

Program

MODULE I: Satellite Navigation Principles [64 hours]

Elements of Geodesy [10h]

- ✚ Shape of the Earth
- ✚ Reference Surfaces and Datums.
- ✚ Coordinate Systems used in Geodesy.
- ✚ The Conformal Mapping Models: Transverse Mercator Model and Lambert Conformal Model.
- ✚ Terrestrial Geometric Geodesy Methods.

Satellite Positioning [10h]

- ✚ Condensed GNSS Program History
- ✚ Kepler's Laws, Keplerian orbit theory.
- ✚ Description of the satellite orbital motion.
- ✚ Definition and expression of the orbital elements
- ✚ Positioning Methods by Radio navigation
- ✚ General Geometric Principle of the Positioning satellite
- ✚ Satellite Systems, ECI, ECEF. WGS 84
- ✚ Coordinate of the Actual and the projected GNSS Systems [GPS, GLONASS, GALILEO, COMPASS, Etc...]

The Global Positioning System [GPS] [34h]

- ✚ GPS Architecture.
- ✚ GPS Positioning Principles
- ✚ GPS Positioning Methods [Autonome, differential]
- ✚ GPS Observables
- ✚ GPS Positioning modes
- ✚ Modeling and Processing of GPS Observations
- ✚ GPS Geodetic Campaign preparation and Observation Strategy
- ✚ Validation of the GPS Observations

GNSS Receiver Architecture [4h]

- ✚ GNSS Receiver Characteristics.
- ✚ The different types of GNSS Receivers.
- ✚ Error
- ✚ GNSS Antennas.

Satellite Positioning [10h]

- ✚ GPS-M [Modernised GPS].
- ✚ GLONASS-M [Modernised GLONASS].
- ✚ GALILEO, COMPASS [or BEIDOU]. and Interoperability Issues.

MODULE II: GNSS Applications [40 hours]

GNSS Augmentation System [9h]

- ✚ Definition and Functioning Principles of the following systems:
SBAS: WAAS, EGNOS, MSAS, BEIDOU, GAGAN, STARFIRE, STRAFIX... Etc.
GBAS, GSBAS, GRAS, LAAS, WADGPS

GNSS Application [24h]

- ✚ Combination of GNSS and other sensors
- ✚ Uses of GNSS for different transportation sectors [Marine, Air and Land].
- ✚ GNSS is Surveying, Mapping, and Geographical Information Systems.
- ✚ Location Based Services.
- ✚ Agriculture and Food Security, Communications and Health
- ✚ Security and Environmental Protection
- ✚ Disaster Management
- ✚ Management of Natural Resources
- ✚ Regional Cooperation
- ✚ Hands on Training

- ✚ Choice's Criteria of GNSS and other sensors
- ✚ Different types of GNSS Software's.
- ✚ User Equipment Needs for Specific Markets
- ✚ How to establish a GNSS equipment Order
- ✚ Discussion.

GNSS Regulation [Law] [2h]

N.B: The Courses will be Consolidated by Practical Work and Demonstration Sessions

