica DeBusk Southwest Virginia Governor's School Nisha Nagarkatti Blacksburg High School
2018 Raaga Unmesha Vullikanti Blacksburg High School Brandon Fan Blacksburg High School	2008 Sanjay Kishore Southwest Virginia Governor's School Laura Vogelaar Southwest Virginia Governor's School	1997 Nisha Nagarkatti Blacksburg High School Kelly E. Seaton Dayspring Christian Academy
2017 Kaelum Hasler Blacksburg High School Carly Porter and Morgan Fisher Southwest Virginia Governor's School	2007 Christopher Long Home Educators of the New River Valley Josh McCann Southwest Virginia Governor's School	1996 Amanda D. Alley Southwest Virginia Governor's School Shannon L. Hughes Carroll County High School
2016 Emily Llaneras Southwest Virginia Governor's School Julian Elmasry Southwest Virginia Governor's School	2006 Christopher Long Home Educators of the New River Valley Erin Long Home Educators of the New River Valley	1995 Jefferson L. Carpenter Southwest Virginia Governor's School Setul G. Patel Narrows High School
2015 Emily Llaneras Southwest Virginia Governor's School Ashley Jordan and Austin Owen Southwest Virginia Governor's School	2005 Loren Liebrecht Southwest Virginia Governor's School Ryan Olson Southwest Virginia Governor's School	1994 James W. Clark Southwest Virginia Governor's School Sarah L. Simpkins Southwest Virginia Governor's School
2014 Jordan Kuhn and Eric Chang Christiansburg High School Southwest Virginia Governor's School Meredith Dove and Keena Shang Blacksburg High School	2004 Ryan Olson Southwest Virginia Governor's School Brian Rice Southwest Virginia Governor's School	1993 Brooks Moses Southwest Virginia Governor's School Carla Sue Rogers Pulaski County High School
	2003 Amy Kabaria Richlands High School Brian Rice Southwest Virginia Governor's School	1992 Jia Liu Southwest Virginia Governor's School Garnett Edwin Simmers Southwest Virginia Governor's School

JUDGES

We thank all of the judges that make the science fair successful!

Eman Abdelrahman

Department of Computer Science
Virginia Tech

Preeya Achari

School of Biomedical Engineering
and Sciences
Virginia Tech

Timilehin Adeboyega

Department of Chemistry
Virginia Tech

Md Sahadat Ali

School of Plant and
Environmental Sciences
Virginia Tech

Garrett Bangert

Department of Biomedical
Engineering
Virginia Tech

Dr. Bastiaan Bargmann

School of Plant and
Environmental Sciences
Virginia Tech

Dr. Ian Barland

School of Information and
Computing Science
Radford University

Madison Barshick

School of Animal Sciences
Virginia Tech

Brooklyn Beck

Department of Aerospace
Engineering
Virginia Tech

Odunayo Bolarinwa

Department of Industrial Systems
Engineering
Virginia Tech

Avraham Boruchowitz

Environmental Health and Safety
Radford University

Dr. Ben Caldwell

Graduate College
Radford University

Dr. Sabrina Campelo

Department of Biomedical
Engineering
Georgia Tech

Dr. Caitlyn Collins

Department of Biomedical
Engineering and Mechanics
Virginia Tech

Brice Crum

Department of Entomology
Virginia Tech

Bamise Egbewole

Department of Chemistry
Virginia Tech

Dr. Scott England

Department of Aerospace Engi-
neering
Virginia Tech

Connor Gallagher

Department of Chemistry
Virginia Tech

Dr. George Harakas

Department of Chemistry
Radford University

Joshua Heuler

Department of Biological Sciences
Virginia Tech

Dr. Shawn Huston

Department of Physics
Radford University

Billie Hutchings

Fralin Biomedical Research
Institute
Virginia Tech Carilion School
of Medicine

Dr. Neil Johnson

Department of Geosciences
Virginia Tech

Dr. Teresa Johnson

Department of Microbiology
and Immunology
Via College of Osteopathic
Medicine, Microbiology and
Immunology

Dr. Cihan Nadir Kaplan

Department of Physics
Virginia Tech

Antarjot Kaur

Department of Engineering
Education
Virginia Tech

Ishveen Kaur

School of Plant and
Environmental Sciences
Virginia Tech

Dr. Courtney Leisner

School of Plant and
Environmental Sciences
Virginia Tech

Abigail Lewis

Department of Biological Sciences
Virginia Tech

Theresa Libera

Department of Biomedical
Engineering and Mechanics
Virginia Tech

Mr. Jacob Lineberry

Appalachian Voices

Dr. Hiram López

Department of Mathematics
Virginia Tech

Victor Lopez

Department of Biomedical Engi-
neering and Mechanics
Virginia Tech

Dr. Samantha Margherio

Department of Psychology
Virginia Tech

Dr. Theresa McCann

Department of Epidemiology,
Community and Public Health,
and Preventive Medicine
Virginia College of Osteopathic
Medicine

Fatima Mony

School of Plant and
Environmental Sciences
Virginia Tech

Joshua Mouser

Department of Fish and
Wildlife Conservation
Virginia Tech

Dr. Phil Nelson

Department of Physics
Virginia Tech

Grogan Onnr

Department of Biological
Sciences Engineering
Virginia Tech

Jash Patel

Carilion Institute for Orthopaedics
and Neurosciences

Dr. Nathaniel Porter

University Libraries and
Department of Sociology
Virginia Tech

Alan Raflo

Virginia Water Resources
Research Center

Jitender Rathore

School of Plant and Environmental
Sciences
Virginia Tech

Dr. Kristofer Rau

Virginia Tech Carilion School of
Medicine

Dr. Alan Sentman

SGS Polymer Solutions

Dr. Priscila Serpa

Department of Biomedical Scienc-
es and Pathology
VA-MD College of Veterinary
Medicine

Dr. Linbo Shao

Department of Electrical and
Computer Engineering
Virginia Tech

Mr. Mayank Sharma

Department of Physics
Virginia Tech

Elizabeth Sicking

Department of Entomology
Virginia Tech

Dr. Gary Silverman

Professor Emeritus
Bowling Green State University
and University of North Carolina
Charlotte

Dr. Marian Silverman

Retired

Mr. Dennis Sleighter

National Weather Service

Steve Smith

Roanoke Valley Governor's School

Megan Sweet

Department of Biological Sciences
Virginia Tech

Dr. Tatsu Takeuchi

Department of Physics
Virginia Tech

Sydney Thornton

Virginia College of Osteopathic
Medicine

Alejandro Venable-Craft

Department of Biomedical
Engineering and Mechanics
Virginia Tech

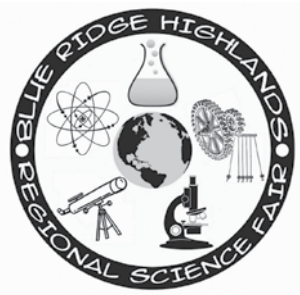
Dr. Josh Worch

Department of Chemistry
Virginia Tech

Dr. Wei Zhou

Department of Electrical and
Computer Engineering
Virginia Tech

Compete in the Blue Ridge Highlands Regional Science Fair



You can win cash prizes, trophies, ribbons, and other awards!



Winners may go on to compete in:

**Thermo Fisher
Junior Innovators
Challenge**

September - October 2024



**Virginia State Science
& Engineering Fair**

April 12 - 13, 2024



**International Science
& Engineering Fair**

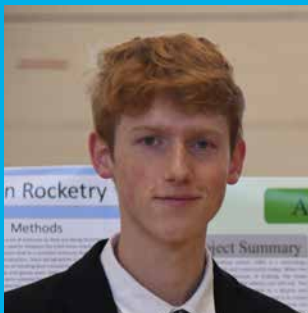
May 11 - 17, 2024



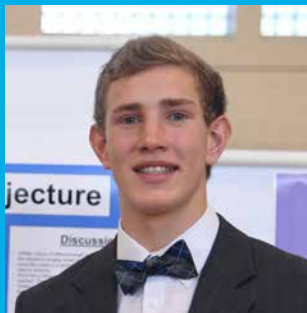
The top two senior projects win the Grand Award and are eligible to attend ISEF 2024!

ISEF participants get to meet Nobel Prize Laureates, meet students from over 80 countries, and compete for nearly \$5 million in prizes!

Congratulations to the 2023 Grand Award Winners!



Jessee Dulaney



Davis Reitzel



Alternate Sriya Sridhar

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SENIOR DIVISION PROJECTS

ANIMAL SCIENCES

- 101 Ethan Easter**
Determining the Effects of Four Natural Items on Oranges to Repel Drosophila melanogaster
 Southwest Virginia Governor's School
 Sponsor: Rebecca Phillips
- 102 Xavier Gitre**
Organic Mercury and Avian Foraging: The Impact of Methylmercury Exposure on the Feeding Efficiency of Invertivorous Passerines
 Blacksburg High School
 Sponsor: Katharine Davis
- 103 Kailin Phillips**
The Effects of Age on Milk Fat Percentage in Holstein Cows
 Southwest Virginia Governor's School
 Sponsor: Rebecca Phillips
- 104 Alexandria Swenson**
Mean Frequencies of Microplastics in Commercially Processed Equine Foods
 Southwest Virginia Governor's School
 Sponsor: Jared Brown
- 105 Nicholas Thompson**
Rationality of Ants
 Southwest Virginia Governor's School
 Sponsor: Sherry Pugh

BEHAVIORAL AND SOCIAL SCIENCES

- 201 Naomi Black**
Perception of Time When Exposed to an Analog vs. Digital Clock While Completing a Task
 Southwest Virginia Governor's School
 Sponsor: Greg Riffe
- 202 Madison Burroughs**
Most Common Forms of Synesthesia in Men and Women
 Southwest Virginia Governor's School
 Sponsor: Greg Riffe
- 203 Isabella Liu**
The Impact Comparison of Artificial Intelligence on Different Occupations in the Labor Market
 Blacksburg High School
 Sponsor: Katharine Davis
- 204 Molly Morris**
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Comparing Different Breathing Techniques in Their Effectiveness of Lowering Elevated Heart Rate
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Investigating the Impact of Parasitic Worm Secretions on Anaphylaxis as Novel Treatment for Food Allergies
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Effects of Supportive Insoles on Foot Pressure and Performance During Soccer Movements
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A Nutritional Assessment of Plant-Based Milk Alternatives: Comparing Common Plant-Based Milk Alternatives to Cow's Milk Using Chemical Analyses
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Water Quality Difference in Stagnant Versus Moving Water
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Caloric Difference of Chicken Strips from Dairy Queen: Bomb Calorimetry, Atwood Method, and Stated Content
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Nutritional Content of Bananas Over Periods of Time
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Evaluating Homemade and Industrial Rust Removers on Steel Metal
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Metagenomic Analysis of the Microbial Biodiversity in Soil of Mountain Balds in Appalachia
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Study of Virginia conservation using Bobwhite quail as an indicator species
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*Testing the Effects of the Sunscreen Ultraviolet Filter Oxybenzone on the Freshwater Plant *Lilaeopsis brasiliensis**
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*Quantifying Microplastics in *Corbicula fluminea* from a Limnic Ecosystem*
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Effect of Different Gravestone Cleaners on Color of Gravestones
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Enhancing Driving Safety via Real-Time Suppression of Vehicle Radar Interference
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602 Asher Porter
Comparing Blacksburg Transit Recorded Versus Posted Stop Times
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- 701 Phoebe Fant**
Analysis of the Heat of Combustion Using Bomb Calorimetry of Three Different Diesel Types
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- 702 Hank Schroeder**
The Effects of Consumer Products with Low Refractive Indexes on the Efficiency of Solar Panels
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Defining the Accuracy of an Automatic Color Detector
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Testing Accuracy of a Gravity-Powered Seed Planter
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Aerating Water by Modifying a Free Water Vortex Turbine
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Enzymatic Engineering for Enhanced Plastic Degradation in a Novel Plasmid System
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*Investigating Degradation of Polyhydroxyalkanoate Straws in Saltwater Environments with Varying and *Lysmata wurdemanni**
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- 1002 Braedon Rafferty**
How Shape and Material Affect Aerodynamics and Affect Turbulence in the Form of Sound
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- 1101 Michael Duncan**
Businesses Per Area Over Time
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The Economic Impact of California's Recent Out-Migration on its Neighboring States
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Effects of Temperature and Humidity on the Timbre of Stringed Instruments
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Investigating the Factors Which Allow for the Stability of Planetary Orbits in Binary Star Systems Using Numerical Simulations Based on Initial Planetary Positions
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Creating a Predictive Model of Limiting Magnitude Using Environmental Factors with Respect to Economic Efficiency
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How Does Changing the Center of Gravity on a Tennis Racket Affect Serve Speed?
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Change of the Coefficient of Friction on a Tennis Court Before, During, and After Being Washed Off with Water
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How Ballistically Resistant Are Specific Wall Components Against Common Home Defense Calibers?
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PLANT SCIENCES

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Relationship between below ground biomass and soil organic matter: case study in Mt Tabor Blacksburg
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1302 Katelyn Melton
Administering Helium to Dandelions, White Clover, Kentucky Bluegrass, and Broadleaf Plantains to Observe Possible Herbicidal Effects
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1303 Natalie Tessar
Plant Health in Hard Water Concentrations Within a Hydroponics System
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Can People Accurately Identify AI Written Text?
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A Comparison of a Student Response-Based Rubric and an AI Detector on Identification of AI-Written Essays
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Systematic Assessment of Large Language Model's Correctness and Biases for Minority Health
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Different in Readability Between ChatGPT Code and Human Code
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Move to the Beat
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- 2103 Virginia Vandyke**
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Different Types of Coke Versus Mentos
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- 2202 Cage Church and Levi Tackett**
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Seaweed Style? From Ocean to Outfit!
 Twin Valley Elementary and Middle School
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- 2204 Mia Sanders**
Yummy
 Twin Valley Elementary and Middle School
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ENGINEERING TECHNOLOGY: STATICS AND DYNAMICS

PHYSICS AND ASTRONOMY

- 2301 Jacob Ohanian**
Play Harmonics Like a Rockstar
 Dawning Light Homeschool
 Sponsor: John Ohanian

2302 Silas Alexander Phillips

Determination of Microwave Frequency Through Antinode Analysis
 Scott Memorial Middle School
 Sponsor: Lucas Phillips

ENVIRONMENTAL ENGINEERING

MATERIALS SCIENCE

- 2401 Kendall Brown and Knightleigh Bell**
Should You Flush It?
 Twin Valley Elementary and Middle School
 Sponsor: Madison Witt
- 2402 Jim Caleb Christian**
LIGHTS OUT
 Hurley Elementary and Middle School
 Sponsor: Scott Embrey
- 2403 Noah Hurley**
Soak It Up
 Hurley Elementary & Middle School
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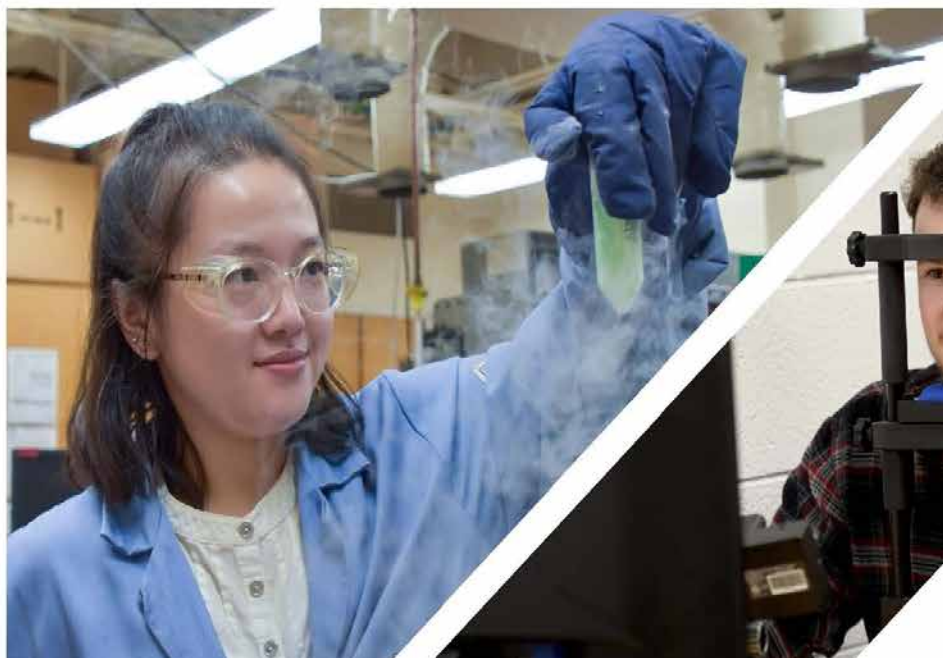


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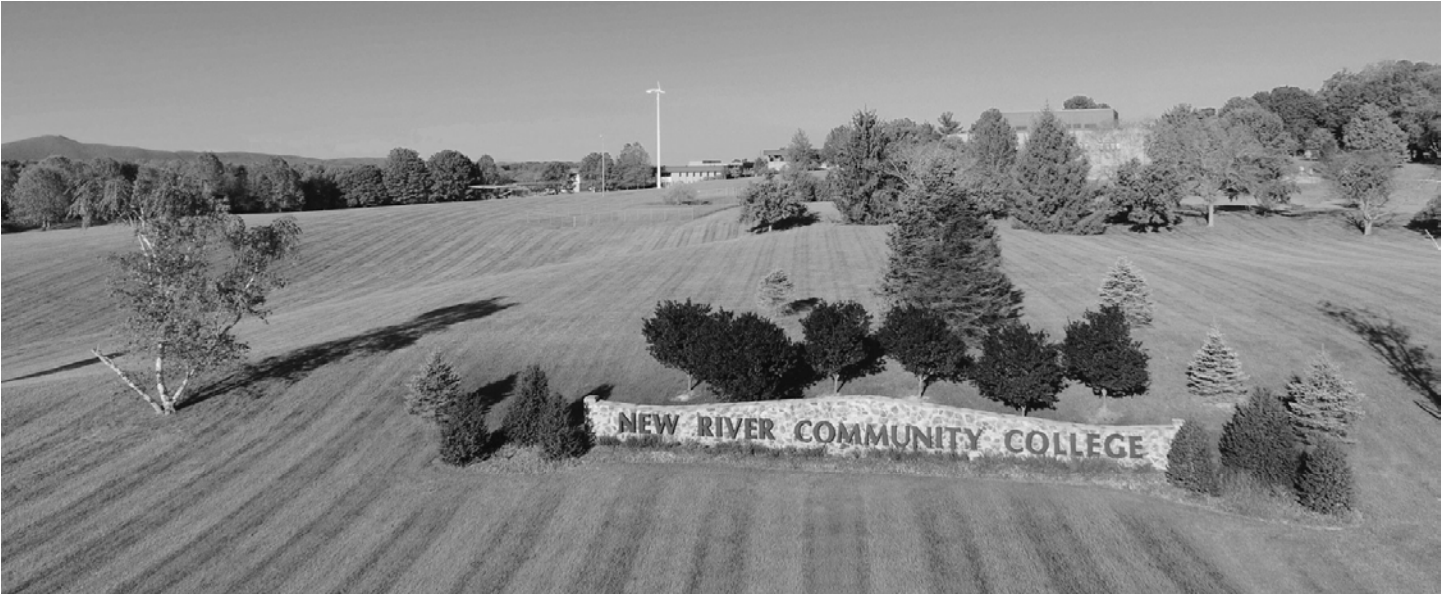
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We would like to thank Kristi Zerull for designing the science fair logo.

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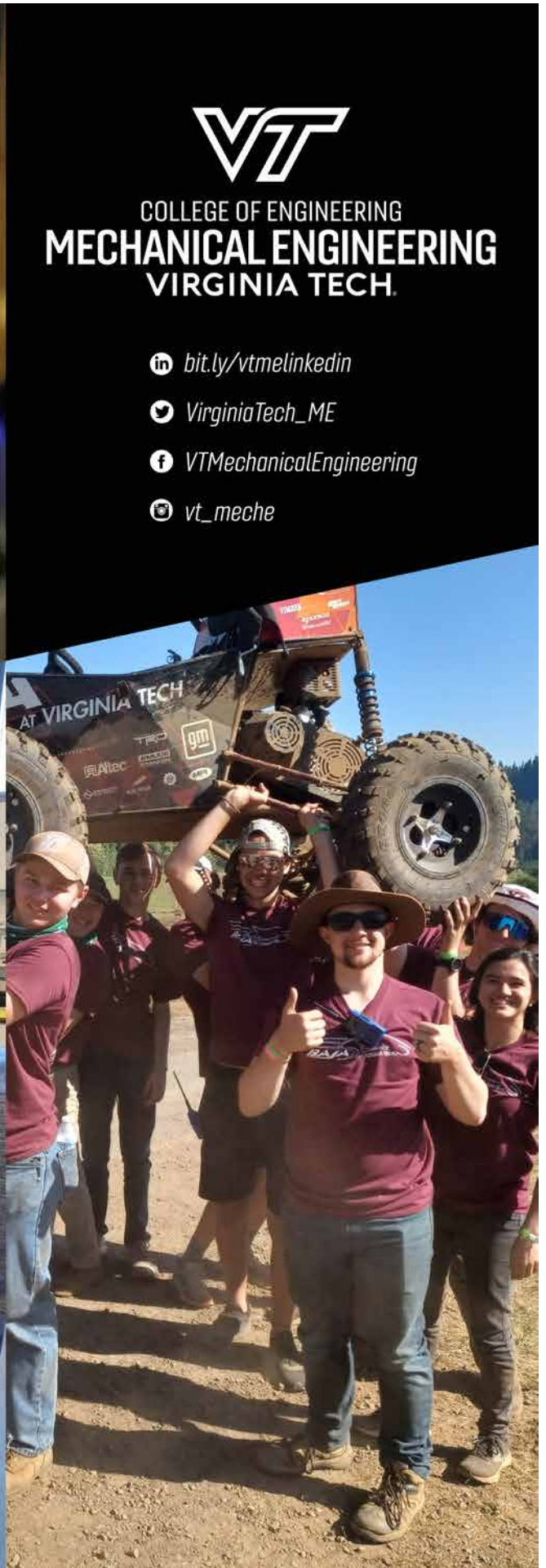
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