

Geomatics AA. 2021-.22

Geodesy. The shape of the Earth. The geoid, Gravity field of the Earth. level surface and plumb lines. The ellipsoid. Geometry of the ellipsoid: semi axes, radius of curvature. Geographic coordinates. Geoid undulation, orthometric height, ellipsoidal height. EGM2008. Global coordinates system: latitude, longitude; Cartesian coordinate. Meridian and parallel. Prime Meridian. relationship between Geographical and cartesian coordinate. Local coordinate system: polar coordinates and cartesian coordinates. Azimuth of a geodetic. Eulerian system. relationship between global and local (Eulerian) cartesian system. Datum: horizontal datum, vertical datum. Horizontal reference surface and vertical reference surface. Conventional definition of a reference system. Realization of a reference system. From local datum to global datum. ITRS Datum, WGS84 datum. ETRS datum. Datum Transformation: equation based method and grid based methods.

Map Projection: the map projection problem, classification of projection based on distortion, classification of projection based on the surface. Cylindrical projection, normal and trasverse. Guass projection. Definition of x axis and y axis in gauss projection. Projected graticule of Gauss projection. Analysis of map distortion of the gauss projection. Universal Traverse Mercator. UTM/UPS. Differences between Gauss and UTM coordinates. UTM zones and bands. Map classification. Scale of a map. Information of a map. Elevation factor a scale factor. Azimuth on the map: bearing or grid azimuth, grid convergence, arc-to-chord correction. Determination of an azimuth from a utm map. Determination of a terrestrial distance from a utm map. Elements of GIS.

GNSS. GNSS systems. GPS system. Space segment, user segment, control segment. GPS signal, carrier signal and code. How GPS works. GPS observable: pseudo range code and carrier wave phase. Integer ambiguity. RINEX format. Stand alone GPS. Source of errors. Method of positioning. Method of processing. Differential DGNSS Relative and differential positioning. Accuracy of GPS positioning.

Adjustment. Errors. Error classification. Random Error. Description of random error: mean value, variance, density probability function. Normal distribution. Theory of least square adjustment.

Total station. Horizontal and zenith angle. The axes of the theodolite. Monument and point description. Centring and levelling. Rough centring. Precise levelling. Forced centring. Total station reference system.

Surveying. From polar coordinates to local cartesian. Helmert Transformation. Zero Bearing. Base and detail network.