

INSTITUTE REPORT

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Rockets, Research, and Rovers Cadet Launches into Never-Completed Mars Rover Competition

By Mary Price

At VMI, seeing cadets set and achieve big goals is almost an everyday occurrence. But Clay Penney '19 has set a goal big enough to be called audacious: to succeed in a rocket-launching competition that no entrant has ever completed successfully in the decade-plus history of the competition.

On March 30-31, 2019, Penney will launch his 11-foot-tall homemade



Clay Penney '19 and Col. Jim Squire watch as Penney's rocket launches in Highland County Nov. 3.—VMI
Photo by Kelly Nye.

rocket in Culpeper, Virginia, as part of the Federation of Galaxy Explorers' Mars Rover Competition. For Penney, an electrical and computer engineering major, the rocket project is the basis of his Institute Honors thesis.

To meet the requirements for full completion of the competition, contestants must launch a rocket to

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Ranger Teams Rise to the Challenge

By Mary Price

It was cold, raining, and just downright miserable. The assigned tasks required plenty of physical strength, plus a commensurate amount of mental toughness. And yet with the "never say die" spirit of VMI cadets, the two VMI teams competing in Ranger Challenge this fall persevered to finish second and third to the University of North Georgia in the annual competition held at Fort Knox, Kentucky, Oct. 24-28.

The Institute's two teams went up against teams from the U.S. Army Cadet Command's 1st Brigade, which includes the six Senior Military Colleges.

"[VMI has] never had two teams finish as high as they did this year in the military brigade competition," said Sean Cook, who's in his first year as coach to the Ranger Challenge teams.

The cadets' performance earned them a place at the Sandhurst International Military Skills Competition at West Point April 12-13.

Described as the "Army ROTC varsity sport" by the U.S. Army Cadet Command, Ranger Challenge involves a written

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Ford '14 Among Best in the Air Force

By Molly Rolon, VMI Alumni Agencies

U.S. Air Force Capt. Alyssa Ford '14 comprises one half of the best missile combat crew in the Air Force. Ford and her crew partner, 1st Lt. Collin Crane, won the 2017 Air Force Global Strike Competition for best intercontinental ballistic missile weapon system score. They topped their success with another, winning the Gen. Thomas S. Power award for best missile crew in 2018.

The Global Strike Competition, run by the Air Force's Global Strike Command, has many categories, and Air Force personnel compete within their specialties. For Ford, it meant preparing by using missile procedure trainers, which are mock-ups of the ICBM launch control centers that run simulations. To prepare for the competition, Ford and Crane practiced at night, normally from about 8 p.m. to 3 a.m.

A normal work schedule for a missile crew involves being on call, and the schedule doesn't include weekends off on a regular basis. Ford said six to eight alerts per month are the norm. Each alert begins with a briefing to bring the missile crew up to date, and the crew reports to their squadron's command post, picks up their transportation and any other items or personnel that may need to go to the missile site, and then drives out to the missile site.

After being checked in by Air Force security forces who protect the missile sites, the crew descends 60 to 70 feet below the ground and spends about 24 hours on alert. The two-person crew splits the shift, and Ford noted that the senior person normally takes the night shift. "I'm perpetually tired," she laughed, adding that, "VMI taught me to sleep anywhere." After the alert ends, the crew has the rest of the day off, plus the following day. Then the cycle begins again.

While Ford and Crane were training for the competition, their squadron helped out, making sure they only had to go to two events per month. The training encompassed two areas: weapons system knowledge and emergency war order knowledge. "Our instructors were throwing weird scenarios at us, making us critically think, and overcome and adapt," Ford said.

After waiting for all the other missile crews in the Air Force to finish their training and testing, Ford and Crane went to a

convention at Barksdale Air Force Base, Louisiana. There, they learned, in a somewhat "nerve-wracking" public score posting, that they had won the missile category of the Global Strike Competition.

The two next applied for the Power award. In August 2018, they found out that they had been selected as the best missile crew in the Air Force. The next month, Ford and Crane attended the annual Air Force Association conference in Washington, D.C., to receive their award.

"I love missiles," Ford said, talking about her career field. This was not, however, always the case. As an Air Force ROTC cadet, she knew that the career field had negative connotations, and Ford was less than thrilled when she found out missiles was her assigned field.

After four years in the career field, Ford's feelings about missiles have changed completely. "I didn't pick missiles, but I'm glad missiles

picked me," she said. Ford recently had an opportunity to choose another career field, but intentionally chose to stay with missiles.

Addressing the negativity sometimes associated with the field, Ford noted that some of the perception comes from the time spent underground. "Nobody wants to be under-

ground eight times a month," she continued. "It does wear you down sometimes. But you have to keep a positive attitude." Once she is underground, Ford said, she often doesn't realize she's there. There are comfortable billets, movies, computer access, and more to occupy the missile crews during their long shifts.

Ford was back on post recently with her younger brother, Sheridan Ford '22, who matriculated in August 2018. Until she matriculated, her family did not have a VMI tradition. She found out about VMI at a local information session while in high school. Ford was already interested in military schools, and a visit to VMI cemented that the Institute was the right choice for her.

Her experience at VMI stands her in good stead four years later. "I still use anything and everything I can from VMI," Ford said. "It's something that sticks with you, especially in high-stress environments. I'm not as crazy, or as stressed. It's more like, 'I've got this. I can work under pressure.'" 🌟



Capt. Alyssa Ford '14 and her crew partner, 1st Lt. Collin Crane, received the Gen. Thomas S. Power Award.—Photo by U.S. Air Force Staff Sgt. Rusty Frank.

INSTITUTE REPORT

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Institute Society Donors Honored

By Scott Belliveau '83, VMI Alumni Agencies

On Nov. 9, VMI celebrated the generous giving of over 500 donors at the 44th annual Institute Society Dinner. At this annual black tie event, the VMI Foundation recognizes Institute Society members—alumni and friends whose generosity marks them as leaders in support of the Institute and the Corps of Cadets. In fiscal year 2018, the society's more than 900 members donated \$2.1 million, a source of critically important unrestricted money for VMI.

In his remarks, T. Bryan Barton '68, VMI Foundation president, praised the members of the society for their willingness to support the Institute. "What is truly important is the impact your generosity has on post," he stated. "The impact it has on our faculty and staff and their ability to educate our cadets in VMI's own unique, demanding style. And the impact it has on the futures of our cadets ... who VMI is preparing to lead lives

of consequence for our state, our country, and the world."

Gen. J.H. Binford Peay III '62, superintendent, addressed the guests as well, saying, "We are here not only because we love the Institute, but also because we are proud of the strong citizens and leaders that this institution produces. We stand for something that our nation needs. It is the 'VMI difference,' and it is why you have heard me say with repetition, 'VMI is a national treasure.'" ❁



Gen. J.H. Binford Peay III '62, superintendent, thanked Institute Society members for their generous support.—VMI Alumni Agencies Photo by Steve Shires.



Institute Society members viewed a short video showcasing highly accomplished cadets.—VMI Alumni Agencies Photo by Steve Shires.

at least 1,000 feet, with an autonomous robot contained inside the rocket at the time of launch, and then deploy the robot for a safe landing.

Once the robot has landed, it must travel at least three feet and wait for a command from a small handheld wireless controller. Upon receiving the command, the robot is to collect between 5 and 25 grams of soil. After that, the robot is to take a picture of the area from which the soil was collected, and then its work is done. The work done is meant to simulate that accomplished by the actual Mars Rover.

Completing the Mars Rover Competition sounds simple. But as Col. Jim Squire, Penney's adviser, explained, nothing could be further from the truth.

"It's freakishly, freakishly difficult," said Squire, professor of electrical and computer engineering. "No team in the history of this competition ... has ever managed to not get disqualified at some point.

"There's just so many things that can go wrong on a rocket launch," Squire continued. "Even the big boys like NASA have had problems with their Pathfinders."

Because every team that's ever attempted the competition has been disqualified,



Clay Penney '19 makes last-minute adjustments before launching his rocket Nov. 3.—VMI Photo by Kelly Nye.

Squire explained, the "winner" is the team which accumulates the most points by coming closest to reaching all of the goals. In years past, the winners have been schools with big aerospace programs such as the University of Alabama at Huntsville and the University of Texas at Arlington. Some years, no one enters the Mars Rover

competition at all, Squire noted, likely because potential entrants realize the depth and breadth of the challenge.

Penney, though, had the wisdom to know he'd need a test launch—and he and Squire completed that in early November at a launch site in Highland County. At the test launch, some things went well, and some did not.

At first, it was a picture-perfect launch as 450 pounds of thrust blasted the rocket skyward. At 1,300 feet, the rocket reached apogee—the highest point of its arc—and the craft's flight computers recognized the time was right to set off the black-powder charges that would deploy the robot, attached to a parachute to assure its safe landing.

That's when things went wrong. "[The rocket] broke apart in ways it was supposed to, and ways it wasn't supposed to," said Penney. Because some screws gave way when they shouldn't have, the force of the parachute yanking away pulled the avionics bay—the portion of the rocket housing the flight computers—away from the main body of the



The rocket built by Clay Penney '19 takes off in Highland County and reaches 1,328 feet during its initial test flight Nov. 3.—VMI Photo by Kelly Nye.

rocket. The avionics bay landed a mile and a half from the launch site, and it was up to Penney, a former cross-country runner, to retrieve it in a speedy fashion.

Not surprisingly, Penney found his creation caught in a tree. But a red, white, and yellow parachute isn't too hard to find. "The VMI colors really stood out in the tree," said Penney.

The robot wasn't part of the test launch, though a prototype was supposed to be launched in the rocket.

"We ran into a size constraint at the last minute," Penney explained. "The robot was about a quarter-inch too wide to fit correctly into the tube."

They'd measured, of course, well aware that an eight-inch diameter rocket is a very small space.

But there was a problem neither Squire nor Penney had thought of—leaving room for the parachute to fit in the space alongside the robot.

"There's odd things like that—that even if you're trying to test along the way, you don't think of," Squire commented. "That's why we did the test [launch]. There's too many variables to hit them all perfectly the first time through."

Before the March competition date, Penney plans to reinforce the rocket by strapping it together internally so it

can't break apart again when the parachute deploys.

"While it didn't go 100 percent perfectly, we can have it flying within a week and have it better than it was before," he said the day of the test launch.

"I wouldn't have this opportunity without VMI or Col. Squire, so I'm just grateful for that and the Honors Program," Penney added.

Funding for Penney's project has come from the Wetmore Fund, the Department of Electrical and Computer Engineering, and the Jamison-Payne chair in electrical and computer engineering, which Squire holds. ❁



Founders Day

VMI observes Founders Day with a parade and a 17-gun salute to honor the nation's veterans and the founders of VMI. The four howitzers—normally fired from the Parade Ground—were fired from the North Post drill fields due to wet weather. The ceremony marks 179 years since 23 cadets relieved the state militia and converted the state arsenal into the Institute.—VMI
Photos by Kelly Nye and Maj. John Robertson IV.



ATHLETICS

Football

Though the Keydets closed the 2018 season with a pair of defeats, 49-13 at home against Furman and 77-14 on the road at Old Dominion, they did manage to snap a long losing streak and avoid a winless season with a 20-11 victory over Tusculum Saturday, Nov. 3, in Lexington.

In the victory, quarterback Reece Udinski '21 completed 17 of 32 passes to set a new VMI single-season completion record, but it was the running game and a stout defense that led the charge for VMI. Running back Alex Ramsey '20 set a career high with 134 yards rushing in the contest, while Bret Howell '22 turned his best effort of the year with 16 tackles on the defensive side of the ball.

At the same time, wide receiver Kris Thornton '21 hauled in eight passes for 83 yards and went over the 1,000-yard receiving mark for the year in the contest against Old Dominion, marking just the third time in school history a receiver has accomplished that feat. The Keydets finished the season with a 1-10 overall record.



Quarterback Reece Udinski '21 looks to pass during the game against Tusculum Nov. 3.—VMI Photo by Chris Floyd.

Behind two goals from Whitney Edwards-Roberts, the Keydets had the lead twice in the second half but couldn't hold on.

VMI advanced to the second round of the tournament with a 1-0 victory over Chattanooga three days earlier in Chattanooga, Tennessee, Amber Levy, scoring just the second goal of her career, gave VMI all the scoring it would need early in the first half. That tally was all the Keydets needed as the VMI defense held the Mocs to just six shots in the contest.

Women's Soccer

The women's soccer team matched last year's total for victories and finished the 2018 campaign with a 7-9-2 overall record after falling to UNC-Greensboro, 3-2, in the quarterfinals of the Southern Conference tournament Oct. 27 in Greensboro, North Carolina.



Claire Lee '22 fires from standing position during a match against North Georgia in Kilbourne Hall Oct. 20.—VMI Photo by H. Lockwood McLaughlin.

Cross Country

The VMI cross country teams wrapped up the season at the Southern Conference Championships Nov. 5 in Cullowhee, North Carolina, with the men placing fifth in the meet and the women taking eighth place.

Davone Henderson was the top finisher for the VMI men, taking 11th and earning All-SoCon honors. Gavin Jenkins '22, who placed 32nd overall, earned a spot on the All-SoCon Freshmen Team.

Anna Armfield '21 and Logan Luckett '20 were the top finishers for the VMI women.

Men's Soccer

The VMI soccer season came to an end with a 2-1 loss to Belmont in the first round of the Southern Conference tournament Oct. 31 in Nashville, Tennessee. Sohlab Shaikh '19 gave the Keydets a 1-0 lead in the first half, but it did not last as Belmont tallied a pair of second-half goals to eke out the win.

Goalkeeper Broden Schull '22 was recognized by the league at the end of the season by being named to the SoCon All-Freshman Team. Schull led all of Division I with 121 saves on the year. The Keydets completed the 2018 campaign with a 1-16-1 overall mark.

Basketball

The VMI basketball team is off to a 3-1 start after defeating USC-Upstate 78-72 Nov. 14 in Cameron Hall.

The Keydets found themselves knotted at 31-31 at intermission but pulled away in the second half. VMI hit seven of eight free throws down the stretch to seal the victory.

Jake Stephens '22 led all VMI scorers with 20 points in the contest. Bubba Parham '21 added 14 points, 12 in the second half, while Greg Parham '21 and Sarju Patel '21 chipped in with 12 and 11 points, respectively.

Men's Swimming

VMI's men's swimming has also gotten off to a good start to the season, winning three of its first five meets. The latest victories came in a tri-meet Oct. 13 in Lexington, where the Keydets topped Howard University (157.5-75.5) and Barton College (128-102).

Stephen Hopta '22 led VMI's winning effort, taking first place in two individual events and swimming a leg on the victorious 200-yard freestyle relay team.

Hopta took first in both the 200 freestyle (1 minute, 45.3 seconds) and the 500 freestyle (4:49.33). He also teamed up with Brady Gannon '19, Nick Palmieri '21, and Ryan Schmitz '21 to win the relay race in 12:27.79. Other winners for VMI included Ryan Cooper '22, who



Greg Parham '21 makes a jump shot against Washington College during the Nov. 6 game in Cameron Hall. —Photo courtesy of VMI Athletic Communications.

touched the wall first in the 200 breaststroke, and John Reed Jr. '19, who won both the 1-meter and 3-meter diving competitions.

Rifle

The men's rifle team picked up its first win of the year Nov. 3, defeating Wofford, 4449-4437, in Lexington. John Pitman '19 paced the Keydets, taking first place in the air rifle competition and third in smallbore. Jacob Lagace '21 finished just ahead of Pitman in the smallbore event, while Hunter Jacob '20 took third in air rifle.

In its latest outing, VMI fell to the University of Alabama-Birmingham, 4551-4491, Nov. 11 in Lexington. Pitman again led the way, taking second place in smallbore and third in air rifle.

On the women's side, VMI scored 4333 against Wofford, with Kelia Aardema '20 taking sixth in smallbore, and 4370 in the match against UAB, as Elena Raco '22 placed seventh and Jessica Hankin '22 took eighth in air rifle.

Wrestling

The Keydets are still seeking their first win of the season, but they came close in a 20-17 setback to George Mason in the season opener Nov. 2 in Lexington.

VMI dominated the lighter weights in the match and won five bouts overall. At 125 pounds, Derek Shockey '22 scored a 2-1 decision, and Hunter Starnes '18 won his match with a 6-3 decision at 133. Dom Gallo '19 eked out a 1-0 victory at 141, while Neal Richards '19 dominated in a 19-4 technical fall at 174. In the 187 match, Chris Beck '20 was victorious with a 2-0 decision.

Women's Swimming

While VMI is still seeking its first team victory of the year, the Keydets are getting some outstanding individual performances.

In the latest meet in Davidson, North Carolina, two members of the team really shone. Sophie Svoboda '22 broke her own school record in the 100 breaststroke, clocking a time of 1:08.95 to place fifth. She was also second in the 50 free. At the same time, Callie Biles '20 tallied 152.78 points to win the 1-meter diving competition. ❁



Derek Shockey '22 wrestles against Talha Farooq of George Mason University in a Nov. 2 meet in Cormack Hall. —VMI Photo by H. Lockwood McLaughlin.

Conference Explores 'Grit and the American Character'

By Mary Price

Don't accept self-limiting beliefs. Practice the things you're not good at. Then go back and practice them some more. Learn from failure and negative feedback. Most of all, be realistically optimistic—and seek to uplift others, not just yourself.

Those were the key concepts that Milana Hogan, chief legal talent officer at Sullivan & Cromwell LLC, shared with attendees at the VMI Center for Leadership and Ethics' 2018 Leadership Conference, "Grit and the American Character," held Oct. 29-30.

Hogan, whose goal at the firm is to help young lawyers succeed, was the first speaker in VMI's newly established Caroline Dawn Wortham '12 lecture series. The series honors the life and legacy of Wortham, a humanitarian activist who died in 2015 at the age of 26 after being hit by a car while riding her bicycle in Hanover County, Virginia.

"She had a total sense of mission in life," recalled her father, Dr. Edwin Wortham V, who came to post to attend the inaugural lecture. "Nothing stopped that girl."

After graduating from Richmond's all-female St. Catherine's School in 2008, Wortham sought a new challenge and matriculated at VMI, plunging into all that the Institute had to offer. Not only was she one of the founding members of Keydets Without Borders, traveling to Bolivia with that organization, but she also served as the regimental S-2 captain (academics) and was captain of the women's track and field team. She was a recipient of the Society of the Cincinnati Medal, given by the faculty to a member of the graduating class distinguished for efficiency of service and excellence of character.

After graduating from VMI, Wortham lived and worked in Haiti, where she strove to improve prenatal care for pregnant



Milana Hogan addresses Leadership Conference participants in Marshall Hall's Gillis Theater.—VMI Photo by H. Lockwood McLaughlin.

about me. It's about what we can do to serve the world and make a difference," he stated.

Serving the world, though, is an enormous undertaking, and one requiring that strength of character known as grit—which is often thought of as an acronym standing for growth, resilience, integrity, and tenacity. In her remarks, Hogan spoke about some of the research findings contained in her recently published book, *Grit: The Secret to Advancement*.

Hogan, who holds an undergraduate degree from Brown University and a doctorate in educational leadership from the University of Pennsylvania, defined grit as behavioral perseverance in the face

women. The Carrie Wortham Birth Center in Cabestor, Haiti, opened shortly after her death.

Dr. Wortham said that he hopes the lecture series will help current cadets to draw inspiration from his daughter's legacy of service. "If [Carrie] were here, she would say, 'Dad, it's not

of adversity and the sustained, passionate pursuit of goals.

"Whatever natural talent you have is only part of the story," said Hogan. "People of average intelligence and skill can and do become world-class experts and performers."

Mind, she argued, is just as important as body, if not more so. Hogan stated that a growth mindset free of "ceilings" or self-limiting beliefs such as "I'm just not good at ..." is crucial to success, as research has now disproven the idea that intelligence is fixed.

"Having a growth mindset puts you in a position to engage in gritty behavior," she commented. "The brain is a muscle. The more you work it, the smarter you become."

Yet there's good grit and bad grit. Hogan defined good, authentic grit as "the passionate pursuit of hard goals that awes and inspires others to become better people, flourish emotionally, take positive risks, and live their best lives. ... Authentically gritty people are the people who inspire us."

When thinking of good grit, "Carrie [Wortham] came to mind over and over again," said Hogan. "Reading about her and what she accomplished after VMI really resonated with me."

Bad grit, by contrast, involves taking shortcuts, having "summit fever" and refusing to bow to common sense in the pursuit of goals, and focusing narcissistically on the self.

Building good grit, said Hogan, can be accomplished by getting comfortable with uncertainty, learning how to handle failure, and rewarding oneself and others for effort, not outcomes.

"Most of the time when you're getting really good at something, there's also failure along the way," Hogan commented. "Grit is about playing the long-term game."

In addition to Hogan's speech, the Leadership Conference featured a talk by former U.S. Secretary of Education William "Bill" Bennett and a panel discussion about community resilience in the wake of the Sandy Hook Elementary School tragedy in which 26 children and adults died



Caroline Wortham '12 receives her diploma May 16, 2012.—VMI File Photo by Kevin Remington.

in a mass shooting on Dec. 14, 2012.

Other speakers included Medal of Honor recipient Clint Romesha and Afghanistan war veteran and author James Hatch. Conference attendees also had a chance to test their own physical and mental grit by tackling a variety of challenges in the Corps Physical Training Facility. ❁



Class of '93 Presents Campaign Proceeds

The Class of 1993 presented the Institute with the initial proceeds of its 25th Reunion Campaign: gifts and commitments totaling more than \$1 million on Nov. 3. Making the presentation were, left to right, Jim Sharp, Class Agent and the co-chairmen of the campaign, Clifford Foster, and Tom Ripley. General J.H. Binford Peay III '62, superintendent, and Steve Maconi, CEO of the VMI Alumni Agencies, accepted the check on behalf of the Institute. — VMI Alumni Agencies Photo by Micalyn Miller.

Libertini Advises on Policy in DoD Fellowship

By Ashlie Walter



Lt. Col. Jessica Libertini flies in a Singapore Air Force helicopter with U.S. Under Secretary of Defense Ellen Lord on a tour of the city-state.—Photo courtesy of Jessica Libertini.

For Lt. Col. Jessica Libertini, a yearlong fellowship in the U.S. Department of Defense pushed her beyond her comfort zone and expanded her connection to commissioning cadets.

In September 2017, Libertini, associate professor of applied mathematics, started a science and technology policy fellowship through the nonprofit American Association for the Advancement of Science.

The nonprofit places between 200 to 300 scientists and engineers in the three branches of government. Her position as an executive branch fellow allowed her to work with international policy makers in cooperation with other nations.

“I think I spent half the year figuring out what my job was. If I had stayed another year, I would have accomplished more,” Libertini said. “I wanted to do something different, and I wanted to challenge myself.”

As a country desk officer, Libertini managed a portfolio of seven to eight countries. She said she met regularly with embassy staff in Washington, D.C., and collaborated with service members from the Navy and Army.

Libertini said her previous experience was on technical aspects of an issue, working with other mathematicians and scientists, but this was the first time working on the policy side.

“I had always been on the technical side, always in the office with other analysts. To give that insight to decision makers, this was different. I was being asked about a lot of policy decisions,” she said.

She traveled with Under Secretary of Defense Ellen Lord to Singapore for primary bilateral discussions, as well as to Jakarta, to work on extending cooperation with Indonesia. Libertini also provided

support to Defense Secretary James Mattis concerning international cooperation.

Her work with the fellowship will fold into the new “Math That Matters” curriculum at VMI, working to make the implementation of the curriculum more realistic and align the writing style more with what the Pentagon uses since “Math That Matters” involves communication of one’s ideas.

“I was always knowledgeable about what type of technical positions are available for [commissioning cadets], but not as knowledgeable what other people could do. I can talk with cadets in my courses, international studies majors, history majors, and give them ideas for foreign area officer jobs,” she said.

Her connection to VMI was shown when Brig. Gen. (retired) Jeffrey G. Smith, Jr. '79 attended her promotion ceremony at the Pentagon. ❁



Jessica Libertini is promoted to the rank of lieutenant colonel by Brig. Gen. Jeffrey G. Smith, Jr. '79 at the Pentagon.—Photo courtesy of Jessica Libertini.



Ring Figure

Members of the Class of 2020 receive their rings in a ceremony in Cameron Hall Nov. 16. The night before, the 2nd Class cadets received their combat rings and heard from Weston Hitchcock '14 during their combat ring supper in Croke Hall. More celebration ensued on Friday night with the Ring Figure Ball in Marshall Hall. Cadets escorted their dates through a ring-shaped archway to put on their ring for the first time. —VMI Photos by Kelly Nye, Maj. John Robertson IV, Stephen Hanes, and H. Lockwood McLaughlin.





ODK Links Cadets with Volunteer Opportunities

By Ashlie Walter

At VMI, there's a new initiative to pair staff and faculty looking for volunteers with cadets willing to volunteer. But what was needed was a conduit to connect the two, according to Col. Howard B. Sanborn IV, professor of international studies and political science.

Sanborn is the faculty adviser for Omicron Delta Kappa, a national leadership honor society, which started a chapter, also known as a circle, at VMI in 2003. The chapter currently has 40 cadet members.

"I don't think we have done enough service, not for lack of desire—cadets are genuinely helpful but they are amongst some of the busiest college students, from the academic side, military side, and athletic side," he said. "I kept trying to find ways to reduce the transaction cost for cadets."

Former ODK chapter president Bethany King '18 came up with the idea of a service fair where cadets could go to one place on post and sign up for volunteer opportunities. Coincidentally, the national ODK organization was hosting a grant contest for service ideas and the VMI chapter won a \$500 grant for its service fair idea.

The inaugural fair, held in Preston Library Nov. 5, attracted dozens of cadets to organizations such as the Valley Mission in Staunton, Rise Against Hunger, and the Discovery Heights Children's Museum. VMI alumnus David Ellington '71 also connected the organization with the Rockbridge Area Free Clinic, Sanborn said.

"If a cadet linked up with an organization, we not only found them a potential partner but also help with facilitating that," Sanborn said.

He added it seemed like an opportunity waiting to be filled. There are cadets who want to help and there are faculty involved in many community organizations, so it was just a matter of linking them together.

"The idea worked very well and in the future, we would like to expand its reach across post. We want to look at the timing and extra funds to support something like that," he said of possibly organizing next year's event. ❁



Joseph Nieto '22 explores local service opportunities during the ODK fair Nov. 5.—VMI Photo by H. Lockwood McLaughlin.



Thanksgiving Dinner

Cadets attend an early Thanksgiving dinner in Crozet Hall Nov. 5. Parkhurst Dining provided traditional Thanksgiving food for the cadets including turkey, pumpkin pie, and sparkling cider.—VMI Photos by H. Lockwood McLaughlin.

e-Club Supports Cadet Entrepreneurs

By Mary Price

Any business professional will tell you that word of mouth is often the best form of advertising—and two professors in the Department of Economics and Business have found that to be true, as membership in the VMI Entrepreneurship Club, informally known as the e-Club, has quadrupled this academic year.

In existence since 2014, but revitalized this year, the e-Club has as its purpose bringing together cadets of all majors who are interested in entrepreneurship, creativity, and innovation as an outreach effort of the department's free enterprise program in innovation and entrepreneurship.

The club got a major boost in the spring with the Institute's inaugural Business Leadership and Innovation Summit, which brought more than 60 alumni to post to network with cadets and share lessons learned from the businesses they've started. Thanks in part to that initiative, the e-Club's numbers are now up to 40 to 45 cadets, whereas last year there were only 10.

"The program is designed as an entrepreneurial road map in seminars, workshops and experiential educational activities facilitated by various alumni entrepreneurs," explained Dr. Dekuwmuni Mornah, associate professor of economics and business and one of the club's two faculty advisers.

With that goal in mind, meetings of the club are organized around learning from alumni, whether on or off post. This year's speakers have included John Williams '88, principal of the consulting firm Powell Strategies; John Kemper '68, a Richmond-based business consultant; and Rich Daughtridge '98 with the entertainment industry's High Rock Group, among others.

"The alumni have stepped up dramatically," Mornah noted.

Once per semester, e-Club members venture off post to meet with alumni entrepreneurs at their places of business. At the end of October, 20 cadets traveled to Richmond, where they toured Luck Industries, a family business that's been sustained by four generations of VMI alumni, and the New Market Corporation, a New York Stock Exchange-listed company whose chairman and CEO is Thomas E. Gottwald '83.

While in Richmond, the group also visited the 1717 Innovation Center, a coworking space for entrepreneurs, and unBoundRVA, a nonprofit organization co-founded by Richard Luck '12 which provides support to low-income entrepreneurs. At the 1717 Innovation Center, David Geary '19 got the surprise of his life when he was offered a job on the spot, with the possibility of an ownership stake down the road if he does well.

"You get a sense of what you can do outside of VMI from people who've been to VMI," said Col. Atin Basuchoudhary, professor of economics and business, who works alongside Mornah as co-adviser of the e-Club. Hearing

alumni talk about their path to business success "generates a certain amount of interest and curiosity and excitement" among current cadets, Basuchoudhary added.

Back on post, e-Club members attend workshops on creating a business plan, selling effectively, and more. An upcoming workshop will focus on entrepreneurship in the military, public, and corporate sectors. This topic, both Mornah and Basuchoudhary noted, is of vital interest as both the Army and Air Force have expressed a desire to cultivate an entrepreneurial, innovative mindset in their officers.

In the spring, e-Club members have a networking trip to Washington, D.C., planned for March. The centerpiece of their spring activities, though, will be the second annual Business Leadership and Innovation Summit, to be held April 11-13, 2019, at the Center for Leadership and Ethics. This event will be sponsored by the Department of Economics and Business, the Center for Leadership and Ethics, and the VMI Alumni Association.

"We're hoping to involve the community as well," said Mornah. Getting Main Street Lexington involved is one goal, he explained, as that organization supports the Lexington Collaboratory & MakerSpace.

In addition, Mornah and Basuchoudhary would like to see partnerships between alumni and all faculty, not just those from the Department of Economics and Business, develop and strengthen.

"We're leveraging every resource that we can get to help cadets," said Mornah.

Funding for e-Club activities this academic year has come from the Charles Koch Foundation. ❁



Richard Luck '12 leads a tour through Luck Industries during the e-Club's trip to Richmond.—Photo Courtesy of Dee Mornah.

Science for Citizens

Biology Faculty Members Work to Revitalize Core Courses

By Mary Price

Science is everywhere around us—on the news, on social media, even in everyday complaints about weather phenomena that may or may not be linked to climate change. But how many non-scientists are prepared to evaluate scientific news carefully, with a critical eye to the claims presented?

Seeking to boost non-science major cadets' understanding of the science topics they'll likely encounter in real life, Maj. Mary Beth Manjerovic, assistant professor of biology, and Dr. Janice Friend, adjunct instructor, have teamed up to write a Jackson-Hope Fund grant proposal, "Science for Citizens."

If received, the funds would be used to purchase laboratory modules for Biology 101 and 102, core curriculum classes that are often taken by 4th Class cadets seeking to fulfill distribution requirements. The classroom lecture portions of those courses will be restructured regardless of whether grant funds are received.

"We're not changing the curriculum at all," said Manjerovic. "What we're hoping to do is change the delivery of the material. The curriculum is going to stay the same, but we're going to tailor it more to non-biology majors."

Friend explained that the impetus for the change has come from negative cadet evaluations of Biology 101 and 102. Comments such as "This course is so boring" and "I didn't learn anything useful" have made her realize that there's a golden opportunity to make a meaningful change. What's more, a change to those courses would impact a large number of cadets, as approximately 200 cadets per year enroll in the two-course sequence.

This fall, Friend has been piloting some new topics in the section of Biology 101 she teaches, with good results. She's asked her cadets to evaluate statements such as "Crystals have healing energies" and "Carrots are good



Maj. Mary Beth Manjerovic and Dr. Janice Friend discuss possible changes to the biology curriculum.—VMI Photo by Mary Price.

for you," with the goal of showing them that real scientific claims can be backed up by verifiable data.

Cadets in Friend's class have also talked about genetic engineering. "How do you know when a child is sick enough that you'll risk an experimental genetic treatment to try to save their life?" she asked. "How sick does the child have to be?"

It's all part of an effort to move the teaching of biology away from dry and dusty factual knowledge to real-life applicability. "Instead of learning all of these facts, and thinking, 'I have to memorize these terms for a test,' they're learning how it's applied and to think like a scientist and evaluate things past

our class," said Manjerovic.

Both Manjerovic and Friend would also like to see cadets learn how to test the accuracy of sources. Friend gave the example of an article on Bigfoot that had been published in a journal, seemingly giving credence to the existence of the yet-unproven creature. Reading the "journal" carefully, though, Friend discovered that it had been created by a Bigfoot hunter and writer as a way of publicizing his research.

"[Cadets are] not going to go into the literature like we do as scientists," said Friend. They're going to get it from blogs. They're going to get it from Facebook. Can they understand, can they think about it on their own?" ❁

Cadets Win DJ Invitational

Caleb Minus '20 speaks with WDBJ7's Bruce Young about the support he and Lane Kieler '19 received from the VMI community in winning the The Club House Festival DJ Invitational, which required a 30-minute demo and online votes for a chance to play in the Club House Festival Oct. 20.—VMI Photo by Maj. John Robertson IV.



Ranger Challenge *continued from page 1*

land navigation test, day orienteering, basic rifle marksmanship, and a grenade assault course that must be completed while avoiding paintball snipers. Then there's the M-16 assembly/disassembly test, a mystery challenge that changes every year, and night orienteering.

To cap it all off, there's the Army Physical Fitness test, consisting of two minutes of push-ups, two minutes of sit-ups, and a two-mile run—all to be completed when participating cadets are operating on less than six hours of sleep.

"The physical fitness levels that the cadets were at were extremely high," Cook noted. "From the first event to the last event, they [won] all of the physical events, which really tested their endurance and their capabilities and all they've done to get ready for the competition."

What's more, the Institute fielded two strong teams of 11 members each, whereas many competing schools only fielded one. "Most schools will stack an A team with their best athletes and best tactical performers, and some schools will split it up. We let [the cadets] pick their own teams, and they chose two strong teams," said Cook.

"Most schools, their A team will come in 5th place, and their B team will come in last place," added Adam Josephson '19, cadet in charge of Ranger Challenge. "We took second and third together."

Cook explained that while VMI has won Ranger Challenge events in the past, the



Gen. J.H. Binford Peay III '62, superintendent, presents members of the Ranger Challenge team with coins following their performance at Fort Knox.—VMI Photo by Kelly Nye.

Institute has only done so when competing against ROTC units from civilian schools. This year, VMI was competing against nine other military schools.

Both Cook and Josephson attributed this year's stellar finishes to increases in both funding and training time. Ranger Challenge is now classified as a club sport, which gives it a set amount of funding each year. In addition, Ranger Challenge cadets now train with the VMI Running Club, giving them an extra edge when it comes to cardiovascular fitness.

"Their kit was wet. Going into the road march, their feet were wet. It made for a perfect storm for something to go wrong, but because of their physical conditioning and mental toughness, they were able to fight through that."

Ranger Challenge cadets have an extra edge in their Army preparation as well. Cook noted that when cadets go to Advance Camp as they typically do before their 1st Class year, those who've participated in Ranger Challenge almost always rise to the top.

"Ranger Challenge cadets have historically done better than regular ROTC cadets because of the intense training and tactical knowledge they learned through the Ranger Challenge program," Cook commented.

Going forward, Cook hopes to see Ranger Challenge continue on an upward trajectory.

"We're trying to integrate more with the school and the Running Club," he noted. "With a good plan ... we're able to sit down and do a lot more than we've done before. We're smarter in that way." 🌿



Cadets compete in Ranger Challenge in late October.—Photo Courtesy of Andrew Critchelow, *The News Enterprise*.

'Life is Multi-Disciplinary'

Compost Paper Publication Highlights Cross-Departmental Research

By Mary Price

Three and a half years ago, a group of faculty members and cadets began an innovative, interdisciplinary project to investigate the viability of recycling food scraps from Crozet Hall into compost. The "living laboratory" project ended when its driving force, Physical Plant sustainability coordinator Jenny deHart, left for employment elsewhere, but the results of the project have recently been accepted for publication.

"An interdisciplinary living laboratory approach to investigate college food waste co-composting with additional on-site organic waste feedstocks," with six VMI faculty members and six recent alumni majoring in biology listed as co-authors, will be published in the *International Journal of Environment and Waste Management*.

Cadets and faculty involved came from four departments: biology, economics and business, civil and environmental engineering, and mechanical engineering. The compost bins for the pilot project were located off post at Hinty Hall, site of VMI's Physical Plant.

Lt. Col. Anne Alerding, associate professor of biology and the paper's lead author, said she'd like to see more green initiatives such as this one at VMI—and getting composting going again would be on the list of projects to explore.

"It potentially could save money," said Alerding. "Also, it creates this learning environment where you take a real-world problem and you bring the students in from different departments with different strengths to solve it."

Alerding noted that with an economic analysis, it's quite possible to measure both the costs of composting—mostly human labor and transportation costs—and the cost savings from reduced tipping fees at the landfill. But it's the intangibles, such as learning to think outside the box and interacting with peers from different disciplines, that were equally valuable to VMI's compost experiment, Alerding and other faculty members stated.

"The whole thing was innovative in that it was experiential learning," said Col. Sam Allen, professor of economics and business and one of the paper's authors. "We got students to work in an interdisciplinary way. The ECU students really hadn't thought about the biology at all, but you get them out there and start shoveling the food waste from Crozet, and it certainly becomes up close and personal."

While the project was ongoing, Allen supervised the work of two cadets majoring in economics and business, both of whom were charged with coming up with a cost-benefit analysis for the compost project. Those cadets found that composting could save the Institute anywhere from \$10,500 to \$17,500 per year, with those savings coming in the form of reduced landfill tipping fees and less need to purchase prepackaged fertilizer.

A number of cadets majoring in civil and environmental engineering also contributed to the living laboratory project as they

worked together to find a way to measure temperature in the compost pile—a necessary step because compost must reach a certain temperature in order to kill pathogens. In addition, the group created a feasibility plan for waste management and designed a structure that would serve as the compost project's permanent home. Mechanical engineering cadets, meanwhile, were asked to design a ventilation system to keep the compost bins aerated.

"It was an opportunity for the cadets to take the fundamental skills learned in the classroom and apply them to a real-world problem," said Maj. Paul Ackerman '93, assistant professor of civil and environmental engineering, who had supervised the cadets' work.



Cadets and faculty investigated the possibility of turning food scraps from Crozet Hall into compost in the spring of 2015.—VMI File Photo by H. Lockwood McLaughlin.

Interdisciplinary projects such as this one are invaluable for cadets, Ackerman believes, because they prepare future engineers for the world they'll encounter once they graduate. "That's the reality of civil engineers," Ackerman commented. "Their clients are not engineers. They tend to be very diverse."

Echoing Ackerman's comments was Lt. Col. Emily Lilly, associate professor of biology. Her role in the project was to help cadets understand the role that microbes play in bacterial decomposition—a critical factor because compost must reach a certain temperature in order to kill pathogens, yet actual sterility is not beneficial because healthy soil contains some bacteria.

Working with cadets and faculty from other disciplines, Lilly believes, is vital to cadets' preparation for life after VMI.

"It helps to expose the cadets to something beyond their comfort zone," she commented. "That's what's going to happen to them when they graduate. The chances of them being in a mono-disciplinary field are slim. Life is multi-disciplinary, and you don't know what kind of job they're going to get." ❀

Virtual Reality Becomes a Reality at VMI

By Ashlie Walter

As consumer-grade Virtual Reality technology advances at a rapid pace, the Department of Computer and Information Science has started incorporating some of that advanced technology into its curriculum.

Two cadet groups are using the CIS department's newly acquired virtual reality and motion capture software for capstone projects.

The department bought a Microsoft HoloLens, a portable head-mounted display used for augmented reality, and an Oculus Rift, another head-mounted device used to view a computer-generated environment.

Sarah MacDougall '20 and Michael McNamara '20 are working on building a Virtual Reality simulation to control a small drone with a HoloLens for their independent study.

Using video game engines Unity and Unreal and GPS coordinates, they created a simulated path for a drone to fly in the real world. The drone is preprogrammed with GPS points defining its flight path.

"Our initial thought was to develop a semi-independent GPS system with a side project to measure the accuracy of GPS, comparing and contrasting the simulated flight to the actual flight," said McNamara.

The project started in the research phase this past summer and both cadets hope to roll it into a capstone project for their 1st Class year. Meanwhile, having experience working with simulations would be helpful when they commission in the military.

"Right now, we are working on testing in a simulation versus in the real world, and that can help with simulated military flights before [actually] flying airplanes. Testing all kinds of things in simulation before actual testing can save time," MacDougall said.

Simulations are also a part of a project led by Nikolos Van Leer '19 and Jonathan Turney '19 using motion capture technology to compare a person shooting a gun to what a video game would simulate. Eventually, they hope to add a feature that gives feedback on posture or aim while a person is shooting.

"We analyze someone while they are shooting, to monitor posture, using something like Google Glass. We would want to talk to you in your ear, or text feeds out to see as you are shooting, or a 3-D model of what you should be doing," Van Leer said.



Dr. Hongbo Zhang, assistant professor of information sciences, demonstrates virtual reality technology with Nikolos Van Leer '19 and Jonathan Turney '19 in Mallory Hall.—VMI Photo by H. Lockwood McLaughlin.

He added the project started as an idea to compare real, combat-trained shooters to what is simulated in a video game and involved into their current capstone project.

"Eventually, we want to just use motion capture in order to train someone in the fundamentals of training with a weapon," Turney said.

Van Leer said he hopes the CIS department begins to incorporate the VR technology and motion capture more into the classrooms because of the future uses of this technology.

CIS department head Col. Mohamed Y. Eltoweissy said he would like to expand using the technologies in education along with collaborating with other colleges and high schools.

If another college, such as Virginia Tech, has equipment that VMI does not, VMI could use VR to train on the equipment, he said.

"Instead of moving physically over there, we can train on equipment from here using VR," Eltoweissy added, noting that schools that lack extensive equipment could also train on VMI's gear.

"We intend to expand this to high schools; we have equipment here, they can use some training on configuration," he said.

Another idea is a virtual conference room where participants can participate in a meeting or conference via virtual reality.

"The meeting is virtually coexistent as an experimental environment, not just using Skype, like a meeting in real life," Eltoweissy said. ✱



Michael McNamara '20 and Sarah MacDougall '20 test out virtual reality technology in Mallory Hall.—VMI Photo by H. Lockwood McLaughlin.

Cadet Fighters Face off in New Barracks

By H. Lockwood McLaughlin

VMI saw the second iteration of boxing in barracks Nov. 8, with cadet fighters facing off in the 'Rumble in the Jungle' event held in the courtyard of New Barracks.

"It's the second time we've done it," remarked VMI boxing coach Joe Shafer, reflecting on the first such event held in November 2016. "It always pulls the Corps together and unites everybody and our guys get to feel what it's like to fight in front of a huge crowd, testing us for nationals."

And a huge crowd it was. Lining all four stoops around the ring were hundreds of energetic cadets filling the courtyard with cheers for the cadet fighters.

"This is one of the things that I think makes us different than any other school in the country," said Bryce Holden '19.

"It's some of the best energy ever," added Adam Fodness '21, who had just finished a bout. "There's nothing like that feeling coming out of the tunnel. You just look around, and the lights hit you, and your BRs are cheering your name. You step in the ring and you're up above all your BRs and it's go time. There's nothing like it."

Jake Shaffer '19, having just finished sparring at the event, reflected on the experience:

"Rumble in the Jungle is crazy because of the atmosphere and you got everybody on the stoops and you got your family in here watching and you feel the pressure to perform and we're not out there trying to knock each other out, but it's boxing," said Shaffer.

The bouts may not have been knockdown drag-out fights, but they gave cadets a chance to hone their skills while feeding off of the electric atmosphere provided by the Corps.



The Corps of Cadets cheers on cadet boxers in the New Barracks Courtyard Nov. 8.—VMI Photo by H. Lockwood McLaughlin.



Cadets spar in the New Barracks Courtyard Nov. 8.—VMI Photo by H. Lockwood McLaughlin.

“What happens happens,” said Shaffer. “You’re just trying to get there to get a good sparring session in front of all your BRs and everybody else in the Corps.”

“It was absolutely amazing,” said Kameron Warlitner '20. “It was such a rush.”

To both the coaches and the boxing team members, the event also provided practical preparation for future events.

“It’s a learning experience for my fresh team. You’re fighting in front of your peers here.... You can’t beat this crowd. Sparring under all this pressure simulates what you’re going to see fighting at nationals with crowds that get in our corner and try to drown out our voice,” said coach Shafer during a break in the action midway through the event.

“They’re doing great. They’re handling the pressures. I couldn’t be more proud.”

“I feel like I fought really well. There’re still things I’ve got to improve on. I’ve got a long way to go. This is my first year of boxing,” said Warlitner.

Before and during the event, interest had been generated throughout the Corps with talk of a possible third event in the near future. “I had so many people coming up to me asking about it,” said Warlitner.

“It’s pretty cool just talking to teachers and master sergeants and fellow students and seeing how everyone was excited about it... how unique an experience it was. [It’s] pretty humbling,” remarked Holden.

And the cadet fighters are hoping to see more chances to spar with the Corps cheering them on.

“It’s an experience unlike any other,” said Shafer. “I hope it happens spring semester.” ❁



Art-Investigative Technology

Dr. Erich Uffelman, professor of chemistry at Washington and Lee University, meets with cadets in Maj. Catharine Ingersoll’s Language of Art class in the VMI Museum library Nov. 16. Uffelman uses noninvasive art-investigative technologies such as x-ray fluorescence spectrometer for pigment analysis, an infrared camera to photograph underdrawings, and a UV lamp to identify evidence of retouching in paintings. VMI Museum director Col. Keith Gibson provided several paintings for cadets to examine using Uffelman’s equipment during his visit.—
VMI Photos by Kelly Nye.





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Homecoming Weekend

Cadets and alumni enjoy a weekend of activities Nov. 2-3. Class members of 1973, 1983, and 1993 attended a parade, tailgating, and the football game against Tusculum College on Saturday, while cadets participated in a Harvest Hop on Friday night. VMI beat Tusculum 20 to 11 in a long-anticipated victory.—VMI Photos by H. Lockwood McLaughlin and Chris Floyd. VMI Alumni Agencies Photos by Micalyn Miller.

