UNIVERSITÀ DI PAVIA

Anno Accademico 2021/2022

ENGINEERING SURVEYING

Enrollment year	2020/2021
Academic year	2021/2022
Regulations	DM270
Academic discipline	ICAR/06 (TOPOGRAPHY AND CARTOGRAPHY)
Department	DEPARTMENT OF CIVIL ENGINEERING AND ARCHITECTURE
Course	CIVIL AND ENVIRONMENTAL ENGINEERING
Curriculum	PERCORSO COMUNE
Year of study	2°
Period	2nd semester (07/03/2022 - 17/06/2022)
ECTS	6
Lesson hours	56 lesson hours
Language	Italian
Activity type	WRITTEN AND ORAL TEST
Teacher	CASELLA VITTORIO MARCO (titolare) - 6 ECTS
Prerequisites	Trigonometry, Calculus (in particular the derivative of functions of one or several variables). Linear Algebra.
Learning outcomes	The survey of the territory, in its natural and man-made components, and its cartographic representation, support the design, construction and final control of civil works. The aim of the course is to provide students with theoretical knowledge and operational methods that make them capable of acquiring data through measurements, to process these data, to critically evaluate the results.
Course contents	Classical surveying - Unit of measurement of angles and their conversions - The instruments for the measurement of angles, distances and height differences: Total Stations, Levels - Main topographical techniques in the plane: radial surveying, forward

intersection, traverses; geometric and trigonometric levelling

Satellite Topography: the GPS system and the GNSS systems
- The constellation, signal structure, the principle of GPS measurement
- Various GPS measurement methods: absolute positioning, relative and differential
- Conversion of GPS coordinates obtained with reference to the Italian system. The GPS levelling

Geodesy and mathematical Cartography
- The reference surfaces: geoid and ellipsoid
- The different coordinate systems
- The different reference systems: Roma40, ED50, WGS84
- Their materialization. The problem of map projection of the projection characteristics of Gauss
- The cartographic systems UTM and Gauss-Boaga
- Conversion between coordinate systems

Coordinate transformations
- Elementary transformations in the plane: translation, scale, rotation. Composite transformations: rototranslation, rototranslation with change of scale
- Generalization to the three-dimensional case

Theory of errors
- Blunders, systematic and random errors
- The precision and accuracy concepts
- The descriptive statistics

Traditional cartography, digital cartography and Geographic Information Systems
- Features of the traditional cartography: the scale ratio used, the constituent parts of a map, the contents
- Characteristics of digital cartography; change from the paper maps; the data structure and the most popular formats.
- A brief introduction to Geographic Information Systems, to the DTM / DSM, the cartography in raster format and orthophotos

Teaching methods

Lectures and practice sessions which will be guided by the teacher sometimes and simply assisted by him and by the support team in other occasions.

Reccomended or required readings

Lecture notes, available on KIRO.

Assessment methods

There are two compulsory tests and one optional.
1 - compulsory oral test, evaluated up to 24 points
2 - compulsory project activity, valued at up to 3 points
3 - optional oral exam, valued at up to 3 points, 5 in exceptional cases.

Those who had at least 18 in the written test and carried out the project activities, can record the sum of the votes of the two mandatory activities.

	In the oral examination, the votes earned in the compulsory tests are maintained, usually. Unless the oral contradicts them in striking way. Who does not carry out the project activity is obligated to do the oral examination, which will be valued up to six points and which will focus on the usual topics of the oral and also on the project's ones.
Further information	
Sustainable development goals - Agenda 2030	$lbl_legenda_sviluppo_sostenibile