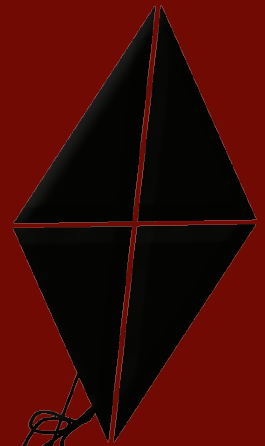


31st Annual

Virginia State Science and Engineering Fair



April 9, 2016

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 2016 Virginia State Science and Engineering Fair (VSSEF) at 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 Phoenix, Arizona 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 the state's future STEM professionals.

Here at VMI, hosting VSSEF is just one of the ways in which we support STEM students in their academic and research endeavors. October 2016 will mark the fifth annual VMI STEM Education conference which emphasizes increasing student and teacher preparedness across the STEM disciplines. 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 science fairs.

Congratulations are in order to all students presenting here today. Each one has dedicated time and energy to completing his or her research and becoming eligible to compete at VSSEF 2016. Best of luck to all taking part!

Sincerely,

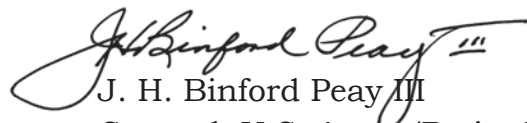

J. H. Binford Peay III
General, U.S. Army (Retired)
Superintendent

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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., U.S. Army (Retired)
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

Jason Calhoun, Tom DeVore, Adrian Felts, Vonita Giddings, Chris Hermann, John Kowalski,
Dat Le, Cheryl Lindeman, Abbie Patterson, Vineeta Ribeiro, Odette Scovel, Myra Thayer



SCHEDULE OF EVENTS

FRIDAY, April 8th, 2016

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, April 9th, 2016

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 building 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.

1:15 p.m. – 2:15 p.m.

VMI Post Tours (optional)

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: RANDALL CONE

Mohamed Aboutabl

Khaled AbouZeid

Paul Ackerman

Anne Alerding

Stephen Alter

Nadia Ayoub

Emily Ayuso

Michael Balazs

Kyle Bantz

Gregory Battle

Michael Bear

Eileen Bill

Julian Bobb

Rich Bradley

Nick Brown

Mitchell Bukzin

William Burston

Sam Chan

Corey Cleland

Clay Devening

Samy El-Tawab

Marcia France

Richard Gardner

John Garman

Avi Gibberman

Gene Godbold

Alan Goldberg

William Graver

Calvin Hale

Maila Hallare

Virginia Harris

Dorothy Hayden

Meagan Herald

Tim Hodges

Tom Hoerner

Sevinj Iskandarova

Gordon Jones

Max Judge

Thomas Jull

Hans Keithley

Mitch Keller

Jared Kleine

Gary Kohl

William LaBelle

Marcel Lambrechts

Bobby Lawrence

Rachel Lazarus

Rajendar Mallepally

Eryney Marrogi

David Marsh

Ramon Mata-Toledo

William Mattson

Anna Maximova

Olga Maximova

Robert McMasters

Vishal Mehta

Dale Meyer

William Midkiff

Carlos Nicolas

Jasper Nijdam

Katherine O'Neill

Kevin Owen

Allan Plumley

Bill Plymale

Catherine Pollack

Stanley Ponce

Eldred Ribeiro

Christine Ring

Gary Schafran

Megan Schoenberg

Ellen Shrader

Troy Siemers

James Stewart

Amanda Storm

Paul Sulewski

Dorothy Tepper

Matthew Tuchler

Dixon Tucker

Frank Turner

Arun Verma

Renuka Verma

Maria-Cristina Villafranca

Jia Wan

Tom Williams

Wayne Williams

Debbie Winetzky

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.*

INCOSE Award

The International Council of System Engineers (INCOSE) Central Virginia Chapter (CVA) will provide certificates and monetary awards for three outstanding science projects (\$100 – 1st, \$75 – 2nd, \$50 – 3rd).

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.

NASA Earth System Science Award

Recognizes outstanding projects relating to earth system science. A certificate will be provided to the student whose project offers the Greatest Insight into Earth's Interconnected Systems.

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. 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.

Virginia Section of the American Water Works Association

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, April 9 – 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
INCOSE Award
Intel Excellence in Computer Science
Mu Alpha Theta
NASA Earth System Science Award
National Oceanic & Atmospheric Administration (NOAA)
Ricoh Sustainable Development Award
Society for In Vitro Biology
Stockholm Jr. Water Prize
U. S. Metric Association Award
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
Virginia Section of the American Water Works Association
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

Governor's Award and Grand Prize

Second Grand Prize

Third Grand Prize



VIRGINIA MILITARY INSTITUTE

NO ORDINARY COLLEGE. NO ORDINARY LIFE.

The VMI Education

Virginia Military Institute offers undergraduate education of highest quality – embracing engineering, science, social sciences, and the humanities – within a military environment. It's an education that develops character, engenders a sense of responsibility to others, and cultivates the ability to master adversity.

The VMI Experience

Small classes where professors know you personally (11:1 cadet-faculty ratio).

90 percent rate of placement for recent VMI graduates to employment or graduate or professional school.

ROTC training that can lead to a commission in the Army, Air Force, Navy, or Marine Corps.

Opportunities to excel, including undergraduate research, international programs, Institute Honors, and service learning.

More academic opportunities, more physical training, more leadership – more challenge.

Engineering Programs

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

Information and Social Sciences

B.S. in Computer Science; B.A. in Economics and Business; B.A. in International Studies and Political Science

Life Sciences

B.S. and B.A. in biology; B.S. in psychology

Natural Sciences

B.S. Applied Mathematics; B.S. and B.A. in Chemistry; B.S. in Physics

Arts & Humanities

B.A. in English; B.A. in History; B.A. in Modern Languages and Cultures

Visit admissions.vmi.edu for more information about academic programs and opportunities to visit.





The VMI Center for Leadership and Ethics

VMI offers a relevant education within a military environment, developing character, engendering a sense of responsibility, and cultivating the ability to master adversity. These leadership traits are inculcated through cadet-led programming, including the Corps of Cadets, the Honor Court, and the class system. All cadets take part in Army, Navy, Marine Corps, or Air Force ROTC programs. The VMI experience is a leadership lab, preparing cadets for military and civilian careers alike.

The Center for Leadership and Ethics enhances VMI's system of leadership training by offering co-curricular cadet programming focused on leadership, ethics, and character development and a robust schedule of conferences on challenging topics of national and international interest.

The Center for Leadership and Ethics is supported in part by the Jackson-Hope Fund.

UPCOMING EVENTS:

April 16: "Anatomy of a War Experience: Vietnam, 1967-1968 – Tet and the Turning Point," an event of The Norman Lane Junior Memorial Project

**April 30-May 1: Virginia Humanities Conference:
"Survival of the Humanities in a Technological World," academic conference hosted by VMI**

**June 5-7: Applied Mathematics Conference:
"Inverse Problems," academic conference hosted by VMI**

Oct. 4-5: Annual VMI STEM Educator's Conference: Focus on Mathematics

**Nov. 7-10: Seventh VMI Leadership Conference –
Topic: Strategic Leadership During Global Transitions**

VSSEF 2016 Sponsor



**Join us for next year's VSSEF:
March 24-25, 2017
Virginia Military Institute**

Virginia State Science
and Engineering Fair

Virginia Military Institute

April 8-9, 2016