AEROSPACE
SHORT COURSES

2016 CATALOG

April
SEATTLE

June, October
KANSAS CITY

September
SAN DIEGO

November
ORLANDO
AEROSPACE SHORT COURSES

The professional training choice of the global aerospace community.
YOUR WORLD. 
OUR TRAINING. 
NEW HEIGHTS.

Your world changes when you achieve your professional goals. As you explore new perspectives and master new competencies, your confidence builds. Your network expands, and your earning potential increases. When new opportunities arise, you’re ready for them.

Learn from the best.
Founded in 1977, the KU Aerospace Short Course Program has become the professional training choice of the global aerospace community. Developed to address the specific training needs of the North American aerospace industry, our program has evolved into one of the most respected non-credit professional development programs in the world.

Take it back and apply it.
Our industry-expert instructors translate theory into practical application, so you can return to work and solve real-world problems immediately.

Reach your goals faster.
- 50+ industry-specific courses (including eight new courses debuting in 2016) allow you to choose the exact training you need.
- Aerospace Short Courses are offered online, on-site and in four locations throughout the United States (course descriptions begins on page 9).
- Bring a course on-site to your workplace and tailor it to meet your specific training needs (see page 2).
- Earn a Certificate of Specialization in one of eight targeted areas by taking a prescribed set of four courses (see pages 6–7).
- Join our LinkedIn Group (KU Aerospace Short Courses) to connect with your aerospace colleagues and follow industry-related discussions.

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785-864-5823 or toll-free in the U.S. 877-404-5823
THREE WAYS TO LEARN

OPEN ENROLLMENT

2016 Schedule and Locations
Each year, the KU Aerospace Short Course Program offers groups of short courses at specific locations in the U.S. Individual courses range from 1-5 days in length, and are delivered in a traditional classroom setting. Participants learn face-to-face from industry expert instructors, enhanced by group discussions and networking opportunities.

2016 Aerospace Short Course Locations:
- Seattle, Washington (April)
- Overland Park, Kansas (June)
- San Diego, California (September)
- Overland Park, Kansas (October)
- Orlando, Florida (November)

See the complete course schedule by locations on pages 4–5 of this catalog.

ONLINE

Learn on Your Schedule
There are two formats for online classes:

Traditional Format
- Take six months to complete a course at your own pace.
- Continue the course any day/any time (there are no set schedules).
- Successful completion of the case studies or project is required.

Available courses in this format:
- Airplane Performance: Theory, Applications and Certification (page 18)
- Durability and Damage Tolerance concepts for Aging Aircraft Structures (page 28)

Live Discussion Format
- Courses are offered during a specific date range.
- Live sessions are scheduled on one or more designated days each week, and at specific times.
- Coursework requirements vary, depending upon the course.
- Courses are delivered via Blackboard, KU’s e-learning interface.

Available courses in this format:
- Airplane Sizing NEW (page 20)
- RTCA DO-160 Qualification: Purpose, Testing and Design Considerations NEW (page 54)

ON-SITE

Bring Aerospace Short Courses to Your Workplace
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 in a specific topic.

Train more people for less
- Incur lower costs per participant
- Save on employee travel expenses
- Train more people at one time

Train when it fits your schedule
- Reduce the time employees are away from work
- Train as a team to enhance project management
- Maintain company confidentiality by training at your workplace

Train on the topics you need most
- Most courses in this catalog are available for on-site delivery
- Course content and mode of delivery can be tailored to meet your specific training needs

For more information, please contact:
On-Site Program Manager
Phone: 913-897-8782
Email: aerosite@ku.edu
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DoubleTree Suites by Hilton Hotel Seattle Airport Southcenter

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| Stress Analysis for Aerospace Structures | Complex Electronic Hardware Development and DO-254 | FAA Functions and Requirements Leading to Airworthiness Approval |
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University of Kansas Edwards Campus

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| Fundamentals of Project Management for Aerospace Professionals | FAA Certification Procedures and Airworthiness Requirements as Applied to Military Procurement of Commercial Derivative Aircraft/Systems |
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San Diego Marriott Mission Valley

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| Principles of Aeroelasticity | Sustainment and Continued Airworthiness for Aircraft Structures | Aircraft Icing: Meteorology, Protective Systems, Instrumentation and Certification |
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*Save $: Combine Software Safety, Certification and DO-178C (M-TH) with Integrated Modular Avionics (IMA) and DO-297 (F) and save $595 on course registration fees.

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- Flight Testing Unmanned Aircraft Systems—Unique Challenges | p. 37 |
Enhance Your Knowledge—Advance Your Career
The Certificate of Specialization is for those who desire concentrated study in a specific area of interest. Achieving a Certificate of Specialization demonstrates to employers, coworkers and the aerospace industry that you are qualified, competent and current in your field. It distinguishes you as a professional who is committed to your career and cares to be the best.

Completion Requirements
You can earn a Certificate of Specialization by completing four courses within any one track. Please visit our website to learn more about each track and how you can apply for a Certificate of Specialization. If you have questions about Certificates of Specialization, please contact us by phone at 913-897-8772 or 877-404-5823 toll-free within the U.S. or by email at aerosite@ku.edu.

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- Either one of these courses will satisfy the certificate requirement
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# How to Register

**Online**  aeroshortcourses.ku.edu

**Phone**  785-864-5823
            877-404-5823 Toll-Free in U.S.

**Fax**  785-864-4871

**Mail**  KU Aerospace Short Course Program
           1515 St. Andrews Drive
           Lawrence, KS  66047 USA

Please copy the registration form on page 63 of this catalog to register by fax or mail.

**Registration**
Course enrollment is limited and will be accepted in order of receipt. Upon registration, a confirmation letter will be emailed to each enrollee.

**Group Registration and Discount**
Group discounts are available for companies registering more than two people for the same course at the same location. The discount rates are as follows:

<table>
<thead>
<tr>
<th>Number of People</th>
<th>Discount Rate</th>
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<tbody>
<tr>
<td>2–4 people</td>
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<tr>
<td>5–9 people</td>
<td>10% discount</td>
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<tr>
<td>10–14 people</td>
<td>15% discount*</td>
</tr>
<tr>
<td>15+ people</td>
<td>20% discount*</td>
</tr>
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</table>

We are unable to register groups online. When requesting a group discount, all completed registration forms must be submitted together by mail or fax. (Please copy the registration form on page 63 or download registration forms from our website.) The group discount cannot be combined with any other course discount. Please contact us if you have any questions about group registration and discount.

If you have more than 10 people at your organization who require training in a specific area, please ask about our on-site program. See page two, or contact the On-site Program Manager at 913-897-8782 for details.

**Payment**
All fees are payable in U.S. dollars.

**Payment by Credit Card**
KU accepts MasterCard, VISA, Discover and American Express. Please enter your credit card information online or on the registration form.

For security reasons KU cannot accept credit card information via email.

**Payment by Check (personal or company check)**
Please mail your check in U.S. dollars to the address listed to the left. Make your check payable to “The University of Kansas”. Please include your invoice number on your check. If no invoice number is available, please reference “KU Aerospace Continuing Education” on your check.

**Payment by Invoice**
If your company requires an invoice to issue payment, please select the “Bill my company” option when registering. An invoice will be issued to the registrant, based on the contact information provided.

**Payment by Wire Transfer**
You may make a wire transfer payment in U.S. dollars to US Bank of Lawrence, 900 Massachusetts, Lawrence, Kansas 66044, U.S. In the wire transfer you must reference “KU Aerospace Continuing Education” and include your invoice number. You are responsible for paying any bank transfer fees. For account and ACH or routing numbers, please contact us. You must be registered for a course before requesting bank transfer information.

**Late Payment Fee**
KU allows a 30-day grace period for payment of invoiced course fees. Any fee that remains unpaid for 30 days following completion of the class will be assessed a late fee of $100.

**Refund Policy**
If you are unable to attend a course, you have three options:

- **Send a qualified substitute.** Please contact the registration department to inform them you will not be attending. Ask your substitute to also contact registration to provide his/her information.

- **Transfer to another course.** You have one year from the original course date to complete a short course of equal value. After one year, a refund will automatically be issued. Contact the registration department to transfer courses.

- **Request a refund.** A full refund of your course registration fee will be made if requested in writing and received two weeks prior to the course’s start date. If your request is received after this time, KU will retain a $100 administrative fee. If a refund is owed but never requested, no refund will be issued after 30 days following the course completion date.
Advanced Flight Tests
Instructors: Donald T. Ward, Thomas William Strganac

Description
This course provides the practical knowledge needed to plan a safe and comprehensive series of flutter envelope expansion tests. It includes suggestions and recommendations for flutter and post-stall certification and demonstration of new or significantly modified airplane designs to meet civil or military requirements.

Highlights
- Why advanced flight testing is necessary
- Fundamental principles of aeroelasticity
- Experimental and analytical tools used in preflight preparations
- Instrumentation for flutter envelope expansion
- Subcritical response techniques and interpretation of supporting analyses
- Interpreting test results
- Expanding the envelope
- Discussions of limit cycle oscillations
- Foundations of post-stall flight testing
- Aerodynamic conditions for dynamic equilibrium
- Experimental tools for preflight preparations
- Instrumentation for post-stall flight tests
- Emergency recovery devices
- Subsystem modifications for post-stall testing
- Recommended recovery techniques
- Guidelines and discipline for conducting advanced flight tests
- Planning for efficiency in data collection and data management
- Contingency planning

Who should attend?
Designed for practicing and entry-level flight test engineers and managers, aircraft engineers and aircraft designers.

“I enjoyed this class. I liked both the professors and the different perspectives they had to offer. Dr. Ward offered his view, knowledge and first-hand experiences. And Dr. Strganac presented the “nuts and bolts” and scientific theoretical perspective that helped me understand aeronautical theory.”

Glenn Johnson, Northrop Grumman Corporation
Aerodynamic Design Improvements: High-Lift and Cruise
Instructors: C.P. (Case) van Dam, Paul Vijgen (This course may be taught by one or both instructors.)

Description
This course covers recent advances in high-lift systems and aerodynamics, as well as cruise drag prediction and reduction. It includes discussion of numerical methods and experimental techniques for performance analysis of wings and bodies and boundary-layer transition prediction/detection.

Highlights
- Aircraft design and the importance of lift and drag on fuel efficiency
- Reynolds number and Mach number effects on aerodynamic lift and drag
- CFD-based drag prediction and decomposition
- Boundary-layer transition prediction and instrumentation/visualization techniques
- Impact of operational, environmental and manufacturing effects on laminar flow
- Drag reduction techniques including viscous, wave, and induced drag
- High-lift physics of multi-element systems
- High-lift wind tunnel and flight testing examples
- Flow separation control and active flow control techniques (cruise and high-lift conditions)

Who should attend?
Designed for engineers and managers involved in the aerodynamic design and analysis of airplanes, rotorcraft and other vehicles.

“This course was very interesting, with useful information for both the design and the evaluation of aerodynamic devices in the aeronautical industry environment. Professor van Dam’s lectures have given me insights for solving actual problems I face continuously at work.”
—Rafael Garcia Leal, Embraer S.A.
Aerodynamic Design of Transport Aircraft
Instructor: Roelof Vos

Description
In this course participants learn how aerodynamics drive the detailed exterior design of transport aircraft. What aerodynamic phenomena play a role in the exterior design of a wing, a cockpit, or an engine intake? What is the effect of aerodynamic add-ons such as vortex generators, fairings, or winglets? What are the advantages and penalties of wing sweep and how can the penalties be mitigated by the aerodynamic design of the wing? Those are the type of questions that are being addressed in this course. Participants learn to understand how the various aircraft components should be shaped in order to fulfill aerodynamic requirements in all corners of the flight envelope. The strong ties between aircraft performance, aircraft aerodynamics, and aircraft exterior design are demonstrated through numerous historical and contemporary examples. Although the main focus is on jet aircraft, the course also covers the effects of propeller installation on the aerodynamic design of the empennage.

Highlights
• Causes for interference drag in high-subsonic conditions
• Effect of Reynolds number on shock-boundary-layer interaction
• Design characteristics of supercritical airfoils
• Mach number effects on flow over multi-element airfoils
• Design of root and tip airfoils of swept-wing aircraft
• Stability and control beyond the maximum operating Mach number
• Propeller slipstream effects on empennage design
• Design constraints resulting from transonic buffet
• Stalling characteristics of wings with high-lift devices

Who should attend?
Designed for aeronautical engineers, pilots with some engineering background, government research laboratory personnel, engineering managers and educators.

“...well thought-out course, well presented. The materials provide up-to-date information with a historical basis.”
—Jeffrey C. Anderson, Guidance, Navigation & Control Engineer, Boeing Commercial Airplanes
An introduction to systems engineering fundamentals as applied to aerospace systems with emphasis on manned aircraft, both commercial and military. The course is based on evolving systems engineering standards, the current versions of the INCOSE Systems Engineering Handbook (the Systems Engineering Book of Knowledge), and the underlying EIA/IS 632, IEEE P1220 and INCOSE papers. The material provides a working knowledge of all elements, technical and managerial, involved in systems engineering as applied to aerospace systems of varying complexity. It concentrates on the most troublesome areas in systems development: requirements definition and derivation, integration, allocation of requirements, risk management, verification and validation. Hardware and software systems case studies, primarily from the aircraft sector of the aerospace industry are used as examples. Techniques have been used on many commercial aircraft (from large airliners to military fighters to small personal aircraft), DoD and NASA programs.

- Comprehensive exposure of systems engineering practices including comprehensive synopsis of all processes and terminology suggested by the INCOSE SE Handbook, definition of terms and methods
- Summary of system life cycles as currently utilized by the U. S. Department of Defense, industry and NASA, with discussion of potential changes in the development and sustainment approaches along with the potential impacts [for example, model-based systems engineering (MBSE), product line management (PLM), and other innovations]
- Introduction to standard practices and activities including requirements generation, trade studies, architectural practices, functional allocation and decomposition, and verification/validation methodologies
- Scope a systems engineering plan for specific purposes—example from large military programs and from a tightly focused research program
- Practical exercises in requirements identification and definition, risk and opportunity management, and in tailoring a systems engineering process to a specific project
- Assessment of specialty engineering contributions to systems engineering effort—value of integrated product and process teams and interaction between project management and systems engineering
- Emphasis on software-intensive systems and innovations in software engineering
- Use of multiple case studies from military, commercial and research implementations of systems engineering to illustrate principles and to illuminate good practices

Who should attend?
The lectures and practice are designed for systems engineers at all levels and program managers developing large or small systems. It is especially well-suited for engineers moving into systems engineering from other disciplines.
Aircraft Icing: Meteorology, Protective Systems, Instrumentation and Certification
Instructors: Wayne R. Sand, Steven L. Morris

SAN DIEGO, CALIFORNIA
September 13–16, 2016
Tuesday–Friday,
8:00 a.m.–4:00 p.m.
Course Number AA171080
CEUS
28 classroom hours
2.8 CEUs
COST $2,195
Includes instruction, course materials, refreshments and lunches.
EARN A CERTIFICATE
This course is part of the Certificate of Specialization in Aerospace Compliance and the Certificate of Specialization in Aircraft Maintenance and Safety. See pages 6–7 for more information.

Visit our website, aeroshortcourses.ku.edu for more information about this course, including a day-by-day outline, instructor bio(s) and a downloadable PDF with course details.

Description
This course covers meteorology and physics of aircraft icing; forecasting, finding and avoiding icing conditions; designing and evaluating ice protection systems and certification of aircraft for flight into known icing conditions.

Highlights
• Description of aircraft icing
• Atmospheric aerosols
• Cloud physics of icing and conceptual cloud modes
• Ground icing
• Skew-T, Log P adiabatic diagrams
• Assessment of icing potential
• Critical icing parameters, theory and measurements
• Finding and avoiding icing conditions
• New and current icing research
• Ice accretion characteristics
• Effects of ice on aircraft performance
• Anti-ice and De-ice systems
• Icing instrumentation and detection
• Effect of SLD on aircraft
• Engine icing considerations
• Ice-testing methods
• Certification and regulations
• Conceptual methods

Who should attend?
Designed for aerospace engineers, flight test and design engineers, test pilots, line pilots, meteorologists, FAA engineers, Designated Engineering Representatives (DERs) and program managers.

“As an aircraft accident investigator, I found the information provided by this course to be extremely relevant. The knowledge I obtained will not only enhance my skills as an investigator, but contribute overall to the advancement of transportation safety.”
—Jon Lee, Western Regional Manager/Operations Investigations, Transportation Safety Board of Canada
Aircraft Lightning: Requirements, Component Testing, Aircraft Testing and Certification

Instructors: C. Bruce Stephens, Kenneth C. Darbonne (This course may be taught by one or both instructors.)

SAN DIEGO, CALIFORNIA
September 19–23, 2016
Monday–Thursday, 8:00 a.m.–4:00 p.m. and Friday, 8:00 a.m.–11:30 a.m.
Course Number AA171110

CEUS
31.5 classroom hours
3.15 CEUs

COST $2,495
Includes instruction, course materials, refreshments and lunches.

EARN A CERTIFICATE
This course is part of the Certificate of Specialization in Avionics and Avionic Components and the Certificate of Specialization in Electromagnetic Effects. See pages 6–7 for more information.

Visit our website, aeroshortcourses.ku.edu for more information about this course, including a day-by-day outline, instructor bio(s) and a downloadable PDF with course details.

Description
This course provides details for direct and indirect effects of aircraft lightning testing and certification. Requirements for both composite and metallic aircraft, including proper RTCA/DO-160 classifications, are examined. The course will also include a high-level overview of Electromagnetic Compatibility (EMC), High-Intensity Radiated Fields (HIRF), Precipitation Static (P-Static) and Electrical Bonding requirements. The new requirements of Electrical Wiring and Installation System (EWIS) and Fuel Tank Safety (14 CFR 25.981 Amd. 102) will also be addressed.

Highlights
• The electromagnetic environment of the aircraft
• Metallic and composite aircraft requirements
• The history of lightning requirements for aircraft certification
• Direct and indirect effects of lightning testing
• FAA compliance for lightning effects

Who should attend?
This course is designed for all design engineering disciplines, project managers, project engineers and laboratory personnel whose aircraft system may require protection from the effects of lightning.

“Th[e] valuable information, based on direct experience, was an important add-on to the full and comprehensive information provided for understanding the lightning phenomenon and relevant investigative approaches.”
—Massimo Semoli, Compliance Verification Engineer (CVE), Pilatus Ltd.
Aircraft Structural Loads: Requirements, Analysis, Testing and Certification
Instructor: Wally Johnson

Description
This course provides an overview of aircraft structural external loads analysis including: criteria, design, analysis, fatigue, certification, validation and testing. It covers FAR 23 and FAR 25 airplane loads requirements. However, the concepts may be applicable for military structural requirements. Loads calculations examples using BASICLOADS software will be demonstrated throughout the course week. A copy of BASICLOADS software will be provided to attendees.

Highlights
- Overview of data requirements—aerodynamics, mass properties, stiffness, control systems and propulsion
- Certification requirements—methods of compliance and FAR 23 and FAR 25 loads requirements
- Structural design airspeeds derivations—construct flight envelope
- V-n diagrams—calculation of maneuvering load factors, gust load factors, construct V-n diagrams
- Maneuver loads—balanced maneuvers, abrupt pitch maneuvers, roll maneuvers, yaw maneuvers and engine-out maneuvers
- Gust loads—gust formula, discrete tuned 1-cos gust, PSD gust, vertical, lateral and head-on gust
- Ground loads—landing, taxi, ground handling, static and dynamic loads and landing gear drop test
- Airframe loads—wing, horizontal tail, vertical tail, fuselage, control surfaces and flaps
- Fatigue loads—certification requirements, mission requirement, exceedance curve, gust and maneuver fatigue loads
- Loads testing—flight loads validation, ground calibration, static limit and ultimate test and fatigue loads test
- Loads calculations using BASICLOADS software throughout the course

Who should attend?
Designed for practicing engineers and engineering managers whose responsibilities include aircraft structures.

“...The course was interactive, comprehensive and the trainer had a dynamic approach which kept the momentum going. Ideal for those who would like to better understand how structural loads are analyzed for design certification.”
—Emilio Isalas, MRB Engineer, Fokker Mexico
Aircraft Structures Design and Analysis
Instructors: Mark S. Ewing, Michael Mohaghegh (This course may be taught by one or both instructors.)

Description
An introduction to analysis and design of aircraft structures, including design criteria, structural design concepts, loads and load paths, metallic and composite materials; static strength, buckling and crippling, durability and damage tolerance; practical design considerations and certification and repairs. Analysis exercises and a design project are included to involve students in the learning process.

Highlights
- Structural design overview
- Aircraft loads
- Metals
- Fiber-reinforced composites
- Material selection
- Design to static strength
- Mechanical joints
- Mechanics of thin-walled and built-up structure
- Design to buckling and stiffness
- Component design
- Design for damage tolerance
- Design for durability
- Certification
- Continued airworthiness of the aging fleet

Who should attend?
Designed for engineers, educators and engineering managers whose responsibilities include aircraft structures.

“Even though I had a lot of the topics at the university, the course gives a clear and more practical view of the actual topic.”
—MSC. Huub Timmermans, National Aerospace Laboratory, The Netherlands
Airplane Flight Dynamics
Instructor: Willem A.J. Anemaat

2016 COURSES

SAN DIEGO, CALIFORNIA
September 12–16, 2016
Monday–Friday,
8:00 a.m.–4:00 p.m.
Course Number AA171010

CEUS
35 classroom hours
3.5 CEUs

COST $2,495
Includes instruction,
course materials,
refreshments and lunches.

EARN A CERTIFICATE
This course is part of the Certificate of Specialization in Flight Tests and Aircraft Performance and the Certificate of Specialization in Aircraft Design. See pages 6–7 for more information.

Visit our website, aeroshorthourses.ku.edu for more information about this course, including a day-by-day outline, instructor bio(s) and a downloadable PDF with course details.

“...I felt the course will be immediately applicable to my current position. The instructor was excellent and had a great command of the course material from both a theoretical and practical point of view.”
— Karl Parsons, Aerospace Engineer, Sierra Nevada Corporation

Description
An overview of airplane static and dynamic stability and control theory and applications, classical control theory and applications to airplane control systems. Overview of flying qualities and regulations.

Highlights
• General airplane equations of motion
• Review of basic aerodynamic concepts
• Longitudinal aerodynamic forces and moments
• Lateral-directional aerodynamic forces and moments
• Thrust forces and moments
• The concept of static stability
• Applications of the steady state airplane equations of motion
• Effects of the flight control system; control forces
• Applications of the perturbed state equations of motion
• Dynamic stability: short period, phugoid, Dutch Roll, spiral and roll mode
• Review of flying qualities criteria
• Videos of flying qualities, cross-wind landings, take-off rotation, roll-rate coupling etc.

Who should attend?
Aeronautical engineers, mechanical engineers, electrical engineers needing to learn more about flight dynamics, along with pilots with some engineering background, government research laboratory personnel, engineering managers and educators.
Airplane Performance: Theory, Applications and Certifications

Instructor: Jan Roskam
Moderator: Mario Asselin

Description
This dynamic learning opportunity featuring Jan Roskam includes an overview of airplane performance and prediction, performance applications, certification standards and the effects of stability and control on performance.

The course delivery features streaming video and animated illustrations.

Participants will be guided through each course section and will have the flexibility to complete sections and readings at their own time and pace, but within the six-month course completion deadline. In addition, attendees will complete case studies, also within the six-month course time frame. Upon satisfactory completion of the case studies, you will be awarded a certificate for instructional hours and CEUs.

Interaction with the course moderator will take place via email.

Highlights
- Review of airfoil theory
- Review of wing theory
- Airplane drag breakdown
- Fundamentals of stability and control
- Class I method for stability and control analysis
- Fundamentals of flight performance
- Take-off performance
- Landing performance
- Climb and drift-down performance
- Airplane propulsion systems
- Range, endurance and payload range
- Sensitivity studies and growth factors
- Maneuvering and the flight envelope
- Estimating wing area, take-off thrust, take-off power and maximum lift for clean takeoff and landing
- Preliminary configuration design and integration of the propulsion system
- Flight test principles and practices
- Airplane life cycle program costs

Who should attend?
Designed for aeronautical engineers, pilots with an engineering background, simulator engineers, government research laboratory personnel and university faculty.

“I have always enjoyed listening to Dr. Roskam. His experience shows with each lecture.”
—Online course participant
Airplane Preliminary Design
Instructor: Willem A.J. Anemaat

Description
This course provides an overview of the fixed-wing airplane design decision-making process and the relation of design to manufacturing, maintainability and cost-effectiveness. It is applicable to jet transport, turboprop commuter transport, military (trainers, fighter bomber, UAV) and general aviation aircraft. The design process covers sizing (weight, wing area, thrust/power), aerodynamics, weight and balance, stability and control and cost. Numerous examples are shown. Lessons learned and “what to watch out for” are discussed.

Highlights
• Review of drag polar breakdown for subsonic and supersonic airplanes
• Preliminary sizing of airplane take off, empty and fuel weights for a given mission specification
• Performance constraint analyses
• Preliminary configuration selection
• Fundamentals of fuselage and wing layout design
• High-lift and lateral control design considerations
• Fundamentals of power plant integration
• Fundamentals of landing gear layout design
• Class I weight and balance prediction
• Class II weight, balance and moment of inertia prediction
• Fundamentals of static longitudinal stability
• Deep stall and how to design for recoverability
• Take-off rotation and the effect of landing gear location
• Review of dynamic stability concepts and prediction methods
• Unusual configurations
• Design optimization
• Cost

Who should attend?
Aeronautical engineers, mechanical engineers and electrical engineers needing to learn more about design. Pilots with some engineering background, government research laboratory personnel, engineering managers and educators.

“The course is very rich in history and details. It should be taken by every preliminary design engineer.”
—Rodrigo F. Souza, Embraer, S.A.
**Description**

This course provides an overview of the fixed-wing airplane sizing process. It is applicable to jet transport, turboprop commuter transport, military (trainers, fighter bomber, UAV) and general aviation aircraft. The design process covers sizing (weight, wing area, thrust/power), drag, high lift device sizing, weight and balance, stability and control and geometry. Numerous examples are shown, and lessons learned and “what to watch out for” are discussed.

**Highlights**

- Introduction to airplane design: flowchart of the design process
- Review of drag polar breakdown for subsonic and supersonic airplanes, rapid method for drag polar prediction, check of drag polar realism
- Two airplanes: same mission, different design: comparison of the Boeing B-47 with the B2 Vulcan
- Preliminary sizing of airplane take-off weight, empty weight and fuel weight for a given mission specification: applications; sensitivity of take-off weight to changes in payload, empty weight, range, endurance, lift-to-drag ratio and specific fuel consumption; role of sensitivity analyses in directing program-oriented research and development: applications
- Performance constraint analyses: relation between wing loading and thrust-to-weight ratio (or wing loading and weight-to-power ratio) for the following cases: stall speed, take-off field length and landing field length, statistical method for estimating preliminary drag polars, review and effect of airworthiness regulations; relation between wing loading and thrust-to-weight ratio (or wing loading and weight-to-power ratio) for the following cases: climb and climb rate (AEO and OEI), cruise speed and maneuvering; the matching of all performance constraints and preliminary selection of wing area and thrust required: applications
- Preliminary configuration selection; what drives unique (advanced) configurations? Discussion of conventional, canard and three-surface configurations; fundamentals of configuration design
- Preliminary Design Sequence:
  - Fuselage/cockpit
  - Type of propulsion
  - Wing planform
  - Type, size and disposition of high-lift devices
  - Layout of empennage (horizontal tail, canard, V-tail, vertical tail sizing)
  - Type of landing gear
  - Preliminary drawing (CAD), including loading diagram
  - Class I weight and balance
  - Class I stability and control
  - Class I moment of inertia estimate
- Example airplane sizing exercise using Advanced Aircraft Analysis (AAA)

**Who should attend?**

Aeronautical engineers, mechanical engineers, electrical engineers needing to learn more about design. Pilots with some engineering background, government research laboratory personnel, engineering managers and educators.
Cabin Electronics: Management, Entertainment and Connectivity Systems  NEW  (course will debut October 2016)
Instructor: Kenneth C. Darbonne

OVERLAND PARK, KANSAS
October 17–20, 2016
Monday–Thursday,
8:00 a.m.–4:00 p.m.
Course Number AA171200

CEUS
28 classroom hours
2.8 CEUs

COST  $2,195
Includes instruction, course materials, refreshments and lunches.

EARN A CERTIFICATE
This course is part of the Certificate of Specialization in Avionics and Avionic Components. See pages 6–7 for more information.

Visit our website, aeroshortcourses.ku.edu for more information about this course, including a day-by-day outline, instructor bio(s) and a downloadable PDF with course details.

Description
This course will provide an introduction to cabin electronics, including cabin management, entertainment and connectivity systems. Fundamental elements of these systems will be presented along with common installation concerns. Certification aspects including FAA regulations and guidance for showing compliance to the regulations will be discussed. Instruction, practical examples, and in-class activities are used to enhance the learning experience.

Highlights
• Cabin management system designs
• Electrical interface fundamentals
• Cabin entertainment elements
• Passenger interfaces
• Common cabin internet connectivity options
• Certification requirements & guidance
• Installation considerations
• Environmental qualification
• Electrical load analyses
• Electromagnetic compatibility

Who should attend?
This course is aimed at designers, engineers, integrators, and project/program managers involved in aircraft completions. Individuals tasked with the design and certification of cabin electronics will benefit from the information presented.
Cabin Safety and Crashworthiness of Aircraft Cabin Interiors

NEW  (course will debut November 2016)
Instructor: Jose Mora-Vargas

Description
This course provides a fundamental review of transport airplane regulatory requirements and compliance-finding methodologies associated with cabin safety and crashworthiness regulations on aircraft cabin interior configurations. The course also reviews FAA/EASA criteria to determine the certification bases of Type Certification and Supplemental Type Certification projects.

Highlights
- Review FAA requirements and advisory material associated with cabin safety/crashworthiness
- Practical insight into industry practices to evaluate transport airplane cabin interiors
- Establishing certification basis applicable to TC/STC projects
- Review seats qualification requirements and impact on cabin safety/crashworthiness compliance

Who should attend?
This course is designed for FAA designees, FAA organizational designees/authorized representatives and certification engineers associated with STC cabin interior projects.
Civil and Military Certification of Propulsion Systems to Support Aircraft and Helicopter Operations NEW (course will debut November 2016)

Instructor: Luc Deniger

Description
This course provides fundamental design considerations for certification of propulsion systems. It discusses design requirements, methods of compliance, tests and analyses to demonstrate compliance to civil and military certification requirements. Using practical examples, the participants will gain knowledge to support their role as propulsion engineers.

Highlights
- Propeller certification
- Engine certification
- Integration of propulsion systems on aircraft/helicopters
- System safety and safety assessments for propulsion systems
- Propulsion systems flight testing
- Electronic control aspects, including FADECs
- Helicopter gear boxes
- Environmental aspects (rain, ice/hail, snow, sand, volcanic ash, etc.)
- Fuel system considerations
- ETOPS considerations
- Thrust reversers
- Critical components lives
- In-service monitoring and engine structural integrity programs
- Continuing airworthiness of propulsion systems

Who should attend?
Intended for practicing and entry-level propulsion engineers and managers, aircraft engineers and aircraft designers.
Commercial Aircraft Safety Assessment and 1309 Design Analysis
Instructor: Marge Jones

Description
This course provides the practical knowledge of system safety requirements of 14 CFR 2X.1309 regulation, from fundamental philosophies and criteria to the analysis techniques to accomplish safety requirement identification, validation, and verification. It includes detailed review of SAE ARP 4761 and system safety aspects of ARP 4754A, including allocation of safety requirements and assigning development assurance levels. Principles apply to all types of commercial aircraft certification and may also be adapted for any system safety activity.

Highlights
- Detailed review of the 14 CFR 2X.1309 regulation and what it requires
- Overview of the SAE ARP 4761 Safety Assessment process for commercial aviation
- Overview of the SAE ARP 4754A Development Process focused to system safety aspects
- Aircraft and system functional hazard assessments
- Preliminary system safety assessments
- Failure rate prediction techniques
- Failure mode and effects analysis (FMEA) and summary (FMES)
- Fault tree analysis concepts
- Common cause analysis
- System safety assessments
- Tailoring the safety process for modifications
- Safety analysis and information required to support development of certification plans
- Guidelines for preparing 1309 safety related compliance statements

Who should attend?
This course is designed for Parts 23, 25, 27 and 29 system certification engineers, system designers, FAA Designated Engineering Representatives (DERs), aircraft certification personnel, system safety specialists who are new to the commercial certification safety process and military personnel who are responsible for procuring civil equipment.

“The course presentation was fantastic, with engaging and thorough course content. I knew I made a great choice by attending this course after learning that even the FAA sends their employees to KU!”
—Mike Beanes, Senior Software Engineer and FAA-Certificated Flight Instructor
Complex Electronic Hardware Development and DO-254
Instructor: Jeff Knickerbocker

Description
This course provides the fundamentals of developing and assessing electronic components to the standard RTCA/DO-254 Design Assurance Guidance for Airborne Electronic Hardware. It is designed for developers, avionics engineers, systems integrators, aircraft designers and others involved in the development or implementation of complex electronic hardware (application-specific integrated circuits, field-programmable gate arrays, etc.). The course also provides insight into the FAA’s review process and guidance and provides practical keys for successful development and certification. Practical exercises and in-class activities will be used to enhance the learning process.

Highlights
• The course addresses RTCA/DO-254 as applied via FAA Advisory Circular AC20-152
• FAA Order 8110.105 is addressed as are current standard EASA certification review items and FAA issue papers
• Potential deficiencies in current regulatory guidance material is addressed versus the current state of practice verification techniques
• Best practices for requirements capture and subsequent verification methodologies are discussed
• White papers will be provided—some out-of-class reading will enhance the participant’s experience

Who should attend?
Designed for developers, avionics engineers, systems integrators, aircraft designers and others involved in development or implementation of complex electronic hardware and programmable devices (application-specific integrated circuits, field-programmable gate arrays, etcetera.)

“After completing the class, I feel that I now have a much better understanding of the requirements and expectations of this guidance, as well as how it is applied in the industry. Overall, I enjoyed the class, took a lot of notes and plan to share the knowledge that I have gained with my department as well as others within my organization. Thank you for a quality job.”

—Frank D’Onofrio, Senior Software Quality Engineer
Conceptual Design of Unmanned Aircraft Systems
Instructor: Bill Donovan

SAN DIEGO, CALIFORNIA
September 12–16, 2016
Monday–Thursday, 8:00 a.m.–4:00 p.m. and Friday, 8:00 a.m.–11:30 a.m.
Course Number AA171020

CEUS
31.5 classroom hours
3.15 CEUs

COST $2,495
Includes instruction, course materials, refreshments and lunches.

EARN A CERTIFICATE
This course is part of the Certificate of Specialization in Aircraft Design and the Certificate of Specialization in Unmanned Aircraft. See pages 6–7 for more information.

Visit our website, aeroshortcourses.ku.edu for more information about this course, including a day-by-day outline, instructor bio(s) and a downloadable PDF with course details.

Description
This conceptual approach to overall design of Unmanned Aircraft Systems (UAS) includes concepts of operations, communications, payloads, control stations, air vehicles and support. It includes requirements and architecture development, initial sizing and conceptual level parametric and spreadsheet assessment of major system elements.

Highlights
- Introduction to Unmanned Aircraft Systems (UAS), including conceptual design issues and operating environments
- Control station, communication and payload considerations and sizing
- Life cycle cost estimation
- Air vehicle parametric design and propulsion
- Conceptual level aerodynamics
- Standard atmosphere models
- Conceptual level mass estimation
- Parametric geometry
- Air vehicle performance
- Mission assessment
- Methodology and correlation
- Air vehicle optimization
- Overall system optimization
- Reliability, maintainability and support

Who should attend?
Designed primarily for practicing conceptual-level design engineers, systems engineers, technologists, researchers, educators and engineering managers. Students should have some knowledge of basic aerodynamics and conceptual design, although it is not mandatory. Basic knowledge of spreadsheet analysis methods is assumed.

“Bill Donovan and KUs’ Conceptual Design of Unmanned Aircraft Systems course has sparked my interest in aircraft design once again, in a way that’s encouraged me to pursue this field even more.”
—Jay Marcos, GA-ASI
Digital Flight Control Systems: Analysis and Design
Instructor: David R. Downing

SAN DIEGO, CALIFORNIA
September 12–16, 2016
Monday–Friday,
8:00 a.m.–4:00 p.m.
Course Number AA171030
CEUS
35 classroom hours
3.5 CEUs
COST $2,495
Includes instruction,
course materials,
refreshments and lunches.
EARN A CERTIFICATE
This course is part of
the Certificate of
Specialization in Aircraft
Design.

Visit our website,
aeroshortcourses.ku.edu
for more information
about this course, including
a day-by-day outline,
instructor bio(s) and a
downloadable PDF with
course details.

Description
This course presents a set of classical and modern flight control analysis and design tools. These tools will be combined to form a design process that will enable the development of flight control systems that are implementable in “real world” vehicles. These techniques will be used to design typical aeronautical vehicles’ lateral and longitudinal controllers.

Highlights
- Discover that it is possible to design autopilots, using the linear equations of motion and linear classical complex S-plane single input/single output continuous analysis and design tools, which can then be implemented on nonlinear aerospace vehicles
- Discover that it is possible to design sampled data autopilots, using the linear equations of motion and linear classical complex Z-plane single input/single output analysis and design tools, which can then be implemented on nonlinear aerospace vehicles
- Discover that it is possible to design continuous and sampled data autopilots, using linear quadratic regulator design tools, which can then be implemented on nonlinear aerospace vehicles
- Discover techniques that extend the linear quadratic regulator solution to permit complex commands, and incorporate proportional integral and control rate limiting compensators

Who should attend?
Designed for individuals from government or industry who design, simulate, implement, test or operate digital flight control systems or who need an introduction to classical and modern flight control concepts.

“As a flight test engineer, it was difficult for me to understand the design changes made by the flight control systems engineers. I now understand digital flight control system design and this has increased my confidence during flight tests. It has also helped me contribute more effectively in the aircraft development process.”
—Leonardo Rodrigues, Flight Test Engineer, Embraer, S.A.
Durability and Damage Tolerance Concepts for Aging Aircraft Structures
Instructor: John Hall

Description
Design, analysis and testing fundamentals are used as an introduction to the effects of fatigue and accidental and corrosion damage on the durability and damage tolerance of aircraft structure. Emphasis is placed on current programs used to assure continuing airworthiness of aging aircraft structure. Principal topics are centered on commercial jet transport aircraft, but fundamentals are applicable to all types of aircraft.

Highlights
- Background to current aging airplane programs
- Design objectives: safety, economics and responsibilities
- Damage sources: environmental deterioration and accidental and fatigue damage
- Evaluation: loads, stresses, detail design, analysis and testing
- Manufacture: processes and assembly
- Certification: fatigue and damage tolerance
- Maintenance: inherent characteristics and operator responsibilities
- Aging airplane programs: introduction, modifications, repairs, corrosion prevention and control, fatigue and widespread cracking and structural maintenance program guidelines
- Future airplanes: design and analysis and MSG-3-Revision 2

Who should attend?
Designed for managers, engineers, maintenance and regulatory personnel in the aircraft industry who are involved in the evaluation, certification, regulation and maintenance of aging aircraft structures.

“This class was indeed interesting and useful.” —Online course participant
Dynamics for Aerospace Structures
Instructor: Dennis Philpot

**SAN DIEGO, CALIFORNIA**
September 20–23, 2016
Tuesday–Friday,
8:00 a.m.–4:00 p.m.
Course Number AA171170

**CEUS**
28 classroom hours
2.8 CEUs

**COST**
$2,195
Includes instruction, course materials, refreshments and lunches.

**EARN A CERTIFICATE**
This course is part of the Certificate of Specialization in Aircraft Design and Certificate of Specialization in Aircraft Structures. See pages 6–7 for more information.

Visit our website, aeroshortcourses.ku.edu for more information about this course, including a day-by-day outline, instructor bio(s) and a downloadable PDF with course details.

**Description**
This course is designed to provide participants with strong theoretical, as well as practical knowledge of the methodologies for performing rigid body and modal-based dynamics analysis on a wide range of structural and mechanical systems. The course builds upon the theoretical foundation with practical applications that can be immediately put into practice in the workplace. In this manner, both the theory and practice of classical “hand” analysis techniques are presented, along with the more modern (numerical/computational) methods used in the industry. The subject matter difficulty-level is intermediate.

**Highlights**
- Solid mechanics: the big picture
- Time-domain vs. frequency-domain analysis
- The structural dynamics analysis process
- Kinetic energy and momentum
- d’Alembert’s Principle
- Mode shapes, boundary conditions and natural frequencies
- The nature of dynamic response
- Newtonian dynamics: first- and second-order systems
- Response of first-order systems to various load conditions
- Second-order systems
- Dynamic response of second-order systems
- Introduction to random vibration
- Probability density functions
- Power spectral density functions
- Multiple-degree-of-freedom (MDOF) Systems
- Computation of eigenvectors and eigenvalues
- Dynamic response of MDOF Systems
- Common failure modes for dynamically-loaded structures
- Practical examples for the aerospace industry
- Shock and vibration testing
- Introduction to MIL-STD-810G
- Deriving environments from flight test data
- Computing RMS values of acceleration, velocity and displacement

**Who should attend?**
Design engineers who would like to become more familiar with the techniques and modern practices of dynamics analysis to help them be more knowledgeable and bring more capability to the work place; mechanical engineers who need to become more proficient in the area of structural dynamics due to a particular job assignment or new career opportunity that requires expertise in the dynamic analysis of structures; and department managers whose staff are involved in loads and dynamics work.

“This is an excellent course. Dennis is a wonderful teacher. I learned a lot. I really appreciate the applied problems used in this course.” —2015 Seattle Participant
**Electrical Wiring Interconnect System (EWIS) and FAA Requirements**

Instructors: C. Bruce Stephens, Franklin L. Cummins *(This course may be taught by one or both instructors.)*

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### SEATTLE, WASHINGTON
April 11–15, 2016  
Monday–Thursday, 8:00 a.m.–4:00 p.m. and  
Friday, 8:00 a.m.–11:30 a.m.  
Course Number AA161360

### CEUS
31.5 classroom hours  
3.15 CEUs

### COST
$2,495  
Includes instruction, course materials, refreshments and lunches.

### EARN A CERTIFICATE
This course is part of the Certificate of Specialization in  
**Aerospace Compliance**, Certificate of Specialization in **Aircraft Maintenance and Safety** and Certificate of Specialization in **Avionics and Avionic Components**. See pages 6–7 for more information.

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**Description**

This course will discuss the FAA Code of Federal Regulations (CFRs) and design concepts required to ensure all aspects of aircraft electrical wiring and installation are safe. It will examine aircraft wiring as a system and review all Part 25 CFRs related to EWIS FAA Certification. A review of FAA Advisory Circulars and practical applications of the information will be conducted as teams will be selected to simulate the EWIS certification process. EWIS requirements for aircraft maintenance and inspection will also be discussed.

### Highlights
- EWIS best practices  
- Team EWIS workshops  
- DER/UM EWIS requirements  
- EWIS examples and practical applications  
- Review of advisory circulars

### Who should attend?
The course is designed for all aircraft design areas including electrical, avionics, and HIRF/lightning engineers and aircraft technicians. Aircraft managers and project engineers working in electrical/avionics related areas should also attend.

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“Trying to learn the intent of the requirements is tough in itself. The instructors know how to bring it home and help you understand how it applies to your job.”  
—Jimmy Cornejo, Seat Electrical Lead Engineer, The Boeing Company

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Visit our website, aeroshortcourses.ku.edu for more information about this course, including a day-by-day outline, instructor bio(s) and a downloadable PDF with course details.
Electrical Wiring Interconnect System (EWIS) Safety Assessment - 25.1709 NEW (course will debut June 2016)

Instructor: Thomas N. Taylor, C. Bruce Stephens (This course may be taught by one or both instructors.)

Description
This course will focus on the requirements and methods that can be used to demonstrate compliance to 14 CFR 25.1709 (EWIS Safety Analysis). The discussion will examine the use of FAA AC 25.1701-1 to prepare a Functional and Physical Analysis. The course will also include an overview of the EWIS requirements included in 14 CFR Part 25, subpart H.

Highlights
- A detailed review of FAA AC 25.1701-1C and 25.1709 Flow Diagram
- Practical EWIS example for new and modified aircraft
- 25.1709 Functional and Physical Analysis Development through Team Workshops

Who should attend?
The course is designed for engineers, technicians and managers involved in the design and certification of Transport Category Aircraft. The course is intended for both Original Equipment Manufacturers (OEM) and aircraft modifiers.

Visit our website, aeroshortcourses.ku.edu for more information about this course, including a day-by-day outline, instructor bio(s) and a downloadable PDF with course details.
**Electromagnetic Effects Aircraft Level Testing and FAA Requirements**  NEW  (course will debut October 2016)

Instructors: C. Bruce Stephens, Darren L. Stout  *(This course may be taught by one or both instructors.)*

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**Description**

This course will discuss the concepts of aircraft ground and flight testing that may be required to ensure that aircraft level systems are safe for operation when exposed to the effects of Electromagnetic Effects (EME), High Intensity Radiated Fields (HIRF), Lightning, Precipitation Static (P-Static), and Transmitting Personal Electronic Devices (TPEDs). This course will discuss the fundamentals of coordinating and performing aircraft testing from a very practical, step-by-step perspective, and examine the process used by aircraft OEMs to show compliance to regulations relating to EME, HIRF, lightning, p-static, and TPEDs. The course will also include a high-level overview for electromagnetic effects areas. Topics discussed include Electromagnetic Compatibility (EMC), High Intensity Radiated Fields (HIRF), Lightning Transit Analysis, Precipitation Static (P-Static) and Transmitting Personal Electronic Devices (TPEDs) requirements.

**Highlights**

- Aircraft testing fundamentals
- Coordination of aircraft testing activities
- Documentation of test procedures and results
- FAA aircraft-level certification requirements
- Problem and solution discussions
- EME testing team workshops

**Who should attend?**

The course targets individuals in all aircraft design and testing areas including electrical, avionics, communications, engineers and technicians. Aircraft managers and project engineers who coordinate airplane testing and/or certification related areas are also recommended to attend.

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Visit our website, aeroshortcourses.ku.edu for more information about this course, including a day-by-day outline, instructor bio(s) and a downloadable PDF with course details.
FAA Certification Procedures and Airworthiness Requirements as Applied to Military Procurement of Commercial Derivative Aircraft/Systems

Instructors: Gilbert L. Thompson, Robert D. Adamson (This course may be taught by one or both instructors.)

Description

This course provides an overview of FAA functions and requirements applicable to Type Design Approval, Production Approval, Airworthiness Approval and Continued Airworthiness associated with military procured commercial derivative aircraft and products. The course will focus on the unique military needs in procurement (customer versus contractor) of products meeting civil airworthiness requirements which are aligned with military-specific mission/airworthiness goals. Prior certification experience is beneficial, but not required.

Highlights

• Overview of FAA Aircraft Certification (AIR) and Flight Standards (AFS) service organizations
• Applicability of FAA advisory circulars, notices and orders
• Parts Manufacturer Approval (PMA) process
• FAA "baseline" and "Program Specific Service Agreement" (PSSA) services following Title 14, Code of Federal Regulations (CFRs), Parts 1, 11, 21
• Eligibility of Department of Defense contractor installations and modification centers as FAA Part 145 Repair Stations
• Part 39 Airworthiness Directives
• Flight Standards Aircraft Evaluation Group’s (AEG) role in aircraft certification
• Type Certification (TC) and Supplemental Type Certification (STC) process (FAA Handbook 8110.4)
• Project Specific Certification Plan (PSCP) principles in the RFP process
• FAA Form 337/Field Approval process
• Role of FAA Military Certification Office (MCO) as defined in FAA Order 8110.101
• Federal Reimbursable Agreement AVS-OA-ACE-12-3035 between DOT/FAA and armed services of the United States
• USAF Policy Directive 62-6, NAV AIR Instruction 13100.15, Army Regulation 70-62, application of Mil-HDBK-516C, TACC/MACC

Who should attend?

This course is designed and focused specifically for U.S. Department of Defense (DoD), Department of Homeland Security, U.S. Coast Guard and non-U.S. military procurement and airworthiness personnel, and associated military/supplier engineers, consultants and project directors involved in procurement of commercial derivative aircraft (CDA) or equipment developed for use on CDA.

“Extremely relevant to my current role and career. Bob Adamson’s in-depth knowledge and high experience in the subject area made it a very enjoyable course.”

—Benjamin Graham, Systems Engineer—Aviation Certification, Royal Australian Air Force
FAA Functions and Requirements Leading to Airworthiness Approval
Instructors: Gilbert L. Thompson, Robert D. Adamson (This course may be taught by one or both instructors.)

Description
This course provides an overview of the FAA organizational structure and its function in aircraft certification, the rule-making and advisory process, production rules applicable to aircraft and aircraft components, and the subsequent certification process and continued airworthiness. The course is specifically tailored toward civil airworthiness certification. The course is FAA-approved for Inspection Authorization (IA) renewal. Prior certification activity is beneficial, but not required.

Highlights
- Overview of FAA Aircraft Certification (AIR) and Flight Standards (AFS) service organization and functions
- Advisory circular, notice and order process and issuance
- Federal Aviation Regulations (FAR) Parts 1, 11, 21, 23, 25, 26, 27, 29, 33, 36, 39, 43, 45 and 183
- Parts Manufacturer Approval (PMA)
- Type Certification (TC) and Supplemental Type Certification (STC) process
- Certification process improvement
- FAA/Industry guide to product certification
- Documentation of typical TC/STC products
- Safety management concepts
- FAA Form 337/Field Approval
- Flight Standards Information Management System (FSMIS) notices and orders
- Bilateral Aviation Safety Agreements

Who should attend?
Designed for industry (airframe and vendor) engineers, design engineers, civil airworthiness engineers, consultants, project directors, aircraft modifiers, FAA Designated Engineering Representatives (DERs) and coordinators, FAA organizational designees/authorized representatives (ARs), industry and governmental quality assurance inspectors and managers.

“I found the course to be most insightful. The information that I learned can be applied immediately to my daily tasks and activities.”
—Howard Anderson, Final Phase Certification Engineer, Gulfstream Aerospace
Flight Control and Hydraulic Systems
Instructor: Wayne Stout

Description
This course covers fundamental design issues, along with analysis and design methodologies for aerospace hydraulic and flight control systems. It includes design requirements, component description and operation, component and system math modeling, component sizing, system layout rationale, system sizing and airframe integration. The course emphasizes the fundamentals and necessary engineering tools (both analytical and otherwise) needed to understand and design aerospace hydraulic and flight control systems. Practical examples and actual systems are presented and discussed throughout the class.

Highlights
- Hydraulic flow fundamentals
- Hydraulic components operation and sizing (actuators, valves, regulators, pumps, motors, accumulators, etc.)
- Servovalve operation and sizing
- Power Control Units (PCUs) function and operation
- Hydraulic system design and airframe integration
- Mechanism fundamentals
- Flight control system design and airframe integration
- Flight control system failure modes and design considerations

Who should attend?
Designed for system- and component-level engineers and managers—including airframe, vendor, industry and government—and educators involved with aerospace mechanical systems.

“This course covers all major topics, design aspects and components pertinent to any practicing flight controls engineer. I highly recommend it.”
—Daniel Alberici, Gulfstream Aerospace
**Flight Test Principles and Practices**

Instructors: Donald T. Ward, George Cusimano

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### Description

An introduction to and definition of the basic flight test process, application of engineering principles to flight test and description of common flight test practices: a survey of the flight test discipline embellished with a variety of examples from completed flight test programs.

### Highlights

- Flight test introduction/overview and brief history
- The atmosphere
- Mass, center of gravity and moment of inertia determination
- Time/space position measurements
- Air data calibration methods
- Instrumentation system principles
- Data recording and processing methods
- Proper use of digital bus data
- In-flight measurement of thrust and power
- Stall tests
- Flight test planning and interaction with program planning
- Preliminary preparation: modeling and simulation preparation, and value of ground testing
- Takeoff and landing and cruise performance
- Climb performance
- Advanced performance methods
- Static stability and control
- Structural flight tests
- Spin testing
- Systems testing and evaluation

### Who should attend?

The course is designed for all levels of engineers and managers in industry working on flight test projects, military and civil project engineers, test pilots and flight test engineers, government research laboratory personnel and FAA and other regulatory agency engineers. It is ideally suited for engineers and managers from other disciplines who are moving into the flight test discipline for the first time or who must interact with flight test engineers regularly on a given project.

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“The instructors are the perfect combination of flight test engineer and qualified test pilot inherent in experimental flight test. The real-life experience they bring to the course makes the theory come alive.”

—Major Nicole Armstrong, Royal Canadian Air Force
Flight Testing Unmanned Aircraft Systems—Unique Challenges
Instructor: George Cusimano

Description
Unmanned Aircraft Systems (UAS) are comprised of an unmanned vehicle (UAV), a manned control element(s), and various data and control links. Although unmanned, the vehicle is still an aircraft and must be tested with the same rigor and precision as manned systems. However, being “unmanned”, and being part of an integrated system, UAVs demand unique flight test approaches that present corresponding challenges. If these challenges go unmet, the UAS Development Test and Evaluation (DT&E) program often experiences unacceptable cost and schedule overruns, which in turn could lead to program termination. This course introduces the primary challenges associated with flight-testing remotely piloted and command-directed (a.k.a. autonomous) vehicles; with primary emphasis on Tactical, MALE and HALE class systems. The course also recommends solutions to these challenges that are meant to either mitigate or eliminate potential problems before they become unmanageable.

Highlights
- Review of the purpose of the flight test and evaluation process as it applies to UAS testing.
- Review of both typical user and certifying airworthiness requirements.
- Review of current regulations for conducting UAV flight operations within both the National Airspace System and on national test ranges.
- Review of the system concept and why knowledge of typical UAS architectures is necessary to assure a successful flight test program.
- Examine the level and complexity of UAS software testing and the need for systems-level flight test.
- The basis for UAV designs, with emphasis on those features that create development and test challenges.
- Review of the most problematic areas of UAV ground and flight test.
- Review of the risk-management process and how it applies to UAV testing.
- Introduction of a new methodology designed to help mitigate UAV flight test problems.
- Discussion of the application of human factors principles to UAS command and control design and test.
- Discussion of the unique aspects of UAV first flight(s).
- UAV lessons learned.
- Review the top 20 flight test challenges presented in the course.

Who should attend?
The course is designed for practicing flight test engineers, test pilots, test managers, aircraft engineers, aircraft designers and educators who already possess a fundamental understanding of flight test principles and practices. The course content is appropriate for civilian, military and academic researchers.

“"The UAV flight test short course was a well-constructed and very well presented course. George Cusimano’s wealth of experience in flight test, and in particular, UAS flight test was the most valuable element.””

—Dr. Clare Chatterjea, San Diego attendee
Fuel Tank Explosion Prevention Certification Requirements—

Instructors: Franklin L. Cummins, C. Bruce Stephens (This course may be taught one or both instructors.)

Description
This course provides details for all elements of fuel tank design needed for compliance with the regulation, with specific emphasis on the electrical design aspects. Some review of regulatory history and 25.981 [25-125] is included for reference and TCA, STC work. Specific design implementations are examined and evaluated.

The course will also include a high level overview of Electromagnetic Effects and Compatibility (EME / EMC), Lightning Effects (direct and indirect), High Intensity Radiated Fields (HIRF), Precipitation Static (P-Static), Electrical Bonding requirements, and requirements for Electrical Wiring and Installation System (EWIS).

Highlights
- The electromagnetic environment: considerations for 25.981
- Metallic and composite aircraft structures: considerations for 25.981
- The history of fuel tank protection requirements for aircraft certification
- Direct and indirect effects of lightning and HIRF testing for 25.981 compliance
- Requirements for in-tank mounted equipment (including FQIS)
- Requirements for out-of-tank mounted FQIS
- Requirements for fuel control equipment mounted out-of-tank
- Fuel tank bonding and continued Safety
- 25.981 ICA; Critical design configuration control limitations

Who should attend?
This course is intended for all design engineering disciplines, project managers, project engineers and laboratory personnel whose aircraft system may require protection of the airplane’s fuel system from ignition / explosion.
Fundamental Avionics

Instructors: Albert Helfrick, Brian Butka (This course may be taught one or both instructors.)

OVERLAND PARK, KANSAS
June 6–10, 2016
Monday–Thursday, 8:00 a.m.–4:00 p.m. and Friday, 8:00 a.m.–2:45 p.m.
Course Number AA161430

ORLANDO, FLORIDA
November 14–18, 2016
Monday–Thursday, 8:00 a.m.–4:00 p.m. and Friday, 8:00 a.m.–2:45 p.m.
Course Number AA171290

CEUS
33.75 classroom hours
3.75 CEUs

COST $2,495
Includes instruction, course materials, refreshments and lunches.

EARN A CERTIFICATE
This course is part of the Certificate of Specialization in Avionics and Avionic Components. See pages 6–7 for more information.

Visit our website, aeroshortcourses.ku.edu for more information about this course, including a day-by-day outline, instructor bio(s) and a downloadable PDF with course details.

Description
This course provides a very broad overview of avionics. It covers the evolution of the avionics industry and usage to provide the student with an understanding of WHY avionics is what it is today, in addition to understanding how it works. The course covers legacy systems still in use and the latest state-of-the-art systems currently being installed.

The avionics environment is an important part of this course. In the context of this course, “environment” refers not only to the physical environment of pressure, temperature, vibration, etc., but the regulatory environment.

Systems are an important part of this course, and system communications and assessment are covered.

This course introduces the student to the unique language of avionics (abbreviations, terms and acronyms) and connects these terms to the systems they represent.

Highlights
• A very comprehensive overview of avionics from the early years to the present
• Covers the fundamentals of navigation, communications and surveillance
• Explains the roles of world-wide regulatory and advisory groups
• Introduces future systems currently under development and equipage
• Special emphasis on satellite-based navigation; the backbone of future navigation and surveillance
• Covers safety assessment and human factors as associated with avionics systems

Who should attend?
This course is for engineers and technicians who are involved with avionics but may not have attended formal courses in avionics. It would also suit those who work in a specific area of avionics and who would benefit from learning the latest developments in areas outside of their discipline or a brush-up on basics.

“I came all the way from Nigeria to attend the Fundamental Avionics course. The organizational planning and delivery of the course was of high standard. The instructor’s technique in presentation, using his professional and technical know-how and good sense of humor made the course interesting.”

—Chris Ejimofor, Bristow Helicopters, Nigerian Operations
Description
This course is designed to give aerospace professionals familiarity with current project management techniques. It includes identifying the functions of a project team and management team; the integration of project management; work breakdown structures, interfaces, communications and transfers; estimating, planning, risk and challenges of the project manager; alternative organizational structures and control and planning of time, money and technical resources. Course attendees are asked to bring a current project management problem from your team or organization. During class you will work on developing a reasonable solution and a project plan to accomplish it.

Highlights
- Understanding the five phases of project management
- Project definition and distinguishing characteristics and how they are related
- Strategic issues to include how this project is significant for the organization
- Internal project planning or how to wear many hats simultaneously
- Work breakdown structure taken to the appropriate level and not just the lowest level
- Time estimating, as well as “guesstimating” and scheduling techniques
- Network diagrams and how to determine the most efficient and expedient options
- Cost estimating for the top down and bottom up perspective
- Contingency and risk for every phase of the project
- Project team selection, training, mentoring, team building and dealing with special people
- Project cost reporting during the course of each phase and calculating the end cost

Who should attend?
Designed for engineers and other technical professionals at all levels, and new project managers responsible for small as well as large and long duration projects. This course is best suited to people who are new to project management and current project managers who want to hone their management skills.

“This course is definitely one of the best. The instructor is very skilled and has an excellent didactic to introduce each topic. I recommend this course to all aerospace professionals who work with PM.”
—Fabio Messias, Project Manager, Embraer S. A.
Integrated Modular Avionics (IMA) and DO-297
Instructor: Jeff Knickerbocker

Description
This course provides the fundamentals for developing and integrating IMA systems, using TSO-C153 (Integrated Modular Avionics Hardware Elements), FAA Advisory Circular 20-170 (Integrated Modular Avionics Development, Verification, Integration and Approval Using RTCA/DO-297 and Technical Standard Order C153) and DO-297 (Integrated Modular Avionics (IMA) Development Guidance and Certification Considerations). Discussions and in-class activities will be used to enhance the learning process.

Highlights
- What is IMA?
- What are the benefits of IMA?
- History of IMA
- Overview of IMA guidance material
- TSO-C153 (Integrated Modular Avionics Hardware Elements)
- Purpose of the advisory circular (AC)
- Technical highlights from the AC
- Roles and responsibilities
- DO-297 (Integrated Modular Avionics (IMA) Development Guidance and Certification Considerations)
- ARINC 653 Usage in IMA Systems
- SAE ARP 4754A aspects in IMA Systems
- Using TSO-C153, AC 20-170, DO-297 and ARINC 653 together
- Common challenges in IMA development and certification
- Practical tips for IMA development and certification

Who should attend?
Designed for developers and integrators of integrated modular avionics systems. The focus will be on identifying challenges with IMA and satisfying the regulatory guidance.

COMBINE COURSES AND SAVE
This course can be combined with: Software Safety, Certification and DO-178C (Course Number AA171090), which is being offered September 19-22, 2016 (Monday–Thursday) in San Diego, California (page 55). If registering for both courses, please use the following COMBO COURSE NUMBER: AA171190. The cost to attend both courses is $2,495 (you save $595!)
Introduction to Electromagnetic Effects (EME)  NEW  (course debuts June 2016)
Instructors: C. Bruce Stephens, Darren L. Stout  (This course may be taught one or both instructors.)

**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.

**Highlights**
- EME best practices
- Team EME compliance workshops
- 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 intended 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.

Visit our website, aeroshortcourses.ku.edu for more information about this course, including a day-by-day outline, instructor bio(s) and a downloadable PDF with course details.
Description
This course covers the information anyone working with helicopters needs to know to understand or analyze an existing design or participate in the development of a new one. It covers hover, vertical and forward flight, flight controls and unique helicopter aspects. Emphasis is on relating helicopter aerodynamics to airplane aerodynamics for those making the transition.

Highlights
- Practical examples to demonstrate theory and practice of performance and stability and control
- Difference between density altitude and pressure altitude and temperature for performance
- Turbine engine controls and governors
- Tandem and other configuration control issues
- Experience in certification of helicopters
- The course includes detailed discussion on helicopter automatic flight control systems and autopilots

Who should attend?
Engineers, engineering managers, pilots and educators who are involved in rotary wing engineering, design, testing, operational evaluation, certification or other technical aspects. The course is suitable for entry through advanced-level students, engineers and pilots.
Introduction to High Intensity Radiated Fields (HIRF)

NEW (course debuts October 2016)
Instructors: C. Bruce Stephens, Franklin L. Cummins (This course may be taught one or both instructors.)

Description
This course will discuss the design concepts required to ensure that all aspects of aircraft HIRF electrical wiring, installations, and aircraft-level systems are safe for operation. This course will discuss the typical certification process for HIRF from a very practical, step-by-step perspective and examine all steps used by aircraft OEMs to show compliance to HIRF regulations. 14 CFR 25.1317 for transport category airplanes will be used as the baseline regulation. A review of FAA Advisory Circulars and practical applications of the information will be conducted, as teams will be selected to simulate the HIRF certification process. HIRF requirements for aircraft maintenance and inspection will also be discussed. The course will also include a high-level overview for electromagnetic effects areas. Topics discussed include Electromagnetic Compatibility (EMC), Precipitation Static (P-Static), lightning, ESD, and electrical bonding requirements. An overview of the new requirements for Electrical Wiring and Installation System (EWIS) will also be addressed.

Highlights
• HIRF best practices
• Team HIRF workshops
• DER/UM HIRF requirements
• HIRF examples and practical applications
• Review of the HIRF Advisory Circulars

Who should attend?
The course is intended for all aircraft design areas including electrical, avionics, HIRF engineers, laboratory and aircraft technicians. Aircraft managers and project engineers working in electrical/avionics related areas should also attend.
Introduction to Performance-Based Navigation (PBN) and Required Navigation Performance (RNP)

Instructor: Albert Helfrick

Description
This course covers the paradigm changes and avionics that led to the creation of performance-based navigation and the methods by which it has been achieved. The course will briefly cover the introduction of “free flight” and the expanded use of “area navigation” (RNAV) to define flight plans and courses. The navigation sensors for RNAV use are reviewed, with special emphasis on GNSS—in particular GPS, and augmentation. Geodesy is discussed, with attention given to WGS-84 to understand the methods of defining paths. DO-236 is the defining document for these subjects. Required data bases are covered. Inertial navigation systems are introduced, and the relation of INS to GPS is discussed. Certification issues of RNP aircraft are covered.

Highlights
- The complex set of documents setting requirements for RNP are discussed; emphasis is on understanding how these documents work together to define RNP.
- This course clarifies how RNP will be an integral part of Nextgen, the plan for future air transportation.

Who should attend?
Those who are involved in the design of avionics systems, concerned with certification of new aircraft and retrofits for RNP operation; those involved in flight planning, scheduling and general airline of air taxi service operations; those involved in sales and marketing of any class aircraft including general aviation and those involved in flight operations.

“Enjoyed the course overall. Particularly important to me was the information about Required Navigation Performance (RNP), WAAS (Wide Area Augmentation System) & FAA changes. Dr. Helfrick is an excellent, knowledgeable instructor.”

—Mike Huston, Human Factors Engineering Tech, U.S. Army Aviation Engineering Directorate
MIL-STD Qualification: Purpose, Testing and Design Considerations
Instructor: Tom Cash

Description
This class is designed to educate program managers, system engineers, design engineers and test engineers/technicians in the aspects of the United States military standard-oriented environmental, electromagnetic interference and power quality testing, with the intention of obtaining an Airworthiness certification. The intention of this course is to acquaint personnel involved in new military aircraft efforts or the modifications of existing military aircraft to add enhanced capabilities with the knowledge of the testing that will be required so that system and design engineers may develop equipment designs that are robust enough to pass the Military Standard testing, test engineers may properly design test plans for their equipment, and program managers are aware of the time necessary to accomplish this testing.

Highlights
- Top-level overview of the U.S. military airworthiness process
- Comparison of the military versus civilian airworthiness process
- Introduction and overview of the documents defining military testing
- An introduction to the environmental tests, their purpose, and a typical setup for performing each test
- An introduction to the electromagnetic interference tests, their purpose, and a typical setup for performing each test
- An introduction to the power quality tests, their purpose, and a typical setup for performing each test

Who should attend?
Any program manager, systems engineer, design engineer and/or test personnel who are or may become involved in the design and manufacturing of any items for which an airworthiness certification is desired.
Operational Aircraft Performance and Flight Test Practices
Instructor: Mario Asselin

SAN DIEGO, CALIFORNIA
September 12–16, 2016
Monday–Friday,
8:00 a.m.–4:00 p.m.
Course Number AA171050
CEUS
35 classroom hours
3.5 CEUs
COST $2,495
Includes instruction, course materials, refreshments and lunches.

EARN A CERTIFICATE
This course is part of the Certificate of Specialization in Flight Tests and Aircraft Performance. See pages 6–7 for more information.

Visit our website, aeroshorthocourses.ku.edu for more information about this course, including a day-by-day outline, instructor bio(s) and a downloadable PDF with course details.

Description
This course provides an overview of airplane performance theory and prediction, certification standards and basic flight test practices. The course will focus on turbojet/turbofan-powered aircraft certified under JAR/CAR/14 CFR Part 25. This standard will briefly be compared to military and Part 23 standards to show different approaches to safety, certification, operational and design differences.

Highlights
- Basic airplane performance theory
- Determining what to test to build performance models
- Required instrumentation to best measure airplane performance
- Minimizing scatter during flight testing
- Performance model development to match flight test results
- Certification requirements
- How to demonstrate certification compliance
- Presentation of airplane performance information to the flight crew
- Setting operational limits to ensure continued operational safety

Who should attend?
Designed for aeronautical engineers in the design or flight test departments, educators, aircrews with engineering background and military personnel involved in managing fleets of 14 CFR Part 25 (FAR 25)-certified aircraft.

“Mario Asselin has the breadth of knowledge and experience that is becoming sorely lacking in an ever more specialized world. Not only this, but he is able to convey this knowledge in a fresh and enthusiastic manner.”
—Stuart Morris, Aerodynamicist, Airbus Operations Ltd.
Principles of Aeroelasticity
Instructor: Thomas William Strganac

Description
The course is designed to provide a qualitative understanding of aeroelastic behavior for aerospace vehicles. The level of class instruction is appropriate for engineers and managers with an undergraduate degree in engineering. The class will explore different forms of aeroelastic phenomena and associated issues in structural dynamics and aerodynamic-structure interaction. Topics include solution methodologies, computational methods for aeroelastic analysis, development of the operational flight boundary, aeroservoelasticity, and contemporary topics such as limit cycle oscillations and related nonlinear pathologies in aeroelastic systems. The course material will require selected study of the essential equations. The class addresses practical issues such as ground and flight tests.

Highlights
- A brief overview of history, definitions and fundamentals
- Description of static aeroelastic phenomena, including divergence and reversal
- Review basic mechanical vibration theory leading to modal methods
- An introduction to unsteady aerodynamics
- An introduction to dynamic aeroelasticity
- The development of the governing equations for the aeroelastic system
- Frequency domain versus time domain methods—Pros & Cons
- Flutter identification and review of flutter models
- Development of the flutter boundary, federal regulations and application to the flight envelope
- Example problems used to elucidate concepts
- Ground tests, GVTs and wind tunnel tests
- Aeroservoelasticity for response mitigation and flutter alleviation
- Flight test program examples
- Nonlinear aeroelasticity

Who should attend?
Designed for engineers and technical managers involved in aerospace vehicle design, analysis and testing related to aeroelastic response and stability issues.

“This course provided me with a good technical and high-level balance of knowledge of aeroelasticity. I will be able to grow with the core knowledge obtained here.”
—San Diego attendee
Principles of Aerospace Engineering
Instructor: Wally Johnson

SAN DIEGO, CALIFORNIA
September 19–23, 2016
Monday–Thursday,
8:00 a.m.–4:00 p.m. and
Friday, 8:00 a.m.–11:30 a.m.
Course Number AA171140

CEUS
31.5 classroom hours
3.15 CEUs

COST
$2,495
Includes instruction,
course materials,
refreshments and lunches.

EARN A CERTIFICATE
This course is part of the Certificate of Specialization in Aircraft Design. See pages 6–7 for more information.

Visit our website, aeroshortcourses.ku.edu for more information about this course, including a day-by-day outline, instructor bio(s) and a downloadable PDF with course details.

Description
The objective of this course is to provide an overview and integrated exposure to airplane aerodynamics, performance, propulsion, flight mechanics, mass properties, structural dynamics, aeroelasticity, structural loads, structures, ground testing, flight testing and certification. Lecture notes are supported by showing examples using Basic Aerospace Engineering software. This course shows the relationship between aircraft certification requirements, engineering analysis and testing.

Highlights
• Atmospheric models and airspeed measurements
• Introduction to certification requirements
• Introduction to aerodynamics
• Weight and balance
• Introduction to propulsion
• Airplane performance
• Flight mechanics
• Mechanical vibrations and structural dynamics
• Aeroelasticity
• Structural design envelopes
• Structural analysis
• Ground Testing and flight testing

Who should attend?
This course is intended as an overview for non-aerospace degreed engineering professionals, managers, military and government personnel who are involved in aircraft design and certification.

“This course not only covered relevant topics, but also provided the experience of an industry participant engineer, which is priceless.”

—2014 Las Vegas Attendee
Process-Based Management in Aerospace: Defining, Improving and Sustaining Processes

Instructor: Michael Wallace

ON-SITE

This course is only available as an on-site course in 2016 (it may return to our open enrollment schedule in subsequent years). The course can be brought on-site to your company and tailored to fit your individual training needs. On-site courses are delivered throughout the United States and around the world. To obtain a no-cost, no-obligation proposal, please contact the On-site Program Manager at 913-897-8782 or email aerosite@ku.edu.

CEUs
35 classroom hours
3.5 CEUs

NOT PART OF A CERTIFICATE TRACK.

Visit our website, aeroshortcourses.ku.edu for more information about this course, including a day-by-day outline, instructor bio(s) and a downloadable PDF with course details.

Description

This course covers foundational principles and the tools and techniques of Process Based Management (PBM) and delineates the strategies for successful implementation of PBM in an aerospace organization. Content focuses on how to depict an enterprise process view, develop process measures, define key components and identify critical success factors to maintain the focus on priority requirements for managing processes to achieve sustainable performance improvements. It includes how this fits with and supports Lean, Six Sigma, Total Quality Management and Toyota Production System. Several aerospace organizational case studies are used to augment the theoretical components.

Highlights

• Overview of the aerospace design and manufacturing processes
• Foundational principles of process management
• Data gathering methods and analysis
• Identifying, reducing and controlling variation
• Increasing efficiencies and effectiveness of the designer and production
• Setting, achieving and holding performance goals
• Achieving a culture of continuous improvement

Who should attend?

Managers, engineers, quality, IT and planning professionals in the aerospace industry who are responsible for the identification, implementation and improvement of existing organizational processes and the development of new processes necessary to compete in the future.

“This course opened my eyes about things that I never thought about. It was very good and will help me to help people from my company.”

—Las Vegas Course Participant
Propulsion Systems for UAVs and General Aviation Aircraft
Instructor: Ray Taghavi

**Description**
This course provides an in-depth understanding of the state-of-the-art propulsion issues for UAVs and general aviation aircraft, including propulsion options, cycle analysis, principles of operation, systems, components, performance and efficiencies.

**Highlights**
- Fundamentals of aircraft propulsion systems, engine types and aircraft engine selection
- Aircraft spark-ignition, diesel and Wankel engines
- Two-stroke and four-stroke cycle engines
- Aircraft engine classification by cylinder arrangement, cooling, cycle, etc.
- Carburetion, ignition and lubrication systems
- Aviation fuels
- Propellers
- Engine testing and simulations
- Electric propulsion
- Overview of turbo-propeller and turboshaft engines
- Engines for special applications, UAVs, RPVs, blimps, etc.

**Who should attend?**
Designed for propulsion engineers, aircraft designers, aerospace industry managers, educators, research and development engineers from NASA, FAA and other government agencies.

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**ON-SITE**
This course is only available as an on-site course in 2016 (it may return to our open enrollment schedule in subsequent years). The course can be brought on-site to your company and tailored to fit your individual training needs. On-site courses are delivered throughout the United States and around the world. To obtain a no-cost, no-obligation proposal, please contact the On-site Program Manager at 913-897-8782 or email aerosite@ku.edu.

**CEUS**
35 classroom hours
3.5 CEUs

**EARN A CERTIFICATE**
This course is part of the Certificate of Specialization in Aircraft Design and the Certificate of Specialization in Unmanned Aircraft. See pages 6–7 for more information.

Visit our website, aeroshortcourses.ku.edu for more information about this course, including a day-by-day outline, instructor bio(s) and a downloadable PDF with course details.

“Dr. Taghavi is a knowledgeable, thorough and effective instructor. He brings things/topics down to the practical level. Love his attitude, personality and his sense of humor.” —San Diego Course Participant
Rotorcraft Vibration: Analysis and Practical Reduction Methods
Instructor: Richard L. Bielawa

SEATTLE, WASHINGTON
April 11–15, 2016
Monday–Thursday,
8:00 a.m.–4:00 p.m. and
Friday, 8:00 a.m.–11:30 a.m.
Course Number AA161370

CEUs
31.5 classroom hours
3.15 CEUs

COST $2,495
Includes instruction,
course materials,
refreshments and lunches.

EARN A CERTIFICATE
This course is part
of the Certificate of
Specialization in Flight
Tests and Aircraft
Performance. See pages
6–7 for more information.

Visit our website,
aeroshortcourses.ku.edu
for more information
about this course, including
a day-by-day outline,
instructor bio(s) and a
downloadable PDF with
course details.

Description
Material is presented for acquiring familiarity with both the underlying physics
and the analytical tools needed for addressing rotorcraft vibration phenomena.
Topics include a review of appropriate mathematical techniques, gyroscopic
time, blade natural frequency characteristics, drive system dynamics, vibration
alleviation devices, rotorcraft instability phenomena and testing procedures.
While some new analysis techniques are introduced, the course will address
familiarization with the physics using traditional methodology.

Highlights
• Overview of rotorcraft structural dynamic problems and solutions
• Mathematical tools
• Rotational dynamics and gyroscopics
• Dynamics of rotating slender beams
• Transverse vibration characteristics
• Basic balancing techniques
• Torsional natural frequencies of shafting systems
• Fuselage vibrations basic issues
• Full-scale vibration testing of real systems
• Linear stability analysis methods
• Blade aeromechanical instabilities
• Linear unsteady aerodynamics
• Bending-torsion flutter
• Nonlinear aeroelastic stability analyses
• Rotor-fuselage coupled instabilities
• Software for ground and air resonance calculations
• Testing for dynamics at model and full scales
• Methods for quantifying stability
• Future trends

Who should attend?
Designed for those engineers and educators involved in rotorcraft research,
design, development and/or testing who seek an understanding of and solutions
to rotorcraft vibration issues in contemporary rotorcraft.

“Mr. Bielawa achieved a very good compilation of all structural dynamics chapters related
to any rotorcraft. Very good exercises can be applied to real design parameters. I’m really
satisfied with this course.”

—Alper Uzunoglu, TIA, Tusas Aerospace Ind. Inc.
RTCA DO-160 Qualification: Purpose, Testing and Design Considerations

Instructors: C. Bruce Stephens, Franklin L. Cummins (This course may be taught by one or both instructors.)

Description
This class is designed to educate engineers of all disciplines - hardware design engineers, test engineers, certification engineers, program managers, project engineers and laboratory employees - in DO-160 as it pertains to the equipment qualification in support of aircraft certification. For system and hardware engineers, the intent is to educate and empower them to develop equipment designs that are compliant with DO-160 by design and avoid expensive redesigns to correct issues found late in the development cycle during test. For test engineers, it is intended to assist them to properly develop test plans for their products. Certification engineers, program managers and project engineers will gain knowledge in the process and requirements of conducting the testing. Laboratory employees will learn the details of each DO-160 section and the requirements for certification. For each test section of DO-160, we provide purpose, adverse effects, categories, and a high-level, step-by-step guide through the test procedure and design considerations for passing the test. A high-level review of related FAA advisory material and certification requirements will be discussed.

Highlights
• The aircraft environment
• Overview of RTCA and DO-160
• Advisory circular AC 21-16G
• Requirements, development and management
• FAA test requirements
• Pass/fail requirements

Who should attend?
This class is designed for all engineering disciplines, program and project management employees, certification employees, and test lab personnel responsible for developing qualification requirements for airborne electronic equipment.

Additional Course Format
An online version of this course is also available. See page 54 for details.

ORLANDO, FLORIDA
November 14–18, 2016
Monday–Thursday,
8:00 a.m.–4:00 p.m. and
Friday, 8:00 a.m.–11:30 a.m.
Course Number AA171310

CEUS
31.5 classroom hours
3.15 CEUs

COST $2,495
Includes instruction,
course materials,
refreshments and lunches.

EARN A CERTIFICATE
This course is part of
the Certificate of
Specialization in
Avionics and Avionic
Components,
Aerospace Compliance,
and the Certificate of
Electromagnetic
Effects. See pages 6–7 for
more information.

Visit our website,
aeroshortcourses.ku.edu
for more information
about this course, including
a day-by-day outline,
instructor bio(s) and a
downloadable PDF with
course details.

“Listening to real DO-160 testing experiences by the instructors was what I enjoyed the most.”
—Aida Urrutia, Electrical Engineer, Jamco America Inc.
RTCA DO-160 Qualification: Purpose, Testing and Design Considerations
Instructor: C. Bruce Stephens

Description
This class is designed to educate engineers of all disciplines - hardware design engineers, test engineers, certification engineers, program managers, project engineers and laboratory employees - in DO-160 as it pertains to the equipment qualification in support of aircraft certification. For system and hardware engineers, the intent is to educate and empower them to develop equipment designs that are compliant with DO-160 by design and avoid expensive redesigns to correct issues found late in the development cycle during test. For test engineers, it is intended to assist them to properly develop test plans for their products. Certification engineers, program managers and project engineers will gain knowledge in the process and requirements of conducting the testing. Laboratory employees will learn the details of each DO-160 section and the requirements for certification. For each test section of DO-160, we provide purpose, adverse effects, categories, and a high-level, step-by-step guide through the test procedure and design considerations for passing the test. A high-level review of related FAA advisory material and certification requirements will be discussed.

Highlights
- The aircraft environment
- Overview of RTCA and DO-160
- Advisory circular AC 21-16G
- Requirements, development and management
- FAA test requirements
- Pass/fail requirements

Who should attend?
This class is designed for all engineering disciplines, program and project management employees, certification employees, and test lab personnel responsible for developing qualification requirements for airborne electronic equipment.

Additional Course Format
If you prefer a classroom-based learning environment, this course will be offered in Orlando, Florida in November, 2016 (see page 53).
Software Safety, Certification and DO-178C
Instructor: Jeff Knickerbocker

Description
This course provides the fundamentals of developing and assessing software to the standard RTCA/DO-178B and RTCA-DO-178C Software Considerations in Airborne Systems and Equipment Certification as well as associated RTCA/DO-178C supplements in DO-330, DO-331, DO-332 and DO-333. Similarities and differences to RTCA/DO-278A for CNS/ATM equipment will also be addressed. The course also provides insight into the FAA’s software review process; the FAA’s software policy; practical keys for successful software development and certification; common pitfalls of software development; and software challenges facing the aviation community. Practical exercises and in-class activities will be used to enhance the learning process.

Highlights
- Differences between DO-178B and DO-178C
- DO-178C supplemental documents and where they fit
- Overview of existing standards related to software safety
- Configuration management
- Development and integration/test processes
- Verification processes
- Quality assurance objectives
- Supplements
- Assessing compliance - the Software Job-Aid
- Planning process
- Common pitfalls
- Software challenges facing the aviation industry

Who should attend?
Designed for software developers, avionics engineers, systems integrators, aircraft designers and others involved in development or implementation of safety-critical software. The focus is on civil aviation, certification and use of RTCA/DO-178C; however, the concepts may be applicable for other safety domains, such as military, medical, nuclear and automotive.

“Jeff Knickerbocker has a wealth of knowledge in his field and does a good job of delivering a somewhat dry topic. His instruction is punctuated with real-world examples, problems and challenges encountered within the industry. An excellent course that gives insight into a complex topic.”

— San Diego attendee

SAN DIEGO, CALIFORNIA
September 19–22, 2016
Monday–Thursday, 8:00 a.m.–4:00 p.m.
Course Number AA171090

CEUs
28 classroom hours
2.8 CEUs

COST $2,195
Includes instruction, course materials, refreshments and lunches.

EARN A CERTIFICATE
This course is part of the Certificate of Specialization in Avionics and Avionic Components. See pages 6–7 for more information.

Visit our website, aeroshortcourses.ku.edu for more information about this course, including a day-by-day outline, instructor bio(s) and a downloadable PDF with course details.

COMBINE COURSES AND SAVE
This course can be combined with: Integrated Modular Avionics (IMA) and DO-297 (Course Number AA171180), which is being offered September 23, 2016 (Friday) in San Diego, California (page 41). If registering for both courses, please use the following COMBO COURSE NUMBER: AA171190. The cost to attend both courses is $2,495 (you save $595!)
Stress Analysis for Aerospace Structures
Instructor: Dennis Philpot

Description
This course is designed for the practicing engineer who has an interest in the various aspects of stress analysis in aerospace structural-mechanical design and would like to enhance his or her expertise in this important field. The approach taken in this course is to start with a strong theoretical foundation and then build upon that foundation with practical applications that can be immediately put into practice in the workplace. In this manner, both the theory and practice of classical “hand” analysis techniques are presented as well as the more modern (numerical/computational) methods used in the industry. The subject matter difficulty-level is intermediate.

Highlights
- Why structures fail
- Analysis in the design environment
- Vectorial and analytical mechanics
- Two-dimensional theory of elasticity
- The airy stress function
- Energy methods in mechanical analysis
- The principle of stationary potential energy
- Finite element method discussion
- Failure prevention of engineering materials
- Deterministic stress analysis
- Generalized Hook’s Law
- Stress concentration factors in mechanical design
- Linear elastic fracture mechanics (LEFM) approach
- Analysis of bolted joints
- The bolted joint diagram
- Calculation of critical external load
- Interaction equation for combined loading
- Fatigue analysis in mechanical design
- Modified Goodman approach
- Gerber and ASME-elliptic relations
- Fatigue crack propagation and Paris’ Law
- Damage tolerance and fracture control
- Numerical optimization
- Unconstrained and constrained design problems
- Multidiscipline design optimization

Who should attend?
Design engineers who would like to become more familiar with the techniques and modern practices of stress analysis to help them be more efficient and productive in their work; mechanical engineers who have been out of college for a while and need to become more knowledgeable in the area of stress analysis due to a particular job assignment or new career opportunity that requires expertise in analyzing structures; and department managers whose staff are involved in stress analysis work.

“Dennis Philpot knows his stuff, and he is the kind of stress analyst I’d want to learn stress analysis from.”
—San Diego Course Participant
SAN DIEGO, CALIFORNIA  
September 19–23, 2016  
Monday–Friday, 8:00 a.m.–4:00 p.m.  
Course Number AA171150  
CEUs  
35 classroom hours  
3.5 CEUs  
COST $2,495  
Includes instruction, course materials, refreshments and lunches.

EARN A CERTIFICATE  
This course is part of the Certificate of Specialization in Aircraft Structures. See pages 6–7 for more information.

Visit our website, aeroshortcourses.ku.edu for more information about this course, including a day-by-day outline, instructor bio(s) and a downloadable PDF with course details.

Description  
An introduction to high-performance composite materials, covering both engineering and manufacturing of composite parts and assemblies; basic material properties of the constituents (fiber and matrix); how they combine to form plies, or lamina; how to obtain lamina properties; how laminae are combined to form laminates and how to obtain the laminate properties. Other engineering topics include stress analysis, failure criteria and testing methods. Case studies and lessons-learned will be discussed. Design using composites will include material selection; lamination rules of thumb; weight analysis; fabrication process description; tool design; and preliminary cost and production rate analysis.

Highlights  
• Historical review of laminated composite usage  
• Constituent materials and properties  
• Formulas and analysis tools to predict mechanical properties of laminates  
• Introduction to manufacturing composites  
• Failure theories and their limitations  
• Coupon level testing methods  
• Introduction to tooling design  
• Design of simple structures, lamination rules of thumb  
• Inspection methods  
• Bonded and bolted joints  
• Hygro-thermal effects  
• Interlaminar and free-edge effects  
• Durability and environmental issues  
• Design problems

Who should attend?  
The course has proven very helpful to those wanting a broad overview and/or a crash course in composites; experienced engineers looking for a refresher course; stress engineers wanting to understand how composites really work or fail and what to look out for when analyzing parts, data and margins; practicing engineers and managers with metal experience wishing to expand their skill set; anyone wanting to jump into the field but does not know how to go about it; and engineering teams embarking on new projects involving composites.

“Great course for someone looking to do design in composite structure. I will use this knowledge immediately upon return to my office.”  
—Todd Pashak, Mechanical Engineer III
Sustainment and Continued Airworthiness for Aircraft Structures
Instructor: Marv Nuss

Description
This course is an introduction to aircraft sustainment and continued airworthiness requirements. Use of basic static, fatigue and damage tolerance analysis methods for repairs and alterations will be discussed, along with best practices for setting up fatigue management programs and documentation of instructions for continued airworthiness. Exposure to regulations, compliance policy and guidance, and technical references will also be examined. Class exercises will provide hands-on experience of simple analysis methods. Relevant reference material will be provided with class notes.

Highlights
- Background of sustainment requirements
- Overview of fatigue management programs (FMPs)
- Static strength analysis for repairs and alterations (class exercise)
- Aircraft flight profiles and spectrum development (class exercise)
- Aircraft fatigue and damage tolerance analysis for repairs using basic concepts (class exercise)
- Non-destructive inspection (NDI) methods and their role in FMPs (class exercise)
- Detailed discussion of FMPs and how to manage widespread fatigue damage (WFD) (several case studies)
- The importance of complete Instructions for Continued Airworthiness (ICA)
- Repair, alteration and return to service approval processes
- Risk assessment and risk management concepts (including case studies)
- Corrosion as it relates to sustainment
- Continuing airworthiness for composite structure
- Related topics and special issues

Who should attend?
Designed for engineers, regulators, maintainers, inspectors and their managers working in continued airworthiness design and compliance. Typical organizations are commercial and military aircraft OEM and operator sustainment groups, air logistics centers, repair stations and regulatory oversight agencies.

SAN DIEGO, CALIFORNIA
September 12–15, 2016
Monday–Thursday,
8:00 a.m.–4:00 p.m.
Course Number AA171000

CEUS
28 classroom hours
2.8 CEUs

COST $2,195
Includes instruction, course materials, refreshments and lunches.

EARN A CERTIFICATE
This course is part of the Certificate of Specialization in Aircraft Structures, Certificate of Specialization in Aerospace Compliance and Certificate of Specialization in Aircraft Maintenance and Safety. See pages 6–7 for more information.

Visit our website, aeroshortcourses.ku.edu for more information about this course, including a day-by-day outline, instructor bio(s) and a downloadable PDF with course details.

“Excellent course content. Best coverage of the topic area I have seen.”
—Ken Knopp, Manager, Structures and Propulsion Research, FAA Technical Center
Description

This course covers the software airworthiness requirements for unmanned aircraft systems (UAS). It will address the development and airworthiness evaluation of complex integrated software intensive unmanned aircraft systems, as well as the relationship between the acquisition/development processes for these systems and the key software airworthiness assessment processes. The course also identifies the deliverables, artifact requirements and approaches for documenting the software airworthiness assurance case, which is required to ultimately provide the certification/qualification basis for approval of the airworthiness of the unmanned aircraft system. The course offers key lessons learned in the application of the airworthiness assessment processes in software intensive unmanned aircraft systems.

Highlights

- Overview of UAS software requirements
- Software acquisition and development
- Software airworthiness products and assessment process during the system life cycle
- Assessments of: planning and requirements analysis; preliminary and architectural design; detailed design, coding and unit test; software integration and formal qualification test and system integration test; and aircraft integration, ground test and flight test
- Developing recommendations for formal flight and airworthiness releases to approval authority
- Documenting the UAS software airworthiness assurance case
- Keys to successful software airworthiness process implementation for UAS
- Problem areas, concerns and lessons learned
- Future trends

Who should attend?

This course is intended for managers, systems engineers, software system safety engineers and software engineers who design, develop or integrate software in unmanned aircraft systems or evaluate these systems to provide the qualification/certification basis for their software airworthiness.
LODGING AND TRAVEL INFORMATION

• Lodging and transportation costs are NOT included in course fees. Attendees are responsible for making their own lodging and travel arrangements.
• The following lodging and transportation suggestions are provided for your convenience and do not represent an endorsement.
• For additional travel information, including convenient weblinks to assist you in making your travel plans, please visit our website: www.aeroshortcourses.ku.edu.

International Travelers
Are you planning to attend one of our courses in the United States but are not a U.S. citizen? Please visit www.travel.state.gov for visa and travel information.

Seattle, Washington
April 11-15, 2016

DoubleTree Suites by Hilton Hotel Seattle Airport Southcenter
16500 Southcenter Parkway
Seattle, Washington 98188
1-800-222-8733 (toll free worldwide)

Hotel information:
• A limited number of rooms have been reserved for course attendees.
• The standard single/double room rate is $129, plus applicable taxes.
• Free in-room internet and on-site parking are included in the group rate.
• The room block will only be held until April 16, 2016.
• When making a reservation, provide the group code UOK.
• Make a reservation by calling 1-800-222-8733.
• A dedicated group reservation link can be accessed from our website.

From the airport:
• The Seattle-Tacoma International Airport (SEA) is 3.5 miles (5.6 km) from the hotel.
• Complimentary shuttle service is provided by the hotel (no reservation is required).
• Hotel shuttle courtesy phones are located on the baggage claim level, in the shuttle pickup area at Islands #1 and #3.

Kansas City
June 6-10, 2016
October 17-21, 2016

University of Kansas Edwards Campus
12600 Quivira Road
Overland Park, KS 66213

Hotel information:
Please visit the Overland Park, Kansas Convention and Visitors Bureau website, www.visitoverlandpark.com, for a listing of hotel options. Please check our website for additional hotel information.

From the airport:
• The Kansas City International Airport (MCI) airport is 37 Miles (60 KM) from the University of Kansas Edwards Campus.
• Ground transportation information can be found on the Kansas City International Airport (MCI) website, www.flykci.com.
• Quicksilver Airport Shuttle is a reputable Kansas based company.
**San Diego, California**
September 12-16, 2016  
September 19-23, 2016

San Diego Marriott Mission Valley  
8757 Rio San Diego Drive  
San Diego, California 92108  
1-877-622-3056 (toll free worldwide)

**Hotel information:**  
- A limited number of rooms have been reserved for course attendees.  
- The standard single/double room rate is $140 (or current U. S. Federal Government per diem rate), plus applicable taxes.  
- Free in-room internet and discounted parking are included in the group rate.  
- The room block will only be held until August 26, 2016.  
- When making a reservation, provide the group code KANKANA.  
- Make a reservation by calling 1-877-622-3056 (toll free worldwide).  
- A dedicated group reservation link can be accessed from our website.

**From the airport:**  
- The San Diego International Airport (SAN) is 8.1 miles (13km) from the hotel.  
- SuperShuttle provides ground transportation for approximately $12.00 each way.  
- Provide group code UPBP7 to receive the discounted rate.  
- To reserve with SuperShuttle, call 1-800-258-3826 (toll free in the U.S.) or visit www.supershuttle.com.

**Orlando, Florida**
November 14-18, 2016

DoubleTree by Hilton at the Entrance to Universal Orlando  
5780 Major Boulevard  
Orlando, Florida 32819  
1-800-327-2110 (toll free worldwide)

**Hotel information:**  
- A limited number of rooms have been reserved for course attendees.  
- The standard single/double room rate is $127 (or current U. S. Federal Government per diem rate), plus applicable taxes.  
- Free in-room internet and discounted parking are included in the group rate.  
- The room block will only be held until October 29, 2016.  
- Please check our website for the group code.  
- Make a hotel reservation by calling 1-800-222-8733.  
- A dedicated group reservation link can be accessed from our website.

**From the airport:**  
- The Orlando International Airport (MCO) is 18 miles (29 km) from the hotel.  
- Mears Transportation provides 24 hours shuttle service for $19 one-way ($30 round trip).  
- Mears reservations can be made online at www.mearstransportation.com or by phone at 407-423-5566
OUR CLIENTS INCLUDE

Airbus Group
Aeronautical Radio, Incorporated (ARINC)
ASELSAN A.Ş.
BAE Systems, plc
B/E Aerospace, Inc.
Bell Helicopter Textron, Inc.
The Boeing Company
Bombardier Aerospace
Brazilian Organization for the Development of Aircraft Certification (DCA-BR)
Cirrus Aircraft
Civil Aviation Administration of China (CAAC)
Commercial Aircraft Corporation of China (COMAC)
Dassault Aviation
Defense Acquisition Program Administration (DAPA)
Department of National Defence and the Canadian Armed Forces
Embraer S.A.
European Aviation Safety Agency (EASA)
Federal Aviation Administration (FAA)
Garmin International, Inc.
General Atomics Aeronautical Systems, Inc.
General Electric Aviation
The Goodrich Corporation
Gulfstream Aerospace Corporation
Honeywell Aerospace
L-3 Communications
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Saab Group
Savunma Teknolojileri Muhendislik (STM)
Sierra Nevada Corporation (SNC)
Sikorsky Aircraft Corporation
Singapore Technologies Aerospace (ST Aerospace)
Spirit AeroSystems, Inc.
SR Technics
Taikoo (Xiamen) Aircraft Engineering Co., Ltd.
Textron Aviation
Transport Canada
U.S. Department of Defense (Air Force, Army, Navy and Coast Guard)
**2016 REGISTRATION FORM**

**AEROSPACE SHORT COURSES**

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**Easy Ways to Register**

**Mail**
Complete the registration form and mail with payment to:
KU Continuing Education Aerospace Short Courses
1515 Saint Andrews Drive
Lawrence, Kansas 66047-1619 USA

**Online**
aeroshortcourses.ku.edu

**Phone**
Toll-free 877-404-5823 or 785-864-5823

**Fax**
785-864-4871  TDD 800-766-3777

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**Please print. If your mailing address requires a different format than indicated here, please use that format and ignore the printed guidelines.**

<table>
<thead>
<tr>
<th>Full name (first, middle initial, last name or surname, suffix)</th>
<th>Male</th>
<th>Female</th>
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<tbody>
<tr>
<td>Email address</td>
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<td>City, state or province</td>
<td>Zip+four or postal code</td>
<td>Country</td>
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<td>Daytime phone</td>
<td>Alternate/evening phone</td>
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**If you will need special accommodation, please call 785-864-5823, or email aerosite@ku.edu.**

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**Please register me for the following course(s):**

<table>
<thead>
<tr>
<th>Course Name</th>
<th>Course #</th>
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<td>Dates</td>
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<table>
<thead>
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<th>Course Name</th>
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<tbody>
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<td>Dates</td>
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**How did you first hear about our short courses?**

- Referral
- Course catalog
- Postcard
- Website
- Email
- LinkedIn group
- Print ad
- Other

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**Payment.**

- Check enclosed, payable in U.S. dollars to The University of Kansas.
- Charge to credit card company ____________ Amount $ ____________
- Card number ____________ Expiration date ____________
- Charge to: credit card company ____________ Amount $ ____________
- Name on card (print) ____________ Cardholder’s phone number ____________

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*aeroshortcourses.ku.edu*  785-864-5823 or toll-free in the U.S. 877-404-5823  63
Policies

Audio or Video Recording
Audio or video recording is not permitted in the classroom.

Certificate of Attendance
A certificate of achievement will be awarded to each participant who is present for 100 percent of the course.

CEUs
Continuing Education Units (CEUs) are assigned for each course and are listed on each course page. CEUs may not be used for college credit.

Course Cancellation
The University of Kansas Professional & Continuing Education reserves the right to cancel a course and return all registration fees in the event of insufficient registrations, inclement weather or other unforeseen circumstances. The liability of the University of Kansas is limited to the course registration fee. The University of Kansas will not be responsible for any losses incurred by a registrant including, but not limited to, airline cancellation charges or hotel deposits.

Course Materials
The course materials (course notes) are for participants only and are not for sale.

Course Schedule
The University of Kansas Professional & Continuing Education and/or its instructors reserve the right to adjust course outlines, schedules and/or materials. Course times and total hours are approximate and may be adjusted by the instructor(s) as the situation warrants.

Instructor Substitution
The University of Kansas Professional & Continuing Education reserves the right to substitute an equally qualified instructor in the event of faculty illness or other circumstances beyond its control.

Privacy Policy
The University of Kansas Professional & Continuing Education does not share, sell or rent its mailing lists. You have our assurance that any information you provide will be held in confidence by The University of Kansas Professional & Continuing Education.

We occasionally use mailing lists that we have leased. If you receive unwanted communication from KUPCE, it is because your name appears on a list we have acquired from another source. In this case, please accept our apology.

Nondiscrimination Policy
The University of Kansas prohibits discrimination on the basis of race, color, ethnicity, religion, sex, national origin, age, ancestry, disability, status as a veteran, sexual orientation, marital status, parental status, gender identity, gender expression and genetic information in the University’s programs and activities. The following person has been designated to handle inquiries regarding the non-discrimination policies: Director of the Office of Institutional Opportunity and Access, IOA@ku.edu, 1246 W. Campus Road, Room 153A, Lawrence, KS, 66045, (785) 864-6414, 711 TTY.

Program Accessibility
We accommodate persons with disabilities. Please call 785-864-5823, or email aerosite@ku.edu to discuss your needs. To ensure accommodation, please contact us at least four weeks before the start of the course. See the nondiscrimination policy above.