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aeroshortcourses.ku.edu/air Tel. 785-864-5823, or toll-free 877-404-5823
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ON-SITE AEROSPACE SHORT COURSES

Realize substantial savings by bringing our outstanding instructors to your workplace.

The University of Kansas Aerospace Short Courses listed in this course catalog are also available for on-site presentations. For additional information about our program, please visit our website at aeroshortcourses.ku.edu/air.

Benefits of KU Aerospace On-Site Training

When you choose the KU Aerospace Short Course Program for your on-site training, you:

- Work directly with the instructors to customize training that meets your specific needs.
- Discuss issues that affect your company without jeopardizing proprietary information.
- Pay only for the training you need.
- Train when it fits your schedule.
- Incur lower costs per participant.
- Save employee travel expenses.
- Reduce the time employees are away from work.
- Train as a team to enhance project management.

Frequently Asked Questions

Where can you provide in-house training?

Anywhere in the world, except U.S. embargoed countries or travel warning countries listed by the U.S. Department of State.

What does the company provide?

You provide the attendees, a classroom and audio-visual equipment such as a projector and a screen. We will send you a description of the course needs in advance to prepare for the class. If you cannot provide a classroom, we can set up a course at a nearby hotel or conference center for an additional charge.

What does KU provide?

KU provides the instructor’s honorarium, his or her travel, all course materials, shipping and customs charges, certificates with CEUs for participants who attend all days, course evaluation and coordination.

Can the course content be modified?

Absolutely. Instructors can tailor instruction to emphasize areas that best accommodate your group.

How is an on-site course price determined?

To make it cost effective for all parties, we base our course fees on 20 participants and offer substantial discounts for each additional participant. We also have worked with organizations to form consortia with other area companies to share costs.

The course fee of an on-site class depends on the instructor’s honorarium, the instructor’s travel reimbursements, the cost of the course materials specific for that class and the shipping costs of the course materials.

How far in advance do you need to schedule a course?

In order to schedule the instructor and order the course materials, we request at least 8 to 12 weeks of lead time prior to the actual course date.

Industry Leaders Who Have Supported the KU Aerospace Short Course Program

Airbus
BAE Systems
Bell Helicopter Textron
The Boeing Company
Bombardier-Learjet, Inc.
Cathay Pacific
Cessna Aircraft Company
DCA-BR (Organização Brasileira para o Desenvolvimento da Certificação Aeronáutica)
Embraer-Empresa Brasileira de Aeronáutica S.A.
European Aviation Safety Agency
Federal Aviation Administration
Garmin
GE Aviation
General Atomics
Goodrich Corporation
Gulfstream Aerospace Corporation
Hawker Beechcraft Corporation
Honeywell, Inc.
Italian Air Force
Lockheed Martin Corporation
Lycoming Engines
NASA
National Aerospace Laboratory of The Netherlands
Northrop Grumman Corporation
Pilatus Aircraft Ltd.
QinetiQ Ltd.
Rockwell Collins
SAAB Aircraft AB
Samsung
Sierra Nevada Corporation
Sikorsky Aircraft Corporation
Spirit AeroSystems
SR Technics
Transport Canada
United States Department of Defense (Air Force, Army, Navy and Coast Guard)

Contact Us

Obtain a no-cost, no-obligation proposal for an on-site class.

Zach Gredlics
On-site Program Manager
E-mail aerosite@ku.edu
Phone 785-864-1066
Fax 785-864-5074
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LODGING AND TRAVEL INFORMATION

- Lodging and transportation costs are not included in the course fees.
- Attendees are responsible for acquiring their own lodging and travel arrangements.
- The following lodging and transportation suggestions are offered as a convenience and do not represent an endorsement.

**Seattle, Washington**
April 11–15, 2011

Doubletree Guest Suites Southcenter
16500 Southcenter Parkway
Seattle, Washington 98188

A limited number of rooms has been reserved at the Doubletree Guest Suites Southcenter for course attendees. The rate is $129 for a standard single/double room plus local occupancy taxes. These rooms will be held as a block, unless depleted, until April 6, 2011, at which time they will be released to the public. After April 6, room rate and availability cannot be guaranteed.

To ensure that you get all the benefits available to our group, including complimentary self-parking and Internet in the guest rooms, please make sure you or your travel agent book your hotel room in the University of Kansas room block and give the Group Code UOK.

To make your reservation, call 206-575-8220 or (toll-free worldwide) 800-222-8733. All reservations must be guaranteed with a major credit card or first night room deposit.

The Seattle-Tacoma International Airport (SEA) is 3.5 miles (5.6 km) from the hotel. The hotel provides complimentary shuttle service. No reservation is required. The hotel shuttle courtesy phone is located on the baggage claim level. Make sure to take the shuttle for the Doubletree Guest Suites Southcenter.

The Doubletree Guest Suites Southcenter also offers complimentary shuttle to the light rail train station. Getting to downtown Seattle is easy using this new transit system.

**Dallas/Fort Worth, Texas**
June 13–17, 2011

Embassy Suites Dallas – DFW
4650 West Airport Freeway
Irving, Texas 75062

A limited number of rooms has been reserved at the Embassy Suites Dallas–DFW for course attendees. The rate is $119 for a standard single or double room plus applicable state and local occupancy taxes. These rooms will be held as a block, unless depleted, until May 21, 2011, at which time they will be released to the public. After May 21, room rate and availability cannot be guaranteed.

To ensure that you get all the benefits available to our group, including a full cooked-to-order breakfast each morning, a manager’s refreshment reception each evening and complimentary parking, please make sure you or your travel agent book your hotel room in the University of Kansas room block. Our group code is UOK. To make a reservation, call 972-790-0093 or (toll-free worldwide) 800-934-7972. All reservations must be guaranteed by credit card or first night’s room and tax deposit.

The Dallas Fort Worth Airport (DFW) is 2 miles (3.2 km) from the Embassy Suites Hotel–DFW. The hotel provides complimentary shuttle to and from DFW from 5:00 a.m. to 12:00 a.m. No reservations are required. To request a shuttle, call 972-790-0093.

Dallas Love Field Airport (DAL) is 12.5 miles (20.1 km) from the Embassy Suites Hotel–DFW. SuperShuttle provides transportation for $16.00 each way. (Fees are subject to change.) Arrangements can be made online at supershuttle.com or by calling (toll-free in the United States) 800-258-3826. The local number is 817-329-2000. Be sure to use our group code UPBP7 to receive the discounted rate.

---

Are you planning to attend one of our programs in the United States but are not a U.S. citizen? Please visit travel.state.gov/visa for visa and travel information.
September 12–16 and September 19–23, 2011
San Diego Marriott Mission Valley
8757 Rio San Diego Drive
San Diego, California 92108

A limited number of rooms has been reserved at the San Diego Marriott Mission Valley for course attendees. The rate will be the prevailing U.S. federal government per diem for September 2011 (the current rate is $147) for a single/double room plus applicable state and local occupancy taxes. These rooms will be held as a block, unless depleted, until August 24, 2011, at which time they will be released to the public. After August 24, room rate and availability cannot be guaranteed.

To ensure that you get all the benefits available to our group, including complimentary Internet in the guest rooms, please make sure you or your travel agent book your hotel room in the University of Kansas room block. State that you will be attending a University of Kansas aerospace short course and give the group code KANKANA. To make your reservation, call 619-692-3800 or (toll-free worldwide) 800-228-9290. All reservations must be guaranteed with a major credit card or first night room deposit.

Participants are responsible for their own parking fees. The San Diego Marriott Mission Valley will offer a discounted rate of $5.00 a day for overnight self-parking and day guests.

The San Diego International Airport (SAN) is 8.1 miles (13 km) from the hotel. SuperShuttle provides transportation for $10.00 each way to and from the Marriott Mission Valley hotel. (Fees are subject to change.) Arrangements can be made online at www.supershuttle.com or by calling (toll-free in the United States) 800-258-3826. The local number is 858-974-8885. Be sure to use our group code UPBP7 to receive the discounted rate.

The Marriott Mission Valley hotel is steps from the Rio Vista Trolley with easy access to many of the top attractions in San Diego.

October 17–21, 2011
Embassy Suites Hotel on the Plaza
220 West 43rd Street
Kansas City, Missouri 64111

A limited number of rooms has been reserved at the Embassy Suites Hotel on the Plaza for course attendees. The rate will be the prevailing U.S. federal government per diem for October 2011. The current rate is $107 for a king bed suite plus applicable state and local occupancy taxes. A Double/Double Bed suite is $117 plus applicable state and local occupancy taxes. These rooms will be held as a block, unless depleted, until October 1, 2011, at which time they will be released to the public. After October 1, room rate and availability cannot be guaranteed.

To ensure that you get all the benefits available to our group, including a complimentary cooked-to-order breakfast each morning, a manager's refreshment reception each evening, complimentary parking and Internet in the guest rooms, please make sure you or your travel agent book your hotel room in the University of Kansas room block. No group code number was available at the time of publishing. Check our website for updated information. To make a reservation, call 816-756-1720 or (toll-free worldwide) 800-362-2779. All reservations must be guaranteed by credit card or first night room and tax deposit.

The Kansas City International Airport (MCI) is 22 miles (5.4 km) from the Embassy Suites Hotel on the Plaza. SuperShuttle provides transportation for $16.00 each way to and from the hotel. (Fees are subject to change.) Arrangements can be made online at www.supershuttle.com or by calling (toll-free in the United States) 800-258-3826. The local number is 817-329-2000. Be sure to use our group code UPBP7 to receive the discounted rate.

The Kansas City Marriott downtown hotel is convenient weblinks to assist you with making your travel plans, please visit our website at aeroshortcourses.ku.edu/air/locations/
Enroll Anytime

Complete the registration form on the back cover to enroll by mail or fax. To enroll online, visit aeroshortcourses.ku.edu/air.

Enrollment is limited and will be accepted in order of receipt. We recommend that you register as soon as possible so that you can secure your place and we can prepare the proper amount of course material. Pre-registration is required for your protection in case of course cancellation.

A confirmation letter will be mailed, faxed or e-mailed to each enrollee prior to the short course. Travel information will be included and also will be available on the website. If you do not receive a confirmation packet, please contact us at one of the above numbers.

Lodging and travel information for each class site can be found on pages 6 and 7.

Discounts

Group discounts are available for companies registering more than two people for the same class at the same time. All participants eligible for the discount will be billed together on the same invoice. The discount rates are as follows:

- 2–4 People: 5% discount
- 5–9 People: 10% discount
- 10–14 People: 15% discount
- 15+ People: 20% discount

Also ask about our on-site program. For more information, see page 4.

Late Payment Fee

All course fees are due at the time the class is held. KU allows a 30-day grace period. Any fees that remain unpaid after 30 days following the class will be assessed a late fee of $100.

Refund/Cancellation Policy

We encourage you to send a qualified substitute if you cannot attend. A full refund of registration fees will be available if requested in writing and received two weeks before a course. After that date, refunds will be made, but an administrative fee may be assessed. No refunds will be made after 30 calendar days following the event.

The University of Kansas Continuing Education reserves the right to cancel any short course and return all fees in the event of insufficient registration, instructor illness or national emergency. The liability of the University of Kansas is limited to the registration fee. The University of Kansas will not be responsible for any losses incurred by the registrants including, but not limited to, airline cancellation charges or hotel deposits.

Class

Location: The course location will be included in your confirmation letter. Smoking is limited to outside the building. No audio or video recording is permitted.

Accessibility: We accommodate persons with disabilities. Please call our office or mark the space indicated on the registration form, and an aerospace short course staff member will contact you to discuss your needs. To assure accommodation, please register at least two weeks before the start of the event, earlier if possible.

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

Instructors: The University of Kansas Continuing Education reserves the right to substitute an equally qualified instructor in the event of faculty illness or other circumstances beyond its control. If an equally qualified instructor is not available, the class will be cancelled.

Certificate of Attendance: A certificate of attendance will be awarded to each participant who is present for 100 percent of the class.

Continuing Education Units (CEUs) are available but may not be used for college credit.
ACQUISITION OF DIGITAL FLIGHT TEST DATA FROM AVIONICS BUSES: TECHNIQUES FOR PRACTICAL FLIGHT TEST APPLICATIONS

Instructors: Keith Schweikhard and Tim Iacobacci

Day One
- Introduction to conventional flight test data acquisition
- Avionics and introduction to digital data
- Common avionics bus protocols (ARINC and MIL-STD)

Day Two
- Instrumentation considerations for digital data acquisition
- Bus architecture and implementation techniques
- Parameter selection considerations

Day Three
- Case studies, real-world examples and troubleshooting
- Data acquisition and analysis problems
- Hardware implementation problems
- Data quality analysis tools
- Configuring data acquisition hardware to be analysis friendly
- Analysis techniques workshop
- Avionics data acquisition course summary
- Wrap-up and questions

Southern Maryland Higher Education Center
California, Maryland
March 15–17, 2011
AA111580

Tuesday–Thursday 8 a.m.–4 p.m.
Class time 21 hours
CEUs 2.1

Description
Designed for practicing engineers who use bus data in flight test work. Presented from a user’s point of view, the course shows how to recognize and accommodate problems associated with using avionics information as traditional flight test data. The course addresses recording and retrieving these data properly on standard PCM instrumentation.

Target Audience
Designed for flight test and analysis engineers. Course material and presentation is oriented toward the data user and not toward experienced system design engineers.

Fee
$1,495 with U.S. military ID
$1,695 non-military

Includes instruction, a course notebook and three light lunches.

The course notes are for participants only and are not for sale.

This course is part of the Flight Tests and Aircraft Performance Track. See page 5.
ADVANCED FLIGHT TESTS
Instructors: Donald T. Ward and Thomas William Strganac

Southern Maryland
Higher Education Center
California, Maryland
October 17–21, 2011
AA121500

Monday–Thursday 8 a.m.–4 p.m.
Friday 8 a.m.–2 p.m.
Class time 33 hours
CEUs 3.3

Description
Provides practical knowledge needed to plan a series of flutter envelope expansion tests safely and comprehensively. Includes procedures for post-stall certification and demonstration of new or significantly modified airplane designs to meet civil or military requirements.

Target Audience
Designed for practicing and entry-level flight test engineers and managers, aircraft engineers and aircraft designers.

Fee
$1,795 with U.S. military ID
$2,095 non-military

The course notes are for participants only and are not for sale.

This course is part of the Flight Tests and Aircraft Performance Track. See page 5.

day one
- Why such advanced tests? Basic philosophy and attitudes, overview of documents describing governing regulations, history
- Fundamental principles of aeroelasticity: description of static and dynamic aeroelastic phenomena; definitions, terminology and assumptions; limitations of theory; flutter analysis; development of basic aeroelastic equations; interpretation of supporting analyses
- Experimental and analytical tools used in preflight preparation: modal methods, ground vibration tests and analysis, wind tunnel test techniques, interpretation of dynamically similar wind tunnel model data

Day Two
- Instrumentation for flutter envelope expansion: suitable sensors, near real-time data analysis
- Subcritical response techniques, interpretation of supporting analyses
- Interpreting test results: analyzing real-time data, postflight analysis of data
- Expanding the envelope: excitation methods, clearance to 85% flutter envelopes, example programs
- Discussions of limit cycle oscillations

Day Three
- Foundations of post-stall flight testing: definitions of stall, departure, post-stall gyrations and spins; description of spin modes and spin phases; development of large disturbance equations of motion; idealized flight path in a spin; balance of aerodynamic and inertial forcing functions; autorotation and its causes; effect of damping derivatives; effect of mass distribution; simplification of post-stall equations of motion
- Aerodynamic conditions for dynamic equilibrium: pitching moment equilibrium, rolling and yawing moment equilibrium; design goals and trends to provide post-stall capability; agility measures of merit, unsteady lift, thrust vector control, vortex control
- Experimental tools for preflight preparation: water tunnel tests and flow visualization tools, static wind tunnel tests, dynamic wind tunnel tests, rotary balance tests

Day Four
- Instrumentation for post-stall flight tests: sensors needed and their specifications; pre-test planning and preparation: data requirements, flight test team preparation and training, flight simulation; maneuver monitoring in real time for envelope expansion
- Emergency recovery devices: types of devices available, sizing and other design constraints, validation
- Subsystem modifications for post-stall testing: additional pilot restraint devices, control system modifications, propulsion system modifications
- Recommended recovery techniques; interpreting post-stall flight test results: analyzing real-time data, postflight analysis of data

Day Five
- Guidelines and discipline for conducting advanced flight tests: test team training, incremental buildup to critical conditions, use of simulation, independent review teams
- Planning for efficiency in data collection and data management: tailoring the scope of the tests to the requirement; identifying critical parts of the envelope; combining maneuvers and integration of backup test points; using all available tools: real-time monitoring, automated inserts; shared data processing between test site and home site
- Contingency planning: attrition of resources, backup support facilities, safety guidelines and documentation; course wrap-up and critique
AERODYNAMIC DESIGN IMPROVEMENTS: HIGH-LIFT AND CRUISE
Instructors: C.P. (Case) van Dam and Paul Vijgen

Day One
- Aircraft design and the importance of drag on fuel efficiency, operational cost and the environmental impact
- Empirical drag prediction including scale effects on aircraft drag and examples of drag estimates for several aircraft
- History of laminar flow for drag reduction
- Natural laminar flow design, application, certification and viability
- Laminar flow control, hybrid laminar flow control design and application considerations including suction system considerations
- CFD-based drag prediction and decomposition

Day Two
- Critical factors in CFD-based prediction
- Boundary-layer transition prediction and analysis ranging from empirical to Parabolic Stability Equation (PSE) and Direct Numerical Simulation (DNS) techniques
- Supersonic laminar flow including boundary-layer instability, transition mechanisms and control methods at supersonic speeds
- Wave drag reduction at transonic and supersonic conditions
- Passive and active methods for turbulent drag reduction

Day Three
- Induced-drag reduction ranging from classic linear theory to active reduction concepts including wingtip turbines and tip blowing
- Experimental techniques for laminar and turbulent flows
- Impact of high-lift on performance and economics of general aviation and subsonic transport aircraft
- Physics of single-element airfoils at high-lift including types of stall characteristics, Reynolds and Mach number effects

Day Four
- High-lift physics of swept and unswept single-element wings
- Physics of three-dimensional high-lift systems including features of 3D high-lift flows and lessons from high Reynolds number tests
- Importance of boundary-layer transition, relaminarization and roughness (icing, rain) effects on high-lift aerodynamics
- Overview and survey of high-lift systems; types of high-lift systems including support and actuation systems
- High-lift computational aerodynamics methods

Day Five
- Passive and active flow separation control
- Conceptual studies of high-lift systems including multi-disciplinary approaches
- High-lift characteristics of unconventional systems and configurations including canard and tandem-wing configurations, Upper Surface Blowing (USB), Externally Blown Flaps (EBF) and Circulation Control Wings (CCW)
- High-lift flight experiments involving general aviation and transport type airplanes
- Final observations

Available as on-site course
Class time 35 hours
CEUs 3.5

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

Target Audience
Designed for engineers and managers involved in the aerodynamic design and analysis of airplanes, rotorcraft and other vehicles.

Course includes instruction and the course notebooks.

The course notes are for participants only and are not for sale.

Contact Us
Obtain a no-cost, no-obligation proposal for an on-site class.

Zach Gredlics
On-site Program Manager
E-mail aerosite@ku.edu
Phone 785-864-1066
Fax 785-864-5074

This course is part of the Aircraft Design Track. See page 5.
**AEROSPACE APPLICATIONS OF SYSTEMS ENGINEERING**

**Instructors: Donald T. Ward, Mark Wilson and Mike Phillips**

**Seattle, Washington**

**April 11–15, 2011**

**AA111320**

Monday–Friday 8 a.m.–4 p.m.

Class time 35 hours

CEUs 3.5

**Description**

Based on evolving systems engineering standards, EIA/IS 632 and IEEE P1220 and Version 3.1 of the INCOSE Systems Engineering Handbook. Provides a working knowledge of all elements, technical and managerial, involved in systems engineering as applied to aerospace systems of varying complexity. Concentrates on the most troublesome areas in systems development: requirements derivation, documentation, allocations, verification and control. Hardware and software systems case studies from several sectors of the aerospace industry will be used as systems development examples. Techniques have been used on many DoD and NASA programs and also are applicable to commercial and civilian projects.

**Target Audience**

Designed for systems engineers at all levels and program managers developing large or small systems.

**Fee $2,345**

Includes instruction, a course notebook, *INCOSE Systems Engineering Handbook*, refreshments and five lunches.

The course notes are for participants only and are not for sale.

This course is part of the Management and Systems Track. See page 5.

**Day One**

- Overview and terminology
- Acquisition and supply (creating a shared vision)
- Technical management (the planning exercise)
- Evolutionary acquisition, spiral development and open systems

**Day Two**

- Technical management (just teamwork—or integrated teaming)
- Technical management (risk management and performance tools)
- System design (requirements—second time around)
- Functional analysis/allocation
- Solution definition

**Day Three**

- Write code and system realization
- Technical analysis and evaluation
- Tailoring the process (How much SE is enough?)
- Configuration management

**Day Four**

- Applying systems engineering to hardware (NASA X-38 Case Study)
- Class exercise (applying principles of systems engineering)

**Day Five**

- Software intensive systems engineering (lessons learned)
- Intensive systems engineering (case studies)
- Course summary and wrap-up
AIRBORNE EQUIPMENT DESIGN AND RTCA DO-160
Instructor: Ken Vranish

Day One
- History and background of why DO-160
- Explanation of aircraft environment
- Overview of DO-160
- Developing requirements to ensure DO-160 compliance in equipment designs
  - Temperature and altitude
  - Temperature variation
  - Humidity
  - Shock and crash safety
  - Vibration
  - Explosion proof

Day Two
- Waterproofness
- Fluids susceptibility
- Sand and dust
- Fungus resist
- Salt fog
- Icing
- ESD
- Flammability
- The aircraft atmospheric radiation environment

Day Three
- Magnetic effect
- Power input
- Voltage spike
- Audio frequency conducted susceptibility
- Induced signal susceptibility

Day Four
- RF susceptibility
- RF emission
- Lightning indirect susceptibility
- Lightning direct effects
- Review requirements development

San Diego, California
September 20–23, 2011
AA121160

Tuesday–Friday 8 a.m.–4 p.m.
Class time 28 hours
CEUs 2.8

Description
This class is designed to educate system engineers, hardware design engineers and test engineers in the aspects of DO-160 as it pertains to the designs of airborne electronic equipment. 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.

Target Audience
This class is designed for system engineers responsible for developing requirements for airborne electronic equipment; hardware design engineers responsible for building such equipment and test engineers responsible for writing test plans.

Fee $2,045
Includes instruction, course notebook, DO-160 Environmental Conditions and Test Procedures for Airborne Equipment, refreshments and four lunches.

The course notes are for participants only and are not for sale.

This course is part of the Avionics and Avionic Components Track. See page 5.

San Diego
Day One
• History and background of why DO-160
• Explanation of aircraft environment
• Overview of DO-160
• Developing requirements to ensure DO-160 compliance in equipment designs
  - Temperature and altitude
  - Temperature variation
  - Humidity
  - Shock and crash safety
  - Vibration
  - Explosion proof

Day Two
• Waterproofness
• Fluids susceptibility
• Sand and dust
• Fungus resist
• Salt fog
• Icing
• ESD
• Flammability
• The aircraft atmospheric radiation environment

Day Three
• Magnetic effect
• Power input
• Voltage spike
• Audio frequency conducted susceptibility
• Induced signal susceptibility

Day Four
• RF susceptibility
• RF emission
• Lightning indirect susceptibility
• Lightning direct effects
• Review requirements development

San Diego, California
September 20–23, 2011
AA121160

Tuesday–Friday 8 a.m.–4 p.m.
Class time 28 hours
CEUs 2.8

Description
This class is designed to educate system engineers, hardware design engineers and test engineers in the aspects of DO-160 as it pertains to the designs of airborne electronic equipment. 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.

Target Audience
This class is designed for system engineers responsible for developing requirements for airborne electronic equipment; hardware design engineers responsible for building such equipment and test engineers responsible for writing test plans.

Fee $2,045
Includes instruction, course notebook, DO-160 Environmental Conditions and Test Procedures for Airborne Equipment, refreshments and four lunches.

The course notes are for participants only and are not for sale.

This course is part of the Avionics and Avionic Components Track. See page 5.


**AIRCRAFT ICING: METEOROLOGY, PROTECTIVE SYSTEMS, INSTRUMENTATION AND CERTIFICATION**  
Instructors: Wayne R. Sand and Steven L. Morris

**San Diego, California**  
September 13–16, 2011  
AA121070

Tuesday–Friday  8 a.m.–4 p.m.  
Class time  28 hours  
CEUs  2.8

**Description**  
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.

**Target Audience**  
Designed for aerospace engineers, flight test and design engineers, test pilots, line pilots, meteorologists, FAA engineers, DERs and program managers.

**Fee $2,045**  
Includes instruction, course and reference notebooks, refreshments and four lunches.

The course notes are for participants only and are not for sale.

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**Day One**  
- Icing hazard description  
- Atmospheric aerosols  
- Cloud physics of icing  
- Ground icing, atmospheric cooling mechanisms  
- Conceptual cloud modes: convective clouds, stratiform clouds  
- Skew-T, Log P adiabatic diagrams

**Day Two**  
- Icing environment analysis using Skew-T, Log P  
- Assessment of icing potential  
- Critical icing parameters, theory and measurements  
- Meteorology of supercooled large drops  
- Finding/avoiding icing conditions  
- New and current icing research  
- Internet resources

**Day Three**  
- Ice accretion characteristics  
- Effects of ice on aircraft performance  
- Anti-ice systems  
- De-ice systems  
- Icing instrumentation, icing environment  
- Icing detection

**Day Four**  
- Effect of SLD on aircraft  
- Engine icing considerations  
- Ice-testing methods  
- Certification and regulations  
- Computational methods  
- Review and discussion

This course is part of the Aerospace Compliance Track and the Aircraft Maintenance and Safety Track. See page 5.
AIRCRAFT LIGHTNING: REQUIREMENTS, COMPONENT TESTING, AIRCRAFT TESTING AND CERTIFICATION (NEW)

Instructor: C. Bruce Stephens

Day One
- Introduction
- The electromagnetic environment of aircraft
- Metallic and composite aircraft requirements
- Electromagnetic Interference (EMI)
- Electromagnetic Compatibility (EMC)
- Electrical bonding
- Electrostatic Discharge (ESD)
- Prescription Static (P-STATIC)
- High Intensity Radiated Fields (HIRF)
- FAA certification process and requirements

Day Two
- The lightning environment
- The history of lightning requirements for aircraft certification
- Aircraft lightning attachment
- Effects of lightning on aircraft
- Direct effects of lightning
- Direct effects testing
- RTCA/DO-160 levels for direct effects testing
- Direct effects certification requirements
- EASA requirements
- Simulation for direct effects requirements

Day Three
- Indirect effects of lightning
- Indirect effects aircraft level testing
- Indirect effects design
- RTCA/DO-160 levels for indirect effects bench testing
- Indirect effects certification requirements
- EASA requirements
- Simulation for indirect effects requirements

Day Four
- Fuel systems
- 14 CFR 25.981 Amendment 102
- Aircraft wiring and shielding
- Electrical Wiring and Installation System (EWIS)

Day Five
- Pre-selected teams will simulate the process of determining aircraft lightning certification and testing requirements for various components installed on the aircraft.
- Electromagnetic Effects (EME) program management
- Future EME Testing Techniques; Final EME discussion and questions

Dallas/Fort Worth, Texas
June 13–17, 2011
AA111380

Monday–Friday 8 a.m.–4 p.m.
Class time 35 hours
CEUs 3.5

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. Direct effects and indirect effects of lightning bench testing as well as full vehicle aircraft testing will be discussed. This course will examine FAA requirements for both Part 23 and Part 25 CFR determination for all lightning requirements.

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.

Target Audience
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.

Fee $2,345
Includes instruction, a course notebook, refreshments and five lunches.

The course notes are for participants only and are not for sale.

This course is part of the Avionics and Avionic Components Track. See page 5.
AIRCRAFT STRUCTURAL LOADS: REQUIREMENTS, ANALYSIS, TESTING AND CERTIFICATION

Instructor: Wally Johnson

Seattle, Washington
April 11–15, 2011
AA111290

Monday–Thursday 8 a.m.–4 p.m.
Friday 8 a.m.–11:30 a.m.
Class time 31.5 hours
CEUs 3.15

Description
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.

Target Audience
Designed for practicing engineers and engineering managers whose responsibilities include aircraft structures.

Fee $2,345
Includes instruction, a course notebook, a copy of BASICLOADS software, refreshments and five lunches.

The course notes are for participants only and are not for sale.

Day One
• Introduction and overview of the course
• Basic aerodynamics overview
• Certification requirements (FAR 23, FAR 25, EASA, MIL SPECS)
• Mass properties calculations (design weights, weight-c.g. envelope development, weight-c.g. code, mass distribution code)
• Structural design airspeeds derivations (maneuver, gust penetration, cruise, dive, flap extended, design-airspeeds code)
• V-n diagrams (maneuver and gust load factors calculations, V-n diagram code)
• Introduction to external loads (definitions, static vs. dynamic, flutter, loads classifications)

Day Two
• External loads process (data requirements, loads conditions, steps to obtain certification loads)
• Steady maneuvers (wind-up turn, pull-up, balancing tail loads derivations, balance-maneuver code)
• Pitch maneuvers analysis (abrupt pitch up, abrupt pitch down, checked pitch)
• Roll maneuver analysis

Day Three
• Yaw maneuver and engine out analysis
• Basic structural dynamics overview
• Static and dynamic gust analysis (gust load factor formula, tuned discrete 1-cos gust, PSD gust)
• Landing loads analysis (one wheel, two wheel, three wheel, landing code)

Day Four
• Wing loads analysis (design wing conditions, wing-load code)
• Horizontal tail loads analysis (HT loads certification requirements, design HT conditions)
• Vertical tail loads analysis (VT loads certification requirements, design VT conditions)
• Fuselage loads analysis (inertia loads, airloads, 1g shear curve, fuselage-loads code)
• Control surface and high-lift devices loads analysis (cert requirements, primary and secondary surfaces, flaps, spoilers, hinge moments, airload distributions)

Day Five
• Static and fatigue test loads
• Flight loads validation (ground loads calibration, in-flight loads measurements)
• Structural loads reduction suggestions
• Course summary and wrap-up

This course is part of the Aircraft Structures Track. See page 5.
AIRCRAFT STRUCTURES DESIGN AND ANALYSIS

Instructors: Michael Mohaghegh and Mark S. Ewing

This course may be taught by one or both instructors, based on their availability.

Day One
- Structural design overview: evolution of structural design criteria; FAA airworthiness regulations; structural design concepts, load paths
- Design requirements and validation of aircraft loads: materials and fasteners, flutter and vibrations, static strengths, durability and damage tolerance, crashworthiness, producibility, maintainability and environment/
discrete events

Day Two
- Metals: failure modes, design allowables testing; failure stacking sequence, repeated loads; processing
- Fiber-reinforced composites: laminated composite performance; failure modes and properties; processing; moisture protection
- Material selection: aluminum, titanium, steel, composites and future materials; design exercise

Day Three
- Design to static strength: mechanical joints and fittings; bonded and welded joints; design exercise; highly loaded tension structures; combined loads
- Thin-walled structures: review of bending and torsion for compact beams; introduction to shear flow analysis of thin-walled beams; analysis exercise; semi-tension field beams; design exercise; introduction to the finite element method

Day Four
- Design to buckling and stiffness: buckling of thin-walled structures; design exercise
- Component design: wings and empennages, fuselage, landing gear, engine attachments, control surfaces

Day Five
- Design for damage tolerance: historical context of safe life, fail safety and damage tolerance; tolerating crack growth in structures; widespread damage; testing; inspection; design exercise
- Design for durability: fatigue, corrosion
- Design considerations: design for manufacture, design process management
- Certification: analysis and validation requirements, component and full-scale aircraft testing requirements
- Continued airworthiness: aging fleet, repairs

Seattle, Washington
April 11–15, 2011
AA111300

Orlando, Florida
November 14–18, 2011
AA121220

Monday–Friday 8 a.m.–4 p.m.
Class time 35 hours
CEUs 3.5

Description
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.

Target Audience
Designed for engineers, educators and engineering managers whose responsibilities include aircraft structures.

Fee $2,345
Includes instruction, a course notebook, refreshments and five lunches.

The course notes are for participants only and are not for sale.

This course is part of the Aircraft Structures Track. See page 5.
AIRPLANE FLIGHT DYNAMICS: OPEN AND CLOSED LOOP
Instructor: Willem A.J. Anemaat

San Diego, California
September 19–23, 2011
AA121100

Monday–Friday 8 a.m.–4 p.m.
Class time 35 hours
CEUs 3.5

Description
Overview of airplane static and dynamic stability and control theory and applications, classical control theory and applications to airplane control systems.

Target Audience
Designed for aeronautical, control system and simulator engineers, pilots with engineering background, government research laboratory personnel and educators.

Fee $2,345
Includes instruction, Airplane Flight Dynamics and Automatic Flight Controls, Parts I–II; Airplane Design, Parts IV, VI, and VII; Roskam’s Airplane War Stories and Lessons Learned in Aircraft Design, all by Jan Roskam, refreshments and five lunches.

The course notes are for participants only and are not for sale.

Day One
- The general airplane equations of motion: reduction to steady state and to perturbed state motions; emphasis: derivation, assumptions and applications
- Review of basic aerodynamic concepts: airfoils—lift, drag and pitching moment, lift-curve slope, aerodynamic center; Mach effects; fuselage and nacelles—destabilizing effect in pitch and in yaw; wings, canards and tails—lift, drag and pitching moments; lift-curve slope; aerodynamic center; downwash; control power; Mach effects
- Longitudinal aerodynamic forces and moments: stability and control derivatives for the steady state and for the perturbed state, example applications and interpretations

Day Two
- Lateral-directional aerodynamic forces and moments: stability and control derivatives for the steady state and for the perturbed state, example applications and interpretations
- Thrust forces and moments: steady state and perturbed state
- The concept of static stability: definition, implications and applications
- Applications of the steady state airplane equations of motion: longitudinal moment equilibrium, the airplane trim diagram (conventional, canard and flying wing), airplane neutral point, elevator-speed gradients, the nose-wheel lift-off problem; neutral and maneuver point (stick fixed)
- Applications of the steady state airplane equations of motion: lateral-directional moment equilibrium, minimum control speed with engine-out

Day Three
- Effects of the flight control system: reversible and irreversible flight controls; control surface hinge moments, stick and pedal forces, force trim; stick-force gradients with speed and with load factor; neutral and maneuver point stick free; effect of tabs—trim-tab, geared-tab, servo-tab, spring-tab; effect of down-spring and bob-weight; flight control system design considerations—reversible and irreversible, actuator sizing and hydraulic system design considerations.
- Applications of the perturbed state equations of motion—complete and approximate longitudinal transfer functions; short period, phugoid, third mode, connections with static longitudinal stability, sensitivity analyses, equivalent stability derivatives; complete and approximate lateral-directional transfer functions—roll mode, spiral mode, Dutch roll mode and lateral phugoid, connections with static lateral-directional stability, sensitivity analyses, equivalent stability derivatives

Day Four
- Review of handling qualities criteria; MIL-F-8785C and FARs, Cooper-Harper ratings, relation to system redundancy, the airworthiness code
- Introduction to Bode plots: method of asymptotic approximations, interpretations of Bode plots, airplane Bode plots, applications of inverse Bode method; introduction to linear feedback systems, the root-locus method and the Bode method to synthesize control systems
- Introduction to human pilot transfer functions; analysis of airplane-plus-pilot-in-the-loop controllability; synthesis of stability augmentation systems—yaw dampers, pitch dampers; effect of flight condition, sensor orientation and servo dynamics

Day Five
- Synthesis of stability augmentation systems—yaw dampers, pitch dampers, α-feedback, β-feedback; effect of flight condition, sensor orientation and servo dynamics; basic autopilot modes; longitudinal modes—attitude hold, control-wheel steering, altitude hold, speed control and Mach trim; lateral-directional modes—bank-angle hold, heading hold, localizer and glide-slope control, automatic landing; coupling problems—roll-pitch and roll-yaw coupling, pitch rate coupling into the lateral-directional modes, nonlinear response behavior; effects of aeroelasticity—aileron reversal, wing divergence, control power reduction; effect of aeroelasticity on airplane stability derivatives; example applications
AIRPLANE PERFORMANCE: THEORY, APPLICATIONS AND CERTIFICATION (computer-based course)
Instructor: Jan Roskam, Mediated by Mario Asselin

This state-of-the-art course delivery features streaming video and animated illustrations. We are excited to present this new dynamic learning opportunity featuring Jan Roskam and Mario Asselin.

Participants will be guided through course sections and will have the flexibility to complete the sections and readings at their own time and pace.

Interaction with the instructor and classmates takes place via threaded discussion and e-mail.

Course material and log-in information is provided upon prepayment of the course fee. The course notes are for participants only and are not for sale. The course notebook and supplemental readings will be mailed upon receipt of payment.

Course Sections
- 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: Clean Takeoff and Landing
- Preliminary Configuration Design and Integration of the Propulsion System
- Flight Test Principles and Practices
- Airplane Life Cycle Program Costs

Bonus Material
Inertial Roll Coupling Lecture by Dr. Jan Roskam

Online Instruction
Available anytime

AA111480
Please check our website for updates and news about this course.

Class time 28 hours
CEUs 2.8

Description
Overview of airplane performance and prediction, performance applications, certification standards and the effects of stability and control on performance.

Target Audience
Designed for aeronautical engineers, pilots with an engineering background, simulator engineers, government research laboratory personnel and university faculty.

Fee $1,395 plus
$45 (USD) shipping within the U.S.
$110 (USD) shipping to Canada and international destinations

This course is part of the Flight Tests and Aircraft Performance Track. See page 5.

For more information about this computer-based course, please contact

Kim Hunsinger
Assistant Director
E-mail kah@ku.edu
Phone 785-864-4758

AIRPLANE PRELIMINARY DESIGN
Instructor: Jan Roskam

Seattle, Washington
April 11–15, 2011
AA111310

Monday–Friday 8 a.m.–4 p.m.
Class time 35 hours
CEUs 3.5

Day One
Review of drag polar breakdown for subsonic and supersonic airplanes, rapid method for drag polar prediction, check of drag polar realism; review of fundamentals of flight mechanics: take-off and landing characteristics, range, endurance and maneuvering, the payload-range diagram; 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

Day Two
Continuation of performance constraint analyses: 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, step-by-step analysis of the feasibility of configurations: applications; fundamentals of fuselage and wing layout design; aerodynamic, structural and manufacturing considerations; effect of airworthiness regulations; high-lift and lateral control design considerations; handling quality requirements; icing effects; layout design of horizontal tail, vertical tail and/or canard; static stability and control considerations; the X-plot and the trim diagram; stable and unstable pitch breaks; effect of control power nonlinearities; icing effects

Day Three
Fundamentals of powerplant integration: inlet sizing, nozzle configuration, clearance envelopes, installation considerations, accessibility considerations, maintenance considerations; effect of engine location on weight, stability and control; minimum control speed considerations; fundamentals of landing gear layout design; tip-over criteria; FOD considerations; retraction kinematics and retraction volume; take-off rotation; Class I weight and balance prediction; the c.g. excursion diagram; Class I moment of inertia prediction; importance of establishing control over weight; preliminary structural arrangement for metallic and composite airframes; manufacturing and materials considerations; the V-n diagram; Class II weight, balance and moment of inertia prediction; fundamentals of static longitudinal stability; the trim diagram, trim considerations for conventional, canard and three-surface designs, tail and canard stall

Day Four
Continuation of fundamentals of static longitudinal stability; deep stall and how to design for recoverability, effects of the flight control system; control force versus speed and load factor gradients; flying quality considerations; additional stability and control considerations; effect of flaps; minimum control speed with asymmetric thrust; take-off rotation and the effect of landing gear location; review of dynamic stability concepts and prediction methods; short period, phugoid, spiral roll and Dutch roll modes; flying quality criteria: before and after failures in flight crucial systems; the role and limitations of stability augmentation; review of control surface sizing criteria: trim, maneuvering and stability augmentation; initial system gain determination; sensitivity analyses and their use in early design decision making; flight control system layout and design considerations; mechanical and hydraulically powered flight controls; layout design considerations for redundant “flight-crucial” systems: architectures associated with various types; safety and survivability considerations; the airworthiness code; fundamental considerations in fuel system layout design; sizing criteria; some do’s and don’ts; layout and design considerations for “other” systems: de-icing, water and waste water

Day Five
Landing gear design revisited, shock absorber design, structural integration of the landing gear, some do’s and don’ts; factors to be considered in estimation of: research and development cost and manufacturing and operating cost; the concept of airplane life cycle cost: does it matter in commercial programs? Discussion of 81 rules for “design for low cost”; the break-even point, estimation of airplane “net worth” and its effect on program decision making; other factors in airplane program decision making, finding a market niche, risk reduction through technology validation, design to cost; lessons learned in past programs: do we really learn them?

This course is part of the Aircraft Design Track. See page 5.

Fee $2,345
Includes instruction, 
Airplane Aerodynamics and Performance by C. Edward Lan and Jan Roskam, 
Airplane Design, Parts I–VIII, 
Lessons Learned in Aircraft Design and Roskam’s Airplane War Stories, all by Jan Roskam, refreshments and five lunches.

The course notes are for participants only and are not for sale.
AIRPLANE SUBSONIC WIND TUNNEL TESTING AND AERODYNAMIC DESIGN (NEW)
Instructor: Willem A.J. Anemaat

Day One
- Introduction
- Wind tunnel facilities
- Measurements: what to measure and how
- Calibration
- Forces and moments measurements
- Pressure measurements
- Flow visualization
- Model design
- Scale effects
- Test plan setup

Day Two
- Trip strips
- Changes to the test plan
- Test management
- Model changes
- Lift
- Drag
- Pitching moment
- Downwash
- Stall
- Deep stall
- Longitudinal stability and control
- Directional stability and control
- Lateral stability and control
- Ground effects
- Propellers/power effects

Day Three
- Airfoils
- Wings
- Flaps
- Landing gears
- Winglets
- Dorsal fins
- Ventral fins
- Nacelles
- Inlets
- T-strips
- Brakes and spoilers
- Miscellaneous components
- Component build-up
- Scaling forces and moments to full scale
- Other tests
- Summary

Orlando, Florida
November 15–17, 2011
AA121260
Tuesday–Thursday 8 a.m.–4 p.m.
Class time 21 hours
CEUs 2.1

Description
This course deals with wind tunnel test specifics on how to set up a test, how to run tests, what is involved with testing from a test management and engineering point of view, how to design the test models and what it is used for in the aerodynamic design of airplanes. The course deals with data analysis and how to correct it to full-scale airplanes.

Target Audience
Aeronautical engineers, researchers, government research laboratory personnel, engineering managers and educators who are involved with research, development and design of subsonic aircraft or modifications to aircraft.

Fee $1,745
Includes instruction, a course notebook, *Low-Speed Wind Tunnel Testing*, third edition, by Jewel B. Barlow, William H. Rae, Jr., and Alan Pope, refreshments and three lunches.

The course notes are for participants only and are not for sale.

This course is part of the Aircraft Design Track. See page 5.
APPLIED NONLINEAR CONTROL AND ANALYSIS
Instructor: Bill Goodwine

Available as on-site course
Class time 35 hours
CEUs 3.5

Description
This course covers analysis methods for nonlinear dynamical systems with the primary applications to feedback control. It is particularly designed for control engineers who are facing challenges due to more tightly integrated systems and systems governed by controllers with switching behavior or logic. The nonlinear control applications covered are overviews of describing functions, the direct Lyapunov method, the Lur'e problem and circle criterion, the small gain theorem, adaptive control, feedback linearization (dynamic inversion) and hybrid systems. The theoretical content, which is the basis for understanding the control applications, consists of identifying nonlinear phenomena, the process and theory of linearization, Lyapunov stability, boundedness, center manifold theory and bifurcations. The supplied CD-ROM contains MATLAB programs that can be used as the basis for hands-on exercises.

Target Audience
This course would be appropriate for managers and engineers who work in the analysis and design of modern control systems.

Fee includes instruction, course notebook and CD-ROM.

The course notes are for participants only and are not for sale.

Contact Us
Obtain a no-cost, no-obligation proposal for an on-site class.

Zach Gredlics
On-site Program Manager
E-mail aerosite@ku.edu
Phone 785-864-1066
Fax 785-864-5074

Day One
- Identifying nonlinear phenomena such as multiple equilibria, bifurcations, chaos, nonunique and multiple solutions, limit cycles, finite escape time, sub- and super-harmonic response
- Nomenclature and definitions
- The theory and process of linearization
- Introduction to describing functions

Day Two
- Describing functions examples
- Nonlinear stability and Lyapunov functions
- Control and the direct Lyapunov method
- Methods for determining Lyapunov functions

Day Three
- The Lur'e problem, circle criterion and Popov criterion
- The small gain theorem and applications
- Stability of nonlinear nonautonomous systems and boundedness

Day Four
- Feedback linearization
- Center manifold theory and stability
- Bifurcation theory

Day Five
- Introduction to hybrid (switching) systems
- Stability of hybrid systems under arbitrary switching
- Stability of hybrid systems under controlled switching
- Stability of hybrid systems under state-dependent switching

This course is part of the Flight Control Systems Design Track. See page 5.
AVIATION WEATHER HAZARDS
Instructor: Wayne R. Sand

Day One
- Thunderstorms and strong convective clouds: basic conceptual models, single-cell storms, multi-cell storms and line storms
- Stability and instability, storm tops and vertical motion
- Turbulence: causes and results, intensity, tornadoes
- Lightning: causes and results, composite aircraft, lightning detection networks
- Heavy rain: raindrops and drop sizes, precipitation intensity, effects on performance
- Radar: airborne weather radar, WSR-88D (NEXRAD), Stormscope
- Icing: mechanisms to develop hail, visual and radar detection

Day Two
- Windshear: physics of microbursts, stability and instability, precipitation loading, evaporation, dry and wet microbursts
- Gust fronts: thunderstorm generated, cold fronts, structure
- Windshear training aid: detection signals, flight crew actions
- Clear air turbulence: jet stream, thunderstorm wake, instability, waves, deformation zones
- Detection Systems: Terminal Doppler Weather Radar, Low-Level Windshear Alert Systems, airborne forward-look systems, airborne in situ systems, integrated terminal weather information system
- Accidents: discussion of key accidents

Day Three
- Basic icing physics: supercooled liquid water content, droplet sizes, temperature
- Intensity and character: light, moderate and severe; continuous and intermittent; collection efficiency; rime, clear and mixed
- Icing forecasts: NWS forecasts; experimental forecasts; cloud type forecasts, cumuliform (max intermittent) and stratiform (max continuous); orographic influence
- Aircraft performance effects: de-iced and anti-iced aircraft; unprotected components; lift, drag, weight and climb considerations; pilot action considerations

Day Four
- Mountain weather: differential heating, mountain and valley winds, channeling winds, thunderstorms, waves, rotors, density altitude
- Low ceiling and visibility: fog, various types; snow, rain; low ceilings; conditional forecasts, chance and occasional
- Weather-related accident statistics: problem areas, NTSB and AOPA statistics, specific accident discussions
- New systems: ASOS, GOES, ADDS, AFSS, data link, rapid update cycle, new display and depiction concepts, air traffic controller weather, others
- Review and questions

How You May Benefit
- Understand the basics of key aviation weather hazard phenomena, including thunderstorms and associated hazards (lightning, hail, etc.), icing (in-flight and ground), windshear (gust fronts and microbursts), turbulence (clear air, instability and mountain-generated), mountain weather, visibility and low ceilings.
- Learn how new weather sensors change the way aviation variables are measured, how to interpret these new data.
- Gain the tools to better understand weather phenomena, fly in and around these phenomena, design aircraft to cope with weather hazards, design and operate RPVs in or around weather hazards and test to ensure that design criteria are met.
- Learn about scientific advancements in the field, including new aviation weather display products and improvements in dissemination.
- Use the information gained in this course to incorporate critical aviation weather hazard phenomena into your particular aviation application.

Available as on-site course
Class time 28 hours
CEUs 2.8

Description
Examines the key weather hazards that affect all of aviation and provides an in-depth understanding of the most serious aviation weather hazards faced by all aspects of aviation. Materials and instruction are designed to provide enough depth to enable pilots to make preflight and in-flight weather-related decisions intelligently. Designed to provide flight test and design engineers the basic information necessary to consider weather factors when designing aircraft and aircraft components. Flight dispatchers also will gain an insight into aviation weather hazards, which should substantially enhance their ability to make weather-related decisions. Course materials are also designed to be used by RPV designers and operators to better deal with weather as it affects these vehicles. New weather data, products and information sources will be discussed.

Target Audience
Designed for pilots, test pilots, meteorologists, flight test engineers, design engineers, dispatchers, RPV designers and operators, government and research laboratory personnel and educators.

The course notes are for participants only and are not for sale.

Contact Us
Obtain a no-cost, no-obligation proposal for an on-site class.

Zach Gredlics
On-site Program Manager
E-mail aerosite@ku.edu
Phone 785-864-1066
Fax 785-864-5074

This course is part of the Aircraft Maintenance and Safety Track. See page 5.
CERTIFICATION ENGINEERING OF UTILITY-SCALE WIND TURBINES

Instructor: Kyle K. Wetzel

Available as on-site course

Class time 28 hours
CEUs 2.8

Description

The course will present current wind turbine industry standard practice for engineering and certifying utility-scale wind turbines. Topics will include: current state-of-the-art in turbine configurations and operations, international standards governing wind turbines, best engineering practices, methods of dynamic simulations and loads analysis, rotor blade aerodynamic and structural design, drivetrain design, electrical systems engineering, controls system design, tower design.

Target Audience

Engineering managers (VPs of engineering, chief engineers, project engineers) and system engineers for entities wanting to enter the wind turbine industry.

Fee includes a course notebook and a CD-ROM. The course notes are for participants only and are not for sale.

Contact Us

Obtain a no-cost, no-obligation proposal for an on-site class.

Zach Gredlics
On-site Program Manager
E-mail aerosite@ku.edu
Phone 785-864-1066
Fax 785-864-5074

This course is part of the Aircraft Design Track. See page 5.

Day One

- General engineering of wind turbines
- General principals of wind turbine operation
- Basic layout and operation of a wind turbine
- Standard terminology, coordinate systems, etc.
- Overview of aerodynamic principles
- Variable speed vs. fixed speed operation
- Pitch and stall regulation
- General methods of turbine engineering design and analysis
- International standards governing turbine engineering
- Best practices
- Process for certification of turbines
- Historical evolution of turbine technology and current state of the art

Day Two

- Loads analysis
- Principles of loads analysis
- Design load cases
- Wind inflow modeling
- Overview of atmospheric conditions
- Extreme wind conditions
- Turbulent wind conditions
- Turbine modeling
- Critical modules in the turbine model (turbine, tower, blades, etc.)
- Post-processing of loads
- Key load components and their applications
- Extreme loads, cyclic loads, Markov matrices, damage equivalent loads, “Revs at Levs,” etc.
- Methods of post-processing
- Requirements for certification of loads
- Loads testing

Day Three

- Rotor blades
- General methods of rotor blade engineering design and analysis
- International standards governing rotor blade engineering
- Best practices
- Process for certification of blades
- Principles of rotor blade aerodynamics
- Typical airfoils and characteristics
- Aerodynamic optimization of variable-speed, pitch regulated blades
- Structural design and optimization
- Typical approaches to structural design and manufacturing
- Typical materials and processes
- Structural optimization and consideration of design drivers
- Finite element analysis of blades
- Typical failure modes
- Manufacturing of rotor blades
- Typical processes employed in the industry
- Quality assurance; typical defects and solutions
- Testing of rotor blades
- International standards for testing
- Industry standard test protocols and procedures
- Test facilities and requirements
- Results and their use

Day Four

- Controls, dynamics, drivetrain and testing
- Control of wind turbine systems
- Pitch regulation and pitch system design
- Stall regulation
- Torque-speed scheduling
- Dynamics of wind turbine systems instabilities
- Campbell diagrams
- Tuning of wind turbine systems and controls
- Drivetrain design
- Drivetrain layout
- Wind turbine gearbox engineering
- Electrical systems engineering
- Testing of wind turbines
- Test standards and protocols
- Best practices for testing wind turbines
COMMERCIAL AIRCRAFT SAFETY ASSESSMENT AND 1309 DESIGN ANALYSIS

Instructor: Marge Jones

**Day One**
- System safety basics including importance of structured systematic evaluations, system safety and reliability concepts and philosophies, understanding 1309 regulations and accident statistics/data
- Overview of the SAE ARP 4761 Safety Assessment process for commercial aviation
- Aircraft and System Functional Hazard Assessments including allocating safety requirements and class exercise

**Day Two**
- System architecture concepts and design assurance levels including SAE ARP 4754 Certification Considerations for Highly-Integrated or Complex Aircraft Systems, DO-254 Certification Considerations for Airborne Complex Electronic Hardware and RTCA DO-178 Software Considerations in Airborne Systems
- Preliminary System Safety Assessments and allocating safety requirements
- Failure rate prediction techniques and class exercise

**Day Three**
- Failure Mode and Effects Analysis (FMEA)/Failure Mode Effects Summary (FMES)
- Reliability block diagrams and dependency diagrams
- Fault Tree Analysis (FTA) concepts, modeling techniques and examples, qualitative evaluation (cutsets), quantitative evaluation, importance measures and software tools
- Class FMEA and FTA exercise

**Day Four**
- Common cause analysis: particular risk, zonal and common mode
- System safety assessment
- Tailoring methods to aircraft modifications/Safety Assessment of Changes

**Dallas/Fort Worth, Texas**
*June 13–16, 2011 • AA111370*
Monday–Thursday 8 a.m.–4 p.m.

**San Diego, California**
*September 20–23, 2011 • AA121170*
Monday–Thursday 8 a.m.–4 p.m.

**Orlando, Florida**
*November 15–18, 2011 • AA121290*
Tuesday–Friday 8 a.m.–4 p.m.

**Class time**
- 28 hours
**CEUs**
- 2.8

**Description**
Covers system safety requirements of 14 CFR 23.1309, 25.1309, 27.1309 and 29.1309 from fundamental philosophies and criteria to the analysis techniques to accomplish safety requirement identification, validation and verification. Includes construction of failure mode and effects analysis, criticality analysis and fault trees. Includes detailed review of SAE ARP 4754 and 4761 including Functional Hazard Assessments, Preliminary System Safety Assessments, Failure Rate Prediction Techniques, Failure Mode and Effects Analysis, Fault Tree Analysis and Common Mode Analysis. Principles apply to all types of commercial aircraft certification and may also be adapted for any system safety activity.

**Target Audience**
Designed for Parts 23, 25, 27 and 29 system certification engineers, system designers, FAA Designated Engineering Representatives (DERs), aircraft certification personnel and military personnel procuring civil equipment.

**Fee $2,045**
Includes instruction, a course notebook, SAE ARP 4754—Certification Considerations for Highly-Integrated or Complex Aircraft Systems, SAE ARP 4761—Guidelines and Methods for Conducting the Safety Assessment Process on Civil Airborne Systems and Equipment, reference materials, refreshments and four lunches.

The course notes are for participants only and are not for sale.

This course is part of the Aerospace Compliance Track and the Aircraft Maintenance and Safety Track. See page 5.
COMPLEX ELECTRONIC HARDWARE DEVELOPMENT AND DO-254
Instructor: Leanna Rierson

San Diego, California
September 14–16, 2011
AA121080

Wednesday–Friday 8 a.m.–4 p.m.
Class time 21 hours
CEUs 2.1

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 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.

Target Audience
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, etc.).

Fee $1,745
Includes instruction, course notebook, RTCA/DO-254 Design Assurance Guidance For Airborne Electronic Hardware, refreshments and three lunches.

The course notes are for participants only and are not for sale.

This course is part of the Avionics and Avionic Components Track. See page 5.

Day One
• Introductions and background
• History and overview of DO-254
• FAA’s advisory material
• Complex electronic technology
• Framework of DO-254
• Planning process
• Development process

Day Two
• Validation and verification
• Configuration management
• Process assurance (a.k.a. quality assurance)
• Certification liaison process
• Tools

Day Three
• Firmware vs. software vs. hardware
• Microprocessor assurance
• Simple vs. complex
• Structural coverage
• What to expect from certification authorities
• Challenges in complex hardware development and certification
• Summary

How You May Benefit
• Gain valuable insight into the development and certification processes for complex and programmable electronics.
• Obtain practical keys for developing and assessing devices and systems to meet the civil aviation standard: RTCA/DO-254.
• Obtain timely information about some of the more difficult topics related to complex electronic hardware, such as “simple” hardware, microprocessor assurance, firmware and hardware tools.
• Learn the common pitfalls in applying DO-254 and obtaining certification and ideas for how to proactively address that issue.
• Understand FAA’s policy and guidance.

Enroll in this course and Integrated Modular Avionics and DO-297 (see page 39) and save money. The cost for the two courses combined is $2,345.
AA121090
CONCEPTUAL DESIGN OF UNMANNED AIRCRAFT SYSTEMS
Instructor: Armand Chaput or Richard Colgren
This class may be taught by either instructor, based on their availability.

Day One
- Course introduction
- Introduction to UAS
- UAS conceptual design issues
- Fundamentals of system design
- UAS operating environments
- Sortie rate estimates

How You May Benefit
- Understand how to design and analyze overall unmanned aircraft systems.
- Understand how to estimate sensor size and performance and their impact on overall system performance.
- Understand basic elements of UAS communications and know how to estimate overall communication system size and power requirements.
- Understand how to develop overall concepts of cooperation and assess impacts of sortie rate and supportability.
- Understand key air vehicle configuration drivers, how to estimate aero propulsion/weight/stability, overall air vehicle performance, size and trade offs.
- Understand how to bring all of the pieces together to optimize performance and cost at the overall unmanned aircraft system level.

Day Two
- Requirements analysis
- Control station considerations and sizing
- Communication considerations/sizing
- Payload (EO/IR and radar) considerations and sizing
- Reliability, maintainability and support
- Life cycle cost
- Decision making

Day Three
- Air vehicle parametric design
- Conceptual level aerodynamics
- Standard atmosphere models
- Parametric propulsion

Day Four
- Mass properties
- Parametric geometry
- Air vehicle performance
- Mission assessment
- Methodology and correlation

Day Five
- Air vehicle optimization
- Overall system optimization
- Class design presentation

Southern Maryland Higher Education Center
California, Maryland
March 14–18, 2011
AA111570

Monday–Thursday 8 a.m.–4 p.m.
Friday 8 a.m.–11:30 a.m.

Class Time 31.5 hours
CEUs 3.15

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

Target Audience
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.

Fee
$1,795 with U.S. military ID
$2,095 non-military

Includes instruction, a course notebook and five light lunches.

The course notes are for participants only and are not for sale.

This course is part of the Aircraft Design Track. See page 5.
DIGITAL FLIGHT CONTROL SYSTEMS: ANALYSIS AND DESIGN
Instructor: David R. Downing

San Diego, California
September 19–23, 2011 AA121110
Monday–Friday 8 a.m.–4 p.m.
Class Time 35 hours
CEUs 3.5

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.

Target Audience
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.

Fee $2,345
Includes instruction, course notebook, refreshments and five lunches.

The course notes are for participants only and are not for sale.

Day One

Day Two
- Classical Design of Continuous Controllers Using SISO Tools (cont’d): Design of typical continuous lateral and longitudinal control modes for continuous MIMO vehicles, implementation of perturbation controllers in non-linear MIMO vehicles
- Classical Design of Sampled Data Controllers Using SISO Tools: problem definition, develop models of sampler and ZOH, complex plane analysis of linear SISO sampled data systems, analysis of closed loop SISO sampled data systems, z-plane compensators, design of typical sampled data lateral and longitudinal control modes for continuous MIMO vehicles, implementation of perturbation controllers in non-linear MIMO vehicles

Day Three
- Modern Design of Continuous MIMO Controllers: analysis of MIMO systems, development of continuous Linear Quadratic Regulator, weighting matrix selection, non-zero set point problem, proportional integral structure, control rate weighting structure, PIF structure, comparison of PIF and PID control structures, design of typical lateral and longitudinal control modes for continuous MIMO vehicles using modern techniques

Day Four
- Modern Design of Sampled Data MIMO Controllers: development and analysis of digital MIMO systems, development of discrete and sampled data Linear Quadratic Regulator, weighting matrix selection, non-zero set point problem, proportional integral structure, control rate weighting structure, PIF structure, design of typical sampled data lateral and longitudinal control modes for MIMO vehicles using modern techniques

Day Five
- Output Feedback for Sampled Data Controllers: development of output feedback design techniques, command generator tracker, output feedback-PIF-CGT MIMO sampled data controllers, design of typical sampled data controllers, design of typical sampled data lateral and longitudinal control modes for MIMO vehicles using output feedback techniques

This course is part of the Flight Control Systems Design Track. See page 5.
Coming Soon: DURABILITY AND DAMAGE TOLERANCE CONCEPTS FOR AGING AIRCRAFT STRUCTURES (computer-based course)

Instructor: John Hall

Topics

- Background to current aging airplane programs
- Design objectives: safety, economics and responsibilities
- Damage sources: environmental deterioration, 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, structural maintenance program guidelines
- Aging airplane programs: introduction, modifications, repairs, corrosion prevention and control, fatigue and widespread cracking, structural maintenance program guidelines (continued)
- Future airplanes: design and analysis, MSG-3-Revision 2
- Open discussion

How You May Benefit

Obtain a better understanding of basic aging airplane programs including:

- Modifications
- Repairs
- Corrosion prevention control
- Fatigue (SSID/DTR)
- Widespread fatigue cracking

Obtain a better understanding of the potential effects of airplane aging on structural maintenance.

Learn about:

- Applicable design
- Evaluation
- Testing
- Manufacturing
- Certification procedures
- Maintenance procedures developed and used by operators and airplane manufacturers

Online Instruction

Available any time

AA111460

Class time 19 hours
CEUs 1.9

Description

Design, analysis and testing fundamentals are used as an introduction to the effects of fatigue, 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. Principle topics are centered on commercial jet transport aircraft, but fundamentals are applicable to all types of aircraft.

Target Audience

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 structure.

For more information about this computer-based course, please contact

Kim Hunsinger
Assistant Director
E-mail kah@ku.edu
Phone 785-864-4758

This course is part of the Aircraft Maintenance and Safety Track. See page 5.
FAA CERTIFICATION PROCEDURES AND AIRWORTHINESS REQUIREMENTS AS APPLIED TO MILITARY PROCUREMENT OF COMMERCIAL DERIVATIVE AIRCRAFT/SYSTEMS

Instructors: Gilbert L. Thompson, Everett W. Pittman and Robert Adamson

This course may be taught by any of these instructors, based on their availability.

San Diego, California
September 20–22, 2011 • AA121140

Monday–Wednesday 8 a.m.–4 p.m.
Class time 21 hours
CEUs 2.1

Fee $1,745
Includes instruction, a course notebook, CD-ROM, refreshments and three lunches. The course notes are for participants only and are not for sale.

Southern Maryland
Higher Education Center
California, Maryland

October 18–20, 2011
AA121510

Tuesday–Thursday 8 a.m.–4 p.m.
Class time 21 hours
CEUs 2.1

Fee $1,495 with U.S. military ID
$1,695 non-military
Includes instruction, a course notebook, CD-ROM and three light lunches. The course notes are for participants only and are not for sale.

Description
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. 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.

Target Audience
Designed, and focused in scope, 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.

This course is part of the Aerospace Compliance Track. See page 5.

Day One
- Review of course content and class exercise
- Overview of FAA Aircraft Certification (AIR) and Flight Standards (AFS) service organizations as they relate to military use of commercial derivative aircraft/systems
- Applicability of FAA Advisory Circulars, Notices and Orders
- FAA "baseline" and "Project Specific Service Agreement" (PSSA) services following Title 14, Code of Federal Regulations (CFR), Parts 1, 11, 21
- Parts Manufacturer Approval (PMA) process
- Technical Standard Order Authorization (TSOA) process
- Airworthiness Standards Parts 23, 25, 26, 27, 29 and 33
- Part 183, Representatives of the Administrator, including Subpart D, Organization Designation Authorization (ODA)

Day Two
- Part 43 Maintenance, Preventive Maintenance, Rebuilding and Alteration
- Eligibility of Department of Defense (DoD)/DoD 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
- Special conditions, equivalent level of safety and exemption process and issuance
- Type Certification (TC) and Supplemental Type Certification (STC) process (FAA Handbook 8110.4)
- Utilizing FAA and Industry Guide to Product Certification, specifically Project-Specific Certification Plan (PSCP) principles in the Request for Proposal (RFP) process
- Impact of FAA Safety Management practices; FAA Form 337/Field Approval process

Day Three
- Type Certification Data Sheets (TCDS)
- Impact of Part 36, Noise Standards; Airworthiness Directive (AD) process applied to CDA
- Bilateral Aviation Safety Agreements (BASA) and European Aviation Safety Agency (EASA)
- Impact of DoD acquisition policies as exemplified by USAF Policy Directives 62-4, 62-5, 62-6, NAVAIR Instruction 13100.15 and Army Regulation 70-62
- Memorandum of Agreement/Interagency Support Agreement between DOT/FAA and Armed Services of the United States
- Comparison of DoD/FAA airworthiness processes; application of MIL-HDBK-516B, Airworthiness Certification Criteria; development of TACC/MACC
- Role of the FAA Military Certification Office (MCO)
- FAA Order 8110.101, Type Certification Procedures For Military Commercial Derivative Aircraft
- Certification options for CDA; use of FAA Form 8130-31, Statement of Conformity–Military Aircraft
FAA CONFORMITY, PRODUCTION AND AIRWORTHINESS CERTIFICATION APPROVAL REQUIREMENTS

Instructor: Donald Plouffe

Day One
- Review course content and identification of attendee key issues
- Aircraft certification service versus flight standards
- Overview of 14 CFR Part 21
- Designee and delegations
- Rules, policy and guidance
- FAA conformity process

Day Two
- Production approvals
- Quality system requirements
- Aircraft Certification Systems Evaluation Program (ACSEP)
- Certificate management
- Airworthiness approvals

Day Three
- Airworthiness approvals
- Compliance and enforcement
- Organizational Delegation Authorization (ODA)

How You May Benefit
- Learn the FAA quality assurance system requirements for producing parts for the civil aviation fleet.
- Obtain a clear understanding of the FAA conformity inspection process.
- Understand the requirements and process leading up to an FAA production approval.
- Gain an understanding of what the FAA considers the elements of a good quality assurance system and how the FAA audits the system.
- Learn the various FAA airworthiness approvals and how they apply to your product.
- Learn what it takes to export your products to other countries.
- Understand the FAA’s Compliance and Enforcement Program.

Kansas City, Missouri
October 18–20, 2011
AA121210

Tuesday–Thursday 8 a.m.–4 p.m.
Class time 21 hours
CEUs 2.1

Description
Presents the fundamental FAA requirements to produce products, appliances and parts for installation on FAA-type certificated products. Includes FAA conformity process, quality assurance requirements, the FAA’s evaluation program, airworthiness requirements and certificate management. Also includes a broad overview of the Organizational Delegation Authorization (ODA) regulations, qualification, responsibilities, application, appointment, operation and management.

Target Audience
Designed for government and industry (original equipment and suppliers) engineers, quality assurance personnel, Designated Airworthiness Representatives (DARs) and managers involved in the manufacture of products, appliances and parts installed on civil or military aircraft with FAA airworthiness certification.

Fee $1,745
Includes instruction, a course notebook, refreshments and three lunches.

The course notes are for participants only and are not for sale.

This course is part of the Aerospace Compliance Track. See page 5.
FAA FUNCTIONS AND REQUIREMENTS LEADING TO AIRWORTHINESS APPROVAL

Instructors: Gilbert L. Thompson, Everett W. Pittman and Robert Adamson

The course may be taught by any of the instructors, based on their availability.

**Seattle, Washington**
April 12–14, 2011 • AA111340
Tuesday–Thursday 8 a.m.–4 p.m.

**San Diego, California**
September 13–15, 2011 • AA121060
Tuesday–Thursday 8 a.m.–4 p.m.

**Orlando, Florida**
November 15–17, 2011 • AA121270
Tuesday–Thursday 8 a.m.–4 p.m.

**Class time** 21 hours  
**CEUs** 2.1

**Description**
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, subsequent certification process and continued airworthiness. Course is specifically tailored toward civil airworthiness certification. Course is FAA-approved for IA renewal.

**Target Audience**
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.

**Fee $1,745**
Includes instruction, a course notebook, CD-ROM, refreshments and three lunches.

The course notes are for participants only and are not for sale.

This course is part of the Aerospace Compliance Track. See page 5.
FLIGHT CONTROL ACTUATOR ANALYSIS AND DESIGN
Instructor: Donald T. Ward

Day One
- Introduction
- Overview of aircraft flight control surfaces, components and functions: primary flight control, secondary flight control; trim and feel, power control units
- Advanced actuation concepts
- Mechanically controlled actuation schemes: modeling and simulation basics
- Electrically signaled (Fly-By-Wire or FBW) systems

Day Two
- Electrically signaled (FBW) systems (continued)
- Modeling and simulation of FBW examples
- Alternate command systems
- Electrically powered actuation (Power-By-Wire or PBW) systems

Day Three
- Electrically powered actuation (Power-By-Wire or PBW) systems (continued)
- Modeling and simulation of PBW examples
- Flight control system design requirements
- Specifications and documents: Power Control Unit (PCU) and Power-Drive Unit (PDU) analysis and design

Day Four
- PCU and PDU analysis and design (continued)
- Dynamic performance and response

Day Five
- Dynamic analysis and modeling exercise
- PCU assembly and installation
- Quality assurance

Available as on-site course
Class time: 33.75 hours
CEUs: 3.375

Description
Provides an in-depth understanding of actuators, sensors and other components in flight control design. Includes both analysis practice and design guidance for flight control system components. Assumes an understanding of linear controls analysis techniques.

Target Audience
Designed for recent graduates of engineering or for practicing engineers outside the aerospace industry who need practical exposure to the types of actuation hardware, sensors and design practice used on both commercial and military aircraft. Students should have an acquaintance with control design software (MATLAB is used in the course for certain example problems).

Course includes instruction, a notebook and R-123 Aircraft Flight Control Actuation System Design by Eugene Raymond and Curt Chenoweth.

The course notes are for participants only and are not for sale.

Contact Us
Obtain a no-cost, no-obligation proposal for an on-site class.

Zach Gredlics
On-site Program Manager
E-mail: aerosite@ku.edu
Phone: 785-864-1066
Fax: 785-864-5074

This course is part of the Flight Control Systems Design Track. See page 5.
FLIGHT CONTROL AND HYDRAULIC SYSTEMS
Instructor: Wayne Stout

San Diego, California
September 12–16, 2011
AA121010

Monday–Thursday 8 a.m.–4 p.m.
Friday 8 a.m.–11:30 a.m.
Class time 31.5 hours
CEUs 3.15

Description
Covers fundamental design issues, system requirements and analysis design methodologies for aerospace hydraulic and flight control systems. Includes design requirements, component description and operation, component and system math modeling, component sizing, system layout rationale, system sizing and airframe integration. 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.

Target Audience
Designed for system and component level engineers and managers, including airframe, vendor, industry, government and educators involved with aerospace mechanical systems.

Fee $2,345
Includes instruction, a course notebook, refreshments and five lunches.

The course notes are for participants only and are not for sale.

Attendees should bring a pocket calculator.

Day One
- Introduction and background, system design methodology, design requirements (customer, business, regulatory, engineering, environmental, competition), design implications of requirements, design requirement example, design guides and manuals, testing, open and closed loop systems, system analysis (nonlinear simulations, linear analysis models and nonlinear analysis models)
- Hydraulic fundamentals: fluid properties (density, viscosity, bulk modulus), fluid flow (tubes, orifices, servo), pressure transients in fluid flow, conservation of mass and momentum, basic hydraulic system modeling equations, computer aided modeling of hydraulic systems, examples

Day Two
- Hydraulic components: operation, examples, fundamental equations for each component and component sizing, components include actuators, metering valves, relief valves, shuttle valves, pumps, motors, check valves and fuses, accumulators, reservoirs, pressure regulation and flow control, thermodynamics of hydraulic systems, examples

Day Three
- Servovalves (flapper, jet pipe and motor controlled)
- Hydraulic system design: basic system configurations, power generation systems, landing gear control, brake systems, flaps/slats, spoilers, steering, thrust reversers, primary flight control, actuation examples (mechanical and electrical)
- Hydraulic system design issues, impact of certification regulations, hydraulic system design methodology, failure modes, safety analysis issues and redundancy, integration with mechanical systems

Day Four
- Mechanism fundamentals: mechanical advantage, gearing ratios, building block mechanisms (linkages, bellcranks, overcenter, dwell or lost motion, addition/amplification, yokes, cables, override and disconnects, etc.), four bar linkages, gearing fundamentals, gearing systems including standard/planetary gear trains, power screws, nonlinearities, stiffness, examples of mechanical systems, examples
- Flight control system design: flight control configurations (reversible, irreversible, fly-by-wire), mechanization of flap/slats, flight control system design issues, impact of certification regulations, failure modes (jams, runaways, slow overs), safety analysis issues and redundancy, flight control system design methodology and examples

Day Five
- Flight control system airframe integration, hydraulic system integration, fault detection, fly-by-wire actuation
- Extensions to current system design methods: hybrid system modeling, Design of Experiments (DOE), comprehensive testing, sensitivity methods, probabilistic methods, references and resources

How You May Benefit
- Learn the fundamentals and enhance overall knowledge of flight control and hydraulic system design.
- Improve understanding of component operation, performance characteristics, sizing and modeling.
- Understand the governing physical equations for the various components/systems and how they can be utilized to address fundamental design issues.
- Gain an appreciation for the issues and requirements associated with aircraft mechanical systems.
- Improve knowledge of sensitivity and robust design methods that are applicable to mechanical system design.

This course is part of the Flight Control Systems Design Track. See page 5.
FLIGHT TEST PRINCIPLES AND PRACTICES
Instructor: Donald T. Ward

Day One
- Flight test overview and introduction
- The atmosphere: properties, altimetry, pneumatic lag; air data principles and measurements: airspeed, altitude, Mach number, alpha and beta
- Mass, center of gravity and moment of inertia determination
- Time/space position measurements

Day Two
- Air data calibration methods: position error
- Temperature probe, angle of attack and sideslip calibration
- Instrumentation system principles: design requirements, static and dynamic response, calibration
- Data recording and processing methods: analog, digital, filtering and signal conditioning
- Proper use of digital bus data (MIL-1553, ARINC 429, 629) for flight testing; propulsion system testing: piston, turboprop and turbofan engines
- In-flight measurement of thrust and power

Day Three
- Stall tests: stall speed determination, stall characteristics, stall protections systems
- Flight test program planning: organization, milestones, flight cards, documentation, procedures, safety issues
- Takeoff and landings and cruise performance: speed, range and endurance
- Climb performance: test methods, correction to standard conditions, specific energy concepts

Day Four
- Advanced performance methods: nonstabilized performance methods, turning performance, ground effect measurement, getting more for less from flight tests
- Static stability and control: longitudinal and lateral-directional static stability testing
- Dynamic stability and control: dynamic mode characteristics and measurement
- Handling qualities: Cooper-Harper scale, FAR and MIL-SPEC requirements, workload scale
- Parameter identification: regression analysis, maximum likelihood estimation of derivatives

Day Five
- Thrust drag accounting, isolation and measurement of component drags
- Structural flight tests: static loads, flutter
- Flow visualization: tufts, flow cones, sublimating chemicals, liquid crystals, dyes, smoke injection; test methods
- Spin testing: test methods, safety issues
- Systems testing and evaluation: communication, navigation, SAS and autopilots

San Diego, California
September 19–23, 2011
AA121120
Monday–Friday 8 a.m.–4 p.m.
Class time 35 hours
CEUs 3.5

Description
Introduction to flight test process, principles and practices. Engineering principles and their application to the flight testing of aircraft will be covered.

Target Audience
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.

Fee $2,345
Includes instruction, a course notebook, Introduction to Flight Test Engineering, Volume I, by Donald T. Ward, Thomas W. Strganac and Rob Niewoehner, refreshments and five lunches.

The course notes are for participants only and are not for sale.

This course is part of the Flight Tests and Aircraft Performance Track. See page 5.
FUNDAMENTAL AVIONICS

Instructors: Albert Helfrick, Brian Butka, William Barott, Robert Chupka

This course may be taught by one instructor or a combination of instructors, based on their availability.

Seattle, Washington
April 11–15, 2011 • AA111330

Dallas/Fort Worth, Texas
June 13–17, 2011 • AA111390

San Diego, California
September 12–16, 2011 • AA121020

Orlando, Florida
November 14–18, 2011 • AA121230

Monday–Thursday 8 a.m.–4 p.m.
Friday 8 a.m.–2:45 p.m.
Class time 33.75 hours
CEUs 3.375

Description
This course is a comprehensive study of avionics from the simple stand-alone systems to the latest integrated systems. The theory of operation is covered as well as the environment and certification processes.

Target Audience
Designed for avionics engineers, electronic testing laboratory personnel, airframe systems and flight test engineers, government research laboratory personnel, FAA DERs and military personnel procuring civil equipment.

Fee $2,345
Includes instruction, course notebook, Principles of Avionics, by Albert Helfrick, supplemental materials, refreshments and five lunches.

The course notes are for participants only and are not for sale.

This course is part of the Avionics and Avionic Components Track. See page 5.
FUNDAMENTALS OF ROTORCRAFT VIBRATION
Instructor: Richard Bielawa

Day One
- Introduction: overview of rotorcraft structural dynamic problems and solutions
- Mathematical tools: linear systems, Fourier analysis, damping, multiple-degree-of-freedom systems, natural modes, resonance, stability
- Rotational dynamics and gyroscopics: simplified gyroscope equation, precessional characteristics of rotors
- Dynamics of rotating slender beams: hinged rigid blades, effects of elastic restraints about the hinges, the Euler beam and basic DEQ for transverse bending, rotor speed characteristics and fan plots, out-of-plane vs. in-plane bending, Yntema charts and numerical methods for bending modes, the two-bladed rotor, torsional dynamics, coupling issues, experimental verification and tracking and balancing, blade section properties, the SECT_PRT computer code, blade natural frequencies, the BLAD_FREQ computer code
- Problem session

Day Two
- Transverse vibration characteristics: the Jeffcott rotor model, subcritical and supercritical operation, pseudo-gyroscopic effects, whirl speeds and modes and rotor instabilities
- Basic balancing techniques
- Torsional natural frequencies of shafting systems: element equivalences, basic natural frequency calculations, branched gear systems, drive system for a typical rotorcraft, drive system natural frequencies, the TORS_HDS computer code, problem session
- Problem session

Day Three
- Fuselage vibrations (continued): modal identification, techniques for achieving response modification, antiresonance theory, methods for vibration alleviation, elastomeric devices, vibration testing applied to material characterization
- Linear stability analysis methods: constant coefficient systems, force phasing matrices, Floquet theory, frequency-domain methods
- Blade aeromechanical instabilities: air mass dynamics, quasi-steady aerodynamics, pitch-flap-lag and flap-lag instabilities
- Software for blade aeromechanical stability analysis
- Problem session

Day Four
- Linear unsteady aerodynamics: general frequency domain theories, finite state formulations
- Bending-torsion flutter: basic flutter theory, bending-torsion of rotor blades, general analysis methods
- Nonlinear aeroelastic stability analyses: nonlinear unsteady aerodynamics, stall flutter, BOOT and SHOT
- Rotor-fuselage coupled instabilities: propeller-nacelle whirl flutter, ground resonance, air resonance
- Software for ground and air resonance calculations
- Problem session

Day Five
- Testing for dynamics at model and full scales: model scaling law, instrumentation and test procedures, methods for instability quenching
- Methods for quantifying stability
- Special topics: aeroelastic optimization, composite blade design, drive system compatibility with engine/fuel control systems-analysis techniques, stabilization
- Summary and future trends

San Diego, California
September 19–23, 2011
AA121130

Monday–Thursday 8 a.m.–4 p.m.
Friday 8 a.m.–11:30 a.m.
Class time 31.5 hours
CEUs 3.15

Description
Material is presented for acquiring familiarity with both the underlying physics and the basic analytical tools needed for addressing rotorcraft vibration phenomena. Topics include a review of appropriate mathematical techniques, gyroscopic theory, 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.

Target Audience
Designed for those engineers, engineering managers and educators involved in rotorcraft research, design, development and/or testing who seek a basic familiarity with the range of rotorcraft vibration issues that must be addressed in contemporary rotorcraft.

Fee $2,345
Includes instruction, a course notebook, Rotary Wing Structural Dynamics and Aeroelasticity, Second Edition by Richard L. Bielawa, refreshments and five lunches.

The course notes are for participants only and are not for sale.

This course is part of the Flight Tests and Aircraft Performance Track. See page 5.
HELIICOPTER PERFORMANCE, STABILITY AND CONTROL
Instructor: Ray Prouty

San Diego, California
September 12–16, 2011
AA121030

Monday–Thursday 8 a.m.–4 p.m.
Friday 8 a.m.–11:30 a.m.
Class time 31.5 hours
CEUs 3.15

Description
What the working helicopter aerodynamicist needs to know to analyze an existing design or participate in the development of a new one. Covers all aspects of hover, vertical flight and forward flight. Emphasis on relating helicopter aerodynamics to airplane aerodynamics for those who are making the transition.

Target Audience
Designed for engineers, engineering managers and educators who are involved in helicopters.

Fee $2,345
Includes instruction, a course notebook, refreshments and five lunches.

The course notes are for participants only and are not for sale.

Day One
• The hovering helicopter
• Factors affecting hover
• Vertical flight
• Momentum theory of forward flight
• Blade-element theory of forward flight

Day Two
• Blade-element theory of forward flight (continued)
• Forward flight computer program
• Estimating performance
• Calculating performance characteristics
• Maneuvering flight

Day Three
• Rotor flapping characteristics
• Trim and static stability
• Dynamic stability
• Aerodynamic considerations of main rotor

Day Four
• Airfoils for rotor blades
• Anti-torque systems
• Empennages and wings
• Other configurations: tandems, coaxials, synchropters, tilt-rotors, tilt-wings
• The preliminary design process

Day Five
• Noise
• Vibrations
• Helicopter accidents

This course is part of the Aircraft Design Track. See page 5.
INTEGRATED MODULAR AVIONICS AND DO-297
Instructor: Leanna Rierson

Day One
- Introductions and background
  - What is IMA?
  - What are the benefits of IMA?
  - History of IMA and supporting certification guidance
- Overview of the IMA guidance material
- TSO-C153 (Integrated Modular Avionics Hardware Elements)
- Purpose of TSO-C153
- Limitations of TSO-C153
- Experiences to date with TSO-C153
- TSO-C153 contents
- Developing a minimum performance specification per TSO-C153
- Unique aspects of TSO-C153
- FAA Advisory Circular 20-145 (Guidance for Integrated Modular Avionics (IMA) that Implement TSO-C153 Authorized Hardware Elements)
  - Purpose of the Advisory Circular (AC)
  - Technical highlights from the AC
  - Roles and responsibilities
  - Considering TSO-C153 and AC 20-145 from various user perspectives (e.g., avionics developer and aircraft manufacturer)
- DO-297 (Integrated Modular Avionics (IMA) Development Guidance and Certification Considerations)
  - Overview of DO-297

Day Two
- DO-297 (continued)
  - Technical highlights of DO-297
  - Design guidelines
  - Partitioning analysis
  - Health management
  - Integration
  - Configuration files and configuration management
  - Certification approach of DO-297
  - Six certification tasks
  - Life cycle processes
  - Life cycle data
  - FAA’s plans for recognizing DO-297
  - ARINC 653 Usage in IMA Systems
  - Using TSO-C153, AC 20-145, DO-297 and ARINC 653 together
  - Common challenges in IMA development and certification
  - Practical tips for IMA development and certification

San Diego, California
September 12–13, 2011
AA121000

Monday–Tuesday 8 a.m.–4 p.m.
Class time 14 hours
CEUs 1.4

Description
This course provides the fundamentals for developing and integrating IMA systems, using TSO-C153 (Integrated Modular Avionics Hardware Elements), FAA Advisory Circular 20-145 (Guidance for Integrated Modular Avionics (IMA) that Implement TSO-C153 Authorized Hardware Elements), and DO-297 (Integrated Modular Avionics (IMA) Development Guidance and Certification Considerations). Practical exercises and in-class activities will be used to enhance the learning process.

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

Fee $1,325
Includes instruction, course notebook, RTCA/DO-297 Integrated Modular Avionics (IMA) Development Guidance and Certification Considerations, refreshments and two lunches.

The course notes are for participants only and are not for sale.

Enroll in this course and Complex Electronic Hardware Development and DO-254 (see page 26) and save money.
The cost for the two courses combined is $2,345.
AA121090
MODELLING AND ANALYSIS OF DYNAMICAL SYSTEMS USING MATLAB
Instructor: Walt Silva

San Diego, California
September 20–22, 2011
AA121150

Tuesday–Thursday 8 a.m.–4 p.m.
Class time 21 hours
CEUs 2.1

Description
This course covers a broad range of practical methods that will enable the participant to accurately model and analyze real-world dynamical systems using MATLAB. Topics covered include the mathematical classification of systems, continuous- and discrete-time systems, transform methods, digital signal processing, state-space modeling and the use of MATLAB and Simulink to develop these models.

Target Audience
The intended audience includes scientists, engineers, mathematicians and anyone with a need to develop mathematical models of real-world dynamical systems.

Fee $1,745
Includes instruction, course notebook, refreshments and three lunches.

The course notes are for participants only and are not for sale.

Day One
- Introduction and motivation
- Brief review of mathematical concepts
- Mathematical classification of systems
- Linear vs. nonlinear
- Time invariant vs. time varying
- Memory vs. memoryless
- Deterministic vs. stochastic
- Examples
- Linear systems
- Continuous-time systems
- Definitions
- Convolution
- Transform techniques (s-plane)
- Discrete-time systems
- Definitions—discretization
- Convolution
- Transform techniques (z-plane)

Day Two
- Linear systems (cont’d)
- Influence coefficients, Green’s functions and ODEs
- Orthogonality and basis functions
- Digital Signal Processing (DSP)
- State-space models
- System identification
- Nonlinear systems (time domain)
- Definitions
- Equilibrium points
- Limit Cycle Oscillations (LCO)
- Bifurcations and chaos
- Example: logistic equation
- Nonlinear state-space models
- Linearization
- Nonlinear systems (frequency domain)
- Power Spectrum Density (PSD)
- Linear vs. nonlinear frequency dynamics
- Various examples

Day Three
- MATLAB
- Basic commands
- Continuous-time state-space models
- Discrete-time state-space models
- Frequency analysis
- System identification examples
- Simulink
- Block Library
- Sources and sinks
- Models and systems
- Simulations
- Open forum and discussion

This course is part of the Flight Control Systems Design Track. See page 5.
OPERATIONAL AIRCRAFT PERFORMANCE AND FLIGHT TEST PRACTICES
Instructor: Mario Asselin

Day One
- Introduction
- Atmospheric models
- Airspeeds
- Position errors
- Drag polar and engine models
- Weight and balance

Day Two
- Stall speeds and stall testing
- Stall warning and stall identification
- Required instrumentation and data reduction
- Testing for low-speed drag, excess thrust monitoring
- Check climbs
- High-speed drag and basic flight envelope limits

Day Three
- Aircraft range
- Measuring SAR
- Data reduction
- Presenting the information to aircrews
- Climbing performance
- WAT limits; turning performance

Day Four
- Take-off performance, basic models
- Flight test
- Rejected takeoff
- Presenting the information to the flight crew (AFM, flight manuals)

Day Five
- Landing performance
- Presenting the information to the flight crew (AFM, flight manuals)
- Consideration for contaminated runways (CAR/JAR)
- Obstacle clearance
- Accounting for high temperature deviation for minimum altitude flights

How You May Benefit
- Review basic airplane performance theory.
- Determine what needs to be tested to build performance models.
- Determine the required instrumentation to best measure airplane performance.
- Understand the scatter normally expected during flight testing and how appropriate feedback from engineering helps the flight crew minimize this scatter.
- Develop performance models to match flight test results.
- Understand the safety level built-in certification requirements and their impact on airplane performance.
- Understand how to show compliance to the certification authorities.
- Learn how to present the airplane performance information to the flight crew.
- Understand how to set operational limits to ensure continued operational safety.

Description
Overview of airplane performance theory and prediction, certification standards and basic flight test practices. 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.

Target Audience
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.

Fee $2,345
Includes instruction, a course notebook, An Introduction to Aircraft Performance, by Mario Asselin, refreshments and five lunches.

This course is part of the Flight Tests and Aircraft Performance Track. See page 5.
PRINCIPLES OF AEROELASTICITY
Instructor: Thomas William Strganac

San Diego, California
September 12–16, 2011
AA121040

Monday–Thursday 8 a.m.–4 p.m.
Friday 8 a.m.–2 p.m.
Class time 33 hours
CEUs 3.3

Description
Provides an in-depth understanding of aeroelastic behavior for aerospace systems. Explores aeroelastic phenomena, structural dynamics and fluid-structure-control interaction; also examines practical issues such as ground and flight tests. Includes solution methodologies, state-of-the-art computational methods for aeroelastic analysis, development of the operational boundary, aeroservoelasticity and contemporary issues such as limit cycle oscillations and related nonlinear pathologies in aeroelastic systems.

Target Audience
Designed for engineers and technical managers involved in aerospace vehicle design, analysis and testing.

Fee $2,345

Day One
- Overview and foundation
- Introduction and historical review
- Fundamentals: definitions, similarity parameters and aeroelastic stability boundaries
- Static aeroelasticity: divergence, lift effectiveness, control effectiveness, reversal and active suppression
- Introduction to dynamic aeroelasticity: gust response, flutter, buzz

Day Two
- Theory
- Principles of mechanical vibrations
- Modal methods
- Structural dynamics
- Steady and quasi-steady aerodynamics

Day Three
- Theory (continued)
- Unsteady aerodynamics: “Theodorsen” aerodynamics, numerical methods and approximations, strip theory, vortex and doublet lattice methods
- Methods of analysis
- Governing equations for the aeroelastic system
- Frequency domain methods: modal formulations, V-g diagrams, K-method (U.S. method) and P-k method (British method)
- Time domain methods

Day Four
- Flutter identification
- Review of flutter models
- The flutter boundary: civilian and military requirements, matched point flutter analysis
- Case studies: examples of flutter analysis
- Experiments: ground vibration tests, wind tunnel tests

Day Five
- Practice
- Aeroservoelasticity for flutter suppression
- Aerelastic tailoring
- Wind tunnel tests
- Flight tests
- Nonlinear aeroelasticity: limit cycle oscillations, store-induced instabilities
- Concluding remarks

This course is part of the Flight Tests and Aircraft Performance Track. See page 5.
PRINCIPLES OF AEROSPACE ENGINEERING
Instructor: Wally Johnson

Day One
- Introduction
- Atmospheric models and airspeed measurements
- Introduction to certification requirements
- Introduction to aerodynamics—review of basic aerodynamic concepts: airfoil fundamentals, finite wings, aircraft aerodynamics. Overview of wind tunnel testing, overview of computational fluid dynamics methods
- Introduction to propulsion—types of propulsion systems, thrust calculations

Day Two
- Airplane performance—review basic airplane performance theory; airspeeds, takeoff, landing and cruise performance; climb performance; turning performance, range and endurance
- Weight and balance—calculation of mass properties: weight, center of gravity and moment of inertia; establishing the weight-cg envelope
- Flight mechanics—aircraft axis systems, aircraft equations of motion, static and lateral-directional stability, longitudinal and lateral-directional applied forces and moments. Linearizing the equations of motion; aircraft dynamic stability
- Flight maneuvers—steady maneuvers, pull-up, pitch maneuvers, yaw maneuvers, roll maneuvers

Day Three
- Mechanics of materials—material behavior under loading, stress-strain relations, beam bending and buckling, yield, compressive, tensile and fatigue strengths
- Mechanical vibrations and structural dynamics
- Aeroelasticity—static aeroelasticity: divergence, control effectiveness, reversal; dynamic aeroelasticity: gust response, flutter and buffet
- Introduction to helicopter—aerodynamics of flight, basic flight maneuvers

Day Four
- Structural loads—external loads classifications; V-n diagram; gust loads, landing loads, ground loads, fatigue loads, wing loads, horizontal tail loads, vertical tail loads, fuselage loads and control surface loads
- Aircraft structures—structural design concept, static strength design, factor of safety, material selection, introduction to the finite element method, damage tolerance design
- Ground testing: instrumentations, bird strike, landing gear drop test, ground vibration, ground loads calibration, static loads tests and fatigue loads tests
- Flight testing: stall speeds, longitudinal stability and control, directional stability and control, flutter, flight loads validation, operational loads monitoring

Day Five
- Certification—certification agencies, certification process, how to show compliance
- Airplane crashes—what went wrong and why

Kansas City, Missouri
October 17–21, 2011
AA121190

Monday–Thursday 8 a.m.–4 p.m.
Friday 8 a.m.–11:30 a.m.
Class time 31.5 hours
CEUs 3.15

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, aerodynamics and performance of helicopters, ground testing, flight testing and certification. The material presented in this course is in the form of lecture notes and showing examples of the Basic Aerospace Engineering software. This course shows the relationship between aircraft certification requirements, engineering analysis and testing.

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

Fee $2,345
Includes instruction, a course notebook, a copy of Basic Aerospace Engineering software, refreshments and five lunches. The course notes are for participants only and are not for sale.
PROCESS-BASED MANAGEMENT IN AEROSPACE: DEFINING, IMPROVING AND SUSTAINING PROCESSES (NEW)
Instructor: Michael Wallace

San Diego, California
September 12–16, 2011
AA121050

Monday–Friday 8 a.m.–4 p.m.
Class time 35 hours
CEUs 3.5

Description
Provides basic principles and the tools and techniques of Process Based Management (PBM) and delineates the strategies for successful implementation of PBM in an aerospace organization. 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. Several aerospace organizational case studies are used to augment the theoretical components.

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

Fee $2,345
Includes instruction, a course notebook, refreshments and five lunches.

The course notes are for participants only and are not for sale.

Day One
• Introduction
• Overview of aerospace organizational processes
• Needs for continuous improvement
• Back to basics
• Basic principles
• Data gathering methods
• Decomposing processes
• Setting performance goals
• Process ownership
• Critical success factors
• Process mapping

Day Two
• Process measurement
• Defining process measures
• Process measures at the organizational level (balanced scorecard)
• Identifying and controlling variation
• Diagnostic tools
• Basic six sigma tools
• Benchmarking
• Change management
• Risk management

Day Three
• Cultural focus
• Integration of strategy and process management
• Role of the leadership team
• Team based decision-making methods
• Self-directed work teams
• High-performance work teams
• Organizational relationships
• Facilitation skills

Day Four
• Identifying and capitalizing on process improvement opportunities
• Conducting a self-assessment
• Systemic approach to product development
• Enterprise process model
• The economics of quality
• Quality management system
• Pitfalls and how to avoid them
• Case studies

Day Five
• Case studies (continued)
• Advance process management techniques and tools
• Performance improvement system
• Knowledge management
• Process modeling
• Knowledge-based engineering
• Artificial intelligence
• Summary and wrap-up
PROJECT MANAGEMENT FOR AEROSPACE PROFESSIONALS
Instructor: Herb Tuttle

Day One
• Survey and benchmark, understanding project management, leadership, obstacles to successful projects, definition of teams
• Project definition and distinguishing characteristics, resources, project management process, typical problems, the triple constraint, obstacles, project outcomes, use of project teams
• Strategic issues, proposals, starting successful projects, contract negotiation, international projects and the true benefits of teamwork
• Participant program or project plans identified

Day Two
• Internal project planning, issues, working with the customer, use of software, team decision making, planning hazards
• Work breakdown structure, statement of work, choosing team players
• Time estimating and scheduling, other planning methods, graphical tools, time estimating, productive meetings, meeting record keeping, goals of meetings

Day Three
• Network diagrams, team improvement activities, designate project teams
• Cost estimating, project cost system, resources, time vs. cost trade off
• Contingency, risk, cost/schedule control, project organization, informal organization, organizational forms, team strategies, team development and traditional management

Day Four
• Project team, sources of people, compromise, control, support team, coordination, interaction, subcontractors, team dynamics, team success, team development and traditional management role of internal project manager, theories of motivation, stimulating creativity, working through group problems

Day Five
• Project cost reporting, computers, project changes, handling changes, team building exercises
• Project or program plans presented by participants; projects evaluated and rated
• Current trends in project management

Kansas City, Missouri
October 17–21, 2011
AA121200
Monday–Friday 8 a.m.–4 p.m.
Class time 35 hours
CEUs 3.5

Description
Designed to give aerospace professionals familiarity with current project management techniques. 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; control and planning of time, money and technical resources.

Target Audience
Designed for engineers and other technical professionals at all levels as well as new project managers responsible for small as well as large and long duration projects.

Fee $2,345
Includes instruction, a course notebook, Project Management: A Systems Approach to Planning, Scheduling, and Controlling, by Harold Kerzner, refreshments and five lunches.

The course notes are for participants only and are not for sale.

This course is part of the Management and Systems Track. See page 5.
PROPULSION SYSTEMS FOR UAVS AND GENERAL AVIATION AIRCRAFT

Instructor: Ray Taghavi

Orlando, Florida
November 14–18, 2011
AA121250

Monday–Friday 8 a.m.–4 p.m.
Class time 35 hours
CEUs 3.5

Description
Provides in-depth understanding of state-of-the-art propulsion issues for UAVs and general aviation aircraft, including propulsion options, cycle analysis, principles of operation, systems, components, performance and efficiency calculations.

Target Audience
Designed for propulsion engineers, aircraft designers, aerospace industry managers, educators, research and development engineers from NASA, FAA and other government agencies.

Fee $2,345
Includes instruction, a course notebook, refreshments and five lunches.

The course notes are for participants only and are not for sale.

Day One
- Overview: Fundamentals of aircraft propulsion systems, engine types and aircraft engine selection
- Aircraft reciprocating engines: spark ignition and diesel engines: theory and cycle analysis, four stroke and two stroke cycles; brake horsepower, indicated horsepower and friction horsepower; engine parameter, efficiencies, classifications and scaling laws; practical issues

Day Two
- Aircraft reciprocating engines (continued): components and classification: cylinder, piston, connecting rod, crankshaft, crankcase, valves and valve operating mechanism; lubrication systems, pumps, filters, oil coolers, etc.; induction system, supercharging, cooling (air and liquid), exhaust engine installation and compound engine; engine knocks (preignition and detonation), aviation fuels, octane and performance number, backfiring and afterfiring

Day Three
- Aircraft reciprocating engines (continued): carburetion and fuel injection systems, FA DEC; magneto (high and low tension), battery and electronic ignition systems, ignition boosters and spark plugs
- Rotary engines: propeller: theory, types airfoils, material, governors, feathering, reversing, synchronizing, synchrophasing, de-icing, anti-icing and reduction gears

Day Four
- Small gas turbine engines: cycles, inlets, compressors, combustors, turbines, exhaust systems, thrust reversers and noise suppressors; turbojet, turboprop, turboshift, turbofan and propfan engines

Day Five
- Engine noise: sources, suppression, measurement techniques and practical issues
- Foreign Object Damage (FOD): ice, sand, bird, etc.
- Engines for special applications: UAVs, RPVs, HALE, blimps, etc.
RELIABILITY AND 1309 DESIGN ANALYSIS FOR AIRCRAFT SYSTEMS (computer-based course)

Instructor: David L. Stanislaw

Lesson Sections and Title
1. National Transportation Safety Board Accident Statistics
2. Learning from an Analysis of Power Industry Accidents
3. AOPA Nall Report and Boeing Statistical Summary
4. Pilot Causes of Accidents—Dr. Milton Survey
5. Safety in Aviation—Dr. Ir. H. Wittenberg
6. Historical 1309 Rules
7. Understanding FAR 25.1309
9. RTCA DO-167 Airborne Electronics Reliability
11. RAC Electronic Parts Reliability Data
12. RAC Nonelectric Parts Reliability Data
13. RAC Failure Mode/Mechanism Distributions
14. DOD—HDBK—763 Human Engineering Procedures Guide
15. DOT/FAA/RD—93/5 Human Factors for Flight Deck Certification
16. JAR—VLA—1309, FAR 23.1309 and FAR 25.1309 Review
17. FAA Advisory Circulars
18. SAE ARP4761 Safety Assessment Guidelines
   SAE ARP4754 Guidelines
19. MIL—STD—1629 Procedures for Performing a Failure Mode, Effects and Criticality Analysis
20. RTCA DO—178B Software Considerations in Airborne Systems
21. RTCA DO—254 Design Assurance Guidance for Airborne Electronic Hardware
22. FAA Order N8110.37 Delegated Functions and Authorized Areas
23. FAA AC 23.1309 Equipment, Systems and Installations
24. AC 25.1309 System Design and Analysis
25. AMJ 25.1309 Advisory Material Joint
26. AC 25—19 Certification Maintenance Requirements
27. Databus Architectures and Interference
28. Electric Lavatory Heater Exercise

Online Instruction
Available anytime
AA111490

Class time 28 hours
CEUs 2.8

Description
Covers requirements of FARs 23.1309, 25.1309, 27.1309 and 29.1309 from fundamental analysis techniques to system integration; includes construction of failure mode and effects analysis, criticality analysis and fault trees. Includes detailed review of SAE ARP 4754 and ARP 4761. Principles apply to all critical and essential aircraft systems.

Target Audience
Designed for Parts 23, 25, 27 and 29 system certification engineers, airframe system designers, FAA-Designated Engineering Representatives (DERs), aircraft certification personnel and military personnel procuring civil equipment.

Fee $1,395 plus
$35 (USD) shipping within the U.S.
$95 (USD) shipping to Canada and other international locations.

Fee includes instruction online, a course notebook, Fault Tree Handbook, by D.F. Haasl, SAE ARP 4754—Certification Considerations for Highly-Integrated or Complex Aircraft Systems, and SAE ARP 4761—Guidelines and Methods for Conducting the Safety Assessment Process on Civil Airborne Systems and Equipment.

The course notes are for participants only and are not for sale.

The course notebook and supplemental readings will be mailed upon receipt of payment.

Participants are guided through the 28 course sections and have the flexibility to complete the sections and readings on their own time within a six-month time frame. Interaction with the instructor and classmates takes place via threaded discussion and e-mail.

This course is part of the Aircraft Maintenance and Safety Track. See page 5.
SOFTWARE SAFETY, CERTIFICATION AND DO-178B
Instructor: Leanna Rierson

Seattle, Washington
April 12–15, 2011 • AA111360

Kansas City, Missouri
October 17–20, 2010 • AA121180

Hours 8 a.m.–4 p.m.
Class time 28 hours
CEUs 2.8

Description
Provides the fundamentals of developing and assessing software to the standard RTCA/DO-178B Software Considerations in Airborne Systems and Equipment Certification. 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.

Target Audience
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-178B; however, the concepts may be applicable for other safety domains, such as military, medical, nuclear and automotive.

Fee $2,045
Includes instruction, a course notebook, the RTCA/DO-178B Software Considerations in Airborne Systems and Equipment Certification, refreshments and four lunches.

The course notes are for participants only and are not for sale.

This course is part of the Avionics and Avionic Components Track. See page 5.

Day One
- Introductions and background
- Overview of existing standards related to software safety
- Tie between the system, safety and software processes
- History, purpose, framework and layout of DO-178B
- Reading the DO-178B Annex A Tables
- DO-178B planning process
- DO-178B development and integration/test processes—development objectives, high-level requirements, traceability, design (low-level requirements and architecture), code/integration, integration/test objectives, normal and robustness testing

Day Two
- DO-178B verification processes—overview of verification, verification of requirements, design, code and testing
- DO-178B configuration management, quality assurance and certification liaison processes—configuration management objectives and terminology, control categories, quality assurance (QA) objectives, DO-178B QA philosophy, SQA approaches, certification liaison objectives, DO-178B life cycle data
- Special topics related to DO-178B—partitioning and protection, structural coverage, dead and deactivated code, service history, Commercial-Off-The-Shelf (COTS) software

Day Three
- FAA software-related policy and guidance—software review process, user-modifiable and field-loadable software, change impact analysis, tool qualification, previously developed software, software reuse, integrated modular avionics, databases (DO-200A), complex hardware (DO-254)

Day Four
- Assessing compliance to DO-178B—the Software Job-Aid
- Common pitfalls in applying DO-178B
- Software challenges facing the aviation industry: object-oriented technology, off-shore development, model-based development, increased use of verification and development tools, use of real-time operating systems and other commercially available components, software reuse
- Summary

How You May Benefit
- Gain valuable insight into the software development and certification processes.
- Obtain practical keys for developing and assessing software to meet the civil aviation standard: RTCA/DO-178B.
- Understand the importance of software assurance and its tie to the system safety assessment and the system development processes.
- Learn the common pitfalls in applying DO-178B and obtaining certification and ideas for how to proactively address those issues.
- Understand the FAA’s software-related policy and guidance.
- Learn about the software challenges facing the aviation industry.
STRUCTURAL COMPOSITES
Instructors: Max Kismarton, Mark S. Ewing and Rick Hale

This course may be taught by any of the instructors, based on their availability.

Day One
- Introduction/historical review
- Materials behavior and selection
- Fibers, matrix materials, other composite materials
- Manufacturing introduction

Day Two
- Manufacturing for varied products: flat and curved parts, longitudinals, sandwich panels and cylinders
- Tooling design
- Cost

Day Three
- Lamina micromechanics, failure modes
- Short fiber composites
- Lamina macromechanics, failure theories
- Laminate macromechanics
- Analysis examples
- Anisotropic elasticity
- Classical lamination theory

Day Four
- Global design considerations
- Hygrothermal effects
- Interlaminar and free-edge effects
- Laminate failure theories
- Design problems, stress analysis, multiply failure
- Family optimization

Day Five
- Joints
- Ply definition in 3-D space
- Modern software tools
- Manufacturability and quality assurance
- Fatigue damage mechanisms
- Damage tolerance, environmental effects and reparability
- Nondestructive evaluation
- Summary and wrap-up

Dallas/Fort Worth, Texas
June 13–17, 2011
AA111400

Monday–Friday 8 a.m.–4 p.m.
Class time 35 hours
CEUs 3.5

Description
The course provides an understanding of available fiber and matrix materials, manufacturing methods and the mechanical behavior of composite materials for the design of airframe structures. The course topics include: material behavior, selection and cost; general anisotropic theory, elastic behavior and stiffness matrix formulation; computer-aided analysis; strength and theory of failure; fatigue and damage tolerance assessment; and repairability.

Target Audience
Designed for practicing design and structural engineers, educators and engineering managers whose responsibilities include aircraft structures.

Fee $2,345
Includes instruction, a course notebook, Composite Airframe Structures, by Michael Niu, refreshments and five lunches.

The course notes are for participants only and are not for sale.

This course is part of the Aircraft Structures Track. See page 5.
SUBCONTRACT MANAGEMENT IN AEROSPACE ORGANIZATIONS (NEW)

Instructor: Robert Ternes

Seattle, Washington
April 12–14, 2011
AA111350

Tuesday–Thursday 8 a.m.–4 p.m.
Class time 21 hours
CEUs 2.1

Description

As more large aerospace organizations turn to specialized companies to provide specialized, cutting edge components and subcomponents, management of subcontractors in an environment that is as quality-driven and regulation defined as the aerospace industry is a significant challenge, especially when the process or product is confidential. On the upside, this reliance on subcontractors brings the latest technology to the platform, and provides the OEM with the ability to draw upon skills and processes that are often trade secrets or at least so highly specialized that they only can be found in a limited number of providers. This course discusses the challenges and provides proven methods to reduce the risks and costs associated with aerospace subcontracting and to increase effectiveness of the subcontractor. The processes, tools and techniques applied to managing lower-tier subcontracts are thoroughly covered. Upon completion of the class, the participants will be able to make the trade offs necessary to identify the processes that they will put into the written agreement and the tools and techniques they will use to successfully control the execution of a subcontract.

Target Audience

Development or project managers responsible for managing the lower tier aerospace/aviation suppliers contracted to deliver product on schedule and within the required cost, quality and regulatory envelopes typical of an aerospace product.

Fee $1,745

Includes instruction, a course notebook, refreshments and three lunches.

The course notes are for participants only and are not for sale.

This course is part of the Management and Systems Track. See page 5.

Day One

- Overview of goals of course and discussion of intended outcomes
- Discussion of typical aerospace environment and needs
- Review of contents of agreement
- Discussion of risk mitigation techniques
- Discussion of negotiation tools
- Cost limitations
- How to clarify communication issues
- How to identify and manage schedule considerations
- How to identify and implement opportunities
- Class exercise/summary of day

Day Two

- Tasks to perform during contract execution
- Tools and techniques used to measure and control quality and progress
- Corrective actions: when, why and how
- Risk management techniques
- Cost and schedule considerations during execution phase
- Communications upward, downward and horizontally
- Class exercise/summary of day

Day Three

- Delivery considerations
- Contract close-out activities and the tools and techniques used
- Application of special quality activities such as First Article inspections
- Configuration management issues and tools
- Cost and risk limitation techniques
- Communication of status (when, how, what) to all parties
- Collection and sharing of lessons learned
- Class exercise/summary/evaluation
UNDERSTANDING AND CONTROLLING CORROSION OF AIRCRAFT STRUCTURES

Instructors: John Hall, Carl E. Locke, Jr.

Day One
- Introduction to aircraft corrosion: Why is it important?
- Basic corrosion electrochemistry
- Corrosion environments
- Types of corrosion: Emphasis on those particular to aircraft
- High temperature corrosion: fundamentals and problems associated with aircraft
- Monitoring corrosion: basic methods
- Corrosion control methods: outline of methods used for aircraft structures

Day Two
- Corrosion control methods (continued)
- Materials construction for aircraft: properties and corrosion resistance
- Aircraft corrosion questions (Sections 1–8)
- Aircraft corrosion answers (Sections 1–8)
- Detection and remediation of corrosion: basic methods of finding and correcting corrosion problems
- Aircraft Corrosion Prevention and Control Programs (CPCPs): detailed description of CPCP development, originally defined by aging airplane programs

Day Three
- Aircraft Corrosion Prevention and Control Programs (continued)
- CPCP interpretations
- Military specifications pertaining to corrosion

Day Four
- Current and future airplanes: MSG-3 Revision 2 and CPCP requirements
- Aircraft maintenance procedures
- Aircraft corrosion questions (Sections 10–16)
- Aircraft corrosion answers (Sections 10–16)
- Group discussion

Available as on-site course

Class time 28 hours
CEUs 2.8

Description
Corrosion fundamentals are used as a basis for exploring manufacturing, inspection and maintenance procedures. Recently developed corrosion-related requirements and procedures for assuring continuous airworthiness of commercial airplanes are used as a basis for defining minimum maintenance requirements. Fundamentals and principles are also applicable to some military aircraft structures.

Target Audience
Designed for managers, engineers, maintenance and regulatory personnel in the commercial and, in some cases, military aircraft industry who are involved with evaluation or control of structural corrosion.

Includes instruction, a course notebook and *Principles and Prevention of Corrosion*, by Denny A. Jones.

The course notes are for participants only and are not for sale.

Contact Us
Obtain a no-cost, no-obligation proposal for an on-site class.

Zach Gredlics
On-site Program Manager
E-mail aerosite@ku.edu
Phone 785-864-1066
Fax 785-864-5074

This course is part of the Aircraft Maintenance and Safety Track and the Aircraft Structures Track. See page 5.
UNMANNED AIRCRAFT SYSTEM SOFTWARE AIRWORTHINESS (NEW)
Instructor: Willie J. Fitzpatrick

Orlando, Florida
November 15–17, 2011
AA121280

Tuesday–Thursday 8 a.m.–4 p.m.
Class time 21 hours
CEUs 2.1

Description
Covers the software airworthiness requirements for unmanned aircraft systems and addresses the development and airworthiness evaluation of complex integrated software intensive unmanned aircraft systems; the relationship between the acquisition/development processes for these systems and the key software airworthiness assessment processes. The course also identifies the 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.

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

Fee $1,745
Includes instruction, course notebook, refreshments and three lunches.

The course notes are for participants only and are not for sale.

This course is part of the Avionics and Avionic Components Track. See page 5.

Day One
- Introduction and overview of UAS software requirements
- Software acquisition/development and relationship to software airworthiness in unmanned aircraft systems
- Software airworthiness in the context of the system safety/airworthiness program
- Software airworthiness products during the system life-cycle
- Software airworthiness assessment process during the system life-cycle

Day Two
- Assessment of planning and requirements analysis
- Assessment of preliminary and architectural design
- Assessment of detailed design
- Assessment of coding and unit test
- Assessment of software integration and formal qualification test
- Assessment of system integration test and aircraft integration/ground test/flight test

Day Three
- Develop recommendations for formal flight release/airworthiness release to approval authority
- Documenting the UAS software airworthiness assurance case
- Useful guidebooks, handbooks and procedures in UAS software airworthiness
- Keys to successful software airworthiness process implementation for UAS
- Problem areas and concerns
- Future trends in UAS software airworthiness
INSTRUCTOR BIOGRAPHIES

Robert Adamson
FAA Certification Procedures and Airworthiness Requirements as Applied to Military Procurement of Commercial Derivative Aircraft/Systems, p. 30
FAA Functions and Requirements Leading to Airworthiness Approval, p. 32

Robert Adamson will co-teach the FAA Military and FAA Functions courses with Gil Thompson and Everett Pittman. He is a private consultant with more than 27 years of experience in the design, certification and management of FAR Part 23 and Part 25 aircraft projects. He worked for Raytheon Aircraft for 15 years as a propulsion engineer, system safety engineer, DER and airworthiness engineer (AR) before joining the FAA in 1998. At the FAA, he worked as a propulsion specialist and program manager for Continued Operational Safety in the Wichita Aircraft Certification Office prior to retiring in December 2010. Adamson is an FAA DER in propulsion systems. He has a B.S. from Southwestern and has completed post-graduate requirements from Embry-Riddle University.

Willem A.J. Anemaat
Airplane Flight Dynamics: Open and Closed Loop, p. 18
Airplane Subsonic Wind Tunnel Testing and Aerodynamic Design, p. 21

Willem A.J. Anemaat is president and co-founder of Design, Analysis and Research Corporation (DARcorporation), an aeronautical engineering and prototype development company. DARcorporation specializes in airplane design and engineering consulting services, wind and water tunnel testing and design and testing of wind energy devices. His primary duties involve supervising all DARcorporation engineering design activities and the day-to-day guidance of all programming, support and sales activities. Anemaat is the software architect for the Advanced Aircraft Analysis software, an airplane preliminary design tool. He has been actively involved with more than 300 airplane design projects and has run many subsonic wind tunnel tests for clients. Anemaat has more than 20 publications in the field of airplane design and analysis, including the to-be published book: Airplane Design: A Systematic Approach, authored with Jan Roskam and Ronald Barrett, and has a patent on a new wind gauge. He is the recipient of the SAE 2010 Forest R. McFarland Award, a member of the AIAA Aircraft Design Technical Committee, an AIAA Associate Fellow and an associate editor for the AIAA Journal of Aircraft. Anemaat holds an M.S.A.E. from the Delft University of Technology in The Netherlands and a Ph.D. in aerospace engineering from the University of Kansas.

Mario Asselin
Airplane Performance: Theory, Applications and Certification, p. 19
Operational Aircraft Performance and Flight Test Practices, p. 41

Mario Asselin is currently chairman of Asselin, Inc., a company providing engineering services in performance, stability and control. He is also senior manager of engineering flight test with Honda Aircraft Corporation where he supervises flight sciences, flight testing and flight simulator activities. He is an FAA Flight Analyst DER. Asselin previously held positions as vice president of engineering with Sino Swearingen Aircraft Corporation, Learjet’s chief of stability and control at the Bombardier Flight Test Center in Wichita, chief technical for the aerodynamic design and certification of Bombardier’s CRJ-900 and Transport Canada DAD. He has taught courses for the Royal Military College of Canada, McGill University and Concordia University in Montreal. He is the author of An Introduction to Aircraft Performance. Asselin holds a B.E. in mechanical engineering from the Royal Military College of Canada and an M.Sc.A. in aerothermodynamics from École Polytechnique of Montreal.

William C. Barott
Fundamental Avionics, p. 36

William C. Barott is an assistant professor of electrical engineering at the Embry-Riddle Aeronautical University in Daytona Beach, Florida. He has expertise in electromagnetics, antennas, phased arrays and RF systems. He is currently engaged in research on orbital determination and radio astronomy with the SETI Institute and low-emission vehicles with General Motors through the EcoCAR Challenge. Prior to teaching at Embry-Riddle, he earned his B.S., M.S. and Ph.D. in electrical engineering from the Georgia Institute of Technology.
Ron Barrett
Adaptive Aerostructures for Missiles, Munitions and UAVs
(See website for information about this course.)
Ron Barrett is an associate professor of aerospace engineering at the University of Kansas where he teaches adaptive aerostructures, and aerospace materials and processing courses. His research areas include enhancement of transportation-related technologies, design, development and testing of unusual uninhabited aerial vehicles, missiles, munitions and adaptive aerostructures. Previously, Barrett served 12 years on the faculty of Auburn University where he received numerous teaching awards. In addition, he has been a USAF Faculty Fellow, flight test engineer and visiting professor at the Delft University of Technology. He has consulted for every major U.S. aerospace corporation and worked for all branches of DoD, NASA and NSF. Barrett has more than 100 publications and three patents on adaptive rotors, dragless wings and high performance convertible UAFs. He is a past recipient of Discover Magazine’s Discover Award for Aviation and Aerospace Technology. Barrett received his B.S. and Ph.D. from the University of Kansas, and an M.S. from the University of Maryland, all in aerospace engineering.

Richard L. Bielawa
Fundamentals of Rotorcraft Vibration, p. 37
Richard L. Bielawa, president of R.L. Bielawa Associates, Inc., has consulted for numerous aerospace companies in diverse areas relating to rotary-wing structural dynamics and aeroelasticity, wind energy systems development and the flight dynamics of spacecraft. Bielawa has more than 40 years of experience in teaching and industrial and academic-based research. He served as lecturer in the department of mechanical and aerospace engineering at UCLA, senior research engineer at the department of aerospace engineering at the Georgia Institute of Technology and an associate professor in the department of mechanical engineering, aeronautical engineering and mechanics at Rensselear Polytechnic Institute. Previously, Bielawa was a senior research engineer at United Technologies Research Center. He holds a B.S.E. from the University of Illinois and an M.S.E. from Princeton University, both in aerospace engineering, and a Ph.D. from the Massachusetts Institute of Technology in aeronautics and astronautics engineering.

Brian Butka
Fundamental Avionics, p. 36
Brian Butka is an associate professor of electrical, computer, software and systems engineering at the Embry-Riddle Aeronautical University in Daytona Beach, Florida. His research interests are in autonomous aerial vehicles, safety-critical hardware design and advanced passive radar applications. He has more than 12 years of analog/mixed signal and VLSI circuit design experience at Integrated Device Technology (IDT) where he was a principal engineer. Prior to IDT he was an assistant professor for six years at the United States Naval Academy. He has also served as an adjunct professor at Georgia Institute of Technology. Earlier in his career, he was process design engineer at Westinghouse Electric Corporation and product engineer at Texas Instruments. Brian Butka has a B.S. in electrical engineering from Syracuse University, and an M.S. and Ph.D. in electrical engineering, both from Georgia Institute of Technology.

Armand Chaput
Conceptual Design of Unmanned Aircraft Systems, p. 27
Armand Chaput is an adjunct professor in aerospace engineering and engineering mechanics at the University of Texas at Austin where he teaches unmanned air system engineering design and serves as director of the Air System Engineering Laboratory. He is retired from Lockheed Martin Aeronautics Company where he was a senior technical fellow and member of the air system design and integration technical staff. While at Lockheed Martin Aeronautics, he supported a range of advanced technology programs, most recently as weight czar and chief weight control engineer for the F-35 Joint Strike Fighter Program. He has served as a member of the USAF Scientific Advisory Board, the Naval Studies Board of the National Academy and the Board of Trustees for the Association for Unmanned Vehicle Systems International. He is the 2003 recipient of the SAE Clarence L. “Kelly” Johnson Aerospace Vehicle Design and Development Award. He is a Fellow of the AIAA, an instrument-rated commercial pilot and flight instructor. Chaput holds a B.S., M.S. and Ph.D. from Texas A&M University, all in aerospace engineering.
Robert Chupka  
**Fundamental Avionics, p. 36**

Robert Chupka is currently the senior aerospace avionics and electrical systems engineer with the systems and equipment branch of the FAA Atlanta Aircraft Certification Office. He has more than 32 years of professional experience within the aerospace industry, including military and commercial avionics systems. Chupka joined the FAA in 2001. His primary responsibilities include systems certification of advanced avionics and electrical systems for commercial aircraft. Prior to joining the FAA, he worked for ARINC, Inc., General Dynamics and Sanders Associates and has been extensively involved in all facets of engineering and management for commercial and military airborne, sea-based and ground-based systems. Chupka received a B.S. in physics from the Rochester Institute of Technology and an M.S. in electrical engineering from Northeastern University.

Richard Colgren  
**Conceptual Design of Unmanned Aircraft Systems, p. 27**

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**Digital Flight Control Systems: Analysis and Design, p. 28**

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**Unmanned Aircraft System Software Airworthiness, p. 52**

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Durability and Damage Tolerance Concepts for Aging Aircraft Structures, p. 29

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Fundamental Avionics, p. 36

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Acquisition of Digital Flight Test Data from Avionics Buses: Techniques for Practical Flight Test Applications, p. 9

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Aircraft Structural Loads: Requirements, Analysis, Testing and Certification, p. 16

Principles of Aerospace Engineering, p. 43

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Commercial Aircraft Safety Assessment and 1309 Design Analysis, p. 25

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Structural Composites, p. 49

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Understanding and Controlling Corrosion of Aircraft Structures, p. 51

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Aircraft Structures Design and Analysis, p. 17
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Aircraft Icing: Meteorology, Protective Systems, Instrumentation and Certification, p. 14
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Aerospace Applications of Systems Engineering, p. 12
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FAA Functions and Requirements Leading to Airworthiness Approval, p. 32
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FAA Conformity, Production and Airworthiness Certification Approval, p. 31
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Helicopter Performance, Stability and Control, p. 38

Ray Prouty is a private consultant for the helicopter industry with more than 50 years of experience. He began his career at Hughes Tool Company and later at Sikorsky Aircraft as a helicopter aerodynamicist. Other positions he has held include: stability and control specialist, Bell Helicopters; group engineer-helicopter aerodynamics, Lockheed Aircraft; and chief, stability and control, Hughes Helicopters/McDonnell Douglas Helicopters. The author of the “Aerodynamics” column of Rotor and Wing Magazine for more than 20 years, Prouty also wrote Helicopter Performance, Stability and Control, a college textbook. He is an Honorary Fellow of the American Helicopter Society. Prouty holds a B.S. and M.S. in aeronautical engineering from the University of Washington.

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Airplane Preliminary Design, p. 20

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Aircraft Icing: Meteorology, Protective Systems, Instrumentation and Certification, p. 14

Aviation Weather Hazards, p. 23

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Acquisition of Digital Flight Test Data from Avionics Buses: Techniques for Practical Flight Test, p. 9

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Modelling and Analysis of Dynamical Systems Using MATLAB, p. 40

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Reliability and 1309 Design Analysis for Aircraft Systems, p. 47

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Aircraft Lightning: Requirements, Component Testing, Aircraft Testing and Certification, p. 15

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Flight Control and Hydraulic Systems, p. 34

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Thomas W. Strganac
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Propulsion Systems for UAVs and General Aviation Aircraft, p. 46

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Subcontract Management in Aerospace Organizations, p. 50

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FAA Certification Procedures and Airworthiness Requirements as Applied to Military Procurement of Commercial Derivative Aircraft/Systems, p. 30

FAA Functions and Requirements Leading to Airworthiness Approval, p. 32

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Project Management for Aerospace Professionals, p. 45

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Aerodynamic Design Improvements: High-Lift and Cruise, p. 11

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Airborne Equipment Design and RTCA DO-160, p. 13

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Process-Based Management in Aerospace: Defining, Improving and Sustaining Processes, p. 44

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**Aerospace Applications of Systems Engineering, p. 12**  
**Flight Test Principles and Practices, p. 35**

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Kyle K. Wetzel  
**Certification Engineering of Utility-Scale Wind Turbines, p. 24**

Kyle K. Wetzel is a wind turbine consultant and the president and CEO of Wetzel Engineering, Inc. He has engineered both utility-scale and small wind turbine systems for energy, aerospace and defense industry since 1993 in a variety of capacities, including as a consultant and researcher through two of his own companies, as an engineering manager at Enron Wind Energy (now part of GE Energy), as executive vice president of Aerotech Engineering & Research Corporation and as a university researcher. Wetzel has served as principal investigator, project manager and/or technical manager on fourteen government-funded R&D contracts worth more than $30 million and has consulted to a number of large and small companies, including GE Energy, DeWind, Suzlon, General Dynamics, Sinoma, Heartland Energy Solutions, Viryd Technologies, SGL Group, Zoltek, 3TEX, Materia and MAG Cincinnati Automation. He has supported engineering of other turbine components for Aero Transportation Products, PKM Steel and Molded Fiberglass Companies (MFG). He has also served as an adjunct professor in the Department of Aerospace Engineering at the University of Kansas. He was a member of the Peer Review Panel for the DOE’s Wind Energy Program, reviewing all wind energy technology projects funded by DOE. Wetzel holds an M.S. in aeronautical and astronautical engineering from the University of Illinois, and a Ph.D. in aerospace engineering from the University of Kansas.

Mark K. Wilson  
**Aerospace Applications of Systems Engineering, p. 12**

Mark K. Wilson, an internationally-recognized authority in systems engineering and president of Mark Wilson Consulting, is a systems engineering and aerospace consultant with more than 40 years of systems engineering acquisition experience. He is a director and chief operating officer of Aerospace Technologies Associates, LLC, and an associate with Dayton Aerospace, Inc. Wilson, a member of the Senior Executive Service, completed his Air Force career as director of the Air Force Center for Systems Engineering, Air Force Institute of Technology (AFIT), Wright Patterson Air Force Base, Ohio. He served as the technical advisor for systems engineering at the Aeronautical Systems Center and as technical director in the Headquarters of Air Force Material Command (AFMC), Directorate of Engineering and Technical Management. He was director of engineering in the C-17 System Program Office at the Aeronautical Systems Center, where he directed all aspects of systems engineering necessary to develop, produce and sustain the C-17 Weapon System. He also worked on numerous weapon systems including the B-2 bomber and the F-15 fighter. His first assignment was as a structural engineer in the F-15 A/B Program Office. Wilson earned his B.S. in aerospace engineering from Purdue University. He is a Sloan Fellow and holds an M.S. in management from Stanford University and an M.S. in management science from the University of Dayton.
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