

**CN413 GNSS Integrity**  
**ION GNSS 2007, September 24, 2007, 1:30 pm - 5:00 pm, CEU: 3.0**

**Instructor:** Dr. Christophe Macabiau, ENAC (Ecole Nationale de l'Aviation Civile)

**Prerequisite:** Some knowledge of mathematics and computer science will be useful.

**Intended Audience:** Engineers, scientists, and managers interested in the area of GNSS using GPS, Galileo, Glonass, and/or other satellite navigation systems. The course provides information on the concept of integrity for GNSS and ways to attain it. Additionally, details on receiver Autonomous Integrity Monitor (RAIM) techniques are presented. Knowledge of basic fundamentals for GNSS and positions solutions computation from CN405 Fundamentals of GNSS I would be helpful.

**Notes Provided:** Slides presented will be professionally spiral bound, with clear plastic cover, including color to add clarity where needed.

**Reference List:** A reference list will be provided as part of the note package for completeness and to allow the interested attendee to obtain additional information.

**Course Overview:** This course provides information on obtaining integrity in GNSS applications. An overview of the different ways to obtain GNSS integrity for various applications will be discussed followed by details on GNSS integrity in civil aviation applications, and particularly on receiver autonomous integrity monitoring (RAIM) approach. The course concludes with several practical examples.

**Course Content:** The main topics to be covered by this course are:

GNSS integrity overview:

- Definition for applications
- Integrity and continuity trees
- Integrity monitoring
- Requirements on integrity monitoring performance
- Overview on integrity monitoring techniques

GNSS Integrity for civil aviation:

- Integrity requirements & monitoring for civil aviation applications
- Augmentations proposed and implemented: ABAS, GBAS, SBAS

RAIM:

- Algorithm specifications from high level requirements
- Detection criterion
  - fault detection
  - fault exclusion
- Horizontal, Vertical, and other Protection Level (PL) computation
- Practical examples

**Course Outcomes:** At the completion of this course, the attendee should have a good understand the fundamental concepts of GNSS integrity, how to attain it for various applications, and knowledge of RAIM.