



General information	
Year of the course	/
Academic calendar (starting and ending date)	Second semester (26.02.2024 – 15.05.2024) In presence UniBa – on line UniFg
Credits (CFU/ETCS):	6
SSD	GEO04
Language	Italiano
Mode of attendance	The attendance is regulated by the Didactic Regulations of the Degree Course (Article 4.2).

Professor/ Lecturer	
Name and Surname	Domenico Capolongo
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Telephone	0805442622
Department and address	Dip. Scienze della terra e geoambientali (campus)
Virtual room	
Office Hours (and modalities: e.g., by appointment, on line, etc.)	Monday 15-17 in presence or online on request

Work schedule			
Hours			
Total	Lectures	Hands-on (laboratory, workshops, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
150	42		108
CFU/ETCS			
6			

<b>Learning Objectives</b>	Provide an overview of the applications of geomatics in geomorphology and archaeology.
<b>Course prerequisites</b>	none

Teaching strategie	
<b>Expected learning outcomes in terms of</b>	
<b>Knowledge and understanding on:</b>	<ul style="list-style-type: none"><li>The student must know and understand the usefulness of applying digital techniques to archaeological studies. This means knowing how to analyze a case study, and providing an articulated answer that, through a theoretical survey, is able to recognize the active processes in a specific area, defining them from a quantitative as well as a qualitative point of view. Particular attention will be paid to natural processes and effects on the physical landscape and on the archaeological record.</li></ul>



<p><b>Applying knowledge and understanding on:</b></p>	<ul style="list-style-type: none"> <li>○ The knowledge acquired can be applied directly to the study and understanding of real cases</li> </ul>
<p><b>Soft skills</b></p>	<ul style="list-style-type: none"> <li>● <i>Autonomy of judgment</i> <ul style="list-style-type: none"> <li>○ The understanding and analysis of the available investigation methodologies will give the student an autonomy of judgment based on the application of the scientific method for everything related to the basic components of geomatics.</li> </ul> </li> <li>● <i>Communication skills</i> <ul style="list-style-type: none"> <li>○ The communication phase will take place both graphically and in writing and speaking. For this reason the student must also be able to read the topographic maps both in paper and digital format from the point of view of the dynamics of the</li> </ul> </li> <li>● <i>territory</i> <ul style="list-style-type: none"> <li>○ . learn independently by applying basic methods and rules of the scientific method.</li> </ul> </li> </ul>
<p><b>Syllabus</b></p>	
<p><b>Content knowledge</b></p>	<p><b>Fundamentals of GIS and cartography</b></p> <ul style="list-style-type: none"> <li>● Define a GIS.</li> <li>● Defining Coordinate Systems</li> <li>● Distinguish between vector and raster data.</li> <li>● Navigate on a GIS map.</li> <li>● Use the tools to access information about features.</li> <li>● Query the GIS data by location or by attribute.</li> <li>● Share the results of your work.</li> <li>● Know some powerful and free WebGIS</li> </ul> <p><b>Fundamentals of remote sensing</b></p> <ul style="list-style-type: none"> <li>● Definitions and basic principles of remote sensing</li> <li>● Geometric, spectral, radiometric and temporal resolution</li> <li>● Spectral signature</li> <li>● Characteristics of the main satellites and sensors available</li> <li>● Main formats for storing remote sensing data</li> <li>● The main functions of QGIS for analysis raster</li> <li>● The main tools that can be integrated for the manipulation of remotely sensed images</li> <li>● Exploration of multispectral and panchromatic data</li> <li>● Notes on image pre-processing</li> <li>● Web data repository for the selection and download of multispectral images</li> </ul> <p><b>Fundamentals of image processing</b></p> <ul style="list-style-type: none"> <li>● Analysis of metadata and study of the histogram</li> <li>● Color compositions and phased colors of multispectral images</li> <li>● Contrast enhancement (emphasis techniques)</li> <li>● Spatial enhancement (low-pass, high-pass and pansharpening filters)</li> </ul>



	<ul style="list-style-type: none"> <li>• <i>Mosaic and creation of spatial and spectral subsets Mask creation</i></li> <li>• <i>Arithmetic and Algebraic manipulation of spectral bands</i></li> <li>• <i>Calculation of vegetation indices</i></li> <li>• <i>Change detection techniques</i></li> <li>• <i>Notes on automatic image classification, unsupervised and supervised</i></li> </ul> <p><b>Digital methods of data acquisition:</b></p> <ul style="list-style-type: none"> <li>• <i>drones,</i></li> <li>• <i>terrestrial laser scanner,</i></li> <li>• <i>GPS</i></li> </ul> <p><b>Geomorphological and thematic cartography</b></p>
<b>Texts and readings</b>	<i>Principi e metodi di Telerilevamento. Brivio, Lenchi, Zilioli. 2006</i>
<b>Notes, additional materials</b>	
<b>Repository</b>	<i>Course on MStears</i>

<b>Assessment</b>	
Assessment methods	<i>Project work presentation</i>
Assessment criteria	<ul style="list-style-type: none"> <li>• <i>Knowledge and understanding:</i></li> <li>• <i>The understanding and analysis of the methodology studied will give the student an autonomy of judgment on the basis of the application of the scientific method for everything related to the basic components of investigations.</i></li> <li>• <i>Applied knowledge and understanding:</i></li> <li>• <i>self-check and ongoing evaluation during the seminar lessons and in the practical parts</i></li> <li>• <i>. Autonomy of judgment:</i></li> <li>• <i>critical re-elaboration of the contents;</i></li> <li>• <i>correct use of tools and methods;</i></li> <li>• <i>Communication skills:</i></li> <li>• <i>describe and interpret, through the use of specific terminology, the material testimonies under study.</i></li> <li>• <i>Ability to learn:</i></li> <li>• <i>demonstrate to be able to critically manage the specific bibliography being examined and the essential research tools;</i></li> </ul>
Final exam and grading criteria	<i>During the oral exam, the student's knowledge of the topics of the course and the ability to apply the course contents will be assessed, also through the discussion of case studies. To pass the exam, the student must demonstrate that they have acquired sufficient knowledge in all the topics of the course. In the attribution of the grade, the ability to analyze</i>



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	<i>and synthesize, the ability to make connections between the different themes and also interdisciplinary, as well as the mastery of the exposition will be evaluated.</i>
<b>Further information</b>	