DEPS and ITEA Tutorials
1 February 2021

Course 1. T&E of HEL Systems (0800-1200)

Classification: Unclassified, Limited Distribution C

Instructor: Larry McKee, American Systems

CEUs awarded: 0.35

Course Description: An introduction to fundamental considerations for the test and evaluation (T&E) of High Energy Laser (HEL) weapon systems. Students will be given an overview of the various distinct types of HEL testing, including example test concepts/configurations, considerations for test instrumentation, and key testing issues, such as safety and environmental concerns. Topics to be covered include:

- HEL employment/testing challenges
- Types of HEL testing
- Lethality phenomenology testing
    - HEL effects
    - HEL lethality testing types and test diagnostics
- System output testing
- System performance testing
    - HEL examples of static ground testing, dynamic OT, OT/Live
    - HEL test measures
- Instrumentation Considerations
    - HEL instrumentation summary
    - Instrumentation protection
    - Non-intrusive measurements
- HEL testing considerations
    - HEL testing issues
    - HEL testing safety
    - Test planning tools

Intended Audience: T&E engineers who may be responsible for planning, supporting, and/or executing range tests that involve HEL weapon systems.

Instructor Biography: Dr. Larry McKee has over 40 years of experience directing and performing RDT&E programs in directed energy weapon (DEW) T&E, distributed testing, nuclear weapon effects, system survivability, neutral particle beam interactive discrimination, and high energy laser effects. He joined American Systems Corporation in 2012 and is currently a subject matter expert supporting the Directed Energy Test Technology Area under the Test Resource Management Center. He has also developed and presented High Energy Laser T&E short courses for the Electronic Warfare Directorate at Edwards AFB, CA.

Course 2. T&E of HPM Systems (0800-1200)

Classification: Unclassified, Limited Distribution C

Instructor: Jeff Schleher, American Systems

CEUs awarded: 0.35

Course Description: The short course is an introduction to the testing of high power radio frequency weapons. The course contains a short introduction to the fundamentals of these high power microwave (HPM) weapons to establish a common vocabulary. The focus of the course is on test practices as they apply to HPM weapons for U.S. system testing and susceptibility testing as specified in MIL STD 464C. HPM instrumentation, test measures, and analysis make up a section of the course. Various presentations address military applications of HPM weapons and how fielded systems have been tested. Substantial new HPM test equipment has been recently made available to military test ranges and developmental laboratories. The course will address the availability, location, and procedures for these test capabilities as well as the process used to determine what test equipment was needed. A portion of the course will address the specialized requirements of these systems for safety considerations and permitting required for testing to proceed. Topics to be covered include:

- HPM Fundamentals
- Testing Fundamentals as Applied to HPM
- Test and Evaluation HPM Environment
- Sources for HPM Testing and Where to Find Them
- HPM Test Locations
- HPM Test Instrumentation and Setup
- Safety and Spectrum Management

Intended Audience: This course is appropriate for managers and analysts requiring an overview of HPM weapons and how they are tested in addition to new HPM field test engineers. A background in science and engineering at least to the technical level is required to understand the technical portion of the course.

Instructor Biography: Jeff Schleher has spent 40-years in military test and is an early member of ITEA, participating in concept, developmental, and operational test. Mr. Schleher's early test activities focused on large radar and space system testing, but since the 1990's he has engaged in high power microwave test support. His current activities are as a subject matter expert for the Test Resource Management Center science and technology efforts to provide military test ranges with necessary equipment and capabilities to support testing of high powered microwave weapon and modern electronic warfare systems. Previously, he supported the acquisition of high power microwave sources and sensors through the Directed Energy Test and Evaluation Capability. Mr. Schleher is retired from the Air Force and is the current president of the Albuquerque Chapter of the Association of Old Crows.

Course 3. Introduction to the DoD Test & Evaluation Process (0800-1200)

Classification: Unclassified, Limited Distribution D

Instructor: Harry Sinsheimer, DE JT0

CEUs awarded: 0.35

Course Description: This course discusses the fundamentals of testing DoD systems, with an emphasis on directed energy systems. Topics to be covered include:

- Overview of Defense Acquisition System
- Where do we start? - Good requirements
- The role of the Systems Engineering process
- Test Planning - when and what do we do it?
    - Test Development Strategy
    - Test & Evaluation Master Plan
    - Role of Test Lead manager
- Types of testing/when started/finished
    - Developmental Testing
    - Initial Operational T&E
    - Live Fire T&E
- Test execution and reporting
- Directed energy testing issues
    - Instrumentation
    - Safety
    - Training
    - Best practices and lessons learned
    - Some important test parameters of laser systems

Intended Audience: While the primary audience for the course remains DoD staff, DEPS shares the course broadly, not as a blueprint, but in a spirit of collegiality and an interest in contributing to others' efforts and continuing our collective dialogue about Directed Energy. As a basic introduction to T&E, it is suitable for personnel in other technical acquisition management and program management positions who want to understand more about T&E and the critical role it plays in DE system acquisition.

Instructor Biography: Harry Sinsheimer serves as the Deputy Director to the High Energy Laser Joint Technology Office since February 2017. As the Deputy Director, Harry's expertise, knowledge, and skills including an understanding of laser technology, directed energy weapons, test and evaluation, financial management, logistics, program analysis, organizational and force structure will advocate, develop and execute a High Energy Laser investment strategy that builds on existing programs while exploiting promising new technology developments for High Energy Laser weapon system applications. Prior to this role Harry was a business consultant helping small scale companies build strong functional organizations while implementing

strategic planning, programming, and progressive execution of tasks and business processes. Harry's 34 year government career included serving as Technical Advisor and Program Manager on several Missile Defense Agency's Advanced Laser and Sensor projects after serving a wide range of roles and responsibilities on the Airborne Laser Program, cradle to grave, from 1995 to 2012 gaining valuable experience on laser weapon systems. Harry earned a Master's Degree in Project Management from Penn State Erie, the Behrend College in 2006 and earned a Master's Degree in Business Administration from the University of New Mexico - Robert O. Anderson School of Management in 1999.

Course 4. Introduction to Cybersecurity T&E (0800-1200)

Classification: Unclassified, Public Release (Dist A)

Instructor: Pete Christensen, American Systems

CEUs awarded: 4

Course Description: This tutorial is intended for managers and practitioners who are required to conduct test and evaluation of systems operation in Cyberspace. The tutorial introduces key concepts associated with Cyberspace and Cyberspace Operations. The material will cover both Offensive Cyber Operations and key avenues of attack as well as Defensive Cyber Operations and strategies for defending against those attacks. With respect to the DOD 5000 and DOD Acquisition Processes we will discuss approaches for developing and testing systems to ensure mission effectiveness in a contested Cyber Environment. Finally, we will overview available resources and ongoing initiatives to improve Cyberspace T&E. Topics to be covered include:

- Understanding the Cyber Threat
- Cyberspace Terms, Definitions, Cyber Attack Lifecycle, Threats
- Cybersecurity in DOD and DHS Acquisition Requirements, Acquisition and Test
- Cybersecurity Acquisition Planning and Testing Tools
- Cyber Table Top Exercises and Cyber Ranges
- Top 10 Best Practices Cybersecurity Acquisition and Test and Evaluation (T&E)

Intended Audience: This tutorial is intended for managers and practitioners who are required to conduct test and evaluation of systems operation in Cyberspace.

Instructor Biography: Pete is an independent consultant helping customers manage, plan and execute Test and Evaluation (T&E) activities in support of the Department of Defense and Department of Homeland Security.

Pete recently retired from the MITRE Corporation after 25 years of service. In his last role, he served as Project Lead for the Operational Test and Evaluation of the Federal Emergency Management Agency (FEMA) Integrated Public Alert and Warning System (IPAWS) Program, Discrete Segment 2 (DS-2), with the long term objective of evaluating the effectiveness,

suitability, interoperability, and cybersecurity. Pete led a combined team from FEMA and DHS to plan for the independent OT&E of IPAWS.

From 2017 to 2019 Pete served as the lead for MITRE's work in support of the Deputy Assistant Secretary of Defense (DASD) for Information and Integration, Portfolio Management, Cyber Directorate.

From 2014 through 2017, Pete was requested to serve on Intergovernmental Personnel Assignment (IPA), with Test Management Resource Center (TRMC), as the Director, National Cyber Range (NCR). In that role Pete was responsible for customer outreach, event planning and execution of Cybersecurity Test & Evaluation (T&E) and Cyber Mission Force Training events at the NCR. Under Pete's leadership, NCR utilization dramatically increased and the Government, FFRDC, Contractor Team successfully executed over 200 events. Pete was also responsible for program management of the NCR Contract and NCR Complex expansion. Pete lead a multimillion-dollar effort to refresh NCR Compute and Store Resources, conduct periodic Security Re-Assessment and Authorization while concurrently sustaining event operations for critical NCR customers.

From 2011 through 2017 Pete served as MITRE's first Test and Evaluation Portfolio Manager, responsible for coordinating Test and Evaluation Activities for several Acquisition and Technology and Logistics and OSD Sponsors. Pete led MITRE work for TRMC, the DASD for Developmental Test and Evaluation and the OSD, Director of Operational Test and Evaluation (OT&E).

Pete originally joined MITRE in 1995 and in other roles has served as Project Lead and Task Lead for a myriad of programs including the Office of Naval Research, Marine Corps Systems Command and Marine Corps Operational Test and Evaluation Activity.

From 2001 through 2006, Pete served as an IPA in Scientific Advisory Roles with MCOTEA. Pete led two Operational Test Agency Initiatives to address OT&E of Information Assurance and Interoperability Testing. Pete concurrently provided oversight and direction to the OT&E for several programs including the M777 Lightweight 155 Howitzer and Expeditionary Fighting Vehicle.

Outside of MITRE, Pete is an Adjunct Professor at Capitol Technology University in Laurel Md.. Since 2006, he taught courses in the Cybersecurity Master's Program on Network Systems Security Concepts and Malicious Software. Pete is an active member of the International Test and Evaluation Association (ITEA), CTEIP Certified, has served on the Board of Directors and authored articles in the ITEA Journal. Pete is studying to be a docent at the Smithsonian's National Air and Space Museum.

Pete is a retired U.S. Navy Commander. He had a wide range of assignments as a Naval Flight Officer flying over 2200 Hours and 550 Carrier Landings in EA-6B Prowlers. His last Navy assignment was as a Program Manager in the Advanced Tactical Aircraft Protection Systems Program Office where he managed three Electronic Warfare programs. His last operational flying tour was with Tactical Electronic Warfare Squadron 136 on USS Midway.

Course 5. TENA & JMETC for Distributed Systems Engineering (0800-1200)

Classification: Unclassified, Public Release (Dist A)

Instructor: Gene Hudgins, KBRWyle, TENA/JMETC

CEUs awarded: 4

Course Description: Together, TENA and JMETC enable interoperability among ranges, facilities, and simulations in a timely and cost-efficient manner. TENA provides for real-time system interoperability, as well as interfacing existing range assets, C4ISR systems, and simulations; fostering reuse of range assets and future software systems. JMETC is a distributed, LVC capability which uses a hybrid network architecture; the JMETC Secret Network (JSN), based on the SDREN, is used for secret testing and the JMETC Multiple Independent Levels of Security (MILS) Network (JMN) is the T&E enterprise network solution for all classifications and cyber testing. JMETC provides readily available connectivity to the Services' distributed test and training capabilities and simulations, as well as industry resources. This tutorial will address the current impact of TENA and JMETC on the Test and Training community; as well as its expected future benefits to the range community and the Warfighter.

Intended Audience:

Instructor Biography: Gene Hudgins works for KBR as Director of Test and Training Environments and supports the Test Resource Management Center's (TRMC's) Test and Training Enabling Architecture (TENA) Software Development Activity (SDA) and Joint Mission Environment Testing Capability (JMETC) as the lead for the TENA and JMETC User Support Team. Since October 1998, the Central Test and Evaluation Investment Program (CTEIP) has overseen the development of TENA – which drastically improves range interoperability and resource reuse among DoD range systems, facilities, and simulations. As a key member of the TENA SDA and JMETC Program Office, Gene is responsible for Distributed Event Coordination, Design, and Integration. Gene also manages TENA training and Range Commanders Council coordination. Gene is an active member of the International Test and Evaluation Association (ITEA) and recently served as President on the Executive Committee of the ITEA National Board of Directors (BOD). Prior to this work for the TRMC, Gene worked on Eglin AFB as an Instrumentation Engineer and Department Head. Gene has a Bachelors Degree in Electrical Engineering from Auburn University (War Eagle!), a Master's Degree in Electrical Engineering from the University of Florida (Go Gators!), and an MBA from the University of West Florida.

Course 6. Design of Tests for Transitioning DE Weapon Systems to Acquisition Programs for Warfighter Fielding (1300-1700)

Classification: Unclassified, Limited Distribution D

Instructors:
- Robert Newton, USAF, Retired
- Dan A. Isbell, USAF, Retired

CEUs awarded: 0.35

Course Description: Test & Evaluation (T&E) of Directed Energy (DE) Systems is nothing new; however, the purpose of testing is changing. DE's many decades of research focused testing is now transitioning to support programs of record that lead to fielded DE weapons systems. This course is designed as an entry level short course where the instructors will briefly review the T&E processes and highlight applicable DoD guidance. Since Directed Energy (DE) is a technology very different from the kinetic weapons that form the basis of DoD written guidance, the instructors will apply the core T&E principles to DE weapon system development. This will include familiarization about methodologies along with unique test range resources that are required for DE weapons T&E.

There are differences in DE T&E phases. For instance, laboratory Research and Development (R&D) T&E has a science and engineering focus. In contrast, DE T&E for defense acquisition of fieldable DE weapons for warfighters has a more combat operational focus. The course will highlight the distinct differences between these types of DE T&E to include the spectrum of R&D T&E, Developmental T&E (DT&E) and Operational T&E (OT&E).

The phases of DT&E and OT&E for DE weapon systems are the types of testing that lead to fielding a DE weapon system after it has been proven to meet technical system performance requirements, military utility, and operational suitability requirements. These combat-relevant areas of T&E also include Logistics T&E (LT&E), which are focused on validated reliability, maintainability, sustainability and other specific logistics requirements that help to determine DE weapon system mission availability in a realistic combat environment.

The course will emphasize the need to consider integrated mission-level T&E for DE weapons, since the cost (in time and resources) is very high if done in a sequential DT&E followed by OT&E, followed by LT&E (as was historically done for other types of systems). Live fire testing of DE weapon systems is costly, and the resources are precious and few in terms of full-scale DE weapon systems test ranges and instrumentation. Careful design of test principles can result in much more effective and efficient DE weapons T&E by integrating all the elements of DT&E, OT&E, and LT&E to the maximum extent possible.

Intended Audience: To understand the material in this course, the attendee should have already completed DE 101, or have prior familiarization with DE weapon systems.

Instructor Biographies: Robert (Bob) Newton is an advanced systems developer with nearly 20-year DE experience. Currently he leads a defense technology company in applying his over 35 years of US Air Force and commercial industry experience. Beginning with a technical education in Aerospace Engineering from The Ohio State University and the Georgia Institute of Technology, his mission perspective comes from F-16 fighter and special operations. He is an acquisition professional and test pilot with over 4500 hours in over 60 types of aircraft. His specific acquisition related responsibilities involved F-16 performance / flying qualities / avionics / sensors / weapons flight test and airworthiness certification, F-22 program management, Air Force Material Command headquarters, Pentagon Air Staff, and industry. He has commanded flying units and is a veteran of Operations ENDURING FREEDOM and IRAQI FREEDOM.

Dan Isbell brings a broad range of expertise and experience to the defense and technology industry with his 27 years of service in the US Air Force. His insight comes from an educational background that includes a Master's degree in National Resource Strategy from the National Defense University, a Master's degree in Human Resource Management from Troy State University and a Bachelor of Science degree in Aerospace Engineering from Georgia Institute of Technology. During his Air Force career he also completed flight school, test pilot school, Senior Acquisition Manager's course, Industrial College of the Armed Forces and the professional military service schools. Mr. Isbell's formal education and training founded his broad experience in aircraft and weapons airworthiness certification and program management, business development and integration, technology and engineering, fighter aircraft and special operations. His positions include Chief, F-16 Systems Program Office, Commander of 514th Flight Test Squadron, Operations Research Systems Analyst for Assistant Secretary of Defense for Program Analysis & Evaluation, Air Vehicle Program Manager for F/A-22 Systems Program Office, Chief of Weapon System Sector and Technology Integration Lead for Battlefield Air Operations Kit National Team.

Course 7. Combat Systems Engineering of DEWs (1300-1700)

Classification: Unclassified, Limited Distribution D

Instructor: Douglas H. Nelson, Teknicare, Inc.

CEUs awarded: 0.35

Course Description: An introduction to the test and evaluation of directed energy weapon systems as they are designed, developed and realized to perform their intended military missions. The fundamentals of the combat systems engineering approach will be introduced to provide context and comparison to systems engineering models commonly in use. The role of test and evaluation in the steps/activities of this combat systems engineering process as tailored to directed energy systems will be briefly examined.

Intended Audience:

Instructor Biography: Doug Nelson received his Bachelor of Science in 1980 from the United States Military Academy (USMA), West Point, NY where he concentrated in physics with a specialty in weapons systems engineering. After graduation, Doug finished the Armor Officer Basic Course at Fort Knox, KY. He then completed a series of operational tours in Korea and CONUS serving as a tank platoon leader, tank company executive officer, tank company commander as well as various brigade & battalion staff positions. Doug then graduated from the Armor Officer Advanced Course at Fort Knox in 1986 subsequently earning Master or Science. in physics from the Naval Postgraduate School (NPS), Monterey, CA, in 1988. While at NPS, he conducted research in the analysis of selected atmospheric optical turbulence effects on the Relay Mirror Experiment. Upon graduation from NPS, he was an instructor and assistant professor of physics at USMA concurrently graduating from the Command & General Staff College, Fort Leavenworth, KS. In 1991, Doug then redeployed to Korea for tours as a tank battalion operations officer and brigade logistics officer. Beginning in 1993, Doug served as a Military Research Associate and upon retirement from the Army in 1997, a Staff Research Assistant, at Los Alamos National Laboratory (LANL) conducting research in CO2 DIAL. While at LANL, Doug earned his PhD in Optical Science from the University of New Mexico in 1999.

In 2000, Doug transitioned to industry, first with Raytheon Missile Systems in Tucson, AZ where he conducted test planning and analysis on AIM-9X Sidewinder. In mid 2001, he transferred to The Boeing Company where he managed and contributed technically to various programs including several in directed energy (DE). Among these were: Relay System Internal Research & Development, Aerospace Relay Mirror System, Airborne Laser, Advanced Tactical Laser, High Energy Laser Technology Demonstrator, Active Track of satellite targets, Exo-atmospheric Kill Vehicle, SBInet, Ground Combat Vehicle as well as several proprietary programs.

In 2011, Doug joined the Systems Engineering Department at the Naval Postgraduate School as an Associate Professor. There he taught the Directed Energy Systems track as well as the Combat Systems Engineering track and other systems engineering & project management courses. He also conducted research into mission engineering, atmospheric optical turbulence effects, combat force protection & survivability as well as high energy laser system and subsystem integration.

He transitioned to the US Army Space and Missile Defense Command in 2016. There his duties included serving as the Army Representative to the High Energy Laser Joint Technology Office (HEL JTO) Atmospheric Propagation Technical Area Working Group (AP TAWG) and the Modeling & Simulation (M&S) TAWG.

Doug is now the Senior Combat Systems Engineer with Teknicare, Inc. supporting several government programs. Areas of expert support include beam control, combat systems engineering and DE test & evaluation.

Course 8. HPM M&S Tools for T&E (1300-1700)

Classification: Unclassified, Limited Distribution D

Instructors: J. Mark DelGrande, Verus Research

CEUs awarded: 0.35

Course Description: The Directed Energy Test & Evaluation Capability (DETEC) has developed two software tools to facilitate High Power Microwave (HPM) testing: HPM Test Hazard Prediction (THP) Tool and the HPM Target Surrogate Material (TSM) database. This short course presents an introduction to both. Drawing from propagation codes such as RF-PROTEC and the EMPIRE Suite, THP provides the T&E community with critical tools and information to mitigate safety and hazard risks to personnel and electronics during open-air tests of HPM systems. THP's essential functions include:

1. Support safety and regulatory compliance by calculating and displaying hazard boundaries
2. Prepare frequency clearance applications in Standard Frequency Action Format (SFAF)
3. Aid in identifying potential harmful effects to non-test site electronics
4. Display specific locations or boundaries with specified field levels

In this portion of the short course, students will see the code in action while instructors discuss: Modeling the Physical Scene, Specifying Scenario Input Parameters, Understanding & Selecting Propagation Models, Graphical Visualization and Output Products, Hazard Thresholds and Hazard Zones, Standard Frequency Action Format, Basic Weather and Atmosphere Models, transferring environmental data to THP, Loading and Using HPM Electric Field Sensor Data in THP. The TSM database is a browser based repository of information on hazardous materials as well as surrogates that can be substituted for these hazardous materials during HPM testing. The purpose of the tool is to provide the HPM T&E community with access to a database that contains information on hazardous materials, how to handle those materials during test, and commonly available materials that can be substituted for the hazardous materials. The TSM database's essential functions are to:

1. Access to the electromagnetic properties of hazardous materials
2. Suggestions for safe substitutes for those materials, to include electromagnetic properties
3. Test Range unique restrictions on hazardous materials
4. Hazardous material handling instructions, including cleanup procedures

In this portion of the short course, students will see TSM in action while instructors discuss: Finding the electromagnetic properties of a hazardous material; Finding a surrogate for the hazardous material; Making plots of material properties as a function of temperature and frequency; Entering new materials into the database; Extracting the original sources of the electromagnetic data.

DEMER: The Directed Energy Models and Effects Repository's (DEMER) was created to aid and encourage the distribution of and collaboration on directed energy (DE) modeling and simulation (M&S) tools and effects data throughout the wider DE community. An appropriate collaborative environment was established to provide for community wide discovery of DE tools and effects data which balances security with utility. The distribution format ensures owners and creators the freedom of development for, and confidence in the ownership of, their products. To reach this end, DEMER's overarching philosophy will be 'Local Management, Enterprise Discovery.' DEMER is a secure web-based card catalog of meta-data files describing the current M&S capabilities and effects testing efforts. Using a meta-data format favors autonomy for resource owners by only describing pertinent details of their products, without surrendering control to a centralized database. The repository also provides the capability for members and agencies to catalog and organize their M&S and effects testing products internally, only sharing with the wider community those products they deem appropriate. In this portion of the short course, students will be given a walk-through tutorial on how to register and use the DEMER database.

HPM PULSE: The High Power Microwave Procedures Leading to Standardized Effects (HPM PULSE) is a guidebook designed to standardize HPM effects testing and is meant to be used by both experienced and novice effects test personnel. It provides best practices and useful information on common aspects of HPM effects testing. The information included in HPM PULSE will aid personnel with test design and setup, as well as provide various quick reference charts, formulas, and other background information for use during the test execution. During this portion of the short course, students will receive an overview of the HPM PULSE guidebook to better understand how it can be used to aid in conducting HPM effects tests.

Intended Audience: The intended users of these HPM tools are test planners, spectrum managers, range safety personnel, test technicians or engineers, and environmental personnel involved in HPM testing.

Instructor Biography:

Course 9. T&E in Support of Prototyping & Experimentation (1300-1700)

Classification: Unclassified, Public Release (Dist A)

Instructor: Al Sciarretta, CNS Technologies, Inc.

CEUs awarded: 4

Course Description: As one of the principal developers of a prototyping and experimentation course at the National Defense University (NDU), Al Sciarretta will provide a tutorial that addresses 1) definitions of prototypes and experiments, 2) a design of experiments (DOE) approach for developing and executing an experiment, and 3) a high-level example that addresses developing an experiment for counter-small unmanned aircraft system (counter-sUAS) systems.

1. A 30-minute block of instruction that includes: 1) discussion about the importance of prototyping and experimentation; 2) definitions for conceptual, developmental, and operational prototypes; and 3) definitions for live, virtual, and constructive experiments

2. A 3-hour block of instruction covering a DOE approach for designing an experiment. This instruction will walk through a process that: 1) identifies the military capability/problem that requires experimentation, 2) defines the primary objective and optional secondary objectives for the experiment; 3) generates â€œissuesâ€ that need to be addressed; 4) identifies hypotheses that need to be proved/disproved; 5) identifies metrics that are need to prove/disprove each hypothesis; 6) discusses data needs for each metric; 7) develops the scenario/vignettes that will maximize the generation of the needed data; and 8) identifies approaches (both instrumentation and non-instrumentation) for collecting the data. [Note: Given the brevity of the course, the identification of issues, hypotheses, metrics, and data needs will not be all inclusive; examples of each will be used to generate student discussion.]. Finally, at the end of this block of instruction, there will be a short discussion of what should be in an experiment plan as well as a short discussion of some considerations for executing the experiment plan.

3. A 30-minute group effort that uses the two blocks of instruction to develop a basic approach for designing an experiment for assessing the military benefits of counter-sUAS systems. This effort will mostly focus on identifying some of the objectives, hypotheses, issues, metrics, and data/instrumentation needs. The development of a representative threat will also be discussed.

Intended Audience:

Instructor Biography: Mr. Albert A. Sciarretta, PE, Lieutenant Colonel (USA, retired), is President of CNS Technologies, Inc. (CNSTI). He works primarily as an independent consultant, supporting various DoD organizations in assessing the military benefits of new technologies. For the DoD Test and Evaluation / Science and Technology (T&E/S&T) Program, within the Test Resource Management Center, he has served more than 14 years as a subject matter expert for advanced test technologies. He has also been tasked to develop a “use case” for counter small unmanned aircraft system (CsUAS) test instrumentation needs.

He also serves as an Expert Consultant in the National Defense University (NDU) Center for Technology and National Security Policy (CTNSP), where he assesses future warfighting system capabilities. He recently developed course content for and teaches an NDU course on prototyping and experimentation, and developed a case study focused on CsUAS experimentation.

Mr. Sciarretta is the Chair of the National Academies of Sciences, Engineering, and Medicine study committee addressing “Counter-Unmanned Aircraft System (CUAS) Capability for Battalion-and-Below Operations.” He is also on the National Academies Board on Army Science and Technology (BAST).

Mr. Sciarretta has a B.S. degree in general engineering from the U.S. Military Academy, and dual M.S. degrees in mechanical engineering and operations research from Stanford University.

Course 10. Predicting & Validating Prototype Performance (1300-1700)

Classification: Unclassified, Public Release (Dist A)

Instructor: Mark Kiemele, PhD, Air Academy Associates

CEUs awarded: 4

Course Description: Design of Experiments (DOE) is a method that can and should be used not only in the design and development of systems, but also in the modeling and validation of prototype systems. Building useful prediction models and then validating them can ease the burden of making procurement decisions. This tutorial will examine two prototypes that are built to satisfy a common set of requirements. DOE will be used to model the performance of each prototype. Then validation testing will be used to confirm the models and assess the performance capability of each prototype, i.e., how well the prototypes meet the requirements. This facilitates a comparison of the capabilities of the two systems, thereby enhancing the decision as to which system to pursue. There are no pre-requisites for this tutorial, as the analysis will be demonstrated via computer.

Intended Audience: This tutorial is for anyone interested in learning how to model performance and evaluate the capability of multiple prototypes, which should include managers, scientists and engineers and those having to make procurement decisions, would benefit from this course. There are no specific education requirements required, though some knowledge of algebra and basic statistics would help.

Instructor Biography: Mark J. Kiemele, President and CEO of Air Academy Associates, has more than 30 years of teaching and consulting experience. Having trained, consulted, and mentored more than 30,000 leaders, scientists, engineers, managers, trainers, practitioners, and college students from more than 20 countries, he is world-renowned for his Knowledge Based KISS (Keep It Simple Statistically) approach to teaching statistical methods to practitioners. His support is requested by an impressive list of global clients. Mark earned a B.S. and M.S. in Mathematics from North Dakota State University and a Ph.D. in Computer Science from Texas A&M University. During his time in the U.S. Air Force, Mark supported the design, development and testing of various weapon systems, including the Maverick and Cruise Missile systems. He was also a professor at the U.S. Air Force Academy. He is the 2017 winner of the International Test & Evaluation Association's prestigious Richard G. Cross Award, which recognizes outstanding accomplishments in test and evaluation education.