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.
- 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

**GNSS Regulation [Law] [2h]**
- Choice's Criterions 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.

**N.B:** The Courses will be Consolidated by Practical Work and Demonstration Sessions
## International Training Course

**“Satellite Navigation and Location Based Services”**

From October, 4th to October 29th, 2010.

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**Modul e 1**

- Satellite Navigation Principles
- Elements of Geodesy
- Satellite Positioning
- The Global Positioning System (GPS)
- GNSS Receiver Architecture

**Modul 2**

- GNSS Augmentation Systems
- GNSS Applications
- GNSS Markets
- GNSS Religion (Law)

**Closed Ceremony**