



COURSE: **Topography And Survey Design for Road Infrastructures**

TEACHER: Donato **CIAMPA**

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website:

Language: **Italian**

ECTS: **6**

n. of hours: **60**

Academic year: **2014-2015**

Campus: **Potenza**

Semester: **I**

TOPICS

Geodesy. Cartographic representations. Surveying. Instrumentation and operational methods. Topography and Civil Engineering.

TEACHING METHODS

- Theoretical lessons
 - Tutorials in classroom
 - Tutorials in laboratory
 - Project works
 - Technical visits
- Other activities (please specify)
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TEXTBOOKS

- Bezoari, Monti, Sellini, *"Fondamenti di rilevamento generale"*, Hoepli Editore.
 - *Cannarozzo Renato - Cucchiarini Lanfranco - Meschieri William:*
 - *Misure Rilievo Progetto - Volume I: "Superfici e sistemi di riferimenti, strumenti, misure"*, Quarta Edizione (2012). Ed. Zanichelli. ISBN 978.88.08.05927.7
 - *Misure Rilievo Progetto - Volume II: "Il rilievo del territorio con tecniche tradizionali e con nuove tecnologie"*, Quarta Edizione (2012). Ed. Zanichelli. ISBN 978.88.08.22358.6;
 - *Misure Rilievo Progetto - Volume III: "Operazioni su superficie volumi e applicazioni professionali"*, Quarta Edizione (2012). Ed. Zanichelli. ISBN 978.88.08.12381.7.
 - Course notes provided by the professor and available in electronic format.
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ON-LINE EDUCATIONAL MATERIAL

web address:

LEARNING OUTCOMES

Acquisition of a good knowledge of surveying instruments traditional and modern and the operational techniques for the survey and the representation of the territory and the structures of Civil Engineering. Acquisition of a good ability reading of topographic maps and the use of techniques and software for the surveying and tracking of roads and structures of Civil Engineering. Acquisition of a good knowledge of the latest techniques of surveying based on GPS satellite system and laser scanner 3D.

REQUIREMENTS

Knowledge of mathematical analysis, trigonometry, geometry, physics and statistics.

EVALUATION METHODS

- Intermediate verifications
- Written examination
- Discussion of a project work
- Practical test
- Oral examination

Other methods: Evaluation of numerical exercises.

DETAILED CONTENT

Introduction: Principles of survey. Definitions. Measurement and their units. Precision and accuracy in surveying.

Geodesy: Shape of the Earth. Earth gravity field. Equipotential surfaces. Geoid. Definition of height. Reference ellipsoid. Geoid undulations. Coordinate systems. Geometry of the ellipsoid of rotation. Normal sections. Principal sections. Reference surfaces used to approximate the ellipsoid.

Cartographic representations: The problem of map projections. Deformation modules. Analytical approach to map



projections. Classification of map projections. Conformal projections. The conformal Gauss map. The Italian official cartography. The UTM mapping system.

Surveying: National geodetic networks: planimetric, leveling, IGM95 networks. Planimetric survey, reduction of distances to the reference surface. Main surveying schemes: triangulation, trilateration, intersection, open and closed polygonals, detailed survey. Vertical survey: orthometric height and ellipsoidal height. Trigonometric and geometric leveling: scheme, instrumentation, accuracy. Practical aspects of GPS surveying, sessions and independent baselines.

Instrumentation and operational methods: Geometrical optics. Measure of angles. Opto-mechanical theodolite. Main components: telescope, vertical and horizontal circles, circle reading and optical micrometer, optical plumb. Setting up. Reading method of azimuth angles. Bessel's method. Zenith angles. Electronic theodolites. Measure of distances. Geodimeters: operating principle, fundamental equation, accuracy of a geodimeter. Total stations. Leveling. Levels, types of levels, main components. Invar stadia. GPS: basic concepts, GPS constellation and control segment. GPS signal structure. GPS biases and errors. GPS receivers. WGS84. Pseudo-range and carrier phase measurements. Other GNSS systems. Laser scanner 3D.

Topography and Civil Engineering: Monitoring and control of structures of Civil Engineering. Geometric tracking of roads and structures of Civil Engineering to.

SEMINARS BY EXTERNAL EXPERTS YES NO

FURTHER INFORMATION

The didactic organization provides for 60 total hours of which 36 hours of lecture and 24 of practice. The certificate of attendance of didactic activities is ex-officio satisfied at the end of the semester in which they are located.

The course is characterized by an operative phase dedicated to the deepening of the topics covered. In the context of this phase will be described and used different surveying instruments (Opto-mechanical theodolites, Electronic theodolites, Total Stations, Laser scanners 3D, Levels, GPS receivers, etc.) and will be applied the principal techniques of surveying and tracking.
