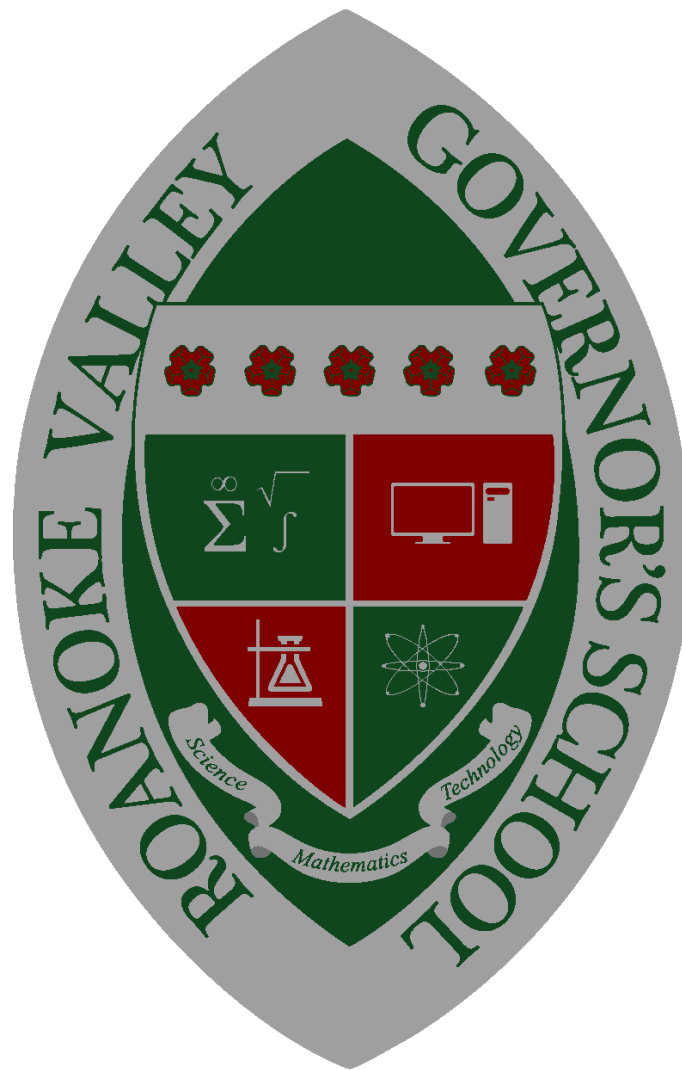


# The Roanoke Valley Governor's School For Science and Technology 2026 Student Project Forum



*The Roanoke Valley Governor's School for Science and Technology is supported by the Virginia Department of Education and the public school divisions of the Roanoke Valley. The RVGS community is grateful for the support and financial commitment from our participating school districts:*

***Bedford County, Botetourt County, Craig County, Floyd County, Franklin County, Roanoke City,  
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Matthew Browning (Chair); Doug Divers; Melissa Fisher; Tracy Jenkins; Brandon Taylor; Don Wages

### **Science Faculty**

Cindy Bohland (Chair); Melissa Carr; Michael Clarkston; Joanne Villers; Steve Villers; Connor Wade

### **Additional Staff**

Fred Hoffman (Adjunct Faculty/Intersession Support); Drew Hurst (Adjunct Faculty/Intersession Support);  
Terri Janiga (Community Outreach Coordinator); Ra Siv (Operations Staff)

**The faculty and staff of the Roanoke Valley Governor's School wish to thank those who have supported the student research efforts during this academic year.**

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Zara Bhowansingh, BH 2  
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Devin Blankenship, EE 4  
Mitchell Blankenship, BH 3  
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Kaleb Humerickhouse, AS-A 8  
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Kaitlin Jackson, BS-B 7  
Akshat Jain, MI-E 7  
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Mason Killeen, BS-A 7  
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Lucyna (Lucy) Laplante, CM 1  
Jack Lawrence, ET-C 8  
Jabe Le Roy, CH 1  
Jack Le Roy, ET-B 6  
Seth Lee, CH 2  
Audrey Lee, MI-A 6  
Ahmad Lemar, MI-C 8  
Jordan Lin, EE 7  
Samuel Long, PS 4  
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Elodie McClintic, ES 7  
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Abel Mengistu, MI-C 1  
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Jamilah (Jennah) Rasoul, AS-A 3  
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Elliott Wiegard, BS-A 3  
Heidi Wienke, CB 3  
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Macyn Woody, MI-B 8  
Timothy Yemey, ET-A 2  
Nicholas (Nich) Young, AS-A 6  
Lucas Young, AS-B 8  
Zachary Young, ET-A 1  
Rand Zangana, MI-E 4

Yufei (Sophia) Zeng, SS-B 3

# Category Abbreviations Key

Animal Sciences A	AS-A	Engineering Technology B	ET-B
Animal Sciences B	AS-B	Engineering Technology C	ET-C
Animal Sciences C	AS-C	Environmental Engineering	EE
Behavioral & Social Sciences A	BS-A	Microbiology A	MI-A
Behavioral & Social Sciences B	BS-B	Microbiology B	MI-B
Biomedical & Health Sciences	BH	Microbiology C	MI-C
Cellular & Molecular Biology	CM	Microbiology D	MI-D
Chemistry/Materials Science	CH	Microbiology E	MI-E
Computational Biology	CB	Plant Sciences	PS
Earth & Environmental Sciences	ES	Systems Software A	SS-A
Engineering Technology A	ET-A	Systems Software B	SS-B

KITCHEN

ES 1	2 ES 3	ES 4	ES 5	6 ES 7	ES 8	ES 9
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CM 2	3 CM 4	CM 5	6 CM 7
1 CM/ CB 7	CB 6	5 CB 4	CB 3

MI-A 4	5 MI-A 6	MI-A 7	8 MI-A 9
3 MI-A 2	MI-A 1	9 MI-B 8	MI-B 7

ET-A 7	8 ET-A 9	ET-A 10	1 CB 2
6 ET-A 5	ET-A 4	3 ET-A 2	ET-A 1

MI-B 1	2 MI-B 3	MI-B 4	5 MI-B 6
9 MI-C 8	MI-C 7	6 MI-C 5	MI-C 4

DOOR

PS 4	5 PS 6	PS 7	8 PS 9
3 PS 2	PS 1	8 EE 7	EE 6

MI-D 7	MI-D 8	MI-C 1	2 MI-C 3
6 MI-D 5	MI-D 4	3 MI-D 2	MI-D 1

DOOR

ET-B 10	1 EE 2	EE 3	4 EE 5
9 ET-B 8	ET-B 7	6 ET-B 5	ET-B 4

MI-E 3	4 MI-E 5	MI-E 6	7 MI-E 8
2 MI-E 1	BS-B 8	7 BS-B 6	BS-B 5

ET-C 7	8 ET-C 9	ET-B 1	2 ET-B 3
6 ET-C 5	ET-C 4	3 ET-C 2	ET-C 1

BS-A 7	BS-A 8/ BS-B 1	BS-B 2	3 BS-B 4
6 BS-A 5	BS-A 4	3 BS-A 2	BS-A 1

BH 6	5 BH 4	BH 3	2 BH 1
6 SS-B 5	SS-B 4	3 SS-B 2	SS-B 1

AS-C 3	4 AS-C 5	AS-C 6	7 AS-C 8
2 AS-C 1	AS-B 8	7 AS-B 6	AS-B 5

SS-A 4	5 SS-A 6
3 SS-A 2	SS-A 1

AS-A 7	8 AS-A/ AS-B 1	AS-B 2	3 AS-B 4
6 AS-A 5	AS-A 4	3 AS-A 2	AS-A 1

CH 6	7 CH 8	CH 9
5 CH 4	CH 3	2 CH 1

LIBRARY

## **ANIMAL SCIENCES A**

### **AS-A 1** The Effect of *Ginkgo biloba* on the Heart Rate of *Daphnia magna*

Daniel Feldmann, Patrick Henry High School

Colton Morris, Patrick Henry High School

Teacher sponsor: Mr. Don Wages

### **AS-A 2** Toxicity of Toluene on Aquatic Organisms

Lera Gibson, Franklin County High School

Teacher sponsor: Mrs. Joanne Villers

### **AS-A 3** The Effect of Caffeine on *Drosophila* with Fragile X Syndrome

Jamileh (Jennah) Rasoul, Patrick Henry High School

Nadia Vile, Patrick Henry High School

Teacher sponsor: Ms. Melissa Carr and Mr. Steve Villers

### **AS-A 4** *Citrus sinensis* and *Lavandula angustifolia* Oils as a Pesticide Alternative Against *Drosophila melanogaster*

Carlee Coleman, Patrick Henry High School

Carter Naff, Patrick Henry High School

Teacher sponsor: Mrs. Joanne Villers

### **AS-A 5** Novel Chemical Blends for Attracting Spotted Lanternflies

Nathan Preston, Lord Botetourt High School

Teacher sponsor: Ms. Melissa Carr and Mr. Steve Villers

### **AS-A 6** The Effect of *Paullinia cupana* on the Heart Rate of *Daphnia magna*

Nolan Togo, Patrick Henry High School

Nicholas (Nich) Young, Patrick Henry High School

Teacher sponsor: Mr. Don Wages

### **AS-A 7** The Effect of *Withania somnifera* on the Heart Rate of *Daphnia magna*

John Finney, Patrick Henry High School

Colin Stromberg, Patrick Henry High School

Teacher sponsor: Mr. Don Wages

### **AS-A 8** The Effect of Spirulina on Alzheimer's Symptoms and Tau Toxicity in *Drosophila melanogaster*

Kaleb Humerickhouse, Cave Spring High School

Benjamin Ogle, Glenvar High School

Teacher sponsor: Ms. Cindy Bohland

## **ANIMAL SCIENCES B**

### **AS-B 1** The Effect of *P. cupanna* on the Heart Rate of *Daphnia magna*

Blake Horne, Patrick Henry High School

Amelia Stockton, Patrick Henry High School

Teacher sponsor: Mr. Don Wages

### **AS-B 2** The Effect of *Camellia Sinensis* of the Heart Rate of *D. magna*

Hana Amo, Patrick Henry High School

Charlotte Gick, Patrick Henry High School

Teacher sponsor: Mr. Don Wages

### **AS-B 3** The Effect of Creatine on the Heart Rate of *Daphnia magna*

Samuel (Sammy) Farrar, Patrick Henry High School

Nishal Wagley, Patrick Henry High School

Teacher sponsor: Mr. Don Wages

### **AS-B 4** The Effect of Fish Oil on Seizure Duration in *D. melanogaster* Epilepsy Models

Julia Batty, Patrick Henry High School

Maya Olson, Patrick Henry High School

Teacher sponsor: Ms. Cindy Bohland

### **AS-B 5** The Effect of Lithium Chloride on Neural Function in *Drosophila melanogaster*

Rhiannon Stowe, Lord Botetourt High School

Teacher sponsor: Ms. Cindy Bohland

### **AS-B 6** The Effects of Bisphenol A and Methylfarnesoate on the Growth and Development of *Eisenia fetida*

Sadie Panko, Patrick Henry High School

Teacher sponsor: Mrs. Joanne Villers

### **AS-B 7** Effects of Storage Conditions on Folic Acid Stability and Larval Development in *Drosophila melanogaster*

Gillian Overstreet, Staunton River High School

Jenna Shipp, Franklin County High School

Teacher sponsor: Ms. Melissa Carr and Mr. Steve Villers

### **AS-B 8** The Effect of Water Quality on Fish Population Densities

Lucas Young, Lord Botetourt High School

Teacher sponsor: Mrs. Joanne Villers

## **ANIMAL SCIENCES C**

### **AS-C 1** The Effect of Red 40 Dye on the Heart Rate of *Daphnia magna*

Silas Calhoun, Patrick Henry High School  
Henry Stephens, Patrick Henry High School  
Teacher sponsor: Mr. Don Wages

### **AS-C 2** The Effect of *Camellia sinensis* on the Heart Rate of *Daphnia magna*

Loryn Divers, Franklin County High School  
Aiden Gillespie, Lord Botetourt High School  
Teacher sponsor: Mr. Don Wages

### **AS-C 3** The Effect of *Hypericum perforatum* on the Heart Rate of *Daphnia magna*

Megan Austin, Hidden Valley High School  
Noah Stewart, Hidden Valley High School  
Teacher sponsor: Mr. Don Wages

### **AS-C 4** Protective Effects of Tart Cherry Pretreatment on Oxidative Stress Resistance in *Caenorhabditis elegans*

Jaiden Dann, Lord Botetourt High School  
Teacher sponsor: Ms. Melissa Carr and Mr. Steve Villers

### **AS-C 5** Using Optogenetics to Study Genetically Modified *Drosophila melanogaster*

Isabella (Izzy) Mather, Patrick Henry High School  
Teacher sponsor: Ms. Cindy Bohland

### **AS-C 6** Milkweed as a Natural Deterrent to *Lycorma delicatula*

Lawson Fralin, Patrick Henry High School  
Andrew (Lachlan) Thompson, Patrick Henry High School  
Teacher sponsor: Ms. Cindy Bohland

### **AS-C 7** The Effect of *Panax quinquefolius* on the Heart Rate of *Daphnia magna*

Natalie Heitz, Patrick Henry High School  
James Thompson, Patrick Henry High School  
Teacher sponsor: Mr. Don Wages

### **AS-C 8** The Effect of Polyethylene Microplastics on *Daphnia magna*

Noah Johnstone, Patrick Henry High School  
William (Parker) McCahill, Patrick Henry High School  
Teacher sponsor: Ms. Melissa Carr and Mr. Steve Villers

## **BEHAVIORAL AND SOCIAL SCIENCES A**

### **BS-A 1** An Evaluation of the Relationship Between Music and Attention

Caiden Perry, Liberty High School

Teacher sponsor: Mrs. Melissa Fisher

### **BS-A 2** Exploring the Relationship Between Attitude Toward AI and Ability to Detect AI-Generated Content

Daniel Owen-O'Quill, Patrick Henry High School

Teacher sponsor: Mrs. Melissa Fisher

### **BS-A 3** How Does Competition Affect Performance and Motivation?

Elliott Wiegard, Patrick Henry High School

Teacher sponsor: Mrs. Melissa Fisher

### **BS-A 4** Does Capturing a Photo Impact One's Memory of the Experience?

Hannah Hertz, Patrick Henry High School

Teacher sponsor: Mrs. Melissa Fisher

### **BS-A 5** A Comparative Analysis of Sentencing Severity in Firearm-Related Offenses

Walker (Jackson) Farrar, Patrick Henry High School

Teacher sponsor: Mr. Brandon Taylor

### **BS-A 6** A Study of the Relationship Among Procrastination, Patience, and Personality

Lydia Goad, Patrick Henry High School

Teacher sponsor: Mrs. Melissa Fisher

### **BS-A 7** The Effect of Driving Experience and Driving Behavior on Memory

Mason Killeen, Glenvar High School

Teacher sponsor: Mrs. Melissa Fisher

### **BS-A 8** How Did the 2020 Pandemic Impact Children's Health?

Cullen Burke, Hidden Valley High School

Teacher sponsor: Mrs. Melissa Fisher

## **BEHAVIORAL AND SOCIAL SCIENCES B**

**BS-B 1** A Study on the Relationship Between Neuroticism and Autonomic Responses to Pain

Gabrielle (Gabby) Harig, Patrick Henry High School

Teacher sponsor: Mrs. Melissa Fisher

**BS-B 2** A Study on the Relationship Between the Temporal Repetition Effect and Images Versus Text

Evelyn (Eve) Foster, Patrick Henry High School

Teacher sponsor: Mrs. Melissa Fisher

**BS-B 3** An Organizational Communication Audit Based in Healthcare

Emma Baldwin, Salem High School

Teacher sponsor: Mr. Brandon Taylor

**BS-B 4** An Analysis of Gender Differences in Emotion Recognition

Brinna Seidel, Patrick Henry High School

Claire Togo, Patrick Henry High School

Teacher sponsor: Mrs. Melissa Fisher

**BS-B 5** A Study on Climate Conscientious Behavior

Anna Favor, Patrick Henry High School

Teacher sponsor: Mrs. Melissa Fisher

**BS-B 6** American Populism, Voting Behavior, and Political Rhetoric

Arrington Short, Staunton River High School

Teacher sponsor: Mrs. Melissa Fisher

**BS-B 7** A Study on Sleep and Driving

Kaitlin Jackson, Patrick Henry High School

Teacher sponsor: Mrs. Melissa Fisher

**BS-B 8** A Study on the Relationship Between Impulsiveness and Social Media Usage

Riley Kerr, Staunton River High School

Teacher sponsor: Mrs. Melissa Fisher

## **BIOMEDICAL AND HEALTH SCIENCES**

**BH 1** The Effect of Different pH Levels on the Acidic Breakdown of Enamel in Extracted Teeth

Stella Gillenwater, Patrick Henry High School

Teacher sponsor: Mr. Brandon Taylor

**BH 2** Investigating the Effect of Personalized, Low-Intensity Focused Ultrasound for Episodic Memory Enhancement

Zara Bhowansingh, Hidden Valley High School

Teacher sponsor: Ms. Melissa Carr and Mr. Steve Villers

**BH 3** The Effect of Bacterial Load on the Development of Huntington's Disease in *Drosophila melanogaster*

Mitchell Blankenship, William Fleming High School

Kritesh Sutar, William Fleming High School

Teacher sponsor: Ms. Cindy Bohland

**BH 4** Pharmacological Effects of Lauric Acid and Virgin Coconut Oil on Pancreatic Cancer Cells

Naomi Fetzer, Cave Spring High School

Teacher sponsor: Ms. Cindy Bohland

**BH 5** *PIEZO1* Inhibition as a Novel Therapy for Glioblastoma Plasticity

Aman Mengistu, Cave Spring High School

Teacher sponsor: Mr. Brandon Taylor

**BH 6** Threat-Induced Affiliation Under Targeted Neural Pathway Inhibition in Mice

Ayush Pinnamaraju, Cave Spring High School

Teacher sponsor: Mr. Brandon Taylor

## **CELLULAR AND MOLECULAR BIOLOGY**

**CM 1** The Effect of p53 Knockout on the Response of Colon Cancer Cells to a Wnt Pathway Inhibitor

Charlotte Hally, Patrick Henry High School

Lucyna (Lucy) Laplante, Patrick Henry High School

Teacher sponsor: Ms. Cindy Bohland

**CM 2** The Effect of Extracellular Matrix Proteins on Cardiomyocyte Proliferation and Function

Gabrielle Romeo, William Byrd High School

Teacher sponsor: Mr. Brandon Taylor

**CM 3** Hyaluronic Acid and Vitamin B9 (folic acid) Effects on the Growth and Healing of Wounded

Neonatal Fibroblasts

Laine Clements, Patrick Henry High School

Teacher sponsor: Ms. Cindy Bohland

**CM 4** Analyzing Flavonoid-Induced Apoptosis in Colon Cancer Cells With and Without Functional p53

Archit Arora, Staunton River High School

Teacher sponsor: Ms. Cindy Bohland

**CM 5** Exploring Targeted MAPK Pathway Inhibition on Pancreatic and Colorectal Adenocarcinoma Lines

Brodie Eanes, Franklin County High School

Teacher sponsor: Ms. Cindy Bohland

**CM 6** The Impact of Desmoplakin Knockdown on Kir2.1 and N-cadherin Expression in Mouse Ventricular Tissue

Preston Vaughn, Lord Botetourt High School

Teacher sponsor: Ms. Cindy Bohland

**CM 7** Natural Compounds as Anticancer Agents: Cell Viability and RNF31 Expression in p53-Wild-Type and p53-Null Adenocarcinoma Cells Treated with Dandelion Root Extract and Taraxasterol

Claire Ricketts, Cave Spring High School

Teacher sponsor: Ms. Cindy Bohland

## **CHEMISTRY/MATERIALS SCIENCE**

### **CH 1** A Comparison of Limestone and Dolomite in Treating Acidic Mine Drainage

Jabe Le Roy, Floyd County High School

Teacher sponsor: Ms. Melissa Carr and Mr. Steve Villers

### **CH 2** Analysis and Removal of Iron in Breakfast Cereals

Seth Lee, Salem High School

Teacher sponsor: Ms. Melissa Carr and Mr. Steve Villers

### **CH 3** Enzymatic Catalyst Vs. Acid Catalyst in Esterification

Isabella (Bella) Godfrey, Franklin County High School

Teacher sponsor: Ms. Melissa Carr and Mr. Steve Villers

### **CH 4** Nanoparticles as a Technique for the Removal of Estradiol from Water

Brynne Wiegard, Patrick Henry High School

Teacher sponsor: Ms. Melissa Carr and Mr. Steve Villers

### **CH 5** Using Cellulose Acetate filters to Remove Pollutants from Water

Nolan Stokes, Patrick Henry High School

Teacher sponsor: Mrs. Joanne Villers

### **CH 6** Optimizing the Structure of Liquid Marbles for Future Environmental Applications

Darby Kerr, Patrick Henry High School

Anders Plunkett, Patrick Henry High School

Teacher sponsor: Mrs. Joanne Villers

### **CH 7** Investigating Cable Strain Reliefs

Jeanne-Eugenie Picard, Cave Spring High School

Teacher sponsor: Mr. Brandon Taylor

### **CH 8** The Effect of Glass Fibers on the Material Properties of Nylon 66

Malachi Schweitzer, Franklin County High School

Riley Sides, Franklin County High School

Teacher sponsor: Ms. Melissa Carr and Mr. Steve Villers

### **CH 9** The Effect of Natural Polymer Hydrogels on the Junction Potential of Galvanic Cells

Reja Moja, Patrick Henry High School

Teacher sponsor: Ms. Melissa Carr and Mr. Steve Villers

## **COMPUTATIONAL BIOLOGY**

**CB 1** An Exploration into Alternate Gene Mutations That Lead to Thrombophilia

Aspen Cooper, Franklin County High School

Teacher sponsor: Mr. Mark Levy

**CB 2** Analysis of Genes and SNPs Correlated to Schizophrenia

Nathan Cloutier, Franklin County High School

Aadesh Mittal, Cave Spring High School

Teacher sponsor: Mr. Mark Levy

**CB 3** Analysis of Gene Expression During Respiratory Viruses

Priya Patel, Glenvar High School

Heidi Wienke, William Byrd High School

Teacher sponsor: Mr. Mark Levy

**CB 4** The Effect of Alcohol Use Disorder Diagnosis in Major Depressive Patients on the Choice of Anesthetic During Electroconvulsive Therapy

Caroline (Gracie) Greer, Patrick Henry High School

Teacher sponsor: Mr. Brandon Taylor

**CB 5** Conservation-Matching as a Predictor of Mutation Impact in Protein-Protein Systems

John (Jack) Janiga, Hidden Valley High School

Teacher sponsor: Ms. Cindy Bohland

**CB 6** A Genetic Analysis of the Impact of Colonization on Indigenous Populations

Isaiah Butler, Patrick Henry High School

Madison Renick, Cave Spring High School

Teacher sponsor: Mr. Mark Levy

**CB 7** Risk Stratifier for Cancer Recurrence using Machine Learning

Elijah (Eli) Harl, Franklin County High School

Prateek Reddy, Cave Spring High School

Teacher sponsor: Mr. Mark Levy

## **EARTH AND ENVIRONMENTAL SCIENCES**

**ES 1** The Effect of Wildfire Ash on *Spirulina major*

Fiona Schwarz, Patrick Henry High School

Teacher sponsor: Mrs. Joanne Villers

**ES 2** The Effect of Bridge Construction on the Microbial Community of the Roanoke River

Helena Longstreth, Franklin County High School

Teacher sponsor: Ms. Cindy Bohland

**ES 3** The Effects of Wildfire Ash on Coral Bleaching

Aeryn Thompson, William Fleming High School

Teacher sponsor: Mrs. Joanne Villers

**ES 4** The Effect of Sow Rate on Runoff Volume and Quantity

Anson Foster, Patrick Henry High School

Teacher sponsor: Mrs. Joanne Villers

**ES 5** The Effect of Location on the Roanoke River for Fecal Coliform

Gabriel (Gabe) Rodriguez, William Fleming High School

Teacher sponsor: Mrs. Joanne Villers

**ES 6** The Interactive Effect of Dissolved Carbon and Salinity on Aquatic Microbial Respiration

Chloe Herold, Hidden Valley High School

Teacher sponsor: Mr. Brandon Taylor

**ES 7** The Effect of Elevated Phosphorous on Survival Rates of *Daphnia magna* and Growth of *Raphidocelis subcapitata*

Elodie McClintic, Franklin County High School

Teacher sponsor: Mrs. Joanne Villers

**ES 8** The Generational Effects of Lead II on the Learning Capabilities of *Drosophila* Larvae

Audrey Kelley, Patrick Henry High School

Teacher sponsor: Mrs. Joanne Villers

**ES 9** Accelerating Secondary Succession Following Deforestation Through Fertilizer Application

Claire Grindo, Liberty High School

Teacher sponsor: Mrs. Joanne Villers

## **ENGINEERING TECHNOLOGY A**

### **ET-A 1** Robotic Hand for American Sign Language Translation

Samuel Dandridge, Patrick Henry High School

Zachary Young, Patrick Henry High School

Teacher sponsor: Mr. Connor Wade

### **ET-A 2** Remote Controlled Stop Light Drone

Lachlan Robrecht, Patrick Henry High School

Timothy Yemey, Patrick Henry High School

Teacher sponsor: Mr. Connor Wade

### **ET-A 3** Automatic Grass Line Painter

Alexander (Alex) Key, Liberty High School

Teacher sponsor: Mr. Connor Wade

### **ET-A 4** Newborn Neonatal EMS Transport Harness

Miya Morton, Hidden Valley High School

Teacher sponsor: Mr. Connor Wade

### **ET-A 5** Automatic Light-Sensing Blinds

Rowan Poelzing, Patrick Henry High School

Jake Robertson, Patrick Henry High School

Maxwell Weiss, Patrick Henry High School

Teacher sponsor: Mr. Michael Clarkston

### **ET-A 6** Automated Pipette: Precise Liquid Transfer

Caralyn (Carrie) Collins, Lord Botetourt High School

Ariana Markham, Northside High School

Teacher sponsor: Mr. Michael Clarkston

### **ET-A 7** Designing a Mechatronic System to Prevent Bay Door-Truck Collisions and Property Damage

Dorothy Myers, Salem High School

Teacher sponsor: Mr. Brandon Taylor

### **ET-A 8** Automated Garbage Truck Using a Raspberry Pi and Object Detection

Holden Bryant, Franklin County High School

Graham Dietrich, Lord Botetourt High School

Teacher sponsor: Mr. Connor Wade

### **ET-A 9** Safe Introductory Cutting Device

Riley Howell, Lord Botetourt High School

Kinsley Milko, Lord Botetourt High School

Teacher sponsor: Mr. Michael Clarkston

### **ET-A 10** Remote Controlled Dispenser

Skye Harbin, William Fleming High School

Charles Rucker V, Patrick Henry High School

Teacher sponsor: Mr. Michael Clarkston

## **ENGINEERING TECHNOLOGY B**

### **ET-B 1** Creating a Self-Balancing Platform with Arduino Programming and CAD Software

Dylan De Meyts, Patrick Henry High School  
Matthew Feldmann, Patrick Henry High School  
Teacher sponsor: Mr. Connor Wade

### **ET-B 2** Path Following Delivery Module

Colt Guilliams, Patrick Henry High School  
Ahnyis Salisbury-Bonhomme, William Fleming High School  
Teacher sponsor: Mr. Michael Clarkston

### **ET-B 3** Smart Navigation Cane

Hayston Chappell, Patrick Henry High School  
Benjamin Grindstaff, Patrick Henry High School  
Teacher sponsor: Mr. Connor Wade

### **ET-B 4** Picking Up Hazardous Materials with an Automated Handheld Broom

Hope Dolan, Staunton River High School  
Claire (Liz) Morris, Craig County High School  
Teacher sponsor: Mr. Michael Clarkston

### **ET-B 5** Power Generating Shoe Attachment

Gage Allran, Cave Spring High School  
Anish Suryapeta, Cave Spring High School  
Teacher sponsor: Mr. Michael Clarkston

### **ET-B 6** Automated Recycling Sorter

Jack Le Roy, Floyd County High School  
Eli Peters, Franklin County High School  
Teacher sponsor: Mr. Michael Clarkston

### **ET-B 7** WanderBot: A Desktop Robot for Assistance and Engagement

Sophie Tisdale, Franklin County High School  
Teacher sponsor: Mr. Connor Wade

### **ET-B 8** EMG-Controlled Hand Exoskeleton for Assistive and Rehabilitative Use

Benjamin Meyer, Cave Spring High School  
Maxton (Max) Mizuba, Lord Botetourt High School  
Teacher sponsor: Mr. Michael Clarkston

### **ET-B 9** Surface-Adhesive Vehicle

Mann Patel, Glenvar High School  
Alpinveer (Alpin) Singh, Cave Spring High School  
Teacher sponsor: Mr. Connor Wade

### **ET-B 10** Steering Assisted Car Controlled by Hand Movements

Samuel Glenn, Patrick Henry High School  
James (Jack) O'Keeffe, Patrick Henry High School  
Teacher sponsor: Mr. Connor Wade

## **ENGINEERING TECHNOLOGY C**

**ET-C 1** Basic Executive-Functionality Assistive Robot  
Molly Caroline(Morgan) Fitzgerald, Patrick Henry High School  
Teacher sponsor: Mr. Connor Wade

**ET-C 2** Supply Aerial Relief (S.A.R)  
Christian Chicas-Nolasco, William Fleming High School  
Teacher sponsor: Mr. Connor Wade

**ET-C 3** Variable-Speed Projectile Launcher  
Joseline Hernandez, Patrick Henry High School  
Grady Stinson, Patrick Henry High School  
Teacher sponsor: Mr. Connor Wade

**ET-C 4** Mechanical Crane  
Nathan Dickens, Glenvar High School  
Palmer Hartberger, Staunton River High School  
Teacher sponsor: Mr. Michael Clarkston

**ET-C 5** Mobile Tower Crane  
Nathan Amos, Franklin County High School  
Teacher sponsor: Mr. Connor Wade

**ET-C 6** Robotic Chain Crew  
Jay (Trey) Hipes, James River High School  
Teacher sponsor: Mr. Connor Wade

**ET-C 7** Robot for Coral Reef Transplants  
Strummer Giffin, Lord Botetourt High School  
Sophia Rorrer, Franklin County High School  
Teacher sponsor: Mr. Michael Clarkston

**ET-C 8** Motorized Window Blinds with Remote Control  
Carter Biscotte, Salem High School  
Jack Lawrence, Salem High School  
Teacher sponsor: Mr. Michael Clarkston

**ET-C 9** Automated Train  
Devanshi Chaudhari, Patrick Henry High School  
Austin White, Patrick Henry High School  
Teacher sponsor: Mr. Michael Clarkston

## **ENVIRONMENTAL ENGINEERING**

### **EE 1** Design and Evaluation of a Microplastic Filtration System

Anika Parashar, Hidden Valley High School

Teacher sponsor: Ms. Melissa Carr and Mr. Steve Villers

### **EE 2** The Bioremediation of Iron(III) Ions Using Biofilms

Joshua Manning, Staunton River High School

Dev Patel, Salem High School

Teacher sponsor: Ms. Melissa Carr and Mr. Steve Villers

### **EE 3** Microplastic Removal Using *Abelmoschus esculentus*

Kassidy Corker, Patrick Henry High School

Teacher sponsor: Mrs. Joanne Villers

### **EE 4** Environmental Monitor and Wildfire Detector

Augustine (Augie) Biviano, Floyd County High School

Devin Blankenship, Floyd County High School

Sebastian Sowards, Liberty High School

Teacher sponsor: Mr. Michael Clarkston

### **EE 5** Removal of Pharmaceuticals from Wastewater Using Biochar

Uma Patel, Salem High School

Teacher sponsor: Ms. Melissa Carr and Mr. Steve Villers

### **EE 6** The Effect of Aeration on the Reduction of *E. coli* Colonies in Simulated Wastewater

Garrett Gent, Patrick Henry High School

Louis Pace, Patrick Henry High School

Teacher sponsor: Ms. Melissa Carr and Mr. Steve Villers

### **EE 7** The Effect of Acid and Base Modified Biochar on the Removal of Lead and Zinc from Water

Jordan Lin, Lord Botetourt High School

Barrett Pace, James River High School

Teacher sponsor: Ms. Melissa Carr and Mr. Steve Villers

### **EE 8** Does *Pistia stratiotes* Aid in Phytoremediation of Ammonium and/or Nitrate Ions in a Solution?

Brantley Pruitt, Patrick Henry High School

Teacher sponsor: Ms. Melissa Carr and Mr. Steve Villers

## **MICROBIOLOGY A**

**MI-A 1** The Effect of Household Cleaners and Apple Cider Vinegar on *S. epidermidis*

Catherine (Cricket) O'Keeffe, Patrick Henry High School

Teacher sponsor: Mr. Matthew Browning

**MI-A 2** The Effect of Ciprofloxacin and Penicillin on *B. coagulans*

Ashley (Ash) Chavez, Patrick Henry High School

Brianna (Bri) McKee, Patrick Henry High School

Teacher sponsor: Mr. Matthew Browning

**MI-A 3** The Effect of *Bacillus subtilis* on the Degradation of PET Plastic

Reeyanna Casseus, William Fleming High School

Nayeli (Naya) Castaneda-Holston, William Fleming High School

Teacher sponsor: Ms. Melissa Carr and Mr. Steve Villers

**MI-A 4** Swimmer's Ear: The Effect of Clotrimazole and Chlorinated Water on *Aspergillus niger*

Amelia Karolyi, Hidden Valley High School

Trisha Mathur, Hidden Valley High School

Teacher sponsor: Mr. Matthew Browning

**MI-A 5** Investigating the Adaptability of *P. polycephalum*

Mollie Hughes, Patrick Henry High School

Daisy (Sloth) Sharrer, Patrick Henry High School

Teacher sponsor: Mr. Matthew Browning

**MI-A 6** Bioremediation Potential of *M. luteus* in the Removal of Copper and Lead

Violet Farmer, Salem High School

Audrey Lee, Salem High School

Teacher sponsor: Mr. Matthew Browning

**MI-A 7** The Effect of PET Crystallinity on Enzymatic Degradation by PETase from *Ideonella sakaiensis*  
Expressed in *E. coli*

Mary (Meg) Greer, Patrick Henry High School

Norah Harper, Patrick Henry High School

Marie Tulou, Patrick Henry High School

Teacher sponsor: Mr. Matthew Browning

**MI-A 8** The Effect of Melittin, Alone and in Conjunction with Traditional Antibiotics, on the Growth and  
Biofilm Formation of *Staphylococcus epidermidis*

Henry Fedak, Patrick Henry High School

Kai Warren, Patrick Henry High School

Teacher sponsor: Ms. Cindy Bohland

**MI-A 9** The Effects of Vancomycin and Thyme Essential Oil on *Bacillus cereus*

Brooklyn Hemphill, Glenvar High School

Katherine Karolyi, Hidden Valley High School

Teacher sponsor: Mrs. Tracy Jenkins

## **MICROBIOLOGY B**

### **MI-B 1** Optimal growth of *E. coli* in the Presence of TPA

Anissa-Rosa Morfa, William Fleming High School

Tammy Phung, William Fleming High School

Teacher sponsor: Mrs. Joanne Villers

### **MI-B 2** The Effect of Streptomycin and Oregano Oil on *S. epidermidis*

Reni O'Brien, Patrick Henry High School

Amirah Rasoul, Patrick Henry High School

Teacher sponsor: Mrs. Tracy Jenkins

### **MI-B 3** The Growth Rate of Bacteria and Fungi

Riley Price, Liberty High School

Teacher sponsor: Mr. Matthew Browning

### **MI-B 4** Evaluating Antibiotic Effectiveness on the Formation of *Staphylococcus epidermis* Biofilms

Adam Doner, William Fleming High School

Teacher sponsor: Ms. Cindy Bohland

### **MI-B 5** The Effect of Neomycin and Natural Oils on *S. salivarius*

Colin Batty, Patrick Henry High School

Cash Hunley, Patrick Henry High School

Teacher sponsor: Mr. Matthew Browning

### **MI-B 6** The Effect of *Allium sativum* on Quorum-Sensing Regulated Gene Expression in *Serratia marcescens*

Kylie Duke, Patrick Henry High School

Teacher sponsor: Ms. Cindy Bohland

### **MI-B 7** What is the Effect of Gentamicin and a Herbal Remedy on the Growth of *Pseudomonas fluorescens*

Ella McReynolds, William Byrd High School

Mahima Sethumadhavan, Cave Spring High School

Teacher sponsor: Mrs. Tracy Jenkins

### **MI-B 8** The Effect of Chloramphenicol and Oregano Oil on *Vibrio fischeri*

Makenzie Dulaney, Floyd County High School

Macyn Woody, Lord Botetourt High School

Teacher sponsor: Mrs. Tracy Jenkins

### **MI-B 9** A Comparative Study of the Effect of Conventional Medicine vs. Natural Remedies on *E. coli*

Noah McCarren, Lord Botetourt High School

Ellie Shawn, Lord Botetourt High School

Teacher sponsor: Mr. Matthew Browning

## **MICROBIOLOGY C**

**MI-C 1** Development of a Biocompatible DMAPS Hydrogel via Enzymatic Radical Initiation with Multi-Phase Optimizable Release for Tailored Biofilm Treatment

Chaitanya Gohil, Glenvar High School

Abel Mengistu, Cave Spring High School

Teacher sponsor: Mr. Matthew Browning

**MI-C 2** The Analysis of the Combined Antimicrobial Dynamics Between Ascorbic Acid (Vitamin C) and Penicillin on *Lactobacillus acidophilus*

Thomas Pan, Hidden Valley High School

Geet Patel, Hidden Valley High School

Teacher sponsor: Mrs. Tracy Jenkins

**MI-C 3** Identifying Carbapenem-Resistant Microbes Using Chromogenic Agar Plates in Pediatric and Adult ICUs

Claire McCahill, Patrick Henry High School

Teacher sponsor: Mr. Brandon Taylor

**MI-C 4** The Effect of Penicillin on Tetracycline Resistant *E. coli*

Galeb Rains-Wallace, Patrick Henry High School

Teacher sponsor: Mr. Matthew Browning

**MI-C 5** The Effect of Horseradish Wasabi and Bacitracin on *Corynebacterium pseudodiphtheriticum*

Christopher (CJ) Johnson, Lord Botetourt High School

Kolbrin Robertson, Franklin County High School

Teacher sponsor: Mrs. Tracy Jenkins

**MI-C 6** Isolation and Characterization of Bacteriophages of Pathogenic Bacterial Strains

Parneet Gill, Salem High School

Teacher sponsor: Mr. Brandon Taylor

**MI-C 7** The Effect of Orange Oil and Streptomycin on *S. marcescens*

Bradley Rottenborn, Patrick Henry High School

Teacher sponsor: Mr. Matthew Browning

**MI-C 8** The Comparative Effects of Manuka Honey and Tetracycline on *Escherichia coli*

Ahmad Lemar, Lord Botetourt High School

Gabriel (Gabe) Puckett, Lord Botetourt High School

Teacher sponsor: Mrs. Tracy Jenkins

**MI-C 9** The Ability of SCOBY to Resist *E. coli* Contamination in Kombucha

Lillian (Lily) Davis-Craighead, Franklin County High School

Teacher sponsor: Ms. Cindy Bohland

## **MICROBIOLOGY D**

### **MI-D 1** The Effect of Ciprofloxacin and Cinnamon Oil on *Serratia marcescens*

Adelaide Coffman, Patrick Henry High School

Cora Hertz, Patrick Henry High School

Teacher sponsor: Mrs. Tracy Jenkins

### **MI-D 2** Viability of Virginia Soil for Oxalate-Carbonate Pathway

Lillian (Ian) Costen, Franklin County High School

Teacher sponsor: Ms. Cindy Bohland

### **MI-D 3** Investigating the Bioremediation Potential of *B. subtilis* and *E. coli* in the Removal of Volatile Organic Compounds

Celena Carvalho, Cave Spring High School

Vasiliki Panogeorgou, Cave Spring High School

Teacher sponsor: Mr. Matthew Browning

### **MI-D 4** Green-synthesized Silver Nanoparticles Infused in Chitosan-based Hydrogels for *E. coli* Biofilms

Tara Farrokhpoor, Salem High School

Teacher sponsor: Ms. Melissa Carr and Mr. Steve Villers

### **MI-D 5** The Effect of Kanamycin and Kelp extract on *Vibrio anguillarum*

Darby Haire, Patrick Henry High School

Emelia (Emmy) Schweitzer, Patrick Henry High School

Teacher sponsor: Mrs. Tracy Jenkins

### **MI-D 6** The Effect of Acidic Juices on *E. coli*

Jude Biller, Franklin County High School

Charlie Tingler, James River High School

Teacher sponsor: Mr. Matthew Browning

### **MI-D 7** The Effect of Tetracycline and Ciprofloxacin vs. Ciprofloxacin and *Curcuma longa* on *Pseudomonas fluorescens*

Lily Borloz, Salem High School

Raelynn Stamper, Craig County High School

Teacher sponsor: Mrs. Tracy Jenkins

### **MI-D 8** The Effects of Amoxicillin and Oregano Oil on *Staphylococcus epidermidis*

Bentley (Miles) Gibson, Franklin County High School

Dashall (Dash) Willard, Franklin County High School

Teacher sponsor: Mrs. Tracy Jenkins

## **MICROBIOLOGY E**

**MI-E 1** The Effect of Gentamicin and *Rosmarinus officinalis* L. on *Bacillus subtilis*

Willow Boucher, Patrick Henry High School

Eva Johnstone, Patrick Henry High School

Teacher sponsor: Mrs. Tracy Jenkins

**MI-E 2** The Effect of Chloramphenicol, *M. piperita* Oil, and Ciprofloxacin on *P. fluorescens* and *N. sicca*

Diana Dietz, Patrick Henry High School

Mae Todd, Patrick Henry High School

Teacher sponsor: Mrs. Tracy Jenkins

**MI-E 3** The Effect of Sucrose Concentration and Sugar Alcohols on *Streptococcus mutans* Biofilm Growth

Evanjali Wagley, Patrick Henry High School

Teacher sponsor: Ms. Cindy Bohland

**MI-E 4** The Effect of Amoxicillin and Tea Tree Oil on *E-coli*

Faith Pardue, William Fleming High School

Rand Zangana, Patrick Henry High School

Teacher sponsor: Mrs. Tracy Jenkins

**MI-E 5** Examining the Role of Root Exudates on Soil Microbes Using Transgenic *Arabidopsis thaliana*

Emily Dewire, Patrick Henry High School

Teacher sponsor: Ms. Cindy Bohland

**MI-E 6** The Effect of Erythromycin and Coriander Oil on *B. subtilis*

Andrew Nguyen, William Fleming High School

Teacher sponsor: Mrs. Tracy Jenkins

**MI-E 7** The Antifungal Effects of Common Household Liquids on *P. notatum* Bread Mold

Akshat Jain, Cave Spring High School

Colin Ray, Cave Spring High School

Teacher sponsor: Mr. Matthew Browning

**MI-E 8** The Effect of Chlorhexidine Mouthwash, Vancomycin, and Peppermint Essential Oil on *S. salivarius*

Annalee Campbell, Lord Botetourt High School

Caroline Rushing, James River High School

Teacher sponsor: Mr. Matthew Browning

## PLANT SCIENCES

**PS 1** The Effect of Different Concentrations of Motor Oil on the Growth of Freshwater Plants

Reese Kuehl, Patrick Henry High School

Teacher sponsor: Mrs. Joanne Villers

**PS 2** Abscisic Acid as a Hormonal Regulator of Abiotic Stress Resilience in *Arabidopsis thaliana*

Vivienne Eaton, Salem High School

Ryan Hubbard, Salem High School

Teacher sponsor: Ms. Cindy Bohland

**PS 3** A study of the Allelopathic Effect of *Coleus scutellarioides* on *Raphanus sativus*

Kailin Johnson, Franklin County High School

Elena Preston, Lord Botetourt High School

Teacher sponsor: Mr. Don Wages

**PS 4** A Study of the Allelopathic Effect of Polyphenols on the Germination of *Medicago sativa* and *Lepidium sativum*

Yehor Belko, Cave Spring High School

Samuel Long, Staunton River High School

Teacher sponsor: Mr. Don Wages

**PS 5** The Allopathic Effects of the *Juglans nigra* Extract on the Germination of *Lactuca sativa*

Joshua Biesterveld, Floyd County High School

Joseph Tesauro, Floyd County High School

Teacher sponsor: Mr. Don Wages

**PS 6** Translational Genomics: Utilizing AgNORs, Chromosomal Aberrations, and the Mitotic Index in *Allium cepa* to Identify Genomic Targets for Salinity Resistance in Rice

Prisha Tiwari, Hidden Valley High School

Teacher sponsor: Mrs. Joanne Villers

**PS 7** The Use of Bacterial Cellulose in Plant Wound Repair

Charlotte Anstey, Patrick Henry High School

Teacher sponsor: Mrs. Joanne Villers

**PS 8** A Study of the Allelopathic Effect of *Eucalyptus pulverlenta* on *Salvia hispanica*

Evelyn Bowden, Lord Botetourt High School

Carter Bratton, Salem High School

Teacher sponsor: Mr. Don Wages

**PS 9** The Effect of Sodium Fluoride on Radishes

Sullivan (Sully) Armstead, Patrick Henry High School

Teacher sponsor: Mrs. Joanne Villers

## **SYSTEMS SOFTWARE A**

**SS-A 1** A Novel Multi-Stage Deep Learning Framework Utilizing Convolutional Neural Networks for the Segmentation of Lung Nodules in Thoracic CT Scans

Aryan Madan, Hidden Valley High School

Teacher sponsor: Mr. Mark Levy

**SS-A 2** Python Synthesizer

Ian Harrison, Patrick Henry High School

Virginia (Ginny) Matthews, Patrick Henry High School

Teacher sponsor: Mr. Doug Divers

**SS-A 3** A System-Level Software Architecture for Multi-Omics Data Harmonization and Machine Learning based Computational Analysis of the Elite Controller HIV Phenotype

Samyak Srivastava, Cave Spring High School

Teacher sponsor: Mr. Doug Divers

**SS-A 4** Using Computer Vision and Statistical Analysis to Aid in Soccer Training

Mattox Jalbert, Franklin County High School

Jayden Wainwright, Franklin County High School

Teacher sponsor: Mr. Doug Divers

**SS-A 5** Comparison and Graphing of Online Retail Pricing for Consumer Benefit

Gryphon Flint, Northside High School

Teacher sponsor: Mr. Doug Divers

**SS-A 6** Using Neural Networks to Improve Mental Health in Young Adults

Jamal Millner, Patrick Henry High School

Teacher sponsor: Mr. Doug Divers

## **SYSTEMS SOFTWARE B**

### **SS-B 1** Creating a Painting Program

Kevin Ly, William Fleming High School

Teacher sponsor: Mr. Doug Divers

### **SS-B 2** Automatic Censorship of Personal Data

Nathan Bulla, Cave Spring High School

Teacher sponsor: Mr. Doug Divers

### **SS-B 3** Personalized Digital Phenotyping to Improve Symptoms of Mild Psychological Distress in Young Adults

Yufei (Sophia) Zeng, Hidden Valley High School

Teacher sponsor: Mr. Brandon Taylor

### **SS-B 4** Predicting Election Results with Machine Learning

Gavin Thornton, William Byrd High School

Teacher sponsor: Mr. Doug Divers

### **SS-B 5** Predicting the Severity of El Nino

Rishika Sethumadhavan, Cave Spring High School

Teacher sponsor: Mrs. Joanne Villers

### **SS-B 6** PPE Surveillance System

Caleb Wang, Hidden Valley High School

Teacher sponsor: Mr. Brandon Taylor