

CN441 Fundamentals of Antennas for Global Navigation Satellite Systems (GNSS)
ION GNSS 2006, September 26, 2006, 1:30-5:00 pm, CEU: 3.0

Instructor: Dr. Chris G. Bartone, P.E., Associate Professor, Ohio University

Prerequisite: Knowledge of mathematics, electromagnetics and introduction to satellite navigation systems (e.g., CN405 Fundamentals of Satellite Navigation Using GPS I) will be useful. (Knowledge of vector calculus and Maxwell's Equations is not needed.)

Intended Audience: Engineers, scientists, and managers involved with the design, development, implementation, and/or use of system using GPS, Galileo, and/or Glonass. The course provides a solid basis in the fundamentals of antennas and in particular for applications in systems where GNSS is used. The course is considered as an introduction to GNSS antennas course.

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 emphasizes the fundamentals of antenna for GNSS applications. The course will present a solid basis for understanding fundamentals of antennas, antenna types, design, development, tests, and implementation aspects of GNSS antennas. The course concludes with an introduction to advanced user equipment antennas such as controlled reception pattern antenna (CRPA).

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

- Fundamentals of Antennas:
 - Antenna pattern and field descriptions
 - Mismatch losses (Γ , SWR, polarization)
 - Wave and antenna polarization
 - Antenna and receiver noise figure considerations
 - Antenna aperture
 - The Friis transmission equation
- Antenna Types:
 - Linear wire antennas
 - Helix
 - Aperture
 - Patches
 - Arrays
- Ground plane effects
- Antenna Specifications
- Antenna Siting Issues: Mask angle, multipath, etc.
- Test and Evaluation:
 - Computer simulation tools

- Component level evaluations
- Antenna test range options
- Field test characterization
- Advanced Antenna UE Developments for AJ
 - FRPAs, CRPAs, characteristics (overview)

Course Outcomes: At the completion of this course, the attendee should have the ability to understand the fundamentals of antenna systems and their applications in GNSS. Additionally, knowledge gain in the understanding and implementation of various GNSS antennas will enable enhanced system performance.