

CN433 Future GNSS Signal Processing I
ION GNSS 2007, September 25, 2007, 8:30 am-12:00 pm, CEU: 3.0

Instructor: Dr. Olivier Julien, ENAC (Ecole Nationale de l'Aviation Civile)

Prerequisite: Some knowledge of mathematics and computer science will be useful. Additionally, knowledge of basic GNSS signal processing and receiver functions will help (i.e., CN430 Basic GNSS Signal Processing).

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 GNSS receiver signal processing and architecture (acquisition and tracking) focusing on future GNSS signals.

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 an excellent overview of future GNSS signal processing and the many aspects that affect GNSS receiver performance. The course starts with requirements on future GNSS signal structures, and then addresses the receiver architecture for future GNSS signals acquisition and tracking.

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

Receiver Requirements for Design:

- Review of future transmitted civil GNSS signal model: GPS L1 C/A, GPS L5, GALILEO E1 OS (BOC and MBOC), GALILEO E5 (E5a/E5b)
- Results on budget link for GPS L1, L5 and GALILEO E1, E5a/E5b
- Application constraints : market, cost, environment, standards

Signal Processing Architecture for future GNSS Signals:

- The GNSS signal processing essential brick: the Correlator output model
- Signal Acquisition in presence of noise:
 - Review of acquisition results for GPS L1 C/A
 - Acquisition detectors for GPS L5 and GALILEO E5, GALILEO E1
 - Acquisition performance for GPS L5 and GALILEO E5, GALILEO E1
- Signal Tracking in presence of noise:
 - Review of tracking loops for GPS L1 C/A: PLL, FLL, DLL
 - Dedicated PLLs and their performances for GPS L5 and GALILEO E5 and E1
 - Dedicated DLLs and their performances for GPS L5 and GALILEO E5 and E1

Course Outcomes: At the completion of this course, the attendee should have a solid understanding of the fundamentals of GNSS signal processing, including future GNSS signals, necessary within GNSS receivers of the future.