

30th Annual

Virginia State Science and Engineering Fair



March 28, 2015

Virginia Military Institute

Center for Leadership & Ethics
Lexington, Virginia





Dear Virginia State Science and Engineering Fair Attendees,

On behalf of the faculty, staff and Corps of Cadets, I welcome you to the 2015 Virginia State Science and Engineering Fair (VSSEF) at the Virginia Military Institute. Approximately 300 students representing 12 regional fairs will be exhibiting their science, technology, engineering and mathematics (STEM) projects this year, with the winners eligible to attend the Intel International Science and Engineering Fair, the world's largest pre-collegiate science competition, taking place in Pittsburgh, Pennsylvania this May. Like last year, we will be awarding The Governor's Award and Grand Prize to the Fair's overall grand prize winner, with cash awards given to category winners. Assisting us with the judging are representatives from the public and private sector, all donating their time to support our state's future STEM professionals.

We encourage you to make the most of this VSSEF experience. We have cadets at VMI who are now majoring in STEM subjects because they were inspired by their own participation in these science fairs. Congratulations are in order to all students presenting here today. Each of you has dedicated your time and energy to complete your research and becoming eligible to compete at VSSEF 2015. Best of luck to all taking part...and our best wishes.

Sincerely,

A handwritten signature in black ink that reads "J. H. Binford Peay III". The signature is written in a cursive style with a flourish at the end.

J. H. Binford Peay III
General, U.S. Army (Retired)
Superintendent

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ACKNOWLEDGEMENTS

Governor of Virginia, Terry McAuliffe

General J.H. Binford Peay III, U.S. Army (Retired)
Superintendent, Virginia Military Institute

Brigadier General Robert L. Green
Deputy Superintendent for Academics and Dean of the Faculty, Virginia Military Institute

Brigadier General Jeffrey G. Smith, Jr.
Deputy Superintendent for Academics and Dean of the Faculty, Virginia Military Institute

VSSEF Fair Director, MAJ Geoffrey Cox, Virginia Military Institute

Center for Leadership and Ethics, Virginia Military Institute

Department of Applied Mathematics, Virginia Military Institute

Office of the Chief of Staff, Virginia Military Institute

Office of Communications & Marketing, Virginia Military Institute

Management and Staff of Aramark, Virginia Military Institute

Physical Plant Staff, Virginia Military Institute

Virginia Military Institute Police

Faculty and Cadet Volunteers

VSSEF, Inc. Regional Fair Directors

Dat Le, Adrian Felts, Myra Thayer, Tom DeVore, Cheryl Lindeman, Jason Calhoun, Odette Scovel,
John Kowalski, Davis Patterson, Chris Hermann, Martha Vogel, Vineeta Ribeiro



SCHEDULE OF EVENTS

FRIDAY, March 27th, 2015

6:00 p.m. – 8:00 p.m.

Registration and setup – VMI's Cameron Hall

1. Students check in at registration desk.
2. Students set up exhibits.
3. Exhibits must be approved by Display & Safety Committee.

NO EXHIBIT SET-UP WILL BE ALLOWED ON SATURDAY

SATURDAY, March 28th, 2015

7:00 a.m. – 7:30 a.m.

Judges check in.

8:00 a.m. – 12:30 p.m.

Judges will interview exhibitors for category and special awards.

Only exhibitors and judges will be allowed in the exhibit area during judging.

11:30 a.m. – 12:30 p.m.

Boxed lunches provided for exhibitors.

1:00 p.m.

Announcement of Grand Prize nominees

Nominees return to exhibits.

1:00 p.m. – 2:30 p.m.

Judges will interview Grand Prize Nominees.

2:30 p.m. – 4:00 p.m.

Exhibits will be open to the public.

4:00 p.m. – 5:30 p.m.

AWARD CEREMONY IN CAMERON HALL

Finalists must attend the award ceremony to receive their awards!

Exhibits MAY NOT be dismantled during the ceremony.

You must wait until the ceremony concludes to dismantle your projects.

Please see the Fair Coordinator for instructions if you are unable to attend the ceremony.

JUDGES

HEAD JUDGE: MAJ RANDALL CONE, PH.D.

Mr. David Abbott	Dr. William Graver	Mr. Seth Mullins
Dr. Mohamed Aboutable	Dr. Calvin Hale	Dr. David Nicholson
Dr. Khaled AbouZeid	Dr. Virginia Harris	Dr. Carlos Nicolas
Mr. Paul Ackerman	Ms. Dorothy Hayden	Dr. Katherine O'Neill
Dr. Anne Alerding	Dr. Meagan Herald	Dr. Stanley Ponce
Mr. Stephen Alter	Dr. Tim Hodges	Dr. Stan Ponce
Ms. Regina Apone	Tom Hoerner	Dr. Lee Rakes
Dr. Nadia Ayoub	Ms. Sevinj Iskandarova	Dr. Eldred Ribeiro
Dr. Michael Balazs	Gordon Jones	Dr. Gary Schafran
Dr. Kyle Bantz	Dr. Max Judge	Dr. Troy Siemers
Dr. Rich Bradley	Steve Keighton	Dr. Erin Smith
Dr. Richard Brown	Mr. Hans Keithley	Dr. Amanda Storm
Dr. Dimplekumar Chalishajar	Dr. Mitch Keller	Dr. Paul Sulewski
Sam Chan	William LaBelle	Ms. Dorothy Tepper
Jenny deHart	Mr. Bobby Lawrence	Mr. Jeff Timmerman
Dr. Samy El-Tawab	Dr. Paul Low	Dr. Matthew Tuchler
Dr. Vicki Fawcett-Adams	Dr. Rajendar Mallepally	Mr. Dixon Tucker
Mr. Fritz Fleming	Dr. David Marsh	Dr. Frank Turner
Dr. Venkat Sundar Gadepalli	Dr. Ramon Mata-Toledo	Dr. Renuka Verma
Jeff Gallagher	Ms. Anna Maximova	Dr. Arun Verma
Jeff Gallagher	Dr. Olga Maximova	Dr. Maria-Cristina Villafranca-Locher
Dr. Nat Ganesh	Robert McMasters	Dr. Jia Wan
Dr. Richard Gardner	Mr. Dale Meyer	Dr. Tom Williams
John Garman	Dr. Tim Moore	Debbie Winetzky
Dr. Gene Godbold	Dr. Brian Moores	Dr. Andrew Young
Mr. Alan Goldberg	Mr. Dennis Morris	Dr. Richard Zechini

SPECIAL AWARD DESCRIPTIONS

American Meteorological Society

Awards 2 certificates of Outstanding Achievement to student exhibitors with the best projects in the areas related to atmospheric, oceanic and hydrologic sciences.

American Psychological Association

Awards a certificate for outstanding research in psychology in the category of Behavior & Social Science.

ASM Materials Education Foundation

Awards a certificate and medallion to the best materials engineering project.

Association for Women Geoscientists

Awards a certificate to a female student whose project, in the opinion of the judges, exemplify high standards of innovativeness and scientific excellence in the geosciences. Special consideration should be given to projects that increase the public awareness of the geosciences, illustrate the interdisciplinary nature of the geosciences or promote the sensitivity to the earth as a global system.

ASU Walton Sustainability Solutions Initiatives

The ASU Walton Sustainability Solutions Initiatives will provide 2 awards consisting of a certificate and a chance to win a trip to Arizona for the 2016 Sustainability Solutions Festival. *Criteria: Eligible projects (from any category) will seek innovative solutions to humanity's most challenging problems in the fields of either social justice or environmental and economic prosperity.*

Central Virginia Chapter INCOSE Award

Central Virginia Chapter (CVA) of International Council of System Engineers (INCOSE) provides 3 awards consisting of a monetary prize (1st-\$100, 2nd-\$75 and 3rd-\$50) and a certificate. *Criteria: The project can come from any category, but it must have been completely independent. That is, the project should have been completed without the mentorship of a professional and without access to professional/industrial resources.*

Intel Excellence in Computer Science

Awards a certificate and \$200 to the first place winner of the Computer Science category.

Leidos

Leidos is a scientific, engineering and technology applications company that solves problems of vital importance in national security, health, and engineering. Leidos is proud to offer monetary awards in the fields of Microbiology, Physics/Astronomy, Applied Science, and Computational Science.

Mark Licata Award for Biotechnology

The Mark Licata Award for Biotechnology focuses on the use of cellular and, molecular processes rather than chemical synthesis, to solve problems or develop products, plus other key areas of industry focus, such as bioinformatics, biodefense, biofuels, agricultural bio and industrial/environmental biotechnology.

Mu Alpha Theta

This National High School and Two-Year College Mathematics Honor Society awards a certificate to the individual or team project, demonstrating the most challenging, original, thorough, and creative investigation of a problem involving modern mathematics. This project does not necessarily have to be entered in the mathematics category.

National Oceanic and Atmospheric Administration (NOAA)

Awards a certificate and lapel pin to the project selected from among all the general award categories whose research emphasizes NOAA's mission: "to understand and predict changes in Earth's environment and conserve and manage coastal and marine resources to meet our Nation's economic, social, and environmental needs."

Ricoh Sustainable Development Award

Awards a certificate to one individual or team, whose principles and scientific innovations best reflect the principles of sustainability – balancing economic development with environmental responsibility.

Society of In Vitro Biology

Awards a certificate to a high school junior in the category of plant or animal in vitro biology or tissue culture.

Stockholm Junior Water Prize

Awards certificates to the top 3 most outstanding water-related research projects. Projects are assessed based on six criteria: relevance, creativity, methodology, subject knowledge, practical skill, and presentation.

U.S. Air Force

The U.S. Air Force provides 4 awards consisting of a certificate, backpack, flashdrive, earbuds, and a 4-port usb hub. *Criteria: Projects related to Air Force applicability will be given special consideration.*

U.S. Department of Health and Human Services

Awards a certificate to a winning project that creatively illustrates and expands upon the following statements from the Surgeon General: regular physical activity is important for maintaining good health, a healthy diet is key to maintaining a healthy weight and having a long healthy life, tobacco use is hazardous to your health, injury and illness prevention saves lives.

U.S. Metric Association

Awards a certificate to the student whose project involves a significant amount of quantitative measurement and which best uses the SI metric system for those measurements.

U.S. Navy/Marine Corps – Office of Naval Research

The Office of Naval Research plans, executes, coordinates and promotes science and technology for the US Navy and Marine Corps through work performed at universities, naval laboratories and industrial research centers. Awards 5 projects a certificate of achievement, a medallion, and a \$75 gift certificate.

VAAWWA Award

The Virginia Section of the American Water Works Association (VAAWWA) is an international nonprofit scientific and educational society dedicated to the improvement of drinking water quality and supply. VAAWWA will present 3 monetary awards (1st-\$500; 2nd-\$200, 3rd-\$100) together with certificates. *Criteria: Projects must be related to water, but special consideration will be given to projects addressing drinking water issues.*

Virginia Dental Association: Science Talent Awards Program

Promotes dentistry through the encouragement of experimental exploration of research; awards Certificates of Merit, career information, (10) \$100 awards and one Grand Award of \$1500.

Yale Science & Engineering Association

Awards a certificate and medallion to the most outstanding 11th grade student exhibiting in the areas of Computer Science, Engineering, Physics or Chemistry.

Awards Ceremony

Saturday, March 28 – 4:00-5:30 pm

Opening Remarks

Brigadier General Jeffrey G. Smith, Jr.
Deputy Superintendent for Academics and Dean of the Faculty, Virginia Military Institute

Special Awards

American Meteorological Society
American Psychological Association
ASM Materials Education Foundation
Association for Women Geoscientists
Intel Excellence in Computer Science
Mu Alpha Theta
National Oceanic & Atmospheric Administration (NOAA)
Ricoh Sustainable Development Award
Society for In Vitro Biology
Stockholm Jr. Water Prize
U.S. Department of Health and Human Services Award
U. S. Metric Association Award
Virginia Section of the American Water Works Association (VAAWWA)
Yale Science and Engineering Award
ASU Walton Sustainability Solutions Initiatives
U.S. Air Force
U.S. Navy/Marine Corps Award, Office of Naval Research
Central Virginia Chapter INCOSE Award
Mark Licata Award for Biotechnology (VA Bio)
Leidos Corporation
Virginia Dental Association: Science Talent Awards Program

Category Awards

Animal Science
Behavioral and Social Sciences
Biochemistry
Cellular & Molecular Biology
Chemistry
Computer Science
Earth & Planetary Science
Energy & Transportation
Engineering: Electrical & Mechanical
Engineering: Materials & Bioengineering
Environmental Management
Environmental Sciences
Mathematical Sciences
Medical and Health Sciences
Microbiology
Physics and Astronomy
Plant Sciences

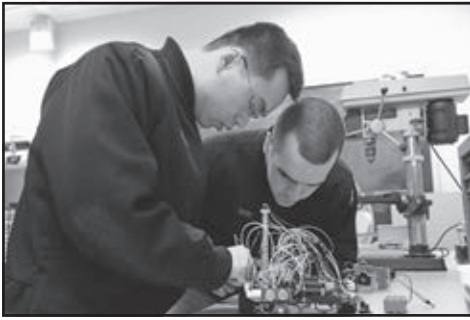
Virginia State Science Fair Grand Prize Awards

Presented by Brigadier General Jeffrey G. Smith, Jr.

Governor's Award and Grand Prize

Second Grand Prize

Third Grand Prize



VMI's STEM Program

2014-15 commemorates 175 years of tradition to student excellence! VMI's STEM programs offer a balance between theory and practical hands-on. Each offers a rigorous and challenging course of study in a small college environment.

Advantages of attending VMI include:

- ☆ Small classes where professors know you personally (12:1 ratio)
- ☆ Full-time professors with Ph.D. degrees who teach the classes and grade the assignments
- ☆ Placement rate of 97% for VMI graduates to employment or graduate or professional schools within four months of graduation
- ☆ If you are interested in the military, you can earn a commission in the Army, Air Force, Navy, or Marine Corps, but this is not a requirement of VMI graduation.

Engineering Programs

B.S. in Civil & Environmental, Electrical & Computer or Mechanical Engineering.

Information and Social Sciences

B.S. in Computer & Information Sciences, Economics and Business, and International Studies and Political Science.

Life Sciences

B.S. and B.A. degree is awarded in biology, and a B.S. in psychology.

Both departments also offer minors and/or concentrations. Newly added: Minor in Exercise Science.

Natural Sciences

B.S. Applied Mathematics, B.S. or B.A. available for either Chemistry or Physics & Astronomy.

Please visit <http://www.vmi.edu> for more information about our academic programs or campus opportunities for prospective students.





The VMI Center for Leadership and Ethics

The primary mission of the Center for Leadership and Ethics (CLE) is to enhance the cadet experience here at VMI. We provide programs that support VMI's system of leadership training and challenge cadets and our society with conferences on topics of national and international importance.

Our staff assists VMI departments and external organizations in developing and offering relevant, dynamic events on a variety of topics including a four-year cycle of STEM Education conferences from 2012 – 2015 and the Virginia State Science and Engineering Fair through 2017.

UPCOMING SCHEDULE OF EVENTS:

Academic Year 2014 - 2015

- Mar. 31 - Apr. 2, 2015 - 26th Environment Virginia Symposium

Academic Year 2015-2016: 'Living in the Age of Machines'

- Oct. 5-7, 2015 - 4th STEM Education Conference - Technology focus
- Dec. 11-12, 2015 - Biennial Seiziémistes of the Mid-Atlantic Conference
- Mar. 7-9, 2016 - 6th Annual Leadership Conference: 'Ethical Dilemmas in the Age of Machines'
- Apr. 5-7, 2016 - 27th Annual Environment Virginia Symposium
 - Apr. 8-9, 2016 - Virginia State Science & Engineering Fair
 - May 28, 2016 - 16th Biennial Stonewall Jackson Symposium

VSSEF 2015 Sponsors

Battelle
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**Join us for next year's VSSEF:
April 8-9, 2016**

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and Engineering Fair

Virginia Military Institute

March 27-28, 2015