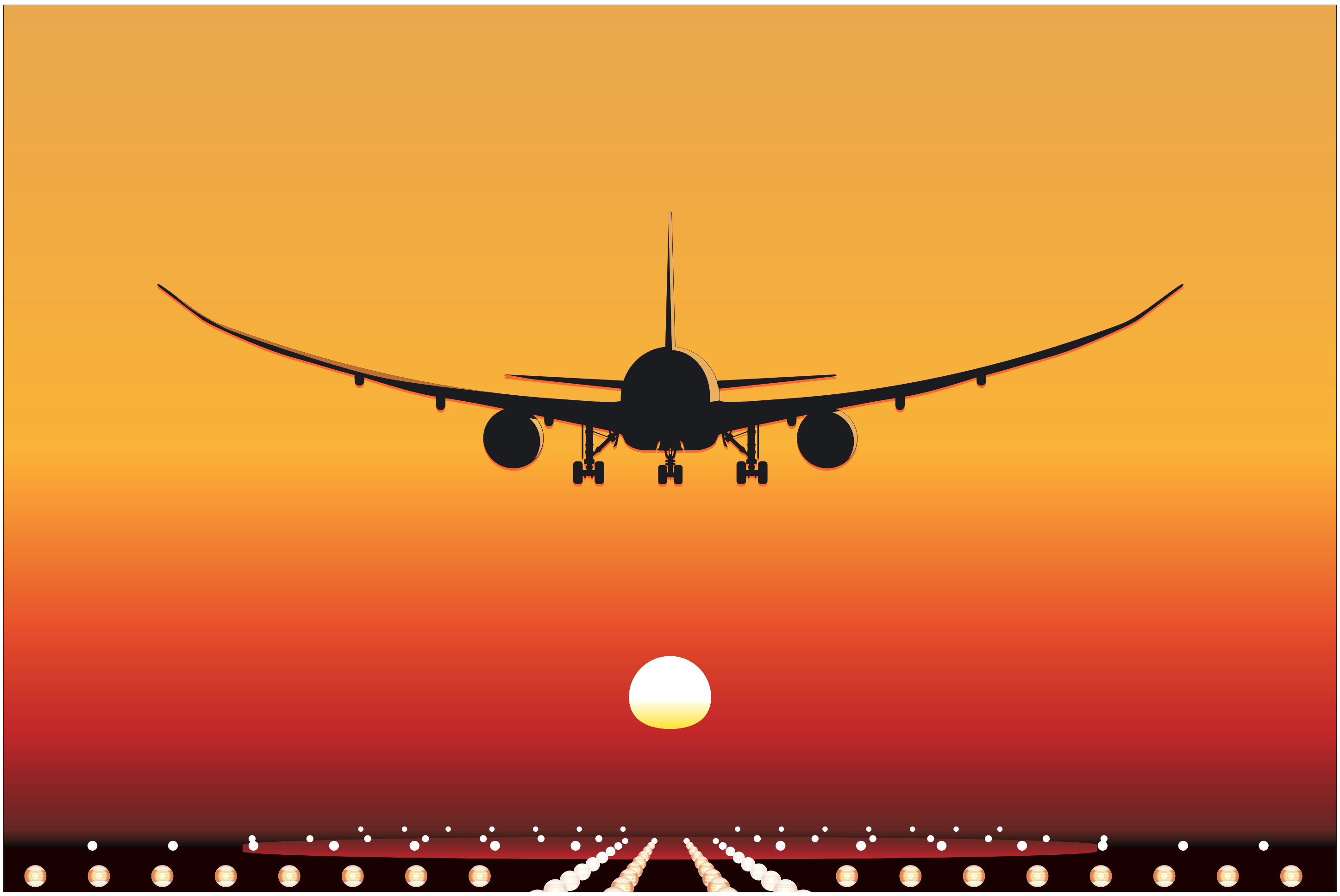
AEROSPACE SHORT COURSES

UNIVERSITY OF KANSAS

2014 COURSE CATALOG

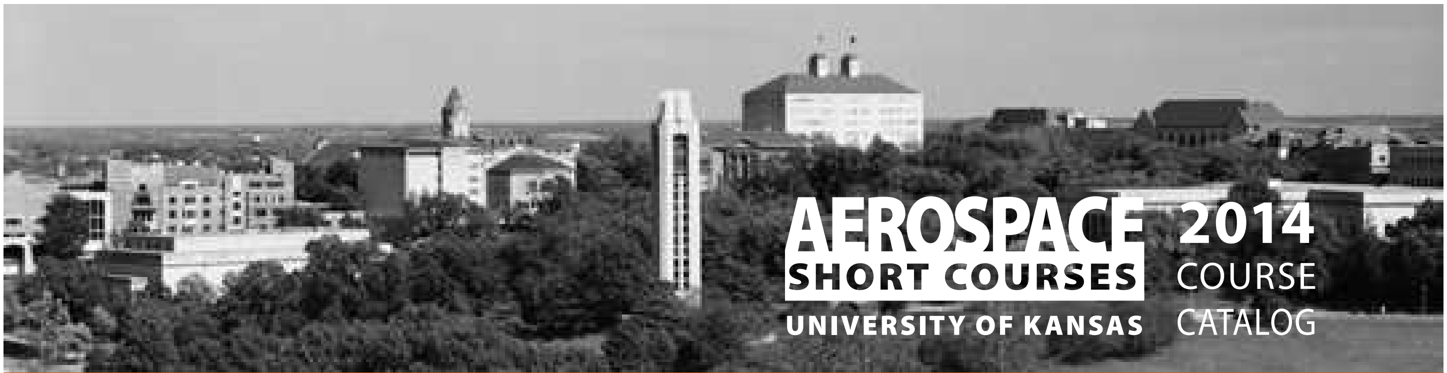


LAS VEGAS	SEATTLE	MARYLAND	SAN DIEGO	ORLANDO
March	April	June	September	November

aeroshortcourses.ku.edu/air

Toll-free in the U.S.: 877-404-5823 or 785-864-5823

KU THE UNIVERSITY OF KANSAS
Continuing Education



Invest in Yourself • Invest in Your Company • Invest in the Aerospace Industry

GLOBAL LEADERS IN AEROSPACE TRAINING

The University of Kansas Continuing Education Aerospace Short Course Program has been serving the worldwide aerospace community for the last 36 years by providing outstanding non-credit short courses in aircraft design, flight control systems, aircraft compliance and safety, avionic hardware and software and aerospace systems and process management.

The Aerospace Short Course Program was founded in 1977 to address the professional development needs of aircraft designers in the North American aerospace industry. It has evolved into one of the most respected non-credit professional development programs in the worldwide aerospace industry. In recent years, one third of our course attendees have been from outside of the United States.

WELCOME TO OUR 2014 COURSE LISTINGS

In the following pages of this catalog you will find detailed descriptions of our exceptional courses, instructors and delivery methods.

With a brilliant instructor pool derived from industry, academia and government experts, the 2014 program offers more than 40 publicly offered short courses at five locations in the United States. Our 2014 public course schedule is located on pages 3–4. We can also bring our courses to your workplace. See page 11 for details. Plus, striving to meet individual training needs, we offer video and web-based conferencing opportunities and on-line courses. See page 12.

As you peruse our 2014 course catalog, if you have any questions or comments, please contact our staff. We are here to serve you.

Professional education is vital to increasing your effectiveness in the workforce. We invite you to invest in your success by registering for a short course today!

Our internationally recognized program uniquely serves your training needs by:

- Offering practical, one-of-a-kind classes taught by outstanding academic and industry professionals;
- Continually upgrading the portfolio of courses by diligently following the industry trends and needs;
- Providing outstanding customer services;
- Responding to global client companies and individual customers by traveling to their locations and respecting their culture and learning styles.

2014 KU AEROSPACE SHORT COURSES LIST

2014 KU AEROSPACE SHORT COURSES PUBLIC SCHEDULE

Las Vegas, Nevada **Alexis Park All Suite Resort**

		Course #	Page
March 3–7	Airplane Aerodynamic Design and Subsonic Wind Tunnel Testing *Willem A.J. Anemaat*	AA141260	22
March 3–7	Operational Aircraft Performance and Flight Test Practices *Mario Asselin*	AA141270	49
March 3–7	Principles of Aerospace Engineering *Wally Johnson*	AA141280	51
March 4–6	FAA Certification Procedures and Airworthiness Requirements as Applied to Military Procurement of Commercial Derivative Aircraft/Systems *Robert D. Adamson*	AA141290	36
March 4–7	Aircraft Icing: Meteorology, Protective Systems, Instrumentation and Certification *Wayne R. Sand, Steven L. Morris*	AA141300	18
March 4–7	Fundamentals of Project Management for Aerospace Professionals *Herbert Tuttle*	AA141310	46
March 4–7	RTCA DO-160 Qualification: Purpose, Testing and Design Considerations *Ernie Condon*	AA141320	56

Seattle, Washington **DoubleTree Suites by Hilton Hotel Seattle Airport—Southcenter**

April 28–May 2	**NEW** Aerodynamic Design of Transport Aircraft *Roelof Vos*	AA141330	15
April 28–May 2	Aircraft Structural Loads: Requirements, Analysis, Testing and Certification *Wally Johnson*	AA141340	20
April 28–May 2	Aircraft Structures Design and Analysis *Michael Mohaghegh, Mark S. Ewing*	AA141350	21
April 28–May 2	Airplane Preliminary Design *Willem A.J. Anemaat*	AA141360	25
April 28–May 2	Commercial Aircraft Safety Assessment and 1309 Design Analysis *Marge Jones*	AA141370	28
April 28–May 2	Fundamental Avionics *Albert Helfrick*	AA141380	45
April 29–May 1	FAA Functions and Requirements Leading to Airworthiness Approval *Gilbert L. Thompson*	AA141390	38
April 29–May 2	Aviation Weather Hazards *Wayne R. Sand*	AA141400	27

California, Maryland **Southern Maryland Higher Education Center**

June 9–13	Advanced Flight Tests *Donald T. Ward, Thomas William Strganac*	AA141410	13
June 9–13	Rotorcraft Vibration: Analysis and Practical Reduction Methods *Richard L. Bielawa*	AA141420	55

San Diego, California **Marriott Mission Valley**

Week One

September 8–10	Complex Electronic Hardware Development and DO-254 *Jeff Knickerbocker*	AA151000	30
September 8–11	Sustainment and Continued Airworthiness for Aircraft Structures *Marv Nuss*	AA151010	61
September 8–12	Commercial Aircraft Safety Assessment and 1309 Design Analysis *Marge Jones*	AA151020	28
September 8–12	Conceptual Design of Unmanned Aircraft Systems *Bill Donovan*	AA151030	31

2014 KU AEROSPACE SHORT COURSES PUBLIC SCHEDULE

San Diego, cont'd.

		Course #	Page
September 8–12	Flight Test Principles and Practices *Donald T. Ward, George Cusimano*	AA151040	43
September 9–11	FAA Conformity, Production and Airworthiness Certification Approval Requirements *Jim Reeves*	AA151050	37
September 9–11	Unmanned Aircraft System Software Airworthiness *Willie J. Fitzpatrick, Jr.*	AA151060	62
September 10–12	FAA Functions and Requirements Leading to Airworthiness Approval *Gilbert L. Thompson and Robert D. Adamson*	AA151070	38
September 11–12	Integrated Modular Avionics (IMA) and DO-297 *Jeff Knickerbocker*	AA151080	47
September 8–12	**Combine** AA151000 (DO-254) and AA151080 (DO-297) **(SAVE $)** *Jeff Knickerbocker*	AA151090	30, 47

Week Two

September 15–17	FAA Certification Procedures and Airworthiness Requirements as Applied to Military Procurement of Commercial Derivative Aircraft/Systems *Gilbert L. Thompson and Robert D. Adamson*	AA151100	36
September 15–17	Flight Testing Unmanned Aircraft—Unique Challenges *George Cusimano*	AA151110	44
September 15–18	Software Safety, Certification and DO-178C *Jeff Knickerbocker*	AA151120	57
September 15–19	Aircraft Engine Vibration Analysis, Turbine and Reciprocating Engines: FAA Item 28489 *Guil Cornejo*	AA151130	17
September 15–19	**NEW** Electrical Wiring Interconnect System (EWIS) and FAA Requirements *C. Bruce Stephens*	AA151140	34
September 15–19	Principles of Aeroelasticity *Thomas William Strganac*	AA151150	50
September 15–19	Structural Composites *Mark S. Ewing*	AA151160	59
September 16–19	**NEW** Stress Analysis for Aerospace Structures *Dennis C. Philpot*	AA151170	58
September 18–19	**NEW** Essentials of Effective Technical Writing for Engineering Professionals *Paul H. Park*	AA151180	35

Orlando, Florida **DoubleTree by Hilton at the Entrance to Universal Orlando**

November 17–21	Aircraft Lightning: Requirements, Component Testing, Aircraft Testing and Certification *C. Bruce Stephens*	AA151190	19
November 17–21	Aircraft Structural Loads: Requirements, Analysis, Testing and Certification *Wally Johnson*	AA151200	20
November 17–21	Aircraft Structures Design and Analysis *Michael Mohaghegh, Mark S. Ewing*	AA151210	21
November 17–21	Airplane Flight Dynamics: Open and Closed Loop *Willem A.J. Anemaat*	AA151220	23
November 17–21	Digital Flight Control Systems: Analysis and Design *David R. Downing*	AA151230	32
November 17–21	Flight Control and Hydraulic Systems *Wayne Stout*	AA151240	42
November 17–21	Fundamental Avionics *Albert Helfrick*	AA151250	45
November 18–20	**NEW** Commercial Space—What It Means and the Issues It Raises (new) *Marco Villa, Max Vozoff*	AA151260	29

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.

Las Vegas, Nevada

March 3–7, 2014

Alexis Park All Suite Resort
375 East Harmon
Las Vegas, Nevada 89109

A limited number of rooms has been reserved at the Alexis Park All Suite Resort for course attendees. This is a non-gaming facility. The rate is $89 for a standard single room and $99 for a double room plus applicable state and local occupancy taxes. These rooms will be held as a block, unless depleted, until **February 13, 2014**, at which time they will be released to the public. After February 13, 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 (for one device per registered person) and free parking, please make sure you or your travel agent book your hotel room in the University of Kansas room block. Our group code is "AERO 014". To make a reservation, call 1-800-582-2228 (toll-free in the continental United States) or 1-702-796-3322. Hotel reservations may also be made via email at reservations@alexispark.com or on-line. Please note that room rates cannot be changed after check-in for guests who fail to identify their group affiliation. A deposit of the first night's revenue plus tax is required. You may cancel with no fee up to 48 hours prior to arrival. The deposit will be forfeited for all no-show reservations.

The McCarran International Airport (LAS) is 2 miles (3.2 km) from the Alexis Park All Suite Resort. The hotel provides complimentary airport shuttle, based on availability, from 7:00 am to 10:00 pm daily. To use the Alexis Park Resort Airport Shuttle, call (702) 796-3300 once you have deplaned and are headed to the baggage claim area. Taxi cab fare is approximately $8. Commercial airport shuttle fare is approximately $12–15 roundtrip. Ground transportation pick up is located on the level below the baggage claim level.

Seattle, Washington

April 28–May 2, 2014

DoubleTree Suites by Hilton Hotel Seattle Airport – Southcenter
16500 Southcenter Parkway
Seattle, Washington 98188

A limited number of rooms has been reserved at the Doubletree Suites by Hilton Hotel Seattle Airport – 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 24, 2014**, at which time they will be released to the public. After April 24, 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. State that you will be attending a University of Kansas aerospace short course and give the Group Code **UOK**. To make your reservation, call (toll-free worldwide) 800-222-8733. Reservations can also be made on-line. All reservations must be guaranteed with a major credit card or first night room deposit. For additional assistance the direct number to the hotel is: 206-575-8220.

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. There are two Doubletree properties near the airport. Make sure to take the shuttle for the Doubletree Suites by Hilton Hotel Seattle Airport – Southcenter. Taxi cab fare is approximately $18.

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

Southern Maryland

June 9–13, 2014

Southern Maryland Higher Education Center
44219 Airport Road
California, Maryland 20619

Courses will be held on the Southern Maryland Higher Education Center campus. Parking is free.

There is no hotel room block associated with this event. For a list of hotels in the area, please visit the St. Mary's County Travel & Tourism website: www.visitstmarysmd.com

International airports serving this area:

- Baltimore-Washington Thurgood Marshall International Airport (BWI)
- Ronald Reagan Washington National Airport (DCA)
- Dulles International Airport (IAD)

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.

San Diego, California
September 8–12, 2014 • September 15–19, 2014

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 2014 (the current rate is $133) for a single/double room plus applicable state and local occupancy taxes. These rooms will be held as a block, unless depleted, until **August 14, 2014**, at which time they will be released to the public. After August 14, 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 and discounted parking, 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 (toll-free worldwide) 877-622-3056 or 619-692-3800. 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 $12.00 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 a discounted rate. Taxi cab fare is approximately $30–35 each way.

For the most current information on our courses and events, including convenient weblinks to assist you with making your travel plans, please visit our website at **aeroshortcourses.ku.edu/air/locations/**

Orlando, Florida
November 17–21, 2014

DoubleTree by Hilton at the Entrance to Universal Orlando

5780 Major Boulevard

Orlando, Florida 32819

A limited number of rooms has been reserved at the DoubleTree by Hilton at the Entrance to Universal Orlando for course attendees. The rate will be the U.S. federal government per diem for November 2014 (the current rate is $97) for a single/double room plus applicable state and local occupancy taxes. These rooms will be held as a block, unless depleted, until **October 30, 2014**, at which time they will be released to the public. After October 30, room rate and availability cannot be guaranteed. Orlando is a busy convention town and the hotel may sell out so book your room early. Please note that room reservations at this property must be cancelled 72 hours prior to arrival to avoid cancellation penalties and early departures are subject to an early departure penalty.

To ensure that you get all the benefits available to our group, including discounted 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. Please check our website for updated information. To make a reservation, call (toll-free worldwide) 800-327-2110 or 407-351-1000. State that you will be attending a University of Kansas aerospace short course. All reservations must be guaranteed and accompanied by a first night's room deposit by credit card, guest check or money order.

The Orlando International Airport (ORL) is 18 miles (29 km) from the DoubleTree by Hilton at the Entrance to Universal Orlando. Mears Transportation provides 24 hour shuttle service for $19 one-way or $30 round trip. (Fees are subject to change.) Reservations can be made on-line or walk-up service is available at the Mears Transportation kiosk on level one of the airport. For additional information, call them at 407-423-5566. Orlando Airport Van is now providing airport shuttle service in Orlando. Their rate is $9.99 per passenger. Reservations can be made on line or by calling 866-204-4000. Taxi cab fare is approximately $45 each way.

GENERAL INFORMATION **aeroshortcourses.ku.edu/air**

Phone 785-864-5823 or toll-free within the U.S. 877-404-5823
Fax 785-864-4871
Email ceipeinfo@ku.edu
Website aeroshortcourses.ku.edu/air
Mail KU Continuing Education Aerospace Short Course Program
1515 Saint Andrews Drive
Lawrence, Kansas 66047-1619 • U.S.

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; otherwise, the course could be cancelled due to insufficient enrollment.

A confirmation letter will be emailed to each enrollee upon registration. If you prefer to receive the confirmation letter by mail or fax, please indicate your preference on the registration form. If you do not receive a confirmation letter, please contact us.

Fees/Billing All fees are payable in U.S. dollars and are due at the time the class is held. Fees are listed on each course page.

We accept MasterCard, VISA, Discover and American Express. Please note for security reasons we cannot accept credit card information via email.

You may mail a check in U.S. dollars to the address listed above. Please make checks payable to "The University of Kansas". If you have received an invoice number, please include it on your check. If no invoice number is available, please reference "KU Aerospace Continuing Education" on your check.

You may make a wire transfer payment in U.S. dollars to US Bank of Lawrence, 900 Massachusetts, Lawrence, Kansas 66044, U.S. In the wire transfer you must reference "KU Aerospace Continuing Education" and include your invoice number. You are responsible for paying any bank transfer fees. For account and ACH or routing numbers, please call 785-864-5823 or email ceipeinfo@ku.edu. You must be registered in a course before requesting bank transfer information.

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 $100.00.

Refund We encourage you to send a qualified substitute if you cannot attend a course. If you wish to transfer into another course you have one year from the original course date to transfer and complete a short course or a refund will automatically be issued. A full refund of registration fees will be available if requested in writing and received two weeks before a course. After that date a refund will be made, less a $100.00 administrative fee. If no prior arrangements have been made, no refunds will be made after 30 calendar days following the event.

Cancellation Policy 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 other unforeseen emergency situations. 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.

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

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

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

Group Discounts

Group discounts are available for companies registering more than two people for the same course at the same time. All participants eligible for the discount must 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

If you have more than 10 people, ask about our on-site program. For more information, see page 11.

All discounts must be requested at the time of registration and ALL registration forms must be submitted together to receive the discount. We are unable to register groups on-line. Please copy the registration form on the back of this catalog or download registration forms from our website. Send completed registration forms together by mail, fax, or scan and submit them via email. Please do not send credit card information by email.

If you have any questions or if you need assistance, please call 785-864-5823 or toll-free within the U.S. 877-404-5823. The group discount cannot be combined with any other course discount.

Course Information

Location The public course venues are listed on pages 5 and 6. When you register for a course, the location will be included in the confirmation letter.

Program Accessibility We accommodate persons with disabilities. Please call 785-864-5823 or email ceipeinfo@ku.edu, and a KU Continuing Education representative will contact you to discuss your needs. To ensure accommodation, please register at least two weeks before the start of the event. See the nondiscrimination policy on page 7.

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

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 course will be cancelled.

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

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

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

Attending an aerospace short course expands your knowledge and increases your effectiveness and productivity in the workplace.

KU Aerospace Short Courses is Now Mobile!

This year we launched our new award-winning mobile site which is optimized for smartphones and smaller tablets. Our aim is to provide the best possible user experience for reading and accessing our content, whatever your device. We have built our mobile site from the ground up, focusing on user interface, reliability, convenience and download speed. Try it today.

Scan to bookmark
or visit us at
aeromobile.continuinged.ku.edu

Linkedin

Join us in a conversation on aerospace training opportunities on LinkedIn at http://www.linkedin.com/groups/KU-Aerospace-Short-Courses-3836449

KU Aerospace Short Courses group on LinkedIn provides opportunities for networking, idea exchanges and training suggestions among the alumni and friends of this short-course program. All alumni are encouraged to join.

CERTIFICATES OF SPECIALIZATION

Enhance Your Knowledge—Advance Your Career

Certificates of specialization are for people who desire concentrated study in a specific area of interest. Achieving a certificate of specialization demonstrates to employers, coworkers and the aerospace industry that you are qualified, competent and current in your field. It distinguishes you as a professional who is committed to your career and strives to be the best.

Completion Requirements

You can earn a certificate in one of eight specialized areas by completing four courses in a specialization track.

To apply for a certificate of specialization, complete and return the application form that can be found on our website at aeroshortcourses.ku.edu/air.

Or, you can contact us and we will send you an application form. Upon approval of your application, you will receive a special certificate of achievement.

There is no fee required to receive a certificate of specialization. The University of Kansas Aerospace Short Course Program is pleased to promote your commitment to the industry.

If you have questions or need assistance, please contact us:

Phone 785-864-5823 or toll-free within the U.S. 877-404-5823

Email ceipeinfo@ku.edu

Aerospace Compliance Track

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- Commercial Aircraft Safety Assessment and 1309 Design Analysis–p. 28 OR Reliability and 1309 Design Analysis for Aircraft Systems (Online Course)–p. 54
- **NEW** Electrical Wiring Interconnect System (EWIS) and FAA Requirements–p. 34
- FAA Certification Procedures and Airworthiness Requirements as Applied to Military Procurement of Commercial Derivative Aircraft/Systems–p. 36
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- FAA Parts Manufacturer Approval (PMA) Process for Aviation Suppliers–p. 39
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- Aviation Weather Hazards–p. 27
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Aircraft Structures Track

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Flight Control Systems Design Track

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ON-SITE AEROSPACE SHORT COURSES

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

Our 2014 short courses are available for on-site presentations. Let us bring our world-class instructors and the training you need to your workplace.

Benefits of KU Aerospace On-Site Training

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

- Train when it fits your schedule
- Train more people
- 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

Contact the On-site Program Manager

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

Phone 785-864-8282
Fax 785-864-5074
Email aerosite@ku.edu

The courses listed below are only available for on-site delivery, and are not available as public courses in 2014. These courses and ALL of our public courses can be brought to your company for on-site delivery.

- Aerodynamic Design Improvements: High-Lift and Cruise
- Aerospace Applications of Systems Engineering
- Applied Nonlinear Control and Analysis
- FAA Parts Manufacturer Approval (PMA) Process for Aviation Suppliers
- FAR 145 for Aerospace Repair and Maintenance Organizations
- Flight Control Actuator Analysis and Design
- Modelling and Analysis of Dynamical Systems: A Practical Approach
- Process-Based Management in Aerospace: Defining, Improving and Sustaining Processes
- Propulsion Systems for UAVs and General Aviation Aircraft
- Subcontract Management in Aerospace Organizations

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.

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
Beechcraft Corporation
Bell Helicopter Textron
The Boeing Company
Bombardier
CAAC—Civil Aviation Administration of China
Cessna Aircraft Company
COMAC—Commercial Aircraft Corporation of China, LTD.
DAPA—Defense Acquisition Program Administration
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
Honeywell, Inc.
Lockheed Martin Corporation
Lycoming Engines
NASA
National Aerospace Laboratory of The Netherlands
New Zealand Defence Force
Northrop Grumman Corporation
Pilatus Aircraft Ltd.
QinetiQ Ltd.
Rockwell Collins
SAAB Aircraft AB
Samsung
Sierra Nevada Corporation
Sikorsky Aircraft Corporation
Spirit AeroSystems
SR Technics
STM—Savunma Teknolojileri Mühendislik
Transport Canada
United States Department of Defense (Air Force, Army, Navy and Coast Guard)

COURSE DELIVERY OPTIONS

Online Courses

Now you have the opportunity to further your training without worrying about time away from work or family and the costs of traveling.

When you register for an online course from the Aerospace Short Course Program you will have six months to complete the course at your own pace. Each course will have a project or case study to complete during the duration of the course. Once the project or case study is completed satisfactorily you will be awarded a certificate for instructional hours and Continuing Education Units (CEUs).

The Aerospace Short Course Program is pleased to offer the following online courses.

- Airplane Performance: Theory, Applications and Certification –p. 24
- Durability and Damage Tolerance Concepts for Aging Aircraft Structures –p. 33
- Reliability and 1309 Design Analysis for Aircraft Systems – p. 54

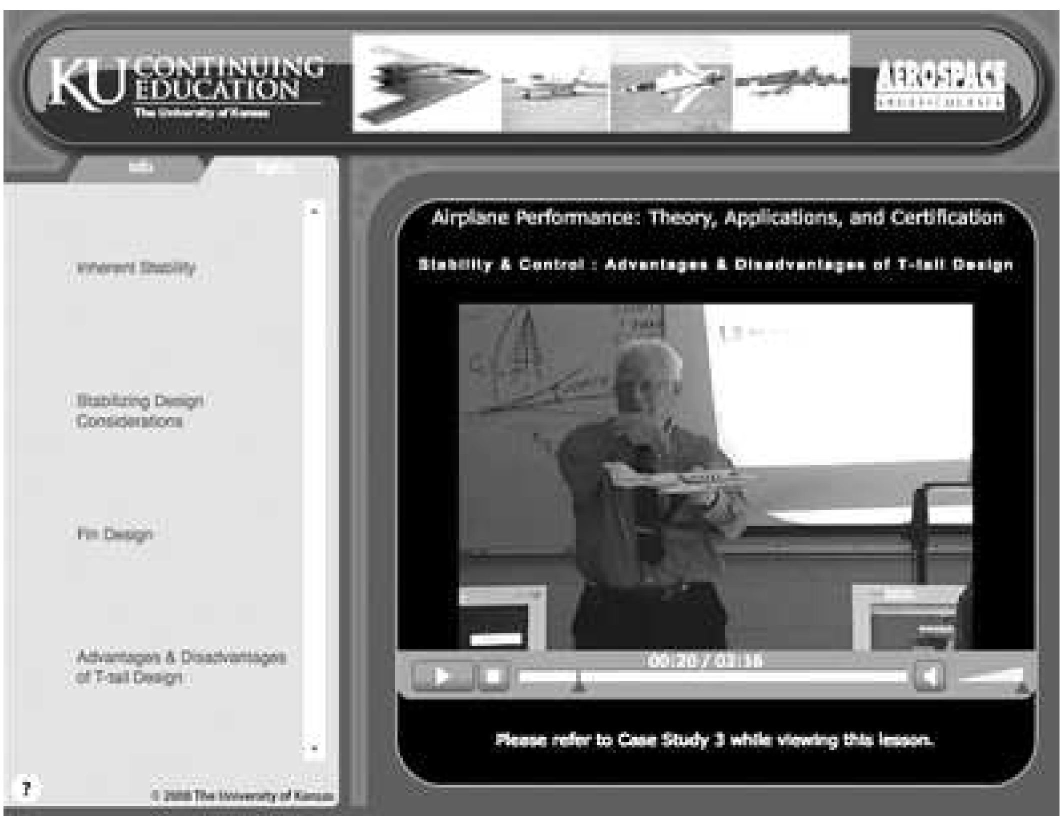
We are committed to developing more on-line courses in the future.

Video Conferencing

The Aerospace Short Course Program can provide various video conferencing solutions for companies to take advantage of when determining training needs for their employees. Our video classroom at the KU Continuing Education building allows you to reach as many as eight international locations simultaneously and in real time, as well as save thousands of dollars in travel expenses. Staff will be available and on hand at all times.

In addition to our video conference classroom, we can provide various web-based solutions to assist in your on-site training needs. We can host a course through our Adobe ConnectPro format or work with your company's internal conferencing systems to provide a blended delivery option to several different locations.

For more information, contact aerosite@ku.edu



Dr. Jan Roskam's online Airplane Performance: Theory, Applications and Certification course

ADVANCED FLIGHT TESTS

Instructors: Donald T.Ward, Thomas William Strganac

Location

Location California, Maryland

Date June 9–13, 2014

Course Number AA141410

Times/CEUs

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 suggestions and recommendations for flutter and 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

$2,445

Includes instruction, a course notebook, *Introduction to Flight Test Engineering, Volumes I and II*, by Don Ward, Thomas Strganac and Rob Niewoehner, and a CD including *AGARD Report #776 Aircraft Dynamics at High Angles of Attack*, refreshments and five lunches.

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

Certificate Track

This course is part of the Flight Tests and Aircraft Performance Track. See page 10.

Day One

- Why such tests are necessary; 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 percent 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, 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

Contact us *for a no-cost, no obligation proposal for an on-site course:*

On-site Program Manager
Email aerosite@ku.edu
Phone 785-864-8282

Times/CEUs

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.

Fee

Includes instruction and a course notebook.

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

Certificate Track

This course is part of the Aircraft Design Track. See page 9.

AERODYNAMIC DESIGN OF TRANSPORT AIRCRAFT (NEW)

Instructor: Roelof Vos

Location

Location Seattle, Washington

Date April 28–May 2, 2014

Course Number AA141330

Times/CEUs

Monday–Friday 8 a.m.–4 p.m.

Class time 35 hours

CEUs 3.5

Description

Examines how the exterior design of high-subsonic transport aircraft can be manipulated in order to meet specified performance objectives and satisfy relevant certification constraints. The course covers which geometric characteristics of the airplane allow for a high operating Mach number while keeping fuel burn at acceptable levels, demonstrates how the exterior of all major airplane components can be shaped so as to adequately handle low-subsonic and high-subsonic flow, and shows how aerodynamic design and operation at low and high speeds affect the airplane in terms of balance, stability, aeroelastic behavior, weight, controllability, cruise performance, and field performance. Through many historic and contemporary examples, the participant will learn to relate the functions of high-subsonic transport aircraft to their external design.

Target Audience

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

Fee

$2,445

Includes instruction, a course notebook, *Aerodynamic Design of Transport Aircraft*, by Ed Obert, refreshments and five lunches.

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

Certificate Track

This course is part of the Aircraft Design Track. See page 9.

Day One: Introduction and review of aerodynamic fundamentals:

- Introduction, classification, design requirements and objectives of transport aircraft, certification regulations and design rules, general goals in aerodynamic design
- Boundary-layer aerodynamics and subsonic cruise drag
- Relation between supervelocity and pressure coefficient. Relation between geometry and pressure distribution
- Interference drag and area ruling

Day Two: Airfoil design:

- Pressure distribution on airfoil sections at high and low speed. Development of the transonic airfoil
- Design of supercritical and sonic airfoils. Reynolds number effects
- Low-speed stalling characteristics of airfoil sections
- Reynolds number and Mach number effects on maximum lift coefficient
- High-speed stall (buffet) on airfoil sections
- Airfoils equipped with high-lift devices: mutual interaction, types of flow separation

Day Three: Wing design:

- Wing requirements
- Development of the swept-wing concept: historical background, principle of wing sweep, transonic flow characteristics, effect on boundary layer, effect on maximum lift coefficient, fences
- First generation of swept wing aircraft: tip-stall, aeroelastic deformation
- Pressure distribution on finite swept wings: spanwise drag distribution, forward sweep, fuselage interference, improving velocity distribution at root and tip, minimizing pitching moment
- Design considerations for pressure distributions on finite swept wings
- Discussion of examples of modern swept-wing designs

Day Four: Empennage design, control surface design and engine integration:

- Horizontal tail surface design: functions and requirements, planform shape, aeroelastic effects, elevator lock
- Vertical tail surface design: functions and requirements, planform shape, effect of dorsal fin
- Control surface design: functions and requirements, linearity, aeroelasticity, stall
- Spoiler panels: functions, effect on pressure distribution, interaction with flaps
- Engine intake design: lip design for take-off and cruise conditions, drag in OEI condition. Exhaust design: effect of ambient pressure, boat tail drag. Thrust reversers: types, interference with empennage

Day Five: Operation:

- Stalling characteristics of full scale aircraft: stall requirements, mechanism complexity vs. maximum lift coefficient, spanwise stall onset, deep stall
- Take-off performance: requirements, minimum unstick speed, lift-to-drag ratio in take-off and landing
- The buffet onset boundary: requirements, effect on flight envelope. Flight characteristics between MMO and MD: requirements, Mach tuck, Mach trim compensation

AEROSPACE APPLICATIONS OF SYSTEMS ENGINEERING

Instructors: Donald T. Ward, Mark K. Wilson, D. Mike Phillips

Day One

- Systems engineering: overview and terminology
- Generic system life cycles
- System hierarchy
- Systems of systems
- Value of systems engineering
- Life cycle stages and characteristics
- Tailoring concepts

Day Two

- Requirements: definition, elicitation and analysis
- Architectural design process
- Evolutionary acquisition, spiral development and open systems
- Implementation process
- Integration process
- Verification process
- Transition process
- Validation process
- Operation process
- Maintenance process
- Disposal process
- Cross-cutting technical methods

Day Three

- Project planning process
- Project assessment and control process
- Decision management process
- Risk management process
- Configuration management process
- Information management process
- Measurement process
- Acquisition process
- Supply process
- Life cycle model management process
- Infrastructure management process
- Project portfolio management process
- Human resource management process
- Quality management process
- Tailoring process

Day Four

- Integrated logistics support
- Cost effectiveness analysis
- Electromagnetic compatibility analysis
- Environmental impact analysis
- Interoperability analysis
- Life-cycle cost analysis
- Manufacturing and producibility analysis
- Mass properties engineering analysis
- Safety and health hazard analysis
- Sustainment engineering analysis
- Training needs analysis
- Usability analysis/human systems integration
- Value engineering
- Applying systems engineering in a "lean" environment (NASA X-38 case study)
- Class exercise

Day Five

- Software intensive systems engineering (lessons learned)
- Intensive systems engineering (case studies)
- Course summary and wrap-up

Available as on-site course

Contact us *for a no-cost, no obligation proposal for an on-site course:*

On-site Program Manager
Email aerosite@ku.edu
Phone 785-864-8282

Times/CEUs

Class time 35 hours

CEUs 3.5

Description

Based on evolving systems engineering standards, EIA/IS 632 and IEEE P1220 and the current version 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, integration, allocation of requirements, verification and control. Hardware and software systems case studies, primarily from the aircraft sector of the aerospace industry are used as examples. Techniques have been used on many commercial (both large airliners and smaller personal aircraft), DoD, and NASA programs.

Target Audience

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

Fee

Includes instruction and a course notebook.

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

Certificate Track

This course is part of the Management and Systems Track. See page 10.

AIRCRAFT ENGINE VIBRATION ANALYSIS, TURBINE AND RECIPROCATING ENGINES: FAA ITEM 28489

Instructor: Guil Cornejo

Location

Location San Diego, California

Date September 15–19, 2014

Course Number AA151130

Times/CEUs

Monday–Friday 8 a.m.–4 p.m.

Class time 35 hours

CEUs 3.5

Description

The objective of this five-day course is to demystify process-vibration concepts to practical remediation tools for resolving and mitigating aircraft engine and gearbox vibrations. The course consists of four modules: review, measurements, turbine, and reciprocating engine process-vibration analysis and mitigation. In the course, both roller and hydrodynamic bearings orbit behavior are reviewed. Animations depict and simplify both crankshaft and rotor-orbit's stability metrics and how they relate to either spectral signature and to oscilloscope orbits. Stiff, slender, overhung rotor and gyroscopic effects are animated to show bearing-shaft stiffness reactions; both journal and bearing-cap orbit behaviors are examined. Roots of engine lateral and torsional vibrations and fatigue are practically considered. Excel programs for first level field troubleshooting are included.

Target Audience

Aircraft power-plant engineers, engineering managers, senior technical personnel and educators concerned with the health, safety, lifecycle and performance of aircraft power-plant rotating components.

Fee

$2,445

Includes instruction, a course notebook, DVD of reference materials, refreshments and five lunches.

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

Certificate Track

This course is part of the Aircraft Maintenance and Safety Track and the Flight Tests and Aircraft Performance Track. See page 10.

Day One

- Review: ABCs of shaft lateral/torsional vibration and phase: time, frequency and modulation domains; natural and forced-coupled vibrations' elastic and plastic limits and temperature dependence; damping; orbit's equilibrium; safe minimum film thickness, log-dec, rotor whirl, Bode and polar plots
- Classification of vibration and acoustic signals
- Measurements: sensors, instrumentation and digital signal technology's A/D converter process to measure and to analyze rotating shaft vibrations
- Optimum vibration instrumentation: oscilloscope, FFT and modulation analyzers
- Sensor's mechanical mounting, temperature and frequency range limits

Day Two

- Reciprocating engine mechanical vibration sources: power-impulse and inertia coupled forces, journal orbits; tappet resonance, star diagram and engine harmonics torsional excitations, damping and Holzet couplings; crank twist, bending and balancing; lubricant cavitations
- Reciprocating vibration sources: PV-timing diagrams, ignition, detonation imbalance, torsional/lateral and tappet-clearance vibration excitations and measurements, imbalance

Day Three

- Bearing Babbitt tension, bonding, temperature, load/temperature hysteresis and fatigue life; arcing and cavitations damage;, crankshaft balance grades
- Propeller static/dynamic balance, prop-balance analyzer, prop mode shapes, engine frame resonance; turbocharger

Day Four/Five

- Turbine engine: aircraft engine design survey, turbojet, turbofan, turboprop and turboshaft
- Antifriction bearings, stiffness, damping, orbit root, life, bearing load arc and matching
- Rotordynamic direct and cross-coupled instability, damping, gyroscopic; roller and hydrodynamic bearings' failure; torsional and lateral vibrations' measurements; rotor fatigue
- Epicyclical/parallel load gearbox vibrations and sidebands
- Blades and vanes, damping coatings, resonance/temperature, aerodynamic excitations, flutter, vortices, erosion, torsion, blade/vane interactions, missing blade; blade crack detection
- Shaft balancing: static, macrobalance and assembly dynamic microbalance
- Combustor acoustic oscillations, damage pulsation levels
- Airborne noise
- Modal analysis

What a participant can expect to learn:

- practical mitigation of excessive aircraft engine process-vibration;
- diagnostic and prognostic evaluation of aircraft engine vibrations;
- demystify aircraft engine and gearing vibration analysis to practical level;
- familiarization with vibration troubleshooting instrumentation;
- introduction to new and state-of-the-art blade crack detection.

AIRCRAFT ICING: METEOROLOGY, PROTECTIVE SYSTEMS, INSTRUMENTATION AND CERTIFICATION

Instructors: Wayne R. Sand, Steven L. Morris

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 (SLD icing)
- 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

"Very interesting and comprehensive introduction to icing conditions and preventions. The instructors are very experienced."

— Zhe Yan, Engineer, Aircraft Integrator
Bombardier Aerospace

Location

Location Las Vegas, Nevada

Date March 4–7, 2014

Course Number AA141300

Times/CEUs

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, Designated Engineering Representatives (DERs) and program managers.

Fee

$2,145

Includes instruction, course and reference notebooks, refreshments and four lunches.

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

Certificate Track

This course is part of the Aerospace Compliance Track and the Aircraft Maintenance and Safety Track. See pages 9 and 10.

AIRCRAFT LIGHTNING: REQUIREMENTS, COMPONENT TESTING, AIRCRAFT TESTING AND CERTIFICATION

Instructors: C. Bruce Stephens, Ernie Condon

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

Location

Location Orlando, Florida

Date November 17–21, 2014

Course Number AA151190

Times/CEUs

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

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

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

$2,445

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

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

Certificate Track

This course is part of the Avionics and Avionic Components Track. See page 10.

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
- Directs 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

"This course is very good, I have learned a lot about the theory, application and certification. Perfect lectures and perfect teacher!"

— Onsite participant

AIRCRAFT STRUCTURAL LOADS: REQUIREMENTS, ANALYSIS, TESTING AND CERTIFICATION

Instructor: Wally Johnson

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)

Day Two

- Introduction to external loads (definitions, static vs. dynamic, flutter, loads classifications)
- Steady maneuvers (wind-up turn, pull-up, balancing tail loads derivations, bal-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)
- Ground handling maneuver loads analysis (taxi, ground turn, nose-wheel yaw, braking, towing, jacking, ground-loads code)
- Fatigue loads analysis (normal operational conditions, missions, load spectra)

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)
- Course summary and wrap-up

A participant can expect to learn:

- the basics of aerodynamics, weights and structural dynamics;
- how the structural loads are developed;
- how the loads group interacts with other groups;
- commercial loads certification requirements;
- the various types of loads conditions;
- the flight and ground testing requirements.

Locations

Location Seattle, Washington
Date April 28–May 2, 2014
Course Number AA141340

Location Orlando, Florida
Date November 17–21, 2014
Course Number AA151200

Times/CEUs

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

$2,445

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.

Certificate Track

This course is part of the Aircraft Structures Track. See page 10.

AIRCRAFT STRUCTURES DESIGN AND ANALYSIS

Instructors: Michael Mohaghegh, Mark S. Ewing

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

Locations

Location Seattle, Washington
Date April 28–May 2, 2014
Course Number AA141350

Location Orlando, Florida
Date November 17–21, 2014
Course Number AA151210

Times/CEUs

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

$2,445

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

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

Certificate Track

This course is part of the Aircraft Structures Track. See page 10.

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, fail safety and damage tolerance, crashworthiness, producibility, maintainability and environment/discrete events

Day Two

- Metals: Product forms, failure modes, design allowables testing, cyclic loads; processing
- Fiber-reinforced composites: laminated composite performance; failure modes and properties; processing; environmental protection
- Material selection: aluminum, titanium, steel, composites and future materials; design exercise

Day Three

- Design to static strength: highly loaded tension structures; combined loads
- Mechanical joints; bonded and welded joints; lugs and fittings; design exercise
- 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

A participant can expect to learn:

- primary requirements for certifiable structural design: static strength, durability and damage tolerance, and how these requirements impact design;
- to recognize the critical role validation plays in both design and analysis;
- to describe similarities and differences between composite and metallic structures;
- to compare and contrast classical analysis methods with FEA to determine the appropriate application.

AIRPLANE AERODYNAMIC DESIGN AND SUBSONIC WIND TUNNEL TESTING

Instructor: Willem A.J. Anemaat

Day One

- Introduction to aerodynamics
- Introduction to Lift, Drag and Moment
- Review of drag polar breakdown for subsonic airplanes, rapid method for drag polar prediction, check of drag polar realism
- Airfoils
- Wings
- Flaps
- Introduction to wind tunnel testing
- Measurements: what to measure and how
- Calibration
- Forces and moments measurements
- Pressure measurements
- Scale effects, Reynolds number effects

Day Two

- Test plan setup
- Trip strips
- Changes to the test plan
- Test management
- Model changes
- Lift
- Drag
- Pitching moment
- Downwash
- Stall
- Deep stall

Day Three

- Longitudinal stability and control
- Directional stability and control
- Lateral stability and control
- Trim, how to use wind tunnel data to check for trimmability
- Ground effects
- Wind tunnel facilities
- Scaling forces and moments to full scale
- Other tests
- Flow visualization: examples

Day Four

- Landing gears
- Winglets
- Dorsal fins
- Ventral fins
- Nacelles
- Inlets
- T-strips
- Brakes and spoilers
- Miscellaneous components
- Component build-up
- Engine intakes, exhausts
- Propellers/power effects, propwash effects on components. Propeller sizing for wind tunnel testing

Day Five

- Model design
- Pressure distributions
- Pressure distribution on finite wings
- Subsonic cruise drag and L/D and range
- Exercise: setup a small wind tunnel test program
- Analyzing wind tunnel test data. Hands-on exercise using wind tunnel data
- Summary

Location

Location Las Vegas, Nevada

Date March 3–7, 2014

Course Number AA141260

Times/CEUs

Monday–Friday 8 a.m.–4 p.m.

Class time 35 hours

CEUs 3.5

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

$2,445

Includes instruction, a course notebook, *Low-Speed Wind Tunnel Testing,* Third Edition, by Jewel B. Barlow; *Airplane Aerodynamics and Performance*, by C. Edward Lan and Jan Roskam; and *Aerodynamic Design of Transport Aircraft*, by Ed Obert, reference materials, refreshments and five lunches.

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

Certificate Track

This course is part of the Aircraft Design Track. See page 9.

AIRPLANE FLIGHT DYNAMICS: OPEN AND CLOSED LOOP

Instructor: Willem A.J. Anemaat

Location

Location Orlando, Florida

Date November 17–21, 2014

Course Number AA151220

Times/CEUs

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

$2,445

Includes instruction, *Airplane Flight Dynamics and Automatic Flight Controls, Parts I–II; Airplane Design, Parts VI and VII; 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.

Certificate Track

This course is part of the Flight Tests and Aircraft Performance Track and the Aircraft Design Track. See pages 9 and 10.

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
- 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 flying qualities criteria; MIL-F-8785C and FARs, Cooper-Harper ratings, relation to system redundancy and the airworthiness code
- Introduction to Bode plots and the root-locus method
- 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
- Exercise using the Advanced Aircraft Analysis software showing stability and control derivatives, trim diagram, longitudinal and lateral-directional trim, take-off rotation, dynamics, flying qualities

What a participant can expect to learn:

- Expect to learn airplane dynamic behavior, how to perform trim, how to check stability, how aerodynamics and propulsion affect flying qualities and trim. Introduction to stability augmentation systems.

AIRPLANE PERFORMANCE: THEORY, APPLICATIONS AND CERTIFICATION (Online Course)

Instructor: Jan Roskam, Mediated by Mario Asselin

This course delivery features streaming video and animated illustrations. We are excited to present this dynamic learning opportunity featuring Jan Roskam.

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

Interaction with the instructor takes place via email.

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

"I have always enjoyed listening to Dr. Roskam. His experience shows with each lecture."

— Online course participant

Online Instruction

Available anytime

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

$1,485 *plus*

$45 (USD) shipping within the U.S.

$110 (USD) shipping to Canada and international destinations

Includes online instruction, *Airplane Aerodynamics and Performance*, by C. Edward Lan and Jan Roskam and *Airplane Design, Parts I, II, and VII*, by Jan Roskam.

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

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

Certificate Track

This course is part of the Flight Tests and Aircraft Performance Track. See page 10.

AIRPLANE PRELIMINARY DESIGN

Instructor: Willem A.J. Anemaat

Location

Location Seattle, Washington

Date April 28–May 2, 2014

Course Number AA141360

Times/CEUs

Monday–Friday 8 a.m.–4 p.m.

Class time 35 hours

CEUs 3.5

Description

Overview of the design decision-making process and relation of design to manufacturing, maintainability and cost-effectiveness. Applicable to jet transport, turboprop commuter transport, military (trainers, fighter bomber, UAV) and general aviation aircraft.

Target Audience

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

Fee

$2,445

Includes instruction, *Airplane Design Parts I–VIII; Lessons Learned in Aircraft Design*, all by Jan Roskam; *Advanced Aircraft Design: Conceptual Design, Technology and Optimization of Subsonic Civil Airplanes*, by Eghert Torenbeek, refreshments and five lunches.

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

Certificate Track

This course is part of the Aircraft Design Track. See page 9.

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; 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

Day Two

- 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
- Examples of weight and balance using AAA
- 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

- 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
- 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?
- Automated Design
- Advanced Concepts including flying wing, hydrogen-fuel airplanes, twin fuselage, joined wing
- Introduction to design optimization

APPLIED NONLINEAR CONTROL AND ANALYSIS

Instructor: Bill Goodwine

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
- The method of harmonic balance
- 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

A participant can expect to learn to:

- identify nonlinear phenomena in the dynamics of physical systems;
- apply the basic tools of Lyapunov stability theory to determine the stability of nonlinear systems;
- use describing functions to determine the existence of limit cycles;
- apply methodologies from adaptive control;
- understand and apply tools for the analysis of center manifolds and bifurcating systems;
- apply methods for the analysis of hybrid and switching systems.

Available as on-site course

Contact us *for a no-cost, no obligation proposal for an on-site course:*

On-site Program Manager
Email aerosite@ku.edu
Phone 785-864-8282

Times/CEUs

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 contains MATLAB programs that can be used as the basis for hands-on exercises.

Target Audience

This course is appropriate for managers and engineers who work in the analysis and design of modern control systems.

Fee

Includes instruction, a course notebook and CD.

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

Certificate Track

This course is part of the Flight Control Systems Design Track. See page 10.

AVIATION WEATHER HAZARDS

Instructor: Wayne R. Sand

Location

Location Seattle, Washington

Date April 29–May 2, 2014

Course Number AA141400

Times/CEUs

Tuesday–Friday 8 a.m.–4 p.m.

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 insight into aviation weather hazards, which should substantially enhance their ability to make weather-related decisions.

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.

Fee

$2,145

Includes instruction and course notebook, refreshments and four lunches.

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

Certificate Track

This course is part of the Aircraft Maintenance and Safety Track. See page 10.

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
- Hail: 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
- Icing sensors, in situ, remote, passive
- Detailed sensors for certification: supercooled liquid water content, droplet sizes, temperature
- How to find and/or avoid icing conditions

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

COMMERCIAL AIRCRAFT SAFETY ASSESSMENT AND 1309 DESIGN ANALYSIS

Instructor: Marge Jones

Day One

- System safety basics including accident statistics/data, system safety vs. reliability concepts, and understanding the 1309 regulation
- Overview of the SAE ARP 4761 Safety Assessment process for commercial aviation
- Determining the required level of safety analysis required

Day Two

- Aircraft and System Functional Hazard Assessments including class exercise
- Overview of the SAE ARP 4754A Development Process focused to capture, validation, and verification of safety requirements using safety assessment techniques
- System architecture concepts, modeling failure conditions from proposed architecture, and assigning development assurance levels including SAE ARP 4754A Guidelines for Development of Civil Aircraft and Systems
- Preliminary System Safety Assessments and allocating safety requirements including common mode mitigations and physical safety requirements (zonal)

Day Three

- Tailoring the safety process for modifications (STCs)
- Failure rate prediction techniques and class exercise
- Failure Mode and Effects Analysis (FMEA)/Failure Mode Effects Summary (FMES)
- Fault Tree Analysis (FTA) concepts, modeling techniques and examples, calculating probabilities, importance measures and software tools
- Class FMEA and FTA exercise

Day Four and Day Five

- Common cause analysis: particular risk, zonal and common mode
- System safety assessment
- Safety analysis and information required to support development of Certification Plans. Guidelines for preparing 1309 safety-related compliance statements

Locations

Location Seattle, Washington
Date April 28–May 2, 2014
Course Number AA141370

Location San Diego, California
Date September 8–12, 2014
Course Number AA151020

Times/CEUs

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 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 detailed review of SAE ARP 4761 and system safety related aspects of ARP 4754A including allocation of safety requirements and assigning development assurance levels. Class exercises include Functional Hazard Assessment, Preliminary System Safety Assessments, Failure Rate Prediction, Failure Mode and Effects Analysis, and Fault Tree 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, system safety specialist new to commercial certification safety process and military personnel procuring civil equipment.

Fee

$2,445

Includes instruction, a course notebook, a CD of references materials, *SAE ARP 4754A–Guidelines for Development of Civil Aircraft and Systems, SAE ARP 4761–Guidelines and Methods for Conducting the Safety Assessment Process on Civil Airborne Systems and Equipment, SAE ARP 5580–Recommended Failure Modes and Effects Analysis (FMEA) Practices for Non-Automobile Applications,* refreshments and five lunches.

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

Certificate Track

This course is part of the Aerospace Compliance Track and the Aircraft Maintenance and Safety Track. See pages 9 and 10.

COMMERCIAL SPACE—WHAT IT MEANS AND THE ISSUES IT RAISES (NEW)

Instructors: Marco Villa, Max Vozoff

Location

Location Orlando, Florida

Date November 18–20, 2014

Course Number AA151260

Times/CEUs

Tuesday–Thursday 8 a.m.–4 p.m.

Class time 21 hours

CEUs 2.1

Description

Leveraging the unique experience of the lecturers, this course will walk participants through the major characteristics, issues, challenges and promises of a new outlook for an industry that is generally highly mature and reticent to change. Multiple examples will be presented as examples of the successes, failures and differences between the new and the traditional approaches, and to illustrate the principles which define this emergent phenomenon.

Target Audience

Designed for engineers, managers, business developers, entrepreneurs, investors, and other professionals at all levels with an interest in reaping benefit from the commercial space phenomena.

Fee

$1,845

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

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

Certificate Track

This course is part of the Management and Systems Track. See page 10.

Day One

- Brief History of Space—Roles of Government and Industry
- Historical Examples of Commercial Space Enterprises—Successful and otherwise
- Current Examples of Commercial Space Enterprises—Products, Services and Target Markets
- Analogies and parallels with history and development of aviation
- International space landscape (agencies, budgets, players, stakeholders)
- Culture Clash—"…when an irresistible force meets an immovable object…"

Day Two

- Intellectual Property—Issues and Management
- The Regulatory Environment—licenses, permits and certifications
- Accepting Government Money—As a Contractor, Partner or Customer
- Policy and Politics
- Safety, Security, Liability and Insurance
- Export Control—Limitations and Opportunities

Day Three

- Terrestrial Markets—Bringing Space Down to Earth
- Space Qualifying—Repurposing Terrestrial Products
- Suborbital Vehicles—Blurring the Boundary
- Potential New Markets—In Space and Beyond
- Investors—Space: The Final Frontier
- Barriers to Entry and Limitations on Growth
- View from the Bridge—Near-Term Prospects and Opportunities

What a participant can expect to learn:

- how the traditional space industry has differed from other industries;
- the key differences in attitude, outlook and approach between the traditional space industry and "NewSpace";
- the reasons for the success of some commercial space companies (and not others);
- the key challenges and hurdles facing the emerging commercial space industry;
- the potential of applying the precepts, processes and products from other industries to space;
- the benefits and challenges of spinning space-derived technologies into other industries;
- the opportunities the emerging commercial space industry offers to small companies, entrepreneurs and investors;
- the hurdles in adapting an existing space company to compete in this new commercial space landscape.

COMPLEX ELECTRONIC HARDWARE DEVELOPMENT AND DO-254

Instructor: Jeff Knickerbocker

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

Enroll in this course and
Integrated Modular Avionics (IMA) and DO-297 (see page 47).

Save money. The cost for the two courses combined is $2,445. To enroll in both courses, use course number AA151090.

A participant can expect to:

- develop and document efficient RTCA/DO-254 compliant processes;
- create, capture and implement compliant requirements design data;
- generate and adhere to effective validation and verification strategies;
- evaluate compliance to RTCA/DO-254;
- understand FAA's policy and guidance.

Location

Location San Diego, California

Date September 8–10, 2014

Course Number AA151000

Times/CEUs

Monday–Wednesday 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

$1,845

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.

Certificate Track

This course is part of the Avionics and Avionic Components Track. See page 10.

CONCEPTUAL DESIGN OF UNMANNED AIRCRAFT SYSTEMS

Instructors: Armand Chaput, Bill Donovan, Richard Colgren

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

Location

Location San Diego, California

Date September 8–12, 2014

Course Number AA151030

Times/CEUs

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

$2,445

Includes instruction, course notebook and five lunches.

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

Certificate Track

This course is part of the Aircraft Design Track. See page 9.

Day One

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

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

A participant can expect to learn to:

- design and analyze overall unmanned aircraft systems;
- estimate sensor size and performance and impact on overall system performance;
- understand basic elements of UAS communications and know how to estimate overall communication system size and power requirements;
- 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 tradeoffs.

DIGITAL FLIGHT CONTROL SYSTEMS: ANALYSIS AND DESIGN

Instructor: David R. Downing

Day One

- Introduction and Problem Definition, Flight Dynamics: development of non-linear equations of motion, development of linear equations of motion, standard trim conditions, development of stability and control derivatives, Classical Design of Continuous Controllers Using SISO Tools: problem definition, Laplace Transforms, complex plane analysis of linear SISO systems, typical compensators, and design of SISO closed loop control systems. Use of frequency response data to estimate unknown transfer functions

Day Two

- Classical Design of Continuous Controllers Using SISO Tools (cont'd): Design of typical continuous lateral and longitudinal control modes for MIMO aeronautical 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 lateral and longitudinal control modes for MIMO vehicles using output feedback techniques

A participant can expect to:

- review flight dynamics to highlight the key features of aircraft dynamics;
- review Classical Single Input/Single Control Design Techniques in the Laplace Domain;
- be introduced to Modern Multi-Input/Multi-Output Linear Quadratic Regulator Design Technique;
- incorporate desirable Classical Controller features into the Linear Quadratic Regulator Optimization Problem by defining new state variables, enhanced command structures and state estimation techniques;
- apply the Classical and Modern Design Techniques to design aircraft flight control systems that can be implemented in the real world.

Location

Location Orlando, Florida

Date November 17–21, 2014

Course Number AA151230

Times/CEUs

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

$2,445

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

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

Certificate Track

This course is part of the Flight Control Systems Design Track. See page 10.

DURABILITY AND DAMAGE TOLERANCE CONCEPTS FOR AGING AIRCRAFT STRUCTURES (Online Course)

Instructor: John Hall

Online Instruction

Available anytime

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. Principal 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.

Fee

$1,245

$35 (USD) shipping within the U.S.

$95 (USD) shipping to Canada and other international locations.

Includes online instruction and course notebook.

The course notebook will be mailed upon receipt of payment.

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

Certificate Track

This course is part of the Aircraft Maintenance and Safety Track. See page 10.

This course delivery features streaming video and animated illustrations.

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

Interaction with the instructor takes place via email.

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
- Future airplanes: design and analysis, MSG-3-Revision 2

"The class was indeed interesting and useful."

— Online course participant

A participant can expect to better understand:

- basic aging airplane programs, including:
  - modifications
  - repairs
  - corrosion prevention control
  - fatigue (SSID/DTR)
  - widespread fatigue cracking
- the potential effects of airplane aging on structural maintenance, including:
  - applicable design
  - evaluation
  - testing
  - manufacturing
  - certification procedures
  - maintenance procedures developed and used by operators and airplane manufacturers

ELECTRICAL WIRING INTERCONNECT SYSTEM (EWIS) AND FAA REQUIREMENTS (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)
- Precipitation Static (P-STATIC)
- High-Intensity Radiated Fields (HIRF)
- Lightning

Day Two

- Aircraft EWIS Best Practices Job Aid—Background and Examples
- Certification of Electrical Wiring Interconnection Systems on Transport Category Airplanes
- EWIS Examples and Practical Applications
- EWIS Workshop

Day Three

- Certification Case Study Design Example
- Electrical Equipment and Installations
- Circuit Protective Devices
- Fire Protection Systems
- Electrical Supplies for Emergency Conditions
- Protection Against Injury
- Electrical Wiring Interconnection Systems Instructions for Continued Airworthiness Using Enhanced Zonal Analysis Procedure
- EWIS Workshop

Day Four

- System Design and Analysis
- Fuel Tank Ignition Source Prevention Guidelines
- Acceptable Methods, Techniques and Practices—Aircraft Inspection and Repair
- EWIS Workshop

Day Five

- CFR Compliance Statements
- Final EWIS Discussion and Questions
- EWIS Final Exam presentations

Location

Location San Diego, California

Date September 15–19, 2014

Course Number AA151140

Times/CEUs

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

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

The course will also include a high level overview of Electromagnetic Compatibility (EMC), High Intensity Radiated Fields (HIRF), Lightning, Precipitation Static, Electrostatic Discharge and Electrical Bonding requirements.

Target Audience

Electrical, Avionics, and HIRF/Lightning Technicians and Designers.

Fee

$2,445

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

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

Certificate Track

This course is part of the Aerospace Compliance Track, Aircraft Maintenance and Safety Track and Avionics and Avionic Components Track. See pages 9 and 10.

ESSENTIALS OF EFFECTIVE TECHNICAL WRITING FOR ENGINEERING PROFESSIONALS (NEW)

Instructor: Paul H. Park

Location

Location San Diego, California

Date September 18–19, 2014

Course Number AA151180

Times/CEUs

Thursday 8 a.m.–4 p.m.

Friday 8 a.m.–11:30 a.m.

Class time 10.5 hours

CEUs 1.05

Description

This course introduces elements of effective technical writing and provides practice in using these elements. The course covers methods to organize documents, techniques for creating figures, guidelines for selecting sentence voice and tense, and guidelines for clear and succinct writing.

Target Audience

Engineering professionals and engineering students

Fee

$695

Includes instruction, handouts, refreshments and two lunches.

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

Certificate Track

This course is part of the Management and Systems Track. See page 10.

Day One

- Introduction, Course Objectives, Organizing Documents, Preparing Figures
- Exercise 1—Develop 2-page Exec Summary Module of Proposal or Report
- Exercise 2—Update Module and Add Bullet Statements
- Lecture/Mini-Exercises—Big-4 Effective Writing Essentials
- Lecture/Mini-Exercises—Guidelines for Clear and Succinct Writing
- Exercise 3—Edit Memo

Day Two

- Exercise 4—Draft Proposal/Report Module
- Student Pairs Edit Proposals/Report Module
- Student Pairs Review Proposal/Report Module Edits
- Prepare Final Draft
- Review Edited Proposals/Reports with Class

A participant can expect to learn:

- a systematic method to organize and build technical documents—reports, proposals, processes;
- basic techniques for creating data-rich, legible figures;
- guidelines for selecting sentence voice and tense;
- guidelines for clear, succinct, and lively technical prose.

FAA CERTIFICATION PROCEDURES AND AIRWORTHINESS REQUIREMENTS AS APPLIED TO MILITARY PROCUREMENT OF COMMERCIAL DERIVATIVE AIRCRAFT/SYSTEMS

Instructors: Gilbert L. Thompson, Robert D. Adamson

This course may be taught by either instructor, based on his availability.

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 62-6, NAVAIR Instruction 13100.15 and Army Regulation 70-62
- Federal Reimbursable Agreement AVS-OA-ACE-12-3035 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
- AC20-169, Guidance for Certification of Military and Special Missions Modifications and Equipment for Commercial Derivative Aircraft (CDA)

What a participant can expect to learn:

- how to plan, during the Request For Proposal (RFP) phase, for leveraging military mission needs with civil certification and embedding same within contract requirements;
- use of TACC and MACC in defining and optimizing civil certification of military mission requirements.

Locations

Location Las Vegas, Nevada
Date March 4–6, 2014
Course Number AA141290
Tuesday–Thursday 8 a.m.–4 p.m.

Location San Diego, California
Date September 15–17, 2014
Course Number AA151100
Monday–Wednesday 8 a.m.–4 p.m.

Time/CEUs

Class time 21 hours
CEUs 2.1

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.

Fee

$1,845

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

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

Certificate Track

This course is part of the Aerospace Compliance Track. See page 9.

FAA CONFORMITY, PRODUCTION AND AIRWORTHINESS CERTIFICATION APPROVAL REQUIREMENTS

Instructor: Jim Reeves

Location

Location San Diego, California

Date September 9–11, 2014

Course Number AA151050

Times/CEUs

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 aircraft with FAA airworthiness certification.

Fee

$1,845

Includes instruction, course notebook, refreshments and three lunches.

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

Certificate Track

This course is part of the Aerospace Compliance Track. See page 9.

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
- Quality System Audit
- Certificate management
- Airworthiness approvals

Day Three

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

"Mr. Reeves brings extensive experience to the class and thoroughly explains the FAA perspective."

— Robert Salyers
Air Tractor, Inc.

FAA FUNCTIONS AND REQUIREMENTS LEADING TO AIRWORTHINESS APPROVAL

Instructors: Gilbert L. Thompson, Robert D. Adamson

The course may be taught by either instructor, based on his availability.

Day One

- Review of course content and identification of attendee key issues
- Overview of FAA Aircraft Certification (AIR) and Flight Standards (AFS) service organization and functions
- Advisory Circular, Notice and Order process and issuance
- Federal Aviation Regulations (FAR) Parts 1 and 11
- FAR Part 21 and the Technical Standard Order Authorization (TSOA) process

Day Two

- Parts 43 and 45
- Part 36 Noise Requirements
- Part 39 Airworthiness Directives
- Part 183 Representatives of the Administrator, including Subpart D, Organization Designation Authorization (ODA); Flight Standards Aircraft Evaluation Group's (AEG) role in aircraft certification
- Parts 23, 25, 26, 27, 29 and 33
- Rulemaking and special conditions, process and issuance
- Equivalent level of safety and exemption process
- Parts Manufacturer Approval (PMA)
- Type Certification (TC) and Supplemental Type Certification (STC) process (FAA Handbook 8110.4)
- Certification Process Improvement (CPI), FAA and Industry Guide to Product Certification, Partnership for Safety Plan (PSP)/Project Specific Certification Plan (PSCP)
- Documentation of typical TC/STC projects
- Safety Management concepts
- FAA Form 337/Field Approval

Day Three

- Continuation of typical TC and STC projects
- Relation of Parts 23 and 25 to Civil Aviation Regulations (CAR), CARs 3 and 4b
- Developing Type Certification Data Sheets (TCDS)
- Noise Certification Part 36; Airworthiness Directive (AD) process, Part 39
- AEG's involvement in MMEL, maintenance and flight manuals
- Flight Standards Information Management System (FSIMS), notices and orders related to airworthiness
- Bilateral Aviation Safety Agreements (BASA)
- U.S./European Union Executive Agreement and the European Aviation Safety Agency (EASA)
- International Civil Aviation Organization (ICAO)

"An essential course for anyone involved in the design, production and maintenance of aircraft."

— Marguerite Russell, Technical Publications Developer
Flight Test Data Systems
The Boeing Company

Locations

Location Seattle, Washington
Date April 29–May 1, 2014
Course Number AA141390
Tuesday–Thursday 8 a.m.–4 p.m.

Location San Diego, California
Date September 10–12, 2014
Course Number AA151070
Wednesday–Friday 8 a.m.–4 p.m.

Times/CEUs

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

$1,845

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

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

Certificate Track

This course is part of the Aerospace Compliance Track. See page 9.

FAA PARTS MANUFACTURER APPROVAL (PMA) PROCESS FOR AVIATION SUPPLIERS

Instructor: Jim Reeves

Available as on-site course

Contact us *for a no-cost, no obligation proposal for an on-site course:*

On-site Program Manager
Email aerosite@ku.edu
Phone 785-864-8282

Times/CEUs

Class time 21 hours

CEUs 2.1

Description

This course will introduce any person producing replacement and modification parts for sale for installation on a type-certificated product how to get a PMA Approval. This includes current suppliers to FAA Type Certificate and Production Certificate Holders.

Target Audience

Aviation part manufacturers/ suppliers who are seeking FAA Parts Manufacturer Approval.

Fee

Includes instruction, course notebook and CD.

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

Certificate Track

This course is part of the Aerospace Compliance Track. See page 9.

Day One

- Introductions
- FAA Organization
- Aircraft Certification Service and Flight Standards Service
- Purpose of the PMA
- Order 8110.42c Introduction—Review Appendix List
- PMA Exceptions
- Quality System Requirements
- Roles of the FAA and Applicant in the PMA process

Day Two

- Product Specific Certification Plan (PSCP)
- Basis for Design Approval
- Applicant's data package
- Special Requirements for Test and Computation Applications
- Part marking requirements
- Responsibilities of PMA holders after approval
- Aircraft Certification Office (ACO) responsibilities
- Designated Engineering Representatives (DERs) and Organization

Day Three

- PMA Process Flowchart
- PMA Manufacturing Inspection District Office (MIDO) Approval, CFR 21 Subpart K
- Elements of a good PMA production quality system
- Quality System Components TC, PC, PMA and TSOA
- Certificate Management of all FAA Production Approval Holders, including overview of the Quality System Audits
- Review a Bilateral Agreement with a Foreign Country
- Review Implementation Procedures for Airworthiness (IPA) Foreign Approvals
- Review and discussion
- Conclusion

FAR 145 FOR AEROSPACE REPAIR AND MAINTENANCE ORGANIZATIONS

Instructor: Paul Pendleton

Day One

- Introduction
- Review of all Federal Aviation Regulations (FARs) with focus on FAR 145
- Development of repair manual for a class airframe versus a limited airframe rating, FAA AC 145-9
- Development of a repair manual for local facility versus off-site locations and specialized services ratings, FAA AC 145-9
- Repairman certification, FAA AC 65-24
- Parts fabrication in repair stations, FAA AC 43-18
- Development of a Quality Manual for FAA Part 145, FAA AC 145-9

Day Two

- Repair stations in countries with FAA BASA, IPA and IPM, FAA AC 145-7A
- Internal evaluation (audit) of all repair stations, FAA AC 145-5
- Development of training programs, FAA AC 145-10
- Hazardous Material Training
- Fabrication of replacement parts, FAA AC 43-18
- Identification of parts, FAA AC 43-213
- Use of commercial parts, FAA AC 43-18

Day Three

- Parts and material receiving inspection, FAA AC 20-154
- Special FAR (SFAR) 36
- Applicability to FAR Part 121
- Field approval of major repairs and alterations using the FAA designee process, FAA AC 43-210
- Processing the FAA Form 337 for major repairs and major alterations of aircraft, engines, etc., FAA AC 43-9-1F
- Overview of manual content in preparation for application of repair station certification
- Discussion and class quiz
- Conclusion

Available as on-site course

Contact us *for a no-cost, no obligation proposal for an on-site course:*

On-site Program Manager
Email aerosite@ku.edu
Phone 785-864-8282

Times/CEUs

Class time 21 hours

CEUs 2.1

Description

This course will introduce students to the details of FAA Federal Aviation Regulation (FAR) 145 and its application process.

Target Audience

Designed for aerospace repair and maintenance organization personnel who are involved with FAR 145 certification.

Fee

Includes instruction, course notebook and CD.

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

Certificate Track

This course is part of the Aerospace Compliance Track and the Aircraft Maintenance and Safety Track. See pages 9 and 10.

FLIGHT CONTROL ACTUATOR ANALYSIS AND DESIGN

Instructor: Donald T. Ward

Available as on-site course

Contact us *for a no-cost, no obligation proposal for an on-site course:*

On-site Program Manager
Email aerosite@ku.edu
Phone 785-864-8282

Times/CEUs

Class time 31.5 hours

CEUs 3.15

Description

Provides an in-depth understanding of actuators, sensors and other components of flight control systems. Includes both analysis and practical use of flight control system components. Reviews good design practices typically used in flight control system design.

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 practices used on both commercial and military aircraft. Students should be acquainted with control design software. (MATLAB/Simulink or Scilab are currently utilized in the course for example problems.)

Fee

Includes instruction, a course notebook, CD 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.

Certificate Track

This course is part of the Flight Control Systems Design Track. See page 10.

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

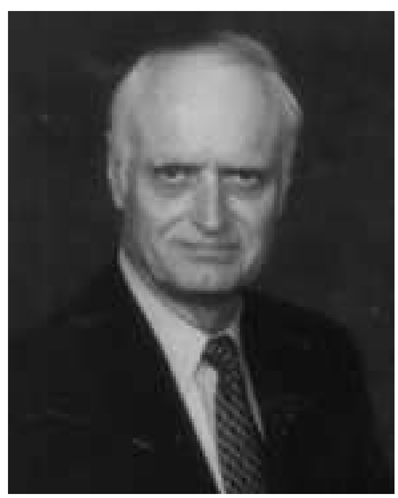
- Electrically powered actuation (Power-By-Wire or PBW) systems (continued)
- Modeling and simulation of PBW examples
- Flight control system design requirements
- Specifications and documents: Power Control Unit (PCU) and Power-Drive Unit (PDU) analysis and design

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



Donald T. Ward
University of Kansas Continuing Education
2012 Distinguished Service Award Recipient

FLIGHT CONTROL AND HYDRAULIC SYSTEMS

Instructor: Wayne Stout

Day One

- Introduction and background, system design methodology, hydraulic system overview
- Hydraulic fundamentals: fluid properties (density, viscosity, bulk modulus), fluid flow (tubes, orifices, servo), spool valves, spool valve control, 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, 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, examples

Day Three

- Servovalves (flapper, jet pipe and motor controlled)
- Power Control Units (PCUs)
- 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
- 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, flight control system design methodology and examples

Day Five

- Flight control system airframe integration, hydraulic system integration, fault detection, fly-by-wire actuation
- Flight control system failure modes (jams, runaways, slow overs), safety analysis issues and redundancy

"Appreciate KU offering a class like this! The KU team is very well organized and they do a great job with these courses."

— Janice Marshall
Thales Avionics, Inc.

Location

Location Orlando, Florida

Date November 17–21, 2014

Course Number AA151240

Times/CEUs

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, 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

$2,445

Includes instruction, a course notebook, *Aerospace Hydraulic System* by Wayne Stout, refreshments and five lunches.

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

Certificate Track

This course is part of the Flight Control Systems Design Track. See page 10.

FLIGHT TEST PRINCIPLES AND PRACTICES

Instructors: Donald T. Ward, George Cusimano

Location

Location San Diego, California

Date September 8–12, 2014

Course Number AA151040

Times/CEUs

Monday–Friday 8 a.m.–4 p.m.

Class time 35 hours

CEUs 3.5

Description

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

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

$2,445

Includes instruction, a course notebook, *Introduction to Flight Test Engineering, Volume I*, by Don Ward, Thomas Strganac and Rob Niewoehner, refreshments and five lunches.

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

Certificate Track

This course is part of the Flight Tests and Aircraft Performance Track. See page 10.

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

"A great course that will no doubt provide a great basis for my career in the flight test and evaluation industry."

— Dominic James Welman, Graduate Flight Physics Engineer QinetiQ

FLIGHT TESTING UNMANNED AIRCRAFT—UNIQUE CHALLENGES

Instructor: George Cusimano

Day One

- Introduction and history
- Fundamentals of flight test
- Typical user requirements
- Typical UAS architecture
- The role of modeling and simulation in flight testing UAVs
- UAV design characteristics
- Flight test mission planning considerations

Day Two

- Fundamentals of performance flight test
- Fundamentals of stability and control flight test
- Parameter identification methods
- Risk management

Day Three

- Human factors considerations
- UAV flight test challenges including:
  - Testing without a pilot
  - Getting off the ground
  - Envelope expansion
  - Testing contingencies
  - See and avoid
- Lessons learned in UAV flight testing
- Summary and wrap-up

Location

Location San Diego, California

Date September 15–17, 2014

Course Number AA151110

Times/CEUs

Monday–Wednesday 8 a.m.–4 p.m.

Class time 21 hours

CEUs 2.1

Description

Flight testing unmanned aircraft systems (UAS) presents unique challenges seldom seen in manned flight test programs. The sources of most of these challenges result from the Development Test and Evaluation (DT&E) of the unmanned test vehicles. This course introduces the methods and challenges associated with flight testing both remotely piloted and command directed (a.k.a. autonomous) vehicles. The course discusses UAV design and employment principles in order to help the student understand how UAVs are flight tested and why.

Target Audience

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

Fee

$1,845

Includes instruction, a course notebook and three lunches.

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

Certificate Track

This course is part of the Flight Tests and Aircraft Performance Track. See page 10.

FUNDAMENTAL AVIONICS

Instructors: Albert Helfrick, Brian Butka, William Barott

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

Locations

Location Seattle, Washington
Date April 28–May 2, 2014
Course Number AA141380

Location Orlando, Florida
Date November 17–21, 2014
Course Number AA151250

Times/CEUs

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

$2,445

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.

Certificate Track

This course is part of the Avionics and Avionic Components Track. See page 10.

Day One

- Early history of aviation and wireless
- History of regulatory and advisory bodies
- Establishment of the National Airspace System, NAS
- Federal Aviation Regulations, FAR
- European regulatory and advisory agencies
- Radio navigation
- Antennas and radio beams
- Nondirectional beacon
- VHF Omni range
- Distance measuring, DME

Day Two

- Long-Range Navigation, LORAN
- Landing Systems, ILS
- Radar altimeter
- Ground proximity warning systems
- Terrain Awareness and Warning System. TAWS
- Satellite navigation
- Global positioning system, GPS

Day Three

- Secondary radar, Mode A/C, Mode S
- Collision avoidance, TCAS
- Automatic Dependent Surveillance, Broadcast, ADSB
- Weather radar
- Lightning detection
- Airborne communication
- Aeronautical telecommunications network
- Data buses/networking
- Compass/gyros
- Air data systems

Day Four

- Inertial navigation
- Laser gyros
- Random Navigation, RNAV
- Required Navigation Performance, RNP Displays
- Human factors
- Electromagnetic compatibility
- High intensity radiated fields, HIRF
- Lightning effects

Day Five

Airborne environment, DO-160
Failure analysis
Safety assessment
Design assurance levels
Reliability prediction, MIL-HDBK 217
Software considerations, DO-178
Hardware considerations, DO-254
Flight data recorder
Cockpit voice recorder
Reliability and safety analysis

"This is a good course for system engineers to take."

— Huong Dinh, System Engineer Rockwell Collins

FUNDAMENTALS OF PROJECT MANAGEMENT FOR AEROSPACE PROFESSIONALS

Instructor: Herbert Tuttle

Day One

- 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

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
- Project cost reporting, computers, project changes, handling changes, team building exercises
- Project or program plans presented by participants; projects evaluated and rated
- Final observations and wrap up

"I found the Program Management course to be very helpful. We covered a lot of topics and were able to have good discussion. I took away a lot of questions from the training that will take back to my company."

— Orlando attendee

Location

Location Las Vegas, Nevada

Date March 4–7, 2014

Course Number AA141310

Times/CEUs

Tuesday–Friday 8 a.m.–4 p.m.

Class time 28 hours

CEUs 2.8

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. Course attendees are asked to bring a current project management problem from your team or organization. During class you will work on developing a reasonable solution and a project plan to accomplish it.

Target Audience

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

Fee

$2,145

Includes instruction, a course notebook, *Project Management: A Systems Approach to Planning, Scheduling, and Controlling*, by Harold Kerzner, refreshments and four lunches.

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

Certificate Track

This course is part of the Management and Systems Track. See page 10.

INTEGRATED MODULAR AVIONICS (IMA) AND DO-297

Instructor: Jeff Knickerbocker

Location

Location San Diego, California

Date September 11–12, 2014

Course Number AA151080

Times/CEUs

Thursday–Friday 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

$1,425

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.

Certificate Track

This course is part of the Avionics and Avionic Components Track. See page 10.

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

Enroll in this course and Complex Electronic Hardware Development and DO-254 (see page 30).

Save money. The cost for the two courses combined is $2,445. To enroll in both courses, use course number AA151090.

A participant can expect to:

- gain valuable insight into the IMA development and certification processes;
- understand the importance of IMA design assurance;
- obtain practical insight into how to address some of the common IMA challenges;
- understand FAA's IMA policy and guidance.

MODELLING AND ANALYSIS OF DYNAMICAL SYSTEMS: A PRACTICAL APPROACH

Instructor: Walt Silva

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

What a participant can expect to learn:

- how to model and analyze a broad range of dynamical systems;
- how to physically interpret the mathematical responses of a dynamical system;
- the physical meaning of nonlinearity and time-invariance.

Available as on-site course

Contact us *for a no-cost, no obligation proposal for an on-site course:*

On-site Program Manager
Email aerosite@ku.edu
Phone 785-864-8282

Times/CEUs

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 and understand mathematical models of real-world dynamical systems.

Fee

Includes instruction, course notebook, *An Engineer's Guide to MATLAB* and *Fundamentals of Signals and Systems*.

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

Certificate Track

This course is part of the Flight Control Systems Design Track. See page 10.

OPERATIONAL AIRCRAFT PERFORMANCE AND FLIGHT TEST PRACTICES

Instructor: Mario Asselin

Location

Location Las Vegas, Nevada

Date March 3–7, 2014

Course Number AA141270

Times/CEUs

Monday–Friday 8 a.m.–4 p.m.

Class time 35 hours

CEUs 3.5

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

$2,445

Includes instruction, a course notebook, *An Introduction to Aircraft Performance*, by Mario Asselin, refreshments and five lunches.

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

Certificate Track

This course is part of the Flight Tests and Aircraft Performance Track. See page 10.

Day One

- Introduction
- Atmospheric models
- Airspeeds
- Position errors
- 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
- Flight Envelope

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

"Course was fantastic. Covered an entire semester at school in one week."

— San Diego attendee

A participant can expect to:

- 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.

PRINCIPLES OF AEROELASTICITY

Instructor: Thomas William Strganac

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
- 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
- Aeroelastic tailoring
- Wind tunnel tests
- Flight tests
- Nonlinear aeroelasticity: limit cycle oscillations, store-induced instabilities
- Concluding remarks

"My background is primarily in linear dynamic loads analysis and I considered Dr. Strganac's short course to be a great introduction to aeroelasticity and flutter."

— John Bright
Aeronautical Engineer Staff
Lockheed Martin Aeronautics Co.

Location

Location San Diego, California

Date September 15–19, 2014

Course Number AA151150

Times/CEUs

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. Topics include solution methodologies, computational methods for aeroelastic analysis, development of the operational flight 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

$2,445

Includes instruction; a course notebook; *Aeroelasticity*, by Raymond Bisplinghoff, Holt Ashley and Robert Halfman; *Introduction to Flight Test Engineering, Volume II*, by Don Ward, Thomas Strganac and Rob Niewoehner; refreshments and five lunches.

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

Certificate Track

This course is part of the Flight Tests and Aircraft Performance Track and Aircraft Design Track. See pages 9 and 10.

PRINCIPLES OF AEROSPACE ENGINEERING

Instructor: Wally Johnson

Location

Location Las Vegas, Nevada

Date March 3–7, 2014

Course Number AA141280

Times/CEUs

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, ground testing, flight testing and certification. Lecture notes are supported by showing examples using Basic Aerospace Engineering software. This course shows the relationship between aircraft certification requirements, engineering analysis and testing.

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

$2,445

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.

Certificate Track

This course is part of the Aircraft Design Track. See page 9.

Day One

- Introduction
- Atmospheric models and airspeed measurements—Calculation of aircraft design airspeeds. Show examples of air properties calculations. Show examples of airspeed unit conversions (i.e. true to calibrated to equivalent to indicated to Mach number)
- Introduction to certification requirements—review of the various certification agencies, requirements, and certificates, review of FAA regulatory and guidance materials. Review of various of means of compliance
- Introduction to aerodynamics—review of basic aerodynamic concepts: low speed and high speed aerodynamics, airfoil fundamentals, finite wings, aircraft aerodynamics. Overview of wind tunnel testing, overview of computational fluid dynamics methods

Day Two

- Weight and balance—calculation of mass properties: weight, center of gravity and moment of inertia; establishing the weight-c.g. envelope, show examples of weight-cg-inertia calculations of various payload/fuel load conditions
- Introduction to propulsion—types of propulsion systems, thrust calculations
- Airplane performance—review basic airplane performance theory; airspeeds, takeoff, landing and cruise performance; climb performance; turning performance, range and endurance
- Flight mechanics—aircraft axis systems, aircraft equations of motion, static and lateral-directional stability, longitudinal and lateral-directional applied forces and moments. Aircraft dynamic stability

Day Three

- Flight maneuvers—steady maneuvers, pull-up, pitch maneuvers, yaw maneuvers, roll maneuvers
- 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

Day Four

- Structural design envelopes—Derive structural design airspeeds, design vertical load factors (V-n diagram), weight-cg envelope
- Structural loads—external loads classifications; 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

Day Five

- 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
- Course Summary

PROCESS-BASED MANAGEMENT IN AEROSPACE: DEFINING, IMPROVING AND SUSTAINING PROCESSES

Instructor: Michael Wallace

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

"This course opened my eyes for stuff that I never thought. It was very good and will help me to help people from my company."

— Las Vegas attendee

Available as on-site course

Contact us *for a no-cost, no obligation proposal for an on-site course:*

On-site Program Manager
Email aerosite@ku.edu
Phone 785-864-8282

Times/CEUs

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

Includes instruction and a course notebook.

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

Certificate Track

This course is part of the Management and Systems Track. See page 10.

PROPULSION SYSTEMS FOR UAVS AND GENERAL AVIATION AIRCRAFT

Instructor: Ray Taghavi

Available as on-site course

Contact us *for a no-cost, no obligation proposal for an on-site course:*

On-site Program Manager
Email aerosite@ku.edu
Phone 785-864-8282

Times/CEUs

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

Includes instruction and a course notebook.

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

Certificate Track

This course is part of the Aircraft Design Track. See page 9.

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 (pre-ignition 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, turboshaft, turbofan and propfan engines

Day Five

- Engine noise: sources, suppression, measurement techniques and practical issues
- Foreign Object Damage (FOD): ice, sand, bird
- Engines for special applications: UAVs, RPVs, HALE, blimps

RELIABILITY AND 1309 DESIGN ANALYSIS FOR AIRCRAFT SYSTEMS (Online Course)

Instructor: David L. Stanislaw

This course addresses the analysis techniques that an applicant needs to know when designing and certifying complex systems on a modern aircraft, according to the FAR 1309 rules.

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 takes place via email.

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
8 Built-in—Test and Probability Perspective Fault Tree Handbook
9 RTCA DO-167 Airborne Electronics Reliability
10 MIL—HDBK—217 Reliability Prediction of Electronic Equipment AFSC 7 Part Derating Guidelines
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

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

$1,485

$35 (USD) shipping within the U.S.

$95 (USD) shipping to Canada and other international locations.

Fee includes instruction online, two course notebooks, *Fault Tree Handbook*, by D.F. Haasle, *SAE ARP 4754A—Guidelines for Development of Civil Aircraft and 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.

Certificate Track

This course is part of the Aircraft Maintenance and Safety Track and Aerospace Compliance Track. See pages 9 and 10.

ROTORCRAFT VIBRATION: ANALYSIS AND PRACTICAL REDUCTION METHODS

Instructor: Richard L. Bielawa

Location

Location California, Maryland

Date June 9–13, 2014

Course Number AA141420

Times/CEUs

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 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 and educators involved in rotorcraft research, design, development and/or testing who seek an understanding of and solutions to rotorcraft vibration issues in contemporary rotorcraft.

Fee

$2,445

Includes instruction, a course notebook, CD, *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.

Certificate Track

This course is part of the Flight Tests and Aircraft Performance Track. See page 10.

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. inplane 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
- Fuselage vibrations basic issues: forced response and vibrations, the rotor as an excitation source and filter, rotor-fuselage interaction, 1P vibrations, the two-bladed rotor
- Full-scale vibration testing of real systems: suspension and excitation techniques, instrumentation, typical shake-test results for helicopters, operational modal analysis

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
- 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

RTCA DO-160 QUALIFICATION: PURPOSE, TESTING AND DESIGN CONSIDERATIONS

Instructor: Ernie Condon

Day One

- Aircraft environment
- Overview of RTCA and DO-160
- Advisory Circular AC 21-16G
- Requirements development and management
- Conditions of tests
- 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
- Flammability

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
- ESD

"Very informative course. Instructor's knowledge of the subject and his experience as DER also adds tremendous value to course content. His sense of humor also kept the course lively and interesting."

— Tanveer Shakeel, Mechanical Systems Engineer
Pilatus Aircraft Limited

What a participant can expect to learn:

- the purpose of each test, and the adverse effects that the test is intended to prevent;
- the ability to properly assign test categories and test levels;
- a basic understanding of each test procedure;
- design considerations to meet the test requirements.

Location

Location Las Vegas, Nevada

Date March 4–7, 2014

Course Number AA141320

Times/CEUs

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 equipment qualification in support of aircraft certification. For system and hardware engineers, the intent is to educate and empower them to develop equipment designs that are compliant with DO-160 by design and avoid expensive redesigns to correct issues found late in the development cycle during test. For test engineers, it is intended to assist them to properly develop test plans for their products. For each test section of DO-160, we provide Purpose, Adverse Effects, Categories, a high level step-by-step through the test procedure, and Design Considerations for passing the test. Also included is an overview of a top-down requirements management approach (systems engineering), review of related FAA advisory material, and overview grounding and bonding, wire shielding practices, and lightning protection for composites.

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

$2,145

Includes instruction, a 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.

Certificate Track

This course is part of the Avionics and Avionic Components Track. See page 10.

SOFTWARE SAFETY, CERTIFICATION AND DO-178C

Instructor: Jeff Knickerbocker

Location

Location San Diego, California

Date September 15–18, 2014

Course Number AA151120

Times/CEUs

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

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

Fee

$2,145

Includes instruction, a course notebook, the *RTCA/DO-178C Software Considerations in Airborne Systems and Equipment Certification*, refreshments and four lunches.

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

Certificate Track

This course is part of the Avionics and Avionic Components Track. See page 10.

Day One

- Introductions and background
- Differences between DO-178B and DO-178C
- DO-178C supplemental documents and where they fit
- Overview of existing standards related to software safety
- Tie between the system, safety and software processes
- History, purpose, framework and layout of DO-178C
- Reading the Annex A Tables
- Configuration management, configuration management objectives and terminology, control categories

Day Two

- 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
- Verification processes—overview of verification, verification of requirements, design, code and testing

Day Three

- Quality assurance (QA) objectives, QA philosophy, SQA approaches, certification liaison objectives, life cycle data
- Supplements including DO-330—Tool Qualification, DO-331—Model Based Development, DO-332—Object Oriented, and DO-333—Formal Methods
- Special topics—partitioning and protection, structural coverage, dead and deactivated code, service history, Commercial-Off-The-Shelf (COTS) software 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—the Software Job-Aid
- Planning process
- Common pitfalls
- Software challenges facing the aviation industry: off-shore development, use of real-time operating systems and other commercially available components, software reuse

A participant can expect to:

- develop and document efficient RTCA/DO-178C and DO-278A compliant processes;
- create, capture and implement compliant requirements, design data and source code;
- evaluate compliance to RTCA/DO-178C and understand the how to integrate DO-178C supplements;
- generate and adhere to effective verification strategies;
- understand FAA's software-related policy and guidance.

STRESS ANALYSIS FOR AEROSPACE STRUCTURES (NEW)

Instructor: Dennis C. Philpot

Day One

- Introduction
- Engineering Mechanics Review
- Introduction to Solid Mechanics
- The Importance and Usefulness of Free Body Diagrams
- Two-Dimensional Theory of Elasticity
- The Airy Stress Functions
- Analysis of Trusses
- Analysis of Beams
- Stability Analysis of Columns
- Analysis of Torsion Rods
- Energy Methods in Mechanical Analysis
- The Usefulness of Energy Methods
- Energy Theorems
- The Principle of Stationary Potential Energy
- Strain Energy in a Variety of Structural Elements
- The Rayleigh-Ritz Method
- Lagrange's Equations of Motion
- Finite Element Method Discussion

Day Two

- Failure Prevention of Engineering Materials
- The Stress Analyst's Primary Task
- Deterministic vs. Probabilistic Stress Analysis
- Design Criteria and Product Specifications
- Computation of Margins of Safety
- Failure by Material Distortion
- Ductile Rupture after Extensive Deformation
- Sudden Fracture of Brittle Materials
- Progressive Fracture through Material Fatigue
- Fundamentals of Deterministic Stress Analysis
- Definition of Stress
- Generalized Hook's Law
- Equilibrium of a 2-D Stress Element
- Derivation of the Principal Stresses
- Mohr's Circle of Stress
- Static Failure Theories for Ductile Failure
- Static Failure Theories for Brittle Failure
- Stress Concentration Factors in Mechanical Design
- Linear Elastic Fracture Mechanics (LEFM) Approach

Day Three

- Analysis of Bolted Joints
- Anatomy of a Bolted Joint (Free Body Diagram)
- Estimating Joint Constants
- The Bolted Joint Diagram
- Calculation of Critical External Load
- Failure Modes of Bolted Joints
- Analysis of Bolts Loaded in Tension
- Analysis of Bolts Loaded in Shear
- Interaction Equation for Combined Loading
- Fatigue and Life Prediction Analysis
- A Brief History of Fatigue Failure
- Mechanism of Fatigue Failure
- Fatigue Stress Concentration Factor and Notch Sensitivity
- Endurance Limit Modifying Factors
- Modified Goodman Approach
- Gerber and ASME-elliptic relations
- Fatigue Crack Propagation and Paris' Law
- Damage Tolerance and Fracture Control

Day Four

- Dynamic Loading
- A Survey of Dynamic Loads
- What We Mean by "Quasi-Static Loads"
- Mode Shapes, Boundary Conditions and Natural Frequencies
- Equations of Motion for Second-Order Systems
- Response of Second-Order Systems to Harmonic Loads
- Response of Second-Order Systems to Shock Loading
- Introduction to Random Vibration
- Linear Response to Random Vibration
- Numerical Optimization
- Introduction and Motivation
- The Optimization Problem
- Unconstrained and Constrained Design Problems
- Optimization Software
- Structural Optimization
- The Finite Element Method
- Multidiscipline Design Optimization
- Closing Remarks

Location

Location San Diego, California

Date September 16–19, 2014

Course Number AA151170

Times/CEUs

Tuesday–Friday 8 a.m.–4 p.m.

Class time 28 hours

CEUs 2.8

Description

This course is designed for the practicing engineer who has an interest in the various aspects of stress analysis in aerospace structural-mechanical design and would like to enhance his or her expertise in this important field. Topics include engineering mechanics, deterministic stress analysis, prevention of failure of ductile and brittle materials, fatigue and fracture mechanics, analysis of bolted joints, dynamic loading and design optimization. Throughout the course, equal attention is given to both the theory and practice of classical analysis as well as modern (numerical/computational) methods used in the industry.

Target Audience

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

Fee

$2,145

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

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

Certificate Track

This course is part of the Aircraft Design Track. See page 9.

STRUCTURAL COMPOSITES

Instructor: Mark S. Ewing

Location

Location San Diego, California

Date September 15–19, 2014

Course Number AA151160

Times/CEUs

Monday–Friday 8 a.m.–4 p.m.

Class time 35 hours

CEUs 3.5

Description

An introduction to high performance composite materials, covering both engineering and manufacturing of composite parts and assemblies. Class starts with the basic material properties of the constituents (fiber and matrix), how they combine to form plies and how to obtain ply properties, how plies combine to form laminates and how to obtain the laminate properties. Other engineering topics include stress analysis, failure criteria and testing methods. To further reinforce the learning process, case studies and lessons learned are discussed. Towards the end of the week, the class becomes more participatory in nature, as the class breaks up into 4–5 person teams, each working on design projects aimed at building confidence with the material and cover areas of special interest or weakness. The teams will be asked to produce a preliminary design package consisting of drawings and sketches, loads, stress and weight analysis, material selection, fabrication process description, tool design, and preliminary cost and production rate analysis.

Target Audience

The course has proven very helpful to (1) those wanting a broad overview and/or a crash course in composites, (2) experienced engineers looking for a refresher course, (3) stress engineers wanting to understand how composites really work or fail and what to look out for when analyzing parts, data and margins, (4) practicing engineers and managers with metal experience wishing to expand their skill set, (5) anyone wanting to jump into the field but does not know how to go about it, and (6) engineering teams embarking on new projects involving composites.

Fee

$2,445

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

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

Certificate Track

This course is part of the Aircraft Structures Track. See page 10.

Day One

- Introduction/historical review of composites usage
- Constituent materials—fibers, matrix
- Analysis tools/formulas to predict mechanical properties of fibers, resins, plies
- Manufacturing introduction

Day Two

- Analysis tools/formulas to predict laminate (stack) elastic properties (classical lamination theory, ABD matrices)
- Constituent materials—weaves, foam and honeycomb cores, adhesives
- Coupon level testing methods, how to use and interpret the data
- Manufacturing high performance composites
- Sandwich cores, adhesives, fasteners

Day Three

- Failure theories and their limitations, proper use of the theories
- Inspection methods
- Manufacturing discussions (cure cycles, processing, defects, inspection)
- Tooling design, issues, materials, costs
- Bonded and bolted joints, how to design and analyze

Day Four

- Composite laminate/part/assembly design guidelines
- Lamination rules
- Hygro-thermal effects
- Interlaminar and free-edge effects
- Durability/environmental issues (impact, fatigue, temp, humidity, EME)
- Design problems

Day Five

- Software tools for stress, manufacturing
- Design project continued
- Summary and wrap-up

"This course is exactly what I needed. Composites are now showing up everywhere. Understanding fiber orientation and the effects of lightning is something that I was needing for proper composites repair design schemes. A top notch course and presentation."

— Harlon Parchment
US Coast Guard

SUBCONTRACT MANAGEMENT IN AEROSPACE ORGANIZATIONS

Instructor: Robert Ternes

Day One

- Overview of course goals 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

A participant can expect to learn:

- critical items that should be in every subcontract;
- ways to measure subcontractor effectiveness;
- better ways to create management and progress reports;
- methods to improve the effectiveness of the subcontract manager;
- techniques to recover when problems occur.

Available as on-site course

Contact us *for a no-cost, no obligation proposal for an on-site course:*

On-site Program Manager
Email aerosite@ku.edu
Phone 785-864-8282

Times/CEUs

Class time 21 hours

CEUs 2.1

Description

Nearly every aerospace organization now develops products with subcontracted activities. Unfortunately, this practice frequently leads to inefficiencies and increased risks. Subcontract and Program managers bear the majority of this increased risk. This course is designed to provide you with tools to reduce that risk and increase the effectiveness of the subcontractors that you manage. The processes, tools and techniques applied to managing lower-tier subcontracts are thoroughly covered and examples of both successful and unsuccessful cases are discussed, as well as integration with existing policies.

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

Includes instruction and a course notebook.

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

Certificate Track

This course is part of the Management and Systems Track. See page 10.

SUSTAINMENT AND CONTINUED AIRWORTHINESS FOR AIRCRAFT STRUCTURES

Instructor: Marv Nuss

Location

Location San Diego, California

Date September 8–11, 2014

Course Number AA151010

Times/CEUs

Monday–Thursday 8 a.m.–4 p.m.

Class time 28 hours

CEUs 2.8

Description

Introduction to aircraft sustainment and continued airworthiness requirements. Use of basic static, fatigue and damage tolerance analysis methods for repairs and alterations. Best practices for setting up fatigue management programs and documentation of instructions for continued airworthiness. Exposure to regulations, compliance policy and guidance, and technical references. Class exercises provide hands-on experience of simple analysis methods. Relevant reference material provided with class notes.

Target Audience

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

Fee

$2,145

Includes course notebook, CD, refreshments and four lunches.

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

Certificate Track

This course is part of the Aircraft Structures Track, Aerospace Compliance Track and Aircraft Maintenance and Safety Track. See pages 9 and 10.

Day One

- Background of sustainment requirements. Focus on evolution of FAA design, maintenance and inspection regulations related to continued airworthiness
- Overview of fatigue management programs (FMP) as they relate to structural sustainment. Similarity between civil and military requirements
- Static strength analysis for repairs and alterations, including a class exercise

Day Two

- Aircraft flight profiles and spectrum development for use in fatigue evaluations, including a class exercise
- Aircraft fatigue analysis for repairs and alterations using basic concepts—material properties, stress concentrations, Miner's rule
- Class exercise
- Aircraft damage tolerance analysis for repairs and alterations using basic concepts—material properties, stress intensity, residual strength, crack growth
- Class exercise

Day Three

- The importance of non-destructive evaluation for damage tolerance based inspection programs. Introduction to common methods and discussion about reliability and probability of detection (POD)
- Class exercise
- The importance of complete Instructions for Continued Airworthiness (ICA). Discussion of regulatory requirements and recommended ICA content
- FMPs—how static strength, fatigue strength, damage tolerance, inspection reliability and ICA fit together. Address widespread fatigue damage (WFD) and limitations of FMPs

Day Four

- Repair and alteration approvals using supplemental type certificates and field approvals. Return to service approvals, service difficulty reporting, major/minor repairs. How operators use MSG-3 process
- Corrosion as it relates to sustainment
- Continuing airworthiness for composite structure
- Risk assessment and risk management concepts
- Related topics, special issues, and wrap up

"Combination between academic theories and real case applications to efficiently explain aircraft structure and continued airworthiness really worked well so that I could cover from the overall concept to practical implementation. I really recommend to try this course to deepen your knowledge as well as to figure out how to apply in real situation."

— Jung Soo Ho, Captain
DAPA

UNMANNED AIRCRAFT SYSTEM SOFTWARE AIRWORTHINESS

Instructor: Willie J. Fitzpatrick, Jr.

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

- Developing 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

A participant can expect to learn:

- key elements required to evaluate or achieve the successful airworthiness substantiation of Unmanned Aircraft System software;
- techniques and approaches for documenting and evaluating the software substantiation/safety case for acceptance by the Unmanned Aircraft System Airworthiness Qualification/Certification Authority;
- the application of acquired knowledge and skills to real world scenarios.

Location

Location San Diego, California

Date September 9–11, 2014

Course Number AA151060

Times/CEUs

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

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

$1,845

Includes instruction, course notebook, CD and three lunches.

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

Certificate Track

This course is part of the Avionics and Avionic Components Track. See page 10.

OUR OUTSTANDING INSTRUCTORS

Robert D. Adamson

FAA Certification Procedures and Airworthiness Requirements as Applied to Military Procurement of Commercial Derivative Aircraft/Systems, p. 36

FAA Functions and Requirements Leading to Airworthiness Approval, p. 38

Robert D. Adamson is a private consultant with more than 30 years of experience in the design, certification and management of FAR Part 23 and Part 25 aircraft projects. He was employed by Raytheon Aircraft for 15 years, holding positions of propulsion engineer, system safety engineer, Designated Engineering Representative (DER) and Airworthiness Engineer (AR) before joining the FAA in 1998. During his FAA tenure, he held positions as a propulsion specialist and program manager for Continued Operational Safety in the Wichita Aircraft Certification Office. He has a B.S. from Southwestern and completed post-graduate requirements from Embry-Riddle University.

Willem A.J. Anemaat

Airplane Flight Dynamics: Open and Closed Loop, p. 23

Airplane Preliminary Design, p. 25

Airplane Aerodynamic Design and Subsonic Wind Tunnel Testing, p. 22

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. Anemaat is the software architect for the Advanced Aircraft Analysis software, an airplane preliminary design tool. He has been actively involved with more than 350 airplane design projects and has run many subsonic wind tunnel tests for clients. Anemaat has more than 25 publications in the field of airplane design and analysis. 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. degree 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 (Online Course), p. 24

Operational Aircraft Performance and Flight Test Practices, p. 49

Mario Asselin is chairman of Asselin, Inc., a company that provides engineering services in performance, stability and control. He is manager flight test center engineering for Bombardier Flight Test Center in Wichita, KS, and is an FAA flight analyst DER. Asselin previously held positions as Manager Flight Test Team CSeries at the Bombardier Flight Test Center in Wichita, senior manager of engineering flight test with Honda Aircraft Corporation, 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.

Richard L. Bielawa

Rotorcraft Vibration: Analysis and Practical Reduction Methods, p. 55

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 associate professor in the department of mechanical engineering, aeronautical engineering and mechanics at Rensselaer 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. 45

Brian Butka is an associate professor of electrical, computer, software and systems engineering at 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. 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. 31

Armand Chaput is a senior lecturer 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.

Richard Colgren

Conceptual Design of Unmanned Aircraft Systems, p. 31

Richard Colgren is a former associate professor of aerospace engineering at the University of Kansas and is vice president of Viking Aerospace. He has 30 years of professional experience within the aerospace industry. He has been an adjunct professor at the University of Southern California and California State University, Long Beach and Fresno. His research focus is on intelligent vehicle systems and controls. Colgren is an Associate Fellow of the AIAA, has more than 130 publications and holds four patents. Colgren received a B.S. in aeronautical and astronautical engineering from the University of Washington, an M.S. in electrical engineering from the University of Southern California and a Ph.D. in electrical engineering with an emphasis in systems, and a minor in aerospace engineering, from the University of Southern California.

Ernie Condon

Aircraft Lightning: Requirements, Component Testing, Aircraft Testing and Certification, p. 19

RTCA DO-160 Qualification: Purpose, Testing and Design Considerations, p. 56

Ernie Condon has 28 years of engineering experience with Hawker Beechcraft. He is a Certification Engineer (DER) in the HIRF/lightning field for Part 23 and Part 25 aircraft, with considerable experience in the certification of carbon fiber aircraft. In addition, he has been a consultant DER in HIRF/lightning and conducting training in electromagnetic effects to departments with Hawker Beechcraft. Condon is a research consultant at WSU/National Institute for Aviation Research (NIAR) for the characterization of electromagnetic effects to carbon fiber aircraft. Condon received a B.S. in electrical engineering from Wichita State University.

Guil Cornejo

Aircraft Engine Vibration Analysis, Turbine and Reciprocating Engines: FAA Item 28489, p. 17

Guil Cornejo is president of RPM & Predictive Engr., a rotating-machinery consulting, process-vibration remediation and training company. Cornejo has more than 30 years of experience in the mitigation of out-of-limit process-vibrations of gas-turbines, reciprocating engines, load-gearbox, centrifugal compressor/pumps, generators, electric-motors and both industrial training and industrial research. Career experience includes submarine noise mitigation at Mare Island, CA and propulsion gear balancing/noise-analysis at Westinghouse in Sunnyvale, California, as well as 20 years at Solar Turbines in San Diego, California. Cornejo holds a B.S. in mechanical engineering from the University of California, Davis, and both an M.S. in mechanical design and a terminal Engineer Degree in vibrations and acoustics from Stanford University.

George Cusimano

Flight Test Principles and Practices, p. 43

Flight Testing Unmanned Aircraft—Unique Challenges, p. 44

George Cusimano has more than 40 years of experience in research, development, and test of important leading edge technologies. He has flight-tested complex systems, such as the F-117, B-2, X-33 (single stage to orbit prototype), DarkStar UAV and X-35 (Joint Strike Fighter prototype). In addition to multiple postings as a flight test engineer, George was: the Director of Test and Evaluation for the F-117 System Program Office; the Chief of Flight Test Engineering for the B-2 Combined Test Force; the Deputy Director of Joint STARS Combined Test Force; and the Director of Flight Test at the Lockheed Martin Skunk Works. George has also taught at the National Test Pilot School and has served as a Technical Advisor to the United States Air Force. He retired from the United States Air Force as a colonel after 24 years of service. George holds a B.S. in mechanical engineering and an M.S. in industrial engineering from Arizona State University. He is a graduate of the USAF Test Pilot School and a Fellow of the Society of Flight Test Engineers.

Bill Donovan

Conceptual Design of Unmanned Aircraft Systems, p. 31

Bill Donovan is president of Pulse Aerospace, LLC, in Lawrence, Kansas. While doing graduate work at the University of Kansas, Donovan worked as a research assistant in the KU Flight Test Laboratory and worked as the chief designer of the Meridian unmanned aircraft system, a 1,100 lb., 26-foot wingspan UAS designed to measure ice thickness and bed surface topology in Antarctica and Greenland. Donovan has worked on the development of several new unmanned aircraft systems, including the Hawkeye UAS, the Wolverine helicopter UAS and the Aggressor II helicopter UAS. Donovan holds a B.S. and M.S. in aerospace engineering from the University of Kansas and is currently completing a doctorate of engineering program in aerospace engineering at KU.

David R. Downing

Digital Flight Control Systems: Analysis and Design, p. 32

David R. Downing is a professor emeritus of aerospace engineering at the University of Kansas. He taught courses and did research in advanced flight control, instrumentation systems and flight testing. Downing was formerly an aerospace engineer at NASA Langley Research Center, a systems engineer at the NASA Electronics Research Center and an assistant professor of systems engineering at Boston University. He received a B.S.E. in aerospace engineering and an M.S.E. in instrumentation engineering from the University of Michigan. He also earned an S.C.D. in instrumentation engineering from the Massachusetts Institute of Technology.

Mark S. Ewing

Aircraft Structural Loads: Requirements, Analysis, Testing and Certification, p. 21

Structural Composites, p. 59

Mark S. Ewing is former chairman of the aerospace engineering department and is currently the director of the Flight Research Laboratory at the University of Kansas. Previously, he served as a senior research engineer in the structures division at Wright Laboratory, Wright-Patterson Air Force Base, and as an associate professor of engineering mechanics at the U.S. Air Force Academy. His research interests include structural vibrations and structural acoustics, especially as related to fiber-reinforced composites. Ewing is a past recipient of the University of Kansas School of Engineering Outstanding Educator Award. He holds a B.S. in engineering mechanics from the U.S. Air Force Academy, an M.S. in mechanical engineering and a Ph.D. in engineering mechanics, both from Ohio State University.

Willie J. Fitzpatrick, Jr.

Unmanned Aircraft System Software Airworthiness, p. 62

Willie J. Fitzpatrick, Jr., has more than 37 years of experience in the software/systems engineering area. His experience includes the development and assessment of automatic control systems, systems engineering and software engineering on various aviation and missile systems. He is currently serving as subject matter expert in software airworthiness and software safety in the Software Engineering Directorate (SED) of the U.S. Army Research, Development, and Engineering Command's Aviation and Missile Research Development and Engineering Center. Fitzpatrick served for over 12 years as the Chief, Aviation Division, SED and was responsible for the management of life cycle software engineering support and software airworthiness assessments for several aviation systems, including Apache, Blackhawk, Chinook and Kiowa aircrafts and unmanned aircraft systems.

Fitzpatrick was honored by the Huntsville Association of Technical Societies (HATS) as the recipient of the Sixth Annual Joseph C. Moquin Award in 2011. He was recognized as the IEEE Huntsville Section 2011 Professional of the Year and 2002 Outstanding Engineer. He has served in various officer capacities for the IEEE Huntsville Section, including Section Chair for 2007 and 2008. Fitzpatrick holds a B.S. in electrical engineering from Tuskegee University, an M.S. in electrical engineering from Stanford University and a Ph.D. in industrial and systems engineering from the University of Alabama–Huntsville.

Bill Goodwine

Applied Nonlinear Control and Analysis, p. 26

Bill Goodwine is an associate professor in the department of aerospace and mechanical engineering at the University of Notre Dame. His research and teaching focus on nonlinear control and dynamical systems, with particular emphasis on geometric methods and hybrid systems. He received his M.S. and Ph.D. from the California Institute of Technology. He was the recipient of a National Science Foundation CAREER award and numerous departmental, college, university and ASEE teaching awards.

John Hall

Durability and Damage Tolerance Concepts for Aging Aircraft Structures (Online Course), p. 33

John Hall began his career in England before joining The Boeing Company in 1966 as a fatigue analysis specialist on the 747. Later he joined a group of specialist engineers responsible for developing company-wide design, analytical procedures and training programs for fatigue, damage tolerance and corrosion control. He was a member of structures working groups responsible for developing new and aging airplane structural maintenance and inspection programs. He was made a Technical Fellow of The Boeing Company for his contributions.

Albert Helfrick

Fundamental Avionics, p. 45

Albert Helfrick is the former chair of the electrical and systems engineering department at Embry-Riddle Aeronautical University. Previously, he was director of engineering for Tel-Instrument Electronics, a manufacturer of avionics test equipment. Before entering academia, he was a self-employed consulting engineer for four years where he and his company designed fire and security systems, consumer items and avionics. He has 49 years of experience in various areas of engineering including communications, navigation, precision testing and measurement, radar and security systems. He performed radiation hardening on military avionics, designed test equipment for the emerging cable television industry, designed general aviation avionics for Cessna Aircraft and precision parameter measuring and magnetic systems for Dowty Industries. Helfrick is the author of 12 books, numerous contributions to encyclopedias, handbooks and other collections. He has more than 100 technical papers and presentations, served as an expert witness in a number of civil cases and testified before Congress. He holds five U.S. patents, is a registered professional engineer in New Jersey, a Life Senior Member of the IEEE, and an associate fellow of the AIAA. Helfrick has received the AIAA Dr. John Ruth Digital Avionics award. He holds a B.S. in physics from Upsala College, M.S. in mathematics from New Jersey Institute of Technology and a Ph.D. in applied science from Clayton University.

Wally Johnson

Aircraft Structural Loads: Requirements, Analysis, Testing and Certification, p. 20

Principles of Aerospace Engineering, p. 51

Wally Johnson is a senior loads engineer and the president of Loads and Dynamics Group Company. He is a structural loads consultant Designated Engineering Representative (DER) for FAR 23 and FAR 25 categories. His responsibilities include design, fatigue, static, dynamic, flight and ground loads analysis. Johnson has 24 years of loads experience. Previously, he worked at Boeing BDS in Wichita as a senior engineer. He also served as a technical specialist and an FAA DER at Raytheon Aircraft Company. He has served as a member of the Aviation Rulemaking Advisory Committee group working to harmonize the FARs and JARs in the area of loads and dynamics. Johnson also has worked as a senior loads engineer at Learjet. He holds a B.S. and M.S. in aerospace engineering from Wichita State University.

Marge Jones

Commercial Aircraft Safety Assessment and 1309 Design Analysis, p. 28

Marge Jones is a system safety consultant specializing in commercial aircraft certification. She has been an FAA DER for safety analysis in structures, power plant, and systems and equipment for more than 24 years. She is also a certified safety professional in system safety. Marge provides safety consultant/product safety services to the aircraft industry and has been involved in a variety of STCs and TCs, many requiring specialized safety assessments. Her area of safety consultation includes defining system architecture and detailed design and safety requirements, performing safety analyses, developing design solutions to safety related issues and evaluating and/or preparing certification documentation for regulations compliance. She has worked on numerous aviation projects including thrust reverser systems, passenger-to-cargo conversions, smoke detection/fire suppression systems, interiors, rotorcraft medical LOX system, display/avionics systems, pressurization systems and engine control systems. Marge also has several years of safety engineering experience with defense systems and NASA payloads. She holds a B.S. in safety engineering from Texas A&M University and an M.S. in systems management from Florida Institute of Technology.

Jeff Knickerbocker

Complex Electronic Hardware Development and DO-254, p. 30

Integrated Modular Avionics (IMA) and DO-297, p. 47

Software Safety, Certification and DO-178C, p. 57

Jeff Knickerbocker is a consulting DER with nearly 30 years of experience as a systems/software engineer. He has led technical teams in designing, developing and verifying real-time embedded software and AEH devices. In addition to industry affiliations, he also provides consulting and training services to the FAA and other non-U.S. regulatory agencies. In 2002, he and his wife started Sunrise Certification & Consulting. Knickerbocker has a B.S. in physics and an M.S. in software engineering.

Michael Mohaghegh

Aircraft Structures Design and Analysis, p. 21

Michael Mohaghegh is a Boeing Technical Fellow in Stress Analysis and Technology Support, with 45 years of experience in designing and analyzing aircraft structures (707, 737, 747, B2, 767, 777, 787) and developing technology needs, roadmaps and design standards. He is the chief editor for the Boeing Design Principles manuals. Previously, he was principal lead engineer, manager and FAA DER for the Boeing Company. Mohaghegh is the director of the Modern Aircraft Structures Certificate Program at the University of Washington. He is the developer and instructor for courses on stress analysis, finite element, fatigue, fracture, composites, airplane components and repairs at The Boeing Company. Mohaghegh has published in the *Journal of Applied Mechanics, Journal of Aircraft, International Journal of Mechanical Sciences, International Journal of Mechanical Engineering Education,* and the Boeing *AERO* magazine. He received his B.S. and M.S. in structural engineering from the University of California, Berkeley, and his Ph.D. in engineering mechanics from the University of Washington.

Steven L. Morris

Aircraft Icing: Meteorology, Protective Systems, Instrumentation and Certification, p. 18

Steven L. Morris is a Senior Managing Consultant and Colorado Manager of Colorado Operations for Engineering Systems Inc. (ESI), Colorado Springs, Colorado. Morris served as an officer and engineer in the U.S. Air Force for more than 24 years. His experience includes teaching, research and consulting in the areas of airplane design, stability and control, aerodynamics, flight simulation, aircraft icing and accident reconstruction. He is a co-author of *Introduction to Aircraft Flight Mechanics: Performance, Static Stability, Dynamic Stability, and Classical Feedback Control.* Morris is an Associate Fellow of AIAA and is a member and Chair on the SAE Aircraft Icing Technology Committee. He received a B.S. in engineering sciences from the U. S. Air Force Academy, an M.S. in aeronautical engineering from the Air Force Institute of Technology and a Ph.D. in aerospace engineering from Texas A&M University.

Marv Nuss

Sustainment and Continued Airworthiness for Aircraft Structures, p. 61

Marv Nuss is the owner of Nuss Sustainment Solutions, an aircraft engineering consulting and training business. He has consulted and/or trained on certification, continued airworthiness, and aircraft research on four continents. Marv has over 40 years of experience in aircraft fatigue, damage tolerance and continued airworthiness. He has worked FAA Part 23, 25 and 27 and Army, Navy and Air Force projects. Nuss retired from the FAA in December 2011 after serving more than 20 years in a variety of engineering and management roles at the Small Airplane Certification Directorate. He was involved in a broad spectrum of continued airworthiness issues for all sizes and classes of aircraft. Prior to joining the FAA, Nuss worked for 18 years as a structural fatigue analyst at Bell Helicopter and McDonnell Aircraft companies. He was involved in several design, in-service, and test projects on helicopters and fighter aircraft. He was also on an on-site design team in Spain. Nuss has a B.S. in aerospace engineering from the University of Kansas and did graduate study in engineering mechanics at the University of Texas–Arlington.

Paul H. Park

Essentials of Effective Technical Writing for Engineering Professionals (new), p. 35

Paul H. Park is a retired Lockheed Martin engineer with more than 35 years' experience in advanced aircraft design. During his career he led preliminary design teams in developing advanced fighters, bombers, rotorcraft, and hypersonic vehicles. He led the configuration design effort for the F-35 program, serving as Air Vehicle Integration IPT lead and subsequently Deputy Chief Engineer. Park also led and authored major sections of proposal technical volumes and reports for the F-35, Joint Multirole Rotorcraft, National Aerospace Plane, Next-Generation Long-Range Strike, and Air Force R&D programs. He is the author of this course, which he has taught to engineers at Lockheed Martin, Bell Helicopter, and engineering students at major universities. Park received his undergraduate degree in mechanical engineering from University of Pennsylvania, and holds graduate degrees in aerospace engineering from Princeton University and Stanford University. He has authored six published papers on aircraft design and was a recipient of the 2002 AIAA Aircraft Design Award.

Paul Pendleton

FAR 145 for Aerospace Repair and Maintenance Organizations, p. 40

Paul Pendleton recently retired from the Federal Aviation Administration where he worked in the Wichita Aircraft Certification Office (ACO) and Military Certification Office (MCO). While with the ACO, Pendleton worked on Bilateral Aviation Safety Agreements (BASA) with various nations, including as a team leader on the BASA with Russia. With the MCO, Pendleton worked as a program manager and engineer on commercial derivative aircraft. Previously, he worked at Beech Aircraft and Learjet in Wichita, Kansas, acting as an FAA Designated Engineering Representative (DER) to develop, certify and manage an

FAA approved repair station, as well as a test pilot and engineer at the National Test Pilot School in Mojave, California. Pendleton has a bachelor's degree in aircraft mechanical engineering from Parks College of Saint Louis University.

D. Mike Phillips

Aerospace Applications of Systems Engineering, p. 16

D. Mike Phillips is a principal research engineer at the Software Engineering Institute, a federally funded research and development center sponsored by the U.S. Department of Defense and operated by Carnegie Mellon University. He led a team that created the CMMI Product Suite, successfully describing key practices for both systems and software engineering. He is the co-author of *CMMI-ACQ: Guidelines for Improving the Acquisition of Products and Services,* which is in its second edition. As an Air Force senior officer, Phillips led an Air Force program office's development and acquisition of the software-intensive B-2 Spirit stealth bomber using integrated product teams. He holds a B.S. in astronautical engineering from the U.S. Air Force Academy, an M.S. in nuclear engineering from Georgia Tech, an M.S. in systems management from the University of Southern California, an M.A. in international affairs from Salve Regina College and an M.A. in national security and strategic studies from the Naval War College.

Dennis C. Philpot

Stress Analysis for Aerospace Structures (new), p. 58

Dennis C. Philpot began his career in the aerospace industry in 1983 at the Rocketdyne Division of Rockwell International, where he was involved in several diverse programs, including the Space Shuttle Main Engines, the National Aerospace Plane, and the International Space Station. In support of these and other programs, Philpot served as both a stress analyst and as a structural dynamics engineer. During the mid to late 1990s, Philpot performed structural analysis on two different fighter aircraft contracts. These included the F/A-18 E/F program for Northrop-Grumman and the Joint Strike Fighter (JSF) for the Lockheed-Martin Skunk Works. He also served as a principal structural analyst on two launch systems—the Kistler reusable launch system and the Delta IV EELV, developed by the Boeing Company. In his current position as chief technologist, Structures and Methods, Philpot is responsible for the structural integrity of Alliant Techsystems (ATK) products and oversees the structural analyses performed at ATK Defense Electronic Systems and subcontractors that support ATK programs. He also serves as the test director for environmental testing (thermal and mechanical) that are conducted for the purpose of hardware development, acceptance, and qualification. Philpot currently leads the ATK *Mechanical Analysis Council* and has authored numerous internal processes, standards and design criteria for mechanical design and development contracts.

Jim Reeves

FAA Conformity, Production and Airworthiness Certification Approval Requirements, p. 37

FAA Parts Manufacturer Approval (PMA) Process for Aviation Suppliers, p. 39

Jim Reeves joined the FAA Atlanta Manufacturing Inspection District Office (MIDO) in 1978 as an aviation safety inspector manufacturing. He then served as manager of the Atlanta Manufacturing Inspection District Office for 28 years. Major activities during his tenure with FAA included development of the FAA Designee Standardization Course, assigned ASI for Embraer San Jose Dos Campos, Brazil 1982–1987, FAA bilateral team to China in 1995 and Malaysia in 1996, ACSEP Team, England 1988, participation in the development of the Certificate Management Information Systems (CMIS) and participation in the development of the Aircraft Certification System Evaluation Program (ACSEP). Reeves participated in or was directly involved with 18 type certificate programs and production certificate issuances.

Jan Roskam

Airplane Performance: Theory, Applications and Certification (Online Course), p. 24

Jan Roskam is the emeritus Ackers Distinguished Professor of Aerospace Engineering at the University of Kansas. His university honors include the 2003 Chancellors Club Career Teaching Award and five-time winner of Aerospace Engineering Educator of the Year selected by graduating seniors. In October 2007, Roskam received the prestigious AIAA Aircraft Design Award for Lifetime Achievement in airplane design, airplane design education, configuration design and flight dynamics education. The author of 15 textbooks, Roskam has had industrial experience with three major aircraft companies and has been actively involved in the design and development of more than 50 aircraft programs. He is a Fellow of AIAA and the Society of Automotive Engineers. Roskam received an M.S. in aeronautical engineering from the Delft University of Technology, The Netherlands, and a Ph.D. in aeronautics and astronautics from the University of Washington.

Wayne R. Sand

Aviation Weather Hazards, p. 27

Aircraft Icing: Meteorology, Protective Systems, Instrumentation and Certification, p. 18

Wayne R. Sand is an aviation weather consultant with expertise in aircraft icing tests, analysis of icing accidents and development of icing instrumentation. He also has extensive expertise in convective weather, winter weather and mountain weather. As former deputy director of the Research Applications Program at the National Center for Atmospheric Research, he developed aviation weather technology for the FAA. Previously, Sand was a member of the atmospheric science department at the University of Wyoming. He also conducted research on thunderstorms and convective icing while at the South Dakota School of Mines and Technology. Sand is co-holder of a patent on a technique for the remote detection of aircraft icing conditions. He holds a B.S. in mathematics and physical science from Montana State University, an M.S. in meteorology from the South Dakota School of Mines and Technology and a Ph.D. in atmospheric science from the University of Wyoming.

Walt Silva

Modelling and Analysis of Dynamical Systems: A Practical Approach, p. 48

Walt Silva is currently a senior research scientist at the NASA Langley Research Center. Silva's interests include computational methods, nonlinear dynamics and system identification. He received a B.S. in aerospace engineering from Boston University, an M.S. in aerospace engineering from the Polytechnic University (formerly known as the Polytechnic Institute of NY) and a Ph.D. in applied mathematics from the College of William & Mary.

David L. Stanislaw

Reliability and 1309 Design Analysis for Aircraft Systems (Online Course), p. 54

David L. Stanislaw is an independent consultant in avionics with emphasis on civil aviation. He held engineering assignments in airborne systems design and later assumed responsibility for avionics and electrical engineering at the airframe level. Stanislaw was an FAA DER for more than 15 years and has conducted seminars on all phases of aircraft electronics. The holder of several radar patents, Stanislaw was a member of RTCA and has participated in international symposiums. He held a commercial pilot rating. Stanislaw received a B.S. in electron physics from LaSalle College.

C. Bruce Stephens

Aircraft Lightning: Requirements, Component Testing, Aircraft Testing and Certification, p. 19

Electrical Wiring Interconnect System (EWIS) and FAA Requirements (new), p. 34

C. Bruce Stephens is an FAA DER consultant at Learjet and a consultant DER at his company, Stephens Aviation, with a wealth of experience in high intensity radiated fields (HIRF) and lightning. Stephens retired from Hawker Beechcraft after 28 years of service. He has HIRF/Lightning experience on both Part 23 and Part 25 including composite aircraft. Stephens is a Six-Sigma/Lean Master Black Belt consultant, developing implementation and training materials, and teaches at a number of universities, including Webster University and Southwestern College. He also owns the company Learning 4.U. Stephens has an executive M.B.A. and M.S. in management from Friends University and a B.S. in industrial technology from Wichita State University.

Wayne Stout

Flight Control and Hydraulic Systems, p. 42

Wayne Stout is an independent consultant with a technical specialization in design, analysis, simulation and certification of aircraft mechanical systems. He has more than 30 years of experience in aircraft mechanical systems as an independent consultant and at Bombardier Aerospace–Learjet, The Boeing Company and Honeywell. Stout has held positions of engineering specialist, systems integrator and chief engineer. His experience covers all design phases from concept to final product across commercial, military and space products. In addition, Stout has been an adjunct professor at Wichita State University and is an FAA DER in flight controls, hydraulics, ECS, pressurization and door mechanisms. Stout received a B.S. in mechanical engineering from the South Dakota School of Mines and Technology, an M.S. in aeronautical engineering from Wichita State University and a Ph.D. in engineering from Wichita State University.

Thomas William Strganac

Advanced Flight Tests, p. 13

Principles of Aeroelasticity, p. 50

Since 1989, Thomas Strganac has served as a professor of aerospace engineering at Texas A&M University. His research and engineering activities focus on aeroelastic phenomena, structural dynamics, fluid-structure interaction, limit cycle oscillations and related nonlinear mechanics. From 1975 to 1989, Thomas served as a research engineer at NASA's Langley Research Center and as an aerospace engineer at NASA's Goddard Flight Space Center. Thomas is an Associate Fellow of the AIAA and a registered professional engineer. He received his B.S. from North Carolina State University and his M.S. from Texas A&M University, both in aerospace engineering, and received his Doctorate in engineering mechanics from Virginia Tech.

Ray Taghavi

Propulsion Systems for UAVs and General Aviation Aircraft, p. 53

Ray Taghavi is a professor of aerospace engineering at the University of Kansas where he teaches courses in jet propulsion, rocket propulsion, aircraft reciprocating engines, fluid mechanics, aerodynamics, advanced experimental techniques and instrumentation. Previously, he was a research engineer at NASA Lewis Research Center conducting experimental research on supersonic jet noise reduction techniques, acoustic excitation of free shear layers and stability and control of swirling flows. He is the co-inventor and patent holder for a supersonic vortex generator. He is a Fellow of the American Society of Mechanical Engineers and an Associate Fellow of the American Institute of Aeronautics & Astronautics. He was the recipient of the Abe M. Zarem Educator Award from AIAA, the Ralph R. Teetor Educational Award from SAE, the John E. and Winifred E. Sharp Award from the KU School of Engineering, Henry E. Gould Award from KU School of Engineering and four-time winner of the Aerospace Engineering Outstanding Educator Award from the seniors of the department of aerospace engineering. Dr. Taghavi received an M.S. from Northrop University and a Ph.D. from the University of Kansas, both in aerospace engineering.

Robert Ternes

Subcontract Management in Aerospace Organizations, p. 60

Robert Ternes is a senior program manager at Atego Aerospace Services, and is a consultant specializing in subcontract management for aerospace organizations, aircraft certification and project management. Mr. Ternes currently manages the PMO for Atego, where he directs the efforts of a broad range of consulting activities. He has provided subcontractor selection, direction and leadership for a wide range of companies including Boeing, Airbus, Lockheed, United Technologies, AAR Corporation, Crane Aerospace, BAE Systems, Raytheon Corporation, WindRiver, Ultra Electronics and Mectron. Prior to Atego, he was a program manager at Honeywell International, a program manager at Motorola, Inc., and a systems engineer at IBM. Mr. Ternes managed subcontractors in programs that included specialized semiconductors, cellular handsets, computer hardware and software, the build and launch of the Iridium space satellite system, custom air transport airframe modifications and several classified aerospace projects. His experiences also include software CMM and CMMI implementation and use in large programs, and system integration. Mr. Ternes has a B.S. in Engineering and Applied Sciences from Yale University where he focused on business and technology. He has a Program Management Professional (PMP) certification.

Gilbert L. Thompson

FAA Certification Procedures and Airworthiness Requirements as Applied to Military Procurement of Commercial Derivative Aircraft/Systems, p. 36

FAA Functions and Requirements Leading to Airworthiness Approval, p. 38

Gilbert L. Thompson is a private consultant in aircraft certification. He has more than 33 years of experience in domestic and international aircraft certification with the FAA. He also has served as a systems engineer; project manager; Manager, Systems and Equipment Branch; Manager, Los Angeles Aircraft Certification Office; and Assistant Manager, Transport Airplane Directorate. His certification experience includes the Robinson R22/R44 rotorcraft, Lockheed L1011, McDonnell Douglas DC-8, DC-9, DC-10, MD-80, MD-90, KC-10A, MD-11, MDHI 369/500NOTAR, MDHI 600, MDHI 900, the first concurrent and cooperative joint FAA/Joint Aviation Authorities certification of the Boeing 717-200, and development of the criteria for civil certification of the military Globemaster C-17. In 1999, he was the recipient of the Aviation Week and Space Technology Laurels Award for outstanding achievement in the field of aeronautics/propulsion. He holds a B.S. in aerospace engineering from the University of Michigan and a B.A. in mathematics from Bellarmine University, Louisville, Kentucky.

Herbert Tuttle

Fundamentals of Project Management for Aerospace Professionals, p. 46

Herbert Tuttle is Professor, Director of Project & Engineering Management and Assistant Dean of Engineering for the KU Edwards Campus. He has instructed there for the past 20 years. In his previous 20 years of professional practice, he was a management consultant, project manager, project engineer and manufacturing manager with various companies. Tuttle holds two undergraduate and three graduate degrees in areas of engineering and management. He has instructed project management internationally and is Certified International Project Manager, CIPM©, a Fellow of the American Academy of Project Management, a member of the Project Management Institute, the American Society for the advancement of Project Management and International Project Management Association. He has published many articles, contributed to number of books and speaks publicly on Achieving Results in Project Management.

C.P. (Case) van Dam

Aerodynamic Design Improvements: High-Lift and Cruise, p. 14

C.P. "Case" van Dam is the Warren and Leta Giedt Endowed Professor and Chair of Mechanical and Aerospace engineering at the University of California at Davis and heads the California Wind Energy Collaborative; a partnership between the University of California and the California Energy Commission. Before joining UC Davis in 1985, he was a National Research Council (NRC) post-doctoral researcher at the NASA Langley Research Center, and a research engineer at Vigyan Research Associates in Hampton, Virginia. Van Dam's current research includes wind energy engineering, aerodynamic drag prediction and reduction, high-lift aerodynamics, and active control of aerodynamic loads. He has extensive experience in computational aerodynamics, wind-tunnel experimentation and flight testing; teaches industry short courses on aircraft aerodynamic performance and wind energy; has consulted for aircraft, wind energy, and sailing yacht manufacturers; and has served on review committees for various government agencies and research organizations. He received B.S. and M.S. degrees from the Delft University of Technology, the Netherlands, and M.S. and Doctor of Engineering degrees from the University of Kansas, all in aerospace engineering.

Paul Vijgen

Aerodynamic Design Improvements: High-Lift and Cruise, p. 14

Paul Vijgen is an Associate Technical Fellow in Washington supporting aerodynamic research, design and development—currently focusing on fuel-burn reduction technologies. Starting at NASA Langley in 1985, he has been involved with application studies and flight tests of laminar flow and other drag-reduction methods to wings, fuselages and nacelles. Flight research activities include high-lift flows, wake-vortex development and supersonic turbulent flows. He supported appendage design and testing for U.S. syndicates in two previous America's Cup campaigns. Vijgen received an M.S. from the Delft University of Technology, The Netherlands, and a doctorate degree from the University of Kansas—both in Aerospace Engineering.

Marco Villa

Commercial Space—What It Means and the Issues It Raises (new), p. 29

Dr. Marco Villa is a partner in mv2space, LLC, a Business Development and Strategy consultancy dedicated to seeing innovative small companies grow and flourish. Marco worked as system engineer and project manager for Swales Aerospace and as a contractor for NASA Wallops and the US Air Force. This time provided Marco with a broad understanding of spacecraft systems as he performed leading roles for many innovative small satellite and launch vehicle systems, including the Air Force sponsored TacSat 3 spacecraft and the Autonomous Flight Safety System. In 2007, Marco joined Space Exploration Technologies (SpaceX), as the Director of Mission Operations. Some of his responsibilities were over the selection and training of operators, ground segment architecture, mission planning, and the final integration, on-orbit operations and recovery of the Dragon spacecraft. Marco was integral in the effort to secure and successfully execute $2.5B in contracts for ISS cargo resupply and crewed Dragon development programs, while also supporting the sales and business development department. A certified Mission Director for Dragon missions to the International Space Station, Marco has been part of multiple successful missions, including lead roles over ISS approach and departure. Marco has a Bachelor's Degree in Aerospace Engineering in 1999 from Politecnico di Milano, a Master's Degree in Aerospace Engineering (Composite Materials) from the University of Kansas in 2002. He also earned his Master's Degree in Engineering Management (Program Management) followed by his PhD in Aerospace Engineering (Space Management) in 2005.

Roelof Vos

Aerodynamic Design of Transport Aircraft (new), p. 15

Roelof Vos is an assistant professor at the Aerospace Engineering Department of Delft University of Technology. He teaches undergraduate courses in conceptual airplane design and two graduate courses on aerodynamic design of transport aircraft and fighter aircraft. He obtained an MSc degree from Delft University of Technology and a Ph.D. degree from The University of Kansas. His research focuses on the development and implementation of design tools for conventional and unconventional airplane configurations.

Max Vozoff

Commercial Space—What It Means and the Issues It Raises (new), p. 29

Max Vozoff is currently an aerospace business development consultant dedicated to seeing innovative small companies in the space sector grow and flourish, to help build a stable and robust commercial space sector. Previously he was SpaceX's Director of Civil Business Development, Senior Design Engineer at NASA's Jet Propulsion Laboratory (JPL), and a communications engineer for commercial companies. At SpaceX, Max was responsible for writing and winning proposals that resulted in over $1.9 billion of business from NASA. Max then managed these highly successful programs for nearly 4 years, including being responsible for development of the Dragon spacecraft. Max's business development responsibilities brought him into regular contact with the highest levels of many commercial spacecraft manufacturers and users internationally, as well as civil and defense management personnel within the US Government. This yielded a wealth of knowledge, insight and ongoing relationships that Max is now leveraging to help multiple clients in the space industry define and implement business strategy, win awards and raise funding. Max has been at the forefront of the emerging "commercial space" or "NewSpace" industry since before its recent rise to prominence and has spoken and written about a wide variety of relevant topics including the challenges it faces. He holds a Bachelor's degree in Electrical Engineering (Communications) from Curtin University in Western Australia and a Masters Degree in Aerospace Engineering (Astronautics) from the University of Southern California (USC).

Michael Wallace

Process-Based Management in Aerospace: Defining, Improving and Sustaining Processes, p. 52

Michael Wallace is an aerospace process management consultant with specializations in knowledge-based engineering and lean manufacturing and information technology. During his 26 years with The Boeing Company, Wallace led the design and implementation of quality improvement techniques including process-based management, knowledge-based engineering and quality management in several in-house processes. As a project manager with The Boeing Company, he was instrumental in introducing process management in factory and office environs and defining and leading process improvement projects that encompassed enhancements in lean manufacturing and information technology. Since retiring from The Boeing Company, Wallace is a frequent presenter on process-based management, along with other related topics such as project management, lean manufacturing and system analysis. He was a Baldrige Examiner with the Kansas Award for Excellence and a board member of the Kansas Center for Performance Excellence. Wallace has an M.B.A. from Wichita State University with extensive study in business and constitutional law and a B.S. in mathematics from the University of Kansas.

Donald T. Ward

Aerospace Applications of Systems Engineering, p. 16

Advanced Flight Tests, p. 13

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Flight Test Principles and Practices, p. 43

Donald T. Ward is a professor emeritus of aerospace engineering at Texas A&M University and a former director of its Flight Mechanics Laboratory. Previously, he served 23 years as an officer in the United States Air Force, retiring as a colonel. His last military assignment was as Wing Commander of the 4950th Test Wing at Wright-Patterson Air Force Base. Earlier tours included Commandant of the USAF Test Pilot School and Director of the F-15 Joint Test Force at Edwards Air Force Base. A Fellow of the AIAA, Ward is the senior co-author of two textbooks, *Introduction to Flight Test Engineering, Volumes I and II.* He is a member of the Society of Flight Test Engineers and the Society of Experimental Test Pilots. Ward holds a B.S. in aeronautical engineering from the University of Texas, an M.S. in astronautics from the Air Force Institute of Technology and a Ph.D. in aerospace engineering from Mississippi State University. Dr. Ward is currently the manager of a Model Based Systems Engineering project designed to radically improve the integration process for complex, software-intensive systems through the use of virtual integration. He has taught short courses for the Kansas University Continuing Education Division for over 30 years.

Mark K. Wilson

Aerospace Applications of Systems Engineering, p. 16

Mark K. Wilson, president of Mark Wilson Consulting, is a systems engineering and aerospace consultant with more than 45 years of systems engineering acquisition experience. He is a founding 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. 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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