

# PANS-OPS COURSE RNAV/GNSS/RNP

## Seminar

**January 12-30, 2009, Orlando, Florida**

**Price \$4,000 (USD)**

**Convenient to Local Area Attractions**

### Course Description:

This 3 week course is based on the ICAO Procedures of Air Navigation – Operations (PANS-OPS, Doc 8168), associated Standards and Recommended Practices (SARPS) in Annexes, manuals and supplementary materials. The course begins with general principles of area navigation (RNAV) and extends through Global Navigation Satellite Systems (GNSS), augmented GNSS (SBAS and GBAS) to Performance-based Navigation (PBN) concepts applied to Required Navigation Performance (RNP) and RNP/Authorization Required (RNP/AR). Studies in principals of RNAV include path definition, geodetic calculations and general RNAV criteria. Emphasis of the course is on satellite navigation which includes principles and performance specifications of system operation relating to instrument procedure design and implementation. Criteria and application for GNSS and RNP are covered for arrival, approach, missed approach and departures. The format of the course is interactive lecture with numbers of desk exercises and two comprehensive practical laboratory procedure design sessions. Material is also included on Flight Validation principles.

### Course Outline:

#### **PANS-OPS RNAV, GNSS, PBN COURSE DURATION: 3 WEEKS**

##### **Area Navigation (RNAV)**

- General Principles
- Earth-Referenced Navigation
- Path Definition
- VOR/DME RNAV
- DME/DME RNAV

##### **GNSS**

- Introduction to GNSS
- Path Definition
- Earth Model
- Calculation of Fixes and Paths
- Airborne Equipment Operation
- Procedures Criteria and Application
- Practical Exercise

## Office of Professional Education

### **Vertical Navigation (VNAV)**

- Principles of Baro VNAV
- Final Approach Segment
- Vertical Path Definition
- Temperature Effects and Compensation
- Missed Approach
- Promulgation of Procedures
- Practical Laboratory Design Exercise

### **Augmented GNSS**

- System Operation
  - SBAS
  - GBAS
- Path Definition
  - Lateral
  - Vertical
- Design Criteria
- Final Approach Segment
- FAS Data Block

### **Introduction to PBN and RNP**

- General Principles
- Navigation Performance
- Areas for RNP segments
- Approach Criteria
- Missed Approach
- Procedure Construction
- Promulgation
- RNP/AR approach criteria

### **RNAV/GNSS/RNP Departures**

- General Criteria
- Straight
- Turning
- GNSS Departure Exercise

### **Flight Validation of Procedures**

**For more information contact the Office of Professional education at 386-226-7694 or [training@erau.edu](mailto:training@erau.edu).**

