

ACADEMIC YEAR: 2017-2018

COURSE : **Survey, Mapping and GIS**

TYPE OF EDUCATIONAL ACTIVITY: **Basic**

TEACHER : **Prof. Ing. Carlo MANERA**

e-mail: **carlo.manera@unibas.it**

website :

phone :

mobile (optional):

Language: **italian**

ECTS: 6

n. of hours : 56 (38 L + 18 E)

Campus: Potenza  
Dept./School: School of  
Agriculture, Forest, Food and  
Environmental Sciences  
Program: Agricultural  
Technologies

Trimester : 2

#### EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

This basic course in Topography, Cartography and GIS aims to provide students with the basic knowledge of the most common topography instruments, GPS instrumentation, and traditional and computerized map data. It will also provide the core contents of the GIS and its land management applications. At the end of the course, students will be able to properly report the acquired knowledge and apply them by solving simple problems, where appropriate, or discussing elementary cases of territorial issues through the most appropriate graphic representations.

- **Knowledge and understanding:** Knowledge and ability to understand the general principles governing, both descriptively and metrically, the territory, the methods of representation, the interactions between the elements constituting it, the importance of each element and its properties, and the typologies of graphic representation. Knowledge and ability to reproduce in the GIS environment the elements that make up the agri-forest territory, their characterization through the appropriate alphanumeric descriptors, and the use of spatial analysis functions to obtain new qualitative and quantitative information.
- **Applying Knowledge and understanding:** Ability to produce graphic design. Ability to read and to give qualitative and quantitative interpretation of projected designs. Ability to read the territory through the use of technical and thematic cartography. Ability to identify the main components of the agro-forestry landscape. Ability to handle appropriately, both qualitatively and quantitatively, the properties of the basic elements constituting the territory. Ability to obtain territorial information through the use of remote and local data, scanning and georeferencing of technical and thematic cartography and implementation of digital information layers. Ability to break down in simple information the elements constituting the territory as a whole. Ability to handle any territorial information appropriately by choosing the most appropriate data model for use in a GIS environment. Ability to structure a spatial analysis project and ability to identify interactions and relationships between the variables analyzed.
- **Making judgements:** Ability to evaluate and apply the most appropriate procedure to solve simple problems of acquisition of spatial information. Ability to identify the specific characteristics of any information and to translate it into a GIS environment. Ability to discriminate between different data properties to use correct technical and graphic interpretation. Ability to evaluate and correct mistakes made. Identify the maximum permissible metric tolerance for each type of data used.
- **Communication skills:** Skills aimed to communicate, logically organizing the information using a correct language and by using relevant maths and graphs, knowledge and skills acquired.
- **Learning skills:** Skills aimed to collect and organize information received during or during the lesson hours on the recommended texts and available literature.

#### PRE-REQUIREMENTS

- High-school Algebra, Geometry, and Physics. Specifically, the following skills are considered essential: use/treatment of identities and simple equations; use of the Cartesian system (reading plots of empirical trends or common mathematical functions, making plots of data); treatment of the basic properties of vectors; handle the basic elements of symmetry; knowledge and handling of basic properties of the most common geometrical figures.

- Computer science: knowledge and ability to use a personal computer; Office automation; Use internet network

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**SYLLABUS (units in bold)**

**Topography.** (2h L + 1h E)

Geodetic and topographic field. Measuring instruments of the territory: traditional instrumentation and G.P.S. Techniques and tools for the relief and representation of rural buildings.

**Cartography.** (6h L + 4h E)

Cartographic representations. The accuracy of cartographic data. Official Italian Cartography. Thematic and Numerical cartography.

**Territorial Information Systems and Geographic Information Systems.** (6h L + 4h E)

Overview of GIS. Spatial information. Georeferencing. Modeling reality. Basic concepts on relational databases. GIS data structures. Vector model. Raster model. TIN and GRID.

**Geographical data.** (6h L + 3h E)

Use and retrieval of territorial information. Creation of geographic data. Raster data sources. Vector data sources. Management and representation of data sets. Data hierarchy. Map categories. Visual variables. Structuring thematic map.

**Spatial Analysis.** (6h L + 2h E)

Generalities and types of spatial analysis. Vector data analysis. Raster data analysis. Conversion between types of data. Graphic modeling.

**Using Open Source Platforms for Map Sharing.** (2h L + 1h E)

Google Maps, Google Earth, KML and KMZ, GPX etc.

**Classroom/laboratory exercises.** (2h L + 1h E)

Finding, reading and using technical and thematic topographic maps.

**Classroom/laboratory exercises.** (8h L + 2h E)

Practical use of SW GIS: Using a data set, organizing and retrieving graphics, creating new data, georeferencing raster files, setting up a print layout, sharing online maps.

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**TEACHING METHODS**

The course includes 38 h of lessons and 18 h of classroom / laboratory training. The sequence with which the topics of the Course are proposed follows as far as possible the criterion of internal propedeuticity. During classroom lessons, the teacher will expose the vertical and horizontal links between the topics discussed, so as to stimulate the critical skills of the students. During the trainings, particular attention will be appointed to the research and identification of the solving strategy of the proposed exercises.

Each step between one unit and the next one will involve the use and extraction of the concepts acquired in the previous phase. During the trainings, any deficiencies will be promptly completed so that they can proceed readily with subsequent teaching units. The final exam will be an oral exam at the end of the course.

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**TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL**

- G. Bezoari, C. Monti, A. Selvini, Fondamenti di rilevamento generale – Topografia e Cartografia – vol. I, Hoepli, Milano 1989

- Biasini, Galetto, Mussio, Rigamonti. La cartografia e i sistemi informativi per il governo del territorio. Franco Angeli Editore

- Introduzione ai sistemi informativi geografici, Giovanni Biallo

[http://www.geoforus.it/index.php?option=com\\_docman&task=cat\\_view&gid=3&limitstart=15](http://www.geoforus.it/index.php?option=com_docman&task=cat_view&gid=3&limitstart=15)

- Poletti. GIS metodi e strumenti per un nuovo governo della città e del territorio. Maggioli Editore

- L. Biagi (2009): I Fondamenti del GPS <http://geomatica.como.polimi.it/fondamentalgps/>

- La Cartografia <https://www.docenti.unina.it/downloadPub.do?tipoFile=md&id=237301>

- Various <http://geomatica.como.polimi.it/corsi/>

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**INTERACTION WITH STUDENTS**

At the beginning of the course the Course programme will be shown, together with teaching and evaluation methods. Reception hours can only be specified accurately after the formalization of lessons but, at least, they will include at least 6 hours per week. The teacher is available to students outside of the reception time by appointment by e-mail.

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**SCUOLA DI SCIENZE  
AGRARIE, FORESTALI,  
ALIMENTARI  
ED AMBIENTALI**

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**EXAMINATION SESSIONS (FORECAST)<sup>1</sup>**

24/01/2018; 21/02/2018; 28/03/2018; 18/04/2018; 16/05/2018; 27/06/2018; 11/07/2018;12/09/2018; 17/10/2018;  
14/11/2018; 12/12/2018.

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**EXAMINATION COMMITTEE**

Prof. Carlo Manera (president), Prof. Pietro Picuno (member), dott. Carlo Sivolella (member)

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**FURTHER INFORMATION ---**

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<sup>1</sup> Subject to possible changes: check the web site of the Teacher or the Department/School for updates.