Course 122: GPS/GNSS Fundamentals & Enhancements (1.2 CEUs)

(Days 1 and 2 of Course 346)

SAME AS DAYS 1 AND 2 OF COURSE 346 DAY 1 DAY 2 **GPS Principles and Technologies** Clocks and Timing • Importance for GPS **GPS System Description** Overview and terminology Timescales Principles of operationAugmentations Clock types Stability measures Trilateration Relativistic effects Performance overview Modernization **Geodesy and Satellite Orbits** Coordinate frames and geodesy **GPS Policy and Context** Satellite orbits Condensed navigation system history GPS policy and governance GPS constellation Constellation maintenance Modernization program **Satellites and Control Segment** Ground seament Other satellite navigation systems Control segment components and operation GPS Applications • Land Monitor stations, MCS, and ground antennas Upload operations Marine Ground control modernization Science Personal navigation Accuracy measures Error sources Legacy GPS Signals • Signal structure and characteristics • Modulations: BPSK, DSSS, BOC **Error Sources and Models** Sources of error and correction models GPS signals in space performancelonospheric and tropospheric effects Signal generation Navigation data Multipath Measurements and Positioning Pseudorange and carrier phase measurements **Augmentations and Other Constellations** Augmentations: local-area, satellite-based, and regional Least squares solution Dilution of precision • Russia's GLONASS Types of positioning solutions Europe's Galileo

JUST NEED THE FUNDAMENTALS?

Take Course 122, which covers all the major areas of GPS.

Instructor





Dr. Chris Hegarty

GPS Receiver Basics

- Types of receiversFunctional overview
- Antennas

China's Compass (BeiDou)

- Precise Positioning
 Precise positioning concepts
- · Reference station networks
- RINEX data format

Objectives

- To give an comprehensive introduction to GPS technology, system concepts, design, operation, implementation and applications.
- To provide detailed information on the GPS signal, its processing by the receiver, and the techniques by which GPS obtains position, velocity and time
- ◆ Note: Course 122 is the same as days 1 and 2 of Courses 336, 346 and 356. The concepts presented in 122 are expanded in depth in the subsequent courses.

Prerequisites

· Some familiarity with engineering terms is helpful but not essential.

Who Should Attend?

- Engineers and technical professionals seeking conceptual explanations of GPS / GNSS technology, operation, capabilities, applications, and development trends
- Professionals in navigation, positioning, and related fields who are concerned with the capabilities, operation and principles of GPS and related GNSS systems.
- System analysts and specialists who need general information on position data and its use
- Managers concerned with GPS, GNSS activities, or the positioning field.

Materials You Will Keep

- A color electronic copy of all course notes provided in advance on a USB drive or
- Ability to use Adobe Acrobat sticky notes.
- NavtechGPS Glossary of GNSS Acronyms.
- A black and white hard copy of the course notes.
- ◆ Introduction to GPS: The Global Positioning System, 2nd ed., Ahmed El-Rabbany, Artech House, 2006., OR GPS Basics for Technical Professionals, P.
- Note: This textbook offer does not apply to private group contracts. Any books for group contracts are negotiated on a case by case basis.

Course Fee Entitles You to the Following Books

Introduction to GPS: The Global Positioning System, 2nd ed., Ahmed El-Rabbany, Artech House, 2006., GPS Basics for Technical Professionals, Pratap Misra, Ganga-Jamuna Press, 2016. (Note: This arrangement does not apply to on-site contracts. Any books for on-site group contracts are negotiated on a case by case basis.)

What Attendees Have Said

"I liked the overall flow and design of the course, especially because I was trying to take the full 4-day [course]. I feel we touched pretty much all major points."

- Devashish Chandekar, Spirent, San Jose, 2018

"I came into the course with only basic GPS knowledge. The course provided a wealth of information and appreciation of GPS technology. The course exceeded expectations."

- Rex Rotebuck, USCG, 2016

"My main objective was to gain a better understanding about the GPS system as a whole. The course met my objective and having the course content in hard/soft copy is a great bonus!'

- Military Attendee, Name withheld upon request, 2016