



## AERO-PROPULSION April 16-20, 2012

### Course Description

The "Aero-Propulsion" short course has been updated and presented annually since 1964. This is the 63th offering of this unique course, designed to present an overview of aero-propulsion system performance, engine operability, engine technologies, and test and evaluation processes. Current and future air breathing propulsion systems performance and technology status will be presented to engineers, scientists and managers engaged in research, development, maintenance and operation, and test and evaluation. Lecturers from academic, government and industrial organizations who are actively engaged in air breathing propulsion technology will discuss the state-of-the-art and the trends in Aero-Propulsion.

The Aero-Propulsion short course was developed with support and sponsorship of the American Institute of Aeronautics and Astronautics (AIAA) Air Breathing Propulsion Technical Committee (ABPTC), and the Tennessee Section of the AIAA.

### About the Directors

**Dr. Stephen Corda** is the Chairman of the Aviation Systems and Flight Research Program at UTSI. His propulsion adventure started with computational fluid dynamic graduate studies in hypersonic propulsion at the University of Maryland, followed by scramjet research with The Johns Hopkins University Applied Physics Laboratory. At the NASA Dryden Flight Research Center, Dr. Corda conducted propulsion flight research on turbine engines, aerospikes, rockets, pulse detonation engines, external burning systems, and scramjets. He has served as the Chief of the Propulsion and Performance Branch at NASA Dryden, an instructor at the U.S. Air Force Test Pilot School, and an Assistant Professor in Aerospace Engineering at the U.S. Naval Academy.

**Dr. Roger Crawford**, Professor Emeritus of Aerospace Engineering at UTSI, has 40 years of research

and development experience in fluid mechanics, high temperature gas dynamics and propulsion. He served as director of propulsion test at AEDC and conducted research on axial flow compressors and rocket engine turbopumps. He is an Associate Fellow of AIAA.

***SPECIAL NOTE: Lecture notes will be supplied to attendees on a compact disk.***

### Course Schedule

(NOTE: All Times Are Eastern Time Zone)

#### Monday - April 16

##### Air-Breathing Propulsion Fundamentals and Overviews

- 07:30-08:15 Registration  
08:15-08:30 Welcome  
08:30-10:00 Fundamentals of Air-Breathing Propulsion, Cycle Analysis, Component Aerothermodynamics, Performance, and Efficiency  
**Dr. Roger A. Crawford, UT Space Institute, Tullahoma, TN**  
10:00-10:30 Break  
10:30-11:30 Mission Adaptation and Technology Trends in Aero-Propulsion  
**Mr. Joseph Christians, Pratt & Whitney, Co., E. Hartford, CT**  
11:30-12:30 Lunch  
12:30-02:30 Compressors and Fans Aerodynamics  
**Ms. Patricia Cargill, General Electric/AED, Cincinnati, OH**  
02:30-03:00 Break  
03:00-05:00 Turbine Technology and Design  
**Mr. Gary Zess, Pratt & Whitney Co., E. Hartford, CT**

#### Tuesday - April 17

##### Propulsion System Components and Controls

- 08:00-09:30 Subsonic Nacelles: Aerodynamic Design and Performance  
**Mr. David E. Yates, General Electric/AED, Cincinnati, OH**

- 09:30-10:00 Break  
10:00-11:30 Inlets and Exhaust Systems for Multi-Mission Applications  
**Mr. Malcolm MacLean, General Electric/AED, Cincinnati, OH**  
11:30-12:30 Lunch  
12:30-02:30 Technology of Advanced Combustion Systems, Augmentors, Design and Operability, Durability, and Emissions  
**Dr. Clarence Chang, NASA Glenn Research Ctr., Cleveland, OH**  
02:30-3:00 Break  
03:00-05:00 Turbofan Engine Operability, Fan Stability, Compressor Stability, Augmentor Stability, and Control System Requirements  
**Mr. Joseph Priestley, Pratt & Whitney, Co., E. Hartford, CT**

#### Wednesday - April 18

##### Propulsion System Components and Controls (Continued)

- 08:00-09:30 Turbomachinery Aeroelasticity  
**Dr. Daniel Hoyniak, Rolls-Royce Corp., Indianapolis, IN**  
09:30-10:00 Break  
10:00-11:30 USAF Propulsion Controls and Subsystems  
**Mr. Patrick Ethier, ASC-ENFP, Wright-Patterson AFB, OH**  
11:30-12:30 Lunch  
12:30-02:30 Advanced Materials for High Temperature and High Life Applications  
**Mr. Stephen Balsone, General Electric Co., Greenville, SC**  
02:30-03:00 Break  
**Air-Breathing Propulsion Materials, Structures, and Fuels**  
03:00-05:00 Engine Life Development Programs, Damage Tolerant Designs, Engine Structural Integrity Programs  
**Mr. Paul Bascom, JSF ~ PO, WPAFB, OH**

#### Thursday - April 19

##### Air-Breathing Propulsion Materials, Structures, and Fuels (Continued)

- 08:00-09:30 Fueling the Future of Aerospace  
**Dr. James Edwards, AFRL~RZPF, WPAFB, OH**  
09:30-10:00 Break  
**Air-Breathing Propulsion Testing and Evaluation**  
10:00-11:30 Turbine Engine Test and Evaluation Techniques, Facility Capability, and Test Technology  
**Dr. Rob McAmis, Aerospace Test Alliance, Arnold AFB, TN**  
11:30-12:30 Lunch  
12:30-02:30 Turbine Engine Technology: A DOD Perspective  
**Mr. Daniel Thomson, AFRL ~ PRT, WPAFB, OH**

#### Friday - April 20

##### Hypersonic Air-Breathing Propulsion

- 08:00-09:30 An Overview of Air-Breathing Propulsion Flight Testing  
**Dr. Stephen Corda, UT Space Institute, Tullahoma, TN**  
09:30-10:00 Break  
10:00-11:30 AFRL Hypersonic Air-Breathing Propulsion (tentative)  
**Dr. Stephen Corda, UT Space Institute, Tullahoma, TN**

### Presentation of course certificates

### COURSE ADJOURN

CERTIFICATES OF CONTINUING EDUCATION  
UNITS (CEUs) WILL BE PRESENTED FOR  
ATTENDING THIS COURSE.  
UTSI IS ABET ACCREDITED.

## Office of Continuing Education

Reservations may be made by using the registration form. The registration fee of \$1,595.00 includes all necessary supplies. Early reservations are recommended. Refund of registration fee can be made if cancellation notice is received ten working days prior to beginning of the course. Cancellation received less than **10 working days prior to the course** will be assessed 20% of the registration fee. Registration within the 10 working days prior to the course is also subject to the same cancellation policy. Substitution may be made at any time.

Please register by mail, FAX, or telephone. A telephoned, mailed, or faxed reservation made **by an official training office** is considered a firm registration and cancellation policy will apply. A letter of acknowledgment will be mailed to the individual for whom the reservation is made, or to the training office, as we are instructed. Class size will be limited to ensure optimum interaction among participants. UTSI reserves the right to cancel the course. The liability of The University of Tennessee Space Institute is limited to the registration fee. UTSI will not be responsible for airline ticket cancellation fees or any other expenses incurred because of course cancellation. Enrollees will be notified and a full refund will be made. Late applicants will be considered on a space available basis.

The course is payable in advance. The fee does not include expenses for motel accommodations or meals. Payment may be made by check, money order, or invoicing your company. Please note that there is a \$10.00 billing charge for invoicing commercial companies. Be sure to include attendee name(s) and course title with check. Please make checks payable to The University of Tennessee Space Institute. **VISA, MasterCard, and Discover are accepted.**

UTSI reserves the right to substitute speakers in the event of unusual circumstances. UTSI does not sell the course notes. You must attend the course in order to receive the material. Training taken to maintain or improve professional knowledge and skills is usually tax-deductible. Consult your tax advisor. **Please notify us if you require wheelchair access or other accommodations.** Casual dress is appropriate.

Enrollment may be made by individuals or companies. Any number of persons may enroll from a single organization so long as there are vacancies. We suggest that you phone us of your intention to enroll as soon as you initiate your organization procedure so we can hold a place for you and be better able to plan the arrangements. Phone the Continuing Education Director at (931) 393-7276 and then follow with the written application.

A place in the course will be reserved for industry personnel and government employees who require time to obtain authorization. Organizations may enroll for a given number of individuals, supplying the names at a later date, if necessary. For all such enrollments or reservations, the individual names should be received by the Institute as soon as possible to ensure a place in the course. For additional applications, use separate sheet giving all particulars required on the application form.