AEROSPACE
SHORT COURSES

Introduction to Electromagnetic Effects (EME) and Aircraft Engineering Requirements (AERO0371)

Instructors: C. Bruce Stephens, Darren L. Stout *(This course may be taught by either instructor.)*

Course Description

This course will provide participants with an understanding of electromagnetic effects related to aircraft engineering requirements, FAA certification requirements, testing requirements for both DO-160 bench testing and aircraft level testing related to EMC, P-Static, ESD, TPED's, HIRF, EWIS and lightning. For a more in-depth focus on aircraft level testing and FAA requirements it is recommended to take **Electromagnetic Effects Aircraft Level Testing and FAA Requirements**.

Students will work in teams to gain hands-on experience building a new STC Electrical/Avionics System Installation to meet Direct Effects of Lightning certification requirements and the internal EME certification requirements. They will also prepare Electromagnetic Effects CFR compliance statements incorporating the information they learn as they progress through the course.

Course Highlights

- EME best practices
- Team EME compliance project
- DER/UM EME requirements
- EME examples and practical applications
- Review of the Advisory Circulars related to EME
- Daily real examples of problems and solutions related to EME certification

Who Should Attend?

The course is designed for all aircraft design areas including certification engineers and managers, electrical, avionics, HIRF & lightning engineers, DO-160 laboratory and aircraft technicians. Aircraft managers, project engineers, and all other system engineers working in electrical/avionics/HIRF/lightning/EWIS-related areas should also attend.

Learning Objectives

- Overview of FAA EME CFR related to aircraft protection
- How EME requirements relate to the different areas of the aircraft
- EME bench testing and aircraft level testing requirements

- Safety aspects of EME
- Design requirements related to EME
- How EME relates to other engineering requirements
- How to find and demonstrate/document compliance for EME requirements

Course Outline

Day 1

- Electrical Bonding Electromagnetic Effects Overview
- Electrical Bonding and Protection Against Static Electricity
    - Advisory Circulars 25.899-1 and 25.1715
- Electrostatic Discharge Sensitive (ESDS) Device
- Electrostatic Discharge
    - RTCA/DO-160G Section 25
- Precipitation Static (P-Static)

Day 2

- Transmitting Portable Electronic Devices (T-PEDs)
- Introduction to Electrical Wiring Interconnection System (EWIS)
- Introduction to EMC/EMI
- Emission of Radio Frequency Energy
    - RTCA/DO-160G Section 21

Day 3

- HIRF Safety and Security
- High Intensity Radiated Fields (HIRF)
- HIRF Requirements
- Radio Frequency Susceptibility
    - RTCA/DO-160G Section 20

Day 4

- The Lightning Environment
- Directs Effects Protection and Paint & Direct Effects of Lightning
- Levels for Direct Effects Testing
    - RTCA/DO-160G Section 23
- Introduction to Indirect Effects
- Lighting Indirect Effects
    - RTCA/DO-160G Section 22
- Aircraft Electrical and Electronic System Lightning Protection
    - Advisory Circular 20-136B
- Protection of Aircraft Fuel Systems Against Fuel Vapor Ignition Caused by Lightning
    - Advisory Circular 20-53C

Day 5

- EME final exam
- EME team report-out
- EME course evaluation

Classroom hours / CEUs

31.50 classroom hours
3.15 CEUs

Certificate Track

Aircraft Maintenance and Safety
Avionics and Avionic Components
Electromagnetic Effects

Course Fees

Early registration course fee: $2,595 if you register and pay by the early registration deadline (45 days out).

Regular registration course fee: $2,795 if you register and pay after the early registration deadline.

Course Materials

Course materials, including outlines, presentation copies, and supplementary materials, will be accessible through Canvas, KU's online learning system. Instructions to access Canvas will be provided upon completed registration. Students are required to bring a computer or other electronic device with PDF-viewing capabilities with them to class each day. If you require accommodation contact us at professionalprograms@ku.edu and we will work with you on an accessible solution.

U.S. Federal Employee Discount

This course is available to U.S. federal employees at 10% off the registration fee. To receive the federal employee discount, you must enter the code **FGVT116** during the checkout process. Please note that you must validate your eligibility to receive this discount by entering your U.S. government email address (ending in .gov or .mil) when creating your online registration profile. This discount is available for both the early registration and regular registration fees.

Instructor Bios

C. Bruce Stephens is an FAA DER/EUM in the areas of EME, HIRF, Lightning, Fuel Systems, Structures and EWIS. His aircraft certification experience includes Beechcraft Starship, King Air, Bonanza, Baron, Hawker 4000, Hawker 800XP, Premier 1, JPATS, Learjet Model 45/75, Cessna Citation Latitude, and military projects related to Boeing 707, 737, 747, 767 KC-46A Tanker, and 777. Stephens continues to work on Part 27 and 29 rotorcrafts (MH139 Grey Wolf), and space vehicle certification projects. He has assisted several smaller companies with FAA EME certification projects and is interested in the certification requirements related to new EVTOL Aircraft. Stephens enjoys mentoring new FAA delegates and instructing several courses he has

developed for The University of Kansas Aerospace Short Course program. These courses include HIRF, Lightning, EWIS, EZAP, DO-160, Fuel Systems, Introduction to EME, and EME Aircraft Testing/Certification. Stephens has been a Six-Sigma/Lean Master Black Belt consultant with experience in both aircraft and copper mining process improvement. He has instructed over 25 college courses, most being MBA level, including MBA Statistics, MBA Business Management, MBA Operations Management, MBA Six Sigma/Lean Production Management, Supply Chain Management, Six Sigma/Lean Black Belt and Green Belt. Universities Stephens has instructed at include Webster University, Friends University, Embry Riddle University, Southwestern College, Newman University and The University of Phoenix. He has an executive M.B.A. and M.S. in Management from Friends University and a B.S. in Industrial Technology from Wichita State University.

Darren Stout is an EME/HIRF/Lightning ODA UM/AR at the Boeing Company. Darren has a wealth of experience in Electromagnetic Effects (EME), High Intensity Radiated Fields (HIRF), lightning effects, p-static effects, and transmitting personal electronic devices, RTCA/DO-160, MIL-STD-461, along with extensive experience in laboratory and aircraft testing. His experience is a result of over 22 combined years as an Electrical and EME engineer with Boeing, Lucent Technologies (Bell Labs), FAA, and BancTec. He also served six years in the United States Air Force as a B-52 navigator, instructor navigator, and radar navigator (bombardier), directing and performing higher headquarters missions including aircraft, systems, and munitions testing, and is a Desert Storm veteran. He has a BSEE degree in electrical engineering (lasers, fiber optics, and antenna arrays) from the University of Michigan - Ann Arbor, is an iNARTE certified EMC Engineer, and is a Level 2 Certified TEMPEST Professional.

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Your company can realize substantial savings by bringing an aerospace short course to your workplace. On-site delivery is ideal for organizations that need to train 10 or more employees on a specific topic. For more information on on-site course delivery, or to request a cost proposal, please email us at ProfessionalPrograms@ku.edu.

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