

**CN426 GNSS Signals and Systems with emphasis on Galileo  
ION GNSS 2006, September 24, 2007, 1:30 pm-5:00 pm, CEU: 3.0**

**Instructor:** Dr. Tony Pratt, Orbstar Consultants

**Prerequisite:** Some knowledge of mathematics and computer science will be useful and knowledge of GNSS signals and systems (i.e., CN425 GNSS Signal & Systems with emphasis on Galileo).

**Intended Audience:** Engineers, scientists, and managers interested in the area of GNSS using GPS, Galileo, Glonass, and/or other satellite navigation system. Emphasis will be on performance of GNSS signals used in GNSS with particular emphasis Galileo and new GNSS signal formats. The course provides a solid foundation for navigation signal formats, characteristics, and performance. This course is a continuation of the topics covered in CN425 GNSS Signals and Systems with emphasis on Galileo.

**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 a solid foundation for the performance of GNSS Signal formats and emphasizes the new signal and services for Galileo. Details on GNSS signal spreading codes and their performance in noise, multipath, and interference are provided. Additionally, the performances of the Galileo signals are characterized with respect to the GPS signal formats.

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

Interference Aspect for GNSS Signals:

- Interference consideration for GNSS spreading codes
  - Inter & Intra interference between Galileo & GPS
  - Galileo/GPS satellite power control
  - Spectral Separation Coefficients (SSC) with lists for SSC values

Signal generation effects at the satellite:

- GNSS satellite signal generation and filter effects
- GNSS satellite antenna effects

Link Performance Characterizations:

- Down link signal link budgets
- Signal-to-Noise ratio budgets
- User range error
  - Cramer-Rao lower bound on tracking performance
- Multipath consideration for Galileo & GPS signals
  - Relationship to transmitted & receiver bandwidth

**Course Outcomes:** At the completion of this course, the attendee should have a solid understanding of the fundamentals of navigation signals, their characteristics, and performance used in GNSS.