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THE GRADUATE SCHOOL OF ENGINEERING AND MANAGEMENT

THE AFIT ENGINEER

Air Force Institute of Technology

Graduate School Welcomes 264 New Students

In August, the Graduate School welcomed a new class of 31 doctoral and 233 master's degree students. The new group includes 41 Second Lieutenants for whom AFIT is their first duty assignment.

During an orientation briefing, Dr. Todd Stewart, AFIT Director and Chancellor welcomed the students stating, "Congratulations on volunteering for advanced education and being competitively admitted to AFIT. Your willingness to come to school shows great promise for you and the future of our Air Force."

The students will study a variety of science, technology, engineering and math programs primarily in Electrical and Computer Engineering and Systems Engineering and Management programs.



Lt Col Andy McQuade, Graduate School of Engineering and Management Dean of Students, speaks to incoming AFIT graduate students on orientation day.

NEW STUDENT ENROLLMENT BY DEPARTMENT

37

Aeronautics and
AstronauticsMathematics
and Statistics

7

81

Electrical and
Computer Engineering

Operational Sciences

42

33

Engineering Physics

Systems Engineering
and Management

64

AFIT Re-designated by NSA and DHS

The Air Force Institute of Technology was re-designated as a National Center of Academic Excellence in Cyber Defense Research by the National Security Agency and the Department of Homeland Security through academic year 2024.

AFIT is one of eight Ohio colleges and universities to earn this distinction, joining a group of more than 275 schools across the country. To obtain the re-designation, AFIT demonstrated continued cyber defense efforts in

research initiatives by faculty and students, publications, PhD student production and research funding.

AFIT has a long history of excellence in research and education in cyber defense. In 2002, AFIT's Graduate School of Engineering and Management instantiated the Center for Cyberspace Research as one of AFIT's first research centers. CCR's leadership excellence in the field led to AFIT being designated the Air Force Cyberspace Technical Center of Excellence.

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Fall Quarter Elevates AFIT's Contagious Spirit of Excellence

If you are reading this issue of The AFIT ENGINEER, following the inaugural issue of June 2019, I welcome you back. If this is your first reading, I excitedly welcome you to the readership club. This September issue represents a continuation of our commitment to a proactive outreach to all our constituents, both internal and external.



Dr. Adedeji Badiru, Dean

recently graduated a group of officers from allied nations. This demonstrates our academic reach beyond the shores of America. My recent official visit to Hurlburt Field, FL and Eglin Air Force Base, FL confirmed the great appetite for AFIT academic degrees among the diverse population of Air Force personnel in various geographical locations in Florida. To this end, we shall be exploring strategies to extend our academic programs, particularly

Distance Learning (DL) offerings, through a satellite presence to be known as AFIT South. Ditto for other locations in the USA. As this idea germinates further, we shall be issuing appropriate communication via a variety of information platforms. Please continue to watch out for communiques from my office.

Some exciting events on the horizon include the AFIT Centennial Celebration on Thursday, November 7th. That will be preceded by the Defense Innovation Symposium (DIS) on Tuesday, October 22nd.

To reiterate previous promulgations, AFIT is adept and responsive to the current and future needs of the Air Force through education, research, and operational consultation. AFIT's organizational structure includes four schools (Graduate School of Engineering and Management, Civil Engineer School, School of Systems and Logistics, and School of Strategic Force Studies), which all work in consonant with Civilian Institutions (CI) to provide a wide span of coverage for advanced educational needs of the Air Force. Please join us in celebrating the "contagious" excellence of AFIT.

Ciao,

Adedeji B. Badiru, Ph.D., PE, PMP, FIIE

This Fall Quarter, we are delighted to welcome the incoming cohort of 264 new students. With this new batch of intellectual arrivals, our integrated defense-focused teaching and research will continue unabated. These students will further energize our overall student population in the pursuit of advanced studies in many technical areas germane to the needs of the US Air Force. Although STEM is the primary focus of our degree programs, we do collaboratively embrace complementing studies in management-related disciplines. With this integrative approach, we effectively align our programs with the prevailing and future priority areas for the Air Force.

We also welcome the addition of 25 new faculty members across our six academic departments. Following my welcome session with the new faculty on September 3rd, some of the feedback comments cited the positive "contagious spirit" that exists at AFIT. This is a great characterization of what permeates this institution. It is that same spirit that has fueled and retained my interest in AFIT since I came here in 2006 from the University of Tennessee, Knoxville.

As I mentioned in the inaugural issue last quarter, AFIT's academic footprint is growing rapidly across the nation and beyond. We



"This Fall Quarter, we are delighted to welcome the incoming cohort of 264 new students. We also welcome the addition of 25 new faculty members across our six academic departments."



EN OUTREACH

The AFIT ENGINEER is an official publication of the Air Force Institute of Technology, Graduate School of Engineering and Management.



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AFIT to Celebrate Anniversary with Centennial Day Symposium and Awards Banquet

On 10 November 1919, Colonel Thurman Bane received authorization to begin instruction at the Air School of Application. The following year, the first class of nine students graduated from the newly named Air Services Engineering School. Now, 100 years later, the Air Force Institute of Technology has grown into a premier educational institution, awarded over 21,000 degrees, and more than 500,000 people have gone through its continuing education courses!

To honor this milestone, AFIT will celebrate its anniversary with a Centennial Day Symposium and Awards Banquet on 7 November 2019 with the theme "A Century of Education Excellence: Inspiration to Innovation."

Morning presentations will include a keynote from alum Maj Gen William Cooley on the AFRL 2030 Strategy, a conversation on the Wright Brothers legacy with Ms. Amanda Wright Lane, Great Grandniece of Orville and Wilbur Wright, and a panel presentation of seven AFIT alumni who became NASA astronauts.

Afternoon presentations will highlight the

technical and educational innovation AFIT faculty, staff, students, and alumni have accomplished.

A keynote presentation by AFIT alum Dr. Billy Mullins, SES will discuss the Air Force level perspectives on deterrence strategy and future directions, followed by a presentation by AFIT faculty on AFIT's support of the national deterrence strategy. Additional talks will cover AFIT space research, using virtual reality and artificial intelligence in a learning environment, and delivering cross-functional education to the total force.

During the evening awards banquet, AFIT alum and keynote presenter Maj Gen Carl Schaefer will help present AFIT-level awards for Innovation, Leadership, Mentorship, and Wingman, and three AFIT Foundation sponsored awards for Distinguished Alum, International Alum, and Young Alum.

For more information, contact AFITAlumni@afit.edu or visit the webpage at <https://www.afit.edu/CENTENNIAL/>



IN MEMORIAM

Colonel Eric Unger, USAF

May 27, 1968 - Aug 30, 2018

Colonel Eric Unger, PhD was born in Brookfield, IL on May 27, 1968 to Carol and Jerry Unger (both deceased.) He attended Northwestern



University, obtaining a bachelors degree in mathematics and economics while enrolled in the ROTC program. Eric was then stationed at the Los Angeles Air Force Base in El Segundo, CA as the Lead Cost Analyst for the Titan IV missile project. In 1997 he worked at the Pentagon as a Weapon System Cost Analyst. Eric then received a Masters Degree in Acquisition Management from the Air Force Institute of Technology in Dayton, OH. Eric was next promoted to Chief of Cost Estimating for the MILSATCOM Joint Program Office, managing a \$40 billion portfolio. He transformed the Air Force cost analysis department making it more accurate, responsive and transparent. In 2007, Eric earned a PhD in Policy Analysis from Pardee RAND Graduate School after which he was named Director of the Graduate Cost Analysis Program at the Air Force Institute of Technology. There, Eric taught graduate level courses to the next generation of professional analysts throughout the Armed Forces. At the young age of 42 Eric attained the rank of Colonel. He returned to the Los Angeles Air Force Base in 2012 and was made Division Chief of cost estimation at the Space and Missile Systems Center. His remarkable life and stellar career were tragically cut short by opioid addiction stemming from a surgical procedure. He died August 30, 2018. Contact ericjungermemorial@yahoo.com for memorial information.

ANNUAL BURGER BURN TRADITION

AFIT hosted its annual Burger Burn on 29 August 2019 to welcome the new students. More than 600 faculty, staff and students enjoyed an afternoon of food, friends, and dunk tanks.

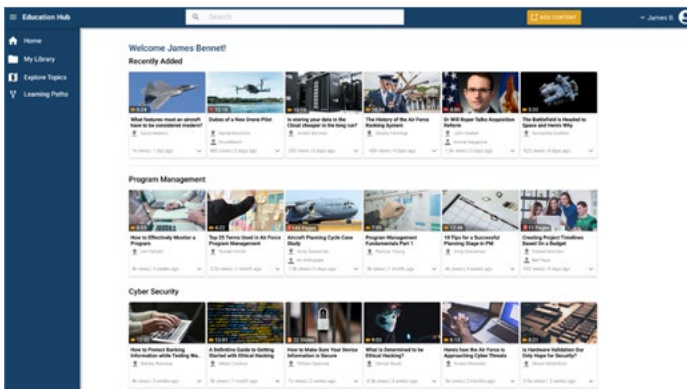


Cyber Research Project Evolves into Innovative Training

By Stacey Geiger
88th Air Base Wing Public Affairs

To have an agile Air Force, Airmen readiness is paramount and a new revolutionary education hub that can deliver the most current, relevant and interactive training just might be the way of the future for the warfighter.

"Created as a research project at the Air Force Institute of Technology, the genesis of the educational hub was born in 2017 at the Air Force CyberWorx located at the United States Air Force Academy when the task was assigned to come up with innovative ideas on how we can better educate our Airmen," said Matthew Dever, Air Force Cyberspace Technical Center of Excellence, Assistant to the Director.



Retired Lt. Col. Mark Reith, who was the Center for Cyber Research director at the time and now an Assistant Professor of Cyber Systems, took that opportunity as a research project for his graduate students at AFIT. "Lt. Landon Tomcho and Capt. Seth 'Data' Martin, both graduate students at the time, were key leaders shaping the look, feel and functionality of the Cyber Education Hub," said Reith. "They worked closely with our program manager, Rob Roseman, our senior developer, Rick Kroll,

and our graphics expert, Stacy Burns, to fashion something that our newest generation of Airmen would find exciting and engaging."

Dever said to his knowledge, the education hub is the first application in the Air Force that is natively built onto the cloud whereas others are moved to the cloud. Having a layout similar to Netflix or YouTube, Reith and Dever said the familiarity of the two makes it easier for a user to navigate and use the hub. The hub offers videos on a vast array of topics to view. And instead of making the hub organization specific, the hub is developed to be topic specific.

"Unlike the Advanced Distribution Learning Service where the training is curated and information requires vetting before

it can go on the site, the hub can provide up-to-date job specific information," said Reith. "It creates a more flexible and agile workforce." Another benefit to the hub is that Airmen are empowered to contribute. Reith said Airmen have

the ability to comment on videos and create their own topic specific videos.

"The hub gives Airmen a huge sense of discovery and autonomy," said Reith. "They are really powerful motivators to learning and when you feel like you are in control, you actually learn!"

CONTINUE READING AT:

<http://bit.ly/cybereducationhub>



AFIT Offers Systems Engineering Certificate Program

By Stacey Geiger
88th Air Base Wing Public Affairs

The Department of Systems Engineering and Management at the Air Force Institute of Technology offers tuition waived systems engineering programs for the military and civilian workforce. The programs range from certificates up through doctoral degrees.

Certificate and master's courses are offered both on-line and in-residence. Further, the certificate courses can be directly applied towards the completion of a Systems Engineering master's degree. The Air Force Materiel Command has made investments to open additional offerings of the Systems Engineering Certificate program.

Areas of study in SEC are model-based systems engineering with systems modeling language, agile software development including cyber security engineering and resilience, system architecture development, and analysis of current challenges in defense acquisition and engineering.

CONTINUE READING AT:

<http://bit.ly/ENVprogram>

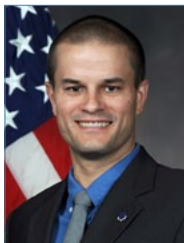
Graduate School Faculty Receive Academic Promotion

The Air Force Institute of Technology's Graduate School of Engineering and Management completed the academic year 2018-19 promotion and tenure (P&T) cycle. Six faculty members underwent a rigorous evaluation of their teaching, scholarship and service resulting in a promotion in academic rank. Cumulatively, the six faculty members have more than 552 publications, advised more than 173 AFIT students, and earned nearly \$40M in sponsored research funds.

Dr. Darryl Ahner was promoted to Professor of Operations Research within the Department of Operational Sciences. Dr. Ahner came to AFIT in 2010 as a military faculty member and joined the civilian faculty upon his retirement from Army active duty in 2012. A 1990 graduate of the United States Military Academy at West Point, his academic studies include Rensselaer Polytechnic Institute, where he earned a M.S. in applied mathematics and a M.S. in operations research and statistics, and Boston University where he earned his doctoral degree in systems engineering as a Draper Fellow.



Dr. Benjamin Akers was promoted to Professor of Mathematics within the Department of Mathematics and Statistics. Akers teaches graduate courses in numerical methods for differential equations, numerical linear algebra, and numerical analysis. His research interests include numerical differential equations with an emphasis on the modeling of capillary waves. Prior to joining the AFIT faculty in 2011, he served as a Research Assistant Professor at the University of Illinois at Chicago.



"Being granted promotion and tenure in an academic institution is an affirmation of the high intellectual caliber of the faculty. AFIT is fortunate to have this year's cadre of exceptional scholars, who demonstrate the art of teaching what is researched and researching what is taught."

-Dr. Adedeji Badiru, Dean, Graduate School of Engineering and Management

Dr. Steven Fiorino was promoted to Professor of Atmospheric Physics within the Department of Engineering Physics. Fiorino teaches graduate courses in meteorology, and more recently, in space surveillance. He has successfully advised 32 master's theses and four doctoral dissertations.



Dr. Seong-Jong Joo was promoted to Professor of Logistics and Supply Chain Management with tenure within the Department of Operational Sciences. Joo began his academic career as a UPS foundation post-doctoral fellow in February 2003 after serving in the Republic of Korea Air Force for 21 years as a supply officer. He taught various courses in logistics and supply chain management as an Assistant or Associate Professor from 2004 to 2016 before joining AFIT. He has taught courses in logistics and supply chain management at AFIT as an Associate Professor since 2016.



Dr. Michael Miller was promoted to Professor of Systems Engineering within the Department of Systems Engineering and Management. He joined the AFIT faculty in 2010 and has



taught more than 32 graduate course sections containing 325 students and 16 special studies courses. He developed the Human Systems specialization in systems engineering, Human Factors specialization in Engineering Management, and the Human Systems Certificate, which rely on a common set of core classes. This activity included the development of four new courses and instruction of four additional courses. Additionally, he helped to develop AFIT's Autonomy Certificate. He has advised 5 doctoral students and 25 master's students. He has also served on the committees of 28 additional students in Systems Engineering and Management or Computer Science.

Dr. Christine Schubert

Kabban was promoted to Professor of Statistics within the Department of Mathematics and Statistics. She teaches graduate courses on many statistical topics including regression, general linear models, theory of probability, categorical data analysis, and nonparametrics. Her research interests include classification methods and performance, information fusion and big data, structural health monitoring, network analysis, and epidemiological topics.



FIND COMPLETE BIOS AT:

<http://bit.ly/facultypromotions>



Advanced Cyber Education (ACE) Program Develops Cadets' Cybersecurity Skills

By John Van Winkle
88th Air Base Wing Public Affairs

Forty-five Air Force and Army ROTC cadets completed the Air Force Institute of Technology's Advanced Cyber Education program July 29 through August 2. The Advanced Cyber Education program, better known as ACE, covers a wide variety of cybersecurity related disciplines to develop original thinkers and technical leaders who will be prepared to solve real-world problems in the area of cybersecurity.

Twenty-nine cadets were from Air Force ROTC units, including Cadet Deanna Meyer from Virginia Polytechnic Institute and State University.

"I find ACE interesting. We're learning how to actually do cybersecurity here, and that isn't something I've really learned in school," said Meyer. "I've learned a lot of

coding, and this is something new and interesting that I want to do. I wouldn't get the chance to learn this in college."

In addition to the Air Force ROTC cadets, the class roster also had 16 Army ROTC cadets, including Cadet Timmy Oshinbanjo, from the University of Dubuque. Oshinbanjo, a computer information systems major, went straight from field training with Army ROTC to the AFIT ACE course to better his chances of being selected for the Army's Military Occupational Specialty of Cyber Operations Officer.

The objective of the ACE program is to develop the next generation of cybersecurity leaders through an intense program that immerses students in the cybersecurity discipline while educating them on becoming future military leaders.

"What we're doing in ACE is a subset of



Dr. Timothy Lacey, director of Information Technology for AFIT's Center for Cyberspace Research, with ROTC Cadet Dawson Godby during the 2019 ACE program.

what we teach our graduate students – a small subset of our graduate program in cyber operations," said Dr. Timothy Lacey, director of Information Technology for AFIT's Center for Cyberspace Research. Students who complete the ACE course often return to AFIT for graduate study, he added.

Professor Attends Global Forum

Dr. Marina Ruggles-Wrenn, Department of Aeronautics and Astronautics, attended the 2nd Global Forum on Advanced Materials and Technologies for Sustainable Development in Toronto 21-26 Jul 2019 and presented a paper entitled "Static Fatigue of Hi-NicalonTM-S Fiber at Elevated Temperature in Air, Steam and Silicic-Acid-Saturated Steam," and chaired an opening session of the Symposium on Advanced CMCs: Processing, Evaluation, and Applications.

Petrosky Serves as Chair at Sandia National Laboratories

Dr. James Petrosky, Department of Engineering Physics, traveled to Kirtland AFB to chair the NNSA CREST Program Review board (Red Team) at Sandia National Laboratories on 6 Aug 2019. Dr. Petrosky continues to serve as chair of the nine-member panel focused on Combined Radiation Environments for Survivability Testing.

Presentation at DE-JTO

The Center for Directed Energy (CDE) presented information at the Directed Energy-Joint Transition Office (DE-JTO), Modeling and Simulation Technical Area Working Group (M&S TAWG) offsite meeting 20-21 Aug 2019 at White Sands Missile Range NM. CDE leads university/academia DE-JTO efforts to transition DE technologies in the areas of M&S—with AFIT-developed models such as HELEEOS and LEEDR—and Atmospheric Propagation with atmospheric measurement and sensing guidelines for HEL field testing and employment.

Hypersonics Briefing

Lt Col Jeffrey Komives, Assistant Professor of Aerospace Engineering in the Department of Aeronautics and Astronautics, briefed at the National Defense Industrial Association's Hypersonic Capabilities Conference, held at Purdue University on 25 Jul 2019. He gave the presentation on "Hypersonics in the Indo-Pacific" at the request of US Indo-Pacific Command.



Lunday Receives Distinguished Award

Dr. Brian Lunday, Associate Professor of Operations Research within the Department of Operational Sciences, received the 2019 Air Force Lessons Learned Senior Civilian Professional of the Year award for leading graduate operations research curriculum realignment to improve PhD research at AFIT and meet Air Force capability requirements.

Finalists in OWDA Grant Competition

Faculty in the AFIT Department of Systems Engineering and Management have proposed to create a new generation of water treatment systems that are powered by light-emitting diodes (LEDs), low-cost, light-weight, nonhazardous devices that can be easily incorporated into water treatment systems.

Dr. Willie Harper, Dr. Michael Miller, and Lt Col John Stubbs have submitted a proposal to the Ohio Water Development Authority (OWDA) to design and develop LED-driven systems that can be used to produce clean, recyclable water. They envision LED-based systems being incorporated into water reclamation systems across a wide range of sizes and applications. Their AFIT proposal was short-listed for oral presentation, and on 8 Aug 2019, Dr. Harper appeared before the OWDA grant committee in Columbus, Ohio to discuss the project. The OWDA Board of Directors will decide the grant winners in September 2019.

AFIT-USAFA Collaboration

Department of Engineering Physics faculty member **Lt Col Samuel Butler** collaborated with USAFA/DFCEDFCE (Col Sloan) and USAFA/DFP (Capt Ullom) to measure retroreflective optical scatter of certain runway paint materials. The DOD currently spends about \$10M-\$20M/year on runway paint (cost fluctuates with material pricing).

Research Center Open House

The Center for Space Research and Assurance (CSRA) held its annual open house 17-18 Jul 2019 to reach the broader WPAFB community, attract and inform prospective students and research partners, and build esprit de corps within the interdisciplinary center. CSRA welcomed attendees from the following organizations: AFRL, AFLCMC, NASIC, and AFRC. Additional attendees included a University of Dayton intern, an AFIT cyber course student, and an out-of-town guest from NY ANG. CSRA continues to field follow-up requests from interested parties as a result of this year's open house.



DELTA System to Support Research

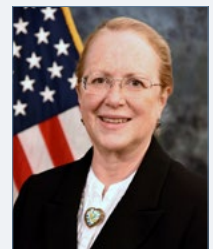
The Center for Directed Energy (CDE) took delivery of a state-of-the-art DELTA Turbulence Sensor system on behalf of AFLCMC/XZM (Staff Meteorology). The DELTA system will be used to support USAF Strategic Development Planning and Experimentation (SDPE) high energy laser (HEL) testing at Fort Sill, OK in Oct 2019, and later in OCONUS locations where the Air Force will test HELs in contested airspace. CDE research is at the forefront of establishing methods to use HELs in the operational battlespace.



NEW EN LEADERSHIP

Graduate School Names Giles as Executive Associate Dean for Strategies

Dr. Nancy Giles earned a BS in Physics from The University of North Carolina-Chapel Hill in 1981 and a PhD in Physics from North Carolina State University in 1987. In 1989, Dr. Giles joined the faculty in the Department of Physics at West Virginia University, where she was appointed as Graduate Faculty during her first year. Dr. Giles received the highest teaching and research faculty awards at WVU. In 2009, Dr. Giles was hired as Department Head and Professor of Physics in the Department of Engineering Physics at AFIT. She served as Department Head from 2009-2018 while keeping an active research program.



Dr. Giles is the co-author of two book chapters. She has authored 198 journal publications, has an h-index of 36, and has over 5000 citations. Her experimental research interests are characterization of atomic-scale defects in optical and electronic materials using photoluminescence, electron paramagnetic resonance, absorption, and thermoluminescence spectroscopies. Current research includes wide bandgap materials for power electronics, scintillator and radiation detection materials, photorefractives, and nonlinear optical materials of interest to AFRL/RX.

In her new position in the Graduate School of Engineering and Management, she will provide strategies for AFIT/EN to provide increased opportunities for STEM education for all Airmen.

UPCOMING EVENTS

OCTOBER 2019

AFIT Graduate School Fall Quarter Classes Begin

AFIT Campus, Wright-Patterson AFB, OH
1 Oct 2019

Air University Board of Visitors AFIT Subcommittee Meeting

AFIT Campus, Wright-Patterson AFB, OH
21-22 Oct 2019

2019 Defense Innovation Symposium

Sinclair Community College, Dayton, OH
22 Oct 2019

NOVEMBER 2019

AFIT Centennial Day Celebration

AFIT Campus, Wright-Patterson AFB, OH
7 Nov 2019

AFIT Official 100th Anniversary

10 Nov 2019

DECEMBER 2019

AFIT Graduate School Fall Quarter Classes End

AFIT Campus, Wright-Patterson AFB, OH
7 Dec 2019

AFIT Holiday Ball Hosted by the AFIT Spouses Association

Wright-Patterson Club, Wright-Patterson AFB, OH
7 Dec 2019

AFIT Graduate School Fall Graduation Degree Conferral

AFIT Campus, Wright-Patterson AFB, OH
20 Dec 2019

JANUARY 2020

AFIT Graduate School Winter Quarter Classes Begin

AFIT Campus, Wright-Patterson AFB, OH
2 Jan 2020

2019 Faculty Excellence Showcase Coming Soon

Watch for updates on the release of the Graduate School 2019 Faculty Excellence Showcase coming this fall.



AFIT FACULTY SEARCH



For more information about research areas and AFIT faculty members, please visit us online at www.afit.edu/BIOS and click on the new **Faculty Expertise Search Button**

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