



# UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze della Terra e del Mare		
ACADEMIC YEAR	2023/2024		
MASTER'S DEGREE (MSC)	ENVIRONMENTAL ANALYSIS AND MANAGEMENT		
SUBJECT	REMOTE SENSING AND TERRITORIAL INFORMATION SYSTEMS		
TYPE OF EDUCATIONAL ACTIVITY	B		
AMBIT	50572-Discipline giuridiche, economiche e valutative		
CODE	15406		
SCIENTIFIC SECTOR(S)	ICAR/06		
HEAD PROFESSOR(S)	MALTESE ANTONINO	Ricercatore a tempo determinato	Univ. di PALERMO
OTHER PROFESSOR(S)			
CREDITS	6		
INDIVIDUAL STUDY (Hrs)	94		
COURSE ACTIVITY (Hrs)	56		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	1		
TERM (SEMESTER)	2° semester		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	<b>MALTESE ANTONINO</b> Monday 15:00 16:00 Viale delle Scienze, Dipartimento di Ingegneria, Ed. 8, Il piano, Area Trasporti e Geomatica, Stanza 2051 Tuesday 15:00 16:00 Viale delle Scienze, Dipartimento di Ingegneria, Ed. 8, Il piano, Area Trasporti e Geomatica, Stanza 2051 Wednesday 15:00 16:00 Viale delle Scienze, Dipartimento di Ingegneria, Ed. 8, Il piano, Area Trasporti e Geomatica, Stanza 2051 Thursday 15:00 16:00 Viale delle Scienze, Dipartimento di Ingegneria, Ed. 8, Il piano, Area Trasporti e Geomatica, Stanza 2051		

**DOCENTE:** Prof. ANTONINO MALTESE

<b>PREREQUISITES</b>	Basic skills in Cartography and Informatics
<b>LEARNING OUTCOMES</b>	<p>Knowledge of marine environmental monitoring through remote sensing, and skill of remotely sensed image processing</p> <p>Skills of analysing remote sensing images and digital processing software to monitor environmental variables, and evaluating its water quality</p> <p>The student will be able of exploring and analyzing remote sensing data, plan the acquisition of in situ data, and integrate remote sensing and in situ data, to quantify specific environmental emergencies.</p> <p>The student will be able to discuss data acquired by remote platforms and in situ, highlighting problems of data integration, modelling and solutions.</p> <p>Knowledge about digital image processing, earth observation methods, and environmental monitoring.</p>
<b>ASSESSMENT METHODS</b>	<p>Oral exam with a discussion of the reports on the practicals.</p> <p>The oral exam consists of an interview, aimed to check the acquisition of the skills and the discipline knowledge provided by the course; the evaluation is expressed in thirtieths. The questions tend to verify a) the skills acquired by the student; b) the computing capacity, c) the capacity to exhibit the concepts of the disciplines. a) the assessment of the knowledge, we will be carried out testing the ability of the student to establish connections between the content (theories, models, tools, technologies) of the course. b) the verification of computing capacity will be assessed testing the independence of judgement and the degree of understanding of the applications; The maximum score is achieved by taking into consideration the following three aspects: 1) the capacity of using the emergent aspects of the discipline; 2) the capacity of describing the impact of the subject of the course content within the discipline; 3) finally, the capacity to use innovative solutions within the relevant professional and technological context. c) As regards the verification of the speaking ability, the minimum rating corresponds to the case of a student that demonstrates a property of language appropriate to the reference professional context but not sufficiently articulated, whereas the maximum score will be achieved by those who demonstrate complete mastery of technical language.</p>
<b>EDUCATIONAL OBJECTIVES</b>	The general aim of the course is to provide the students with the theoretical knowledge and the operational methodologies of digital image processing of multispectral and hyperspectral remote sensing images and to apply the most appropriate monitoring technologies to a given environmental problem. The integration and the synergy of remotely sensed data and in situ data is also an important objective of the course.
<b>TEACHING METHODS</b>	Lecturing in informatics lab
<b>SUGGESTED BIBLIOGRAPHY</b>	<p>In Italiano: Athanasios Dermanis, Ludovico Biagi. Telerilevamento. Informazione territoriale mediante immagini da satellite. Editore: CEA ISBN: 8808085937 F. Migliaccio, D. Carrion, Sistemi informativi territoriali. Principi e applicazioni. Ed. UTET Università, 2019, ISBN: 8860086078, 9788860086075</p> <p>In english: S. Liang. Quantitative Remote Sensing of Land Surfaces. Wiley Online Books, 2004. F. Harvey. A primer of GIS – Fundamental Geographic and cartographic concepts. The Guilford Press, 2008.</p>

## SYLLABUS

Hrs	Frontal teaching
1	Course introduction: Remote Sensing and Geographic Information Systems (GIS)
2	Remote sensing platforms, sensors and resolutions
3	Images Georeferencing
3	Laws of the Electromagnetic Energy, radiometric calibrations and correction (reflective and emissive part of the spectrum)
3	Vegetation Indices and albedo
3	Remote sensing of water bodies: Water column correction and bathymetry mapping
4	Supervised and unsupervised classification
2	Principle of water quality mapping
3	Geographic Information Systems introduction, the geometric primitives
3	Query

## SYLLABUS

Hrs	Frontal teaching
4	Overlay and map algebra
1	Course overview
Hrs	Practice
4	Image Georeferencing
4	Vegetation Indices maps
4	Images classification
4	Apparent Thermal Inertia mapping
4	Vector Overlay exercises
4	Algorithms implementation using a graphic modeler