



Contact: Dr. Brian Kent, ARA Principal Engineer  
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December 8-10, 2020

Typical Webinar Syllabus (**All times Eastern Daylight**)  
(Subject to minor revisions depending on Instructor revisions)

**Tuesday 8 December 2020 - Day 1 (UNCLASSIFIED) – All Times EDT**

0830-0930	On-Site Go To Meeting Webinar connection time opens	
<b>0930-0940</b>	<b>Webinar Begins - Introduction and Welcome</b>	
0940-0955	<b>(1)</b> Virtual Course Administration/Protocol	Dr. Kent, Organizer
0955-1055	<b>(2)</b> Basic Concepts in Low Observable Technology	Dr. Kent
1055-1105	<b>(3)</b> Breaking the Kill Chain Video	Dr. Kent
1105-1125	<b>BREAK</b>	
1125-1215	<b>(4)</b> EM and Radar Fundamentals	Dr. Kent
1215-1230	<b>BREAK</b>	
1230-1315	<b>(5)</b> RCS Basic Concepts	Dr. Kent
1315-1400	<b>LUNCH</b>	
1400-1440	<b>(6)</b> RCS Scattering Mechanisms	Dr. Kent
1440-1510	<b>(7)</b> RCS of Simple Shapes	Dr. Kent
1510-1530	<b>BREAK</b>	
1530-1630	<b>(9)</b> Radar Absorbing Material Overview	Dr. P. Munk
1630-1645	<b>BREAK</b>	
1645-1730	<b>(16)</b> RAM Material Measurement Techniques	Dr. Munk
1730-1740	Closing Admin Remarks	Dr. Kent
1740	<b>ADJOURN Day 1</b>	

**Wednesday 9 December 2020 - Day 2 (UNCLASSIFIED) - All Times EDT**

0830-0930	On-Site Webinar connection time	
<b>0930-1045</b>	<b>(10) Webinar Begins - IR Signatures</b>	Dr. Randy Jost
1045-1100	<b>BREAK</b>	
1100-1145	<b>(11)</b> Visual Signatures	Dr. Randy Jost
1145-1200	<b>BREAK</b>	
1200-1315	<b>(14)</b> General RCS Measurement Technology	Dr. Kent
1315-1400	<b>LUNCH</b>	
1400-1515	<b>(8)</b> RCS Prediction Overview	Dr. Tri Van
1515-1530	<b>BREAK</b>	
1530-1620	<b>(15)</b> RCS Diagnostic Aids and Compliance	Dr. Kent
1620-1640	<b>BREAK</b>	
1640-1740	<b>(12)</b> Acoustic Signatures	Dr. Randy Jost
1740-1745	Closing Remarks Day 2	Dr. Kent
1640	<b>ADJOURN Day 2</b>	



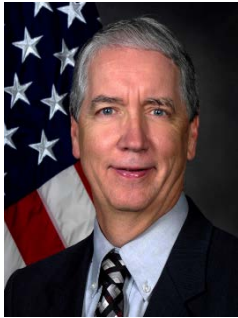
**Thursday 10 December 2020 - Day 3 (UNCLASSIFIED) - All Times EDT**

0830-0930	On-Site Webinar connection time	
0930-1015	Webinar Begins (13) – How Signature Changes A/C Design	Dr. Randy Jost
1015-1030	<b>BREAK</b>	
1030-1110	<b>(17)</b> RCS Integration I	Dr. Kent
1110-1125	<b>BREAK</b>	
1125-1230	<b>(18)</b> RCS Integration II	Dr. Kent
<b>1230-1315</b>	<b>LUNCH BREAK</b>	
1315-1415	<b>(19)</b> LO History – Design in Practice	Dr. Kent
1415-1430	<b>BREAK</b>	
1430-1530	<b>Scripted virtual discussion of the history of LO evolution with reference to high quality imagery and web connections to the National Museum of the USAF.</b>	
<b>1530</b>	<b>ADJOURN</b>	
	B-70 Supersonic Bomber	
	B-47 Bomber	
	B-58 Hustler Bomber	
	SR-71 Strategic ISR	
	F-117 Nighthawk	
	Tacit Blue	
	B-2 Spirit Bomber	
	F/A-22 Raptor Fighter, XF-23 ATF (runner up)	
	Dark Star ISR	

**ARA will mail out course completion certificates at the conclusion of the course.**



### Short Course Speaker Biographies



**Dr. Brian M. Kent**, Lead Instructor, currently serves Applied Research Associates as Chief Scientist and S&T Lead for Electromagnetics (EM), Radio Frequency (RF), and Sensing Systems. He received his MS and PhD in Electrical Engineering from The Ohio State University, and his BSEE from Michigan State University. Outside ARA, Dr. Kent continues to serve as Adjunct Professor of Electrical Engineering with Michigan State University's Department of Electrical Engineering. Dr. Kent's technical work in ARA includes the design impacts of High Power Microwave Devices, instrumentation of static and dynamic radar cross section and antenna measurement ranges, and the passive EMI emanations from commercial instrumentation.

Dr. Kent is a Fellow of the Institute of Electrical and Electronics Engineering and is a former IEEE Distinguished Lecturer for the Antenna and Propagation Society. He is also a Fellow of the Antenna Measurement Techniques Association and of the Air Force Research Laboratory. He also was a 2009 Federal Civil Service Meritorious Presidential Rank Awardee. Previously, Dr. Brian M. Kent, was a member of the scientific and professional cadre of senior executives, as the Chief Technology Officer, Air Force Research Laboratory, Wright-Patterson Air Force Base, Ohio. He served as AFRL's principle scientific/technical advisor and primary authority for the technical content of the Science and Technology Portfolio. Dr. Kent is an internationally recognized scientific expert in signature technology, and provided authoritarian counsel and advice to AFRL management and the professional staff as well as to other government organizations. He collaborated on numerous interdisciplinary research problems that encompass multiple AFRL directorates, customers from other DOD components, as well as the manned space program managed by NASA. He also served as a member of the Shuttle Columbia Accident Investigation technical staff. His technical specialties include EM Scattering & material property measurements, Radar, Antenna, and Radar Cross Section Measurements, Radar Performance Evaluation, RF/EO Sensing Technologies, Passive/Active Electronic Warfare, and co-serves as an Adjunct Professor (Michigan State University). He is an active IEEE Fellow and APS Distinguished Lecturer, an Antenna Measurement Techniques Association Fellow, and an Air Force Research Laboratory Fellow.



**Dr. Tri Van** is the Computational Sciences Group Leader in Berriehill Division. Tri received his Ph.D. in Mathematics from the University of Florida, M.S. in Mathematics from the State University of New York – Stony Brook, and his B.A. in Mathematics from New College of Florida. He has knowledge and experience in a wide range of analytical and numerical methods, working with

engineers and scientists to solve challenging real-world problems. At BerrieHill Research Division of ARA, he has been involved directly with research and code development to perform large scale computations on high performance supercomputers at the Department of Defense Supercomputing Resource Center (DSRC), analyzing the installed performance of antennas on Air Force system platforms. He has been leading the long-standing project on computational electromagnetics (CEM) research and development for Northrop Grumman since 2008 to present. His computational team was twice awarded the prestigious Northrop Grumman's World Class Team Supplier Awards in 2011 and 2015 for outstanding performance and service in advancing Northrop Grumman's computational and modeling capabilities. He is also the principal investigator of the 5-year Computational Research and Engineering Acquisition Tools and Environments (CREATE) RF project for the Air Force Research Laboratory (AFRL), testing and improving the performance of the state-of-the-art CEM SENTRi code as a computational engineering design tool for acquisition programs.



**Dr. Randy Jost (Consultant)** received the BSEE, MSEE, and PhD. EE from the University of Missouri-Columbia. He served as an officer in the United States Air Force, and completed assignment in the Signature Technology Office (Air Force Research Laboratory) and On-Site Test Manager of the National RCS Test Facility (RATSCAT), Holloman AFB, NM. Dr. Jost later worked for the University of Utah's Space Dynamics Laboratory, where he was involved in the development and implementation of electromagnetic range and materials characterization activities for over 25 years, both in the RF and optical area. He has developed calibration and measurement procedures to accurately and verifiably measure the signatures of components, subsystems and platforms for aerospace systems. He has also been active in the development of analysis and prediction codes for the modeling and simulation of aerospace systems. Additionally, he has been active in developing codes for the modeling and simulation of the propagation of electromagnetic waves for such applications as optics, radar and wireless communications. He is also a staff engineer at Ball Aerospace where he executed EMC design and testing of aerospace systems. Provide in-house training for electromagnetic compatibility design and testing. Provide company-wide support in EMC/EMI technologies. Also provide support in electromagnetics-related technologies in other divisions of Ball Aerospace.



**Dr. Peter Munk** received his Bachelors, Masters, and PhD in Electrical Engineering at The Ohio State University. Dr. Munk has over 25 years of experience in Electromagnetics, Antenna and FSS design. Dr. Munk is currently jointly employed at ARA as a principal engineer for a government laboratory that specializes in measuring the electrical properties of materials for use in the defense industry. Specific duties involve developing new and improved inverse algorithms and measurement techniques to determine the properties of these materials including their constitutive parameters, sheet and surface impedance values as well as their conductivity. Prior to this Dr. Munk served as a member of the BRC Antenna and Radome division where his interests resided in High Power Microwave (HPM) Frequency Selective Surface (FSS) solutions. While employed at BRC, and prior to that at Mission Research Corporation (MRC), he performed detailed design and analysis on several projects involving Frequency Selective Surfaces (FSS) and array antennas. These designs include broadband Active Electronic Scanned Arrays, bandpass and bandstop FSS radomes, and circuit analog absorbers. While employed in the Electromagnetic Observables Sector at MRC Dr. Munk worked on several DoD related programs involving detailed computational analysis of embedded antenna/radome structures. Prior to joining Mission Research Corporation, Dr. Munk was part of the Research Staff at the MIT Lincoln Laboratory. His duties included investigating methods of establishing a direct downlink between Defense Support Program (DSP) geostationary satellites and NAVY AEGIS cruisers, and performing an analysis of the Raytheon/TI Systems UHF Electronically Steered Array (UESA). Also while at Lincoln Labs, Dr. Munk developed a concept for an array capable of maintaining superior circular polarization over a large scan sector which was patented in February of 2002.

#### **About ARA-BRD**

BerrieHill Research Division of Applied Research Associates, Inc. specializes in scientific services, products, and research and development for defense and commercial applications in the areas of electromagnetic propagation and scattering, design and fabrication of antennas and radomes, RF measurement testing services, electro-optics, RF materials, microelectronics, and computational modeling and simulation.