UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze della Terra e del Mare
ACADEMIC YEAR	2021/2022
MASTER'S DEGREE (MSC)	GEORISK AND GEORESOURCES
SUBJECT	STRUCTURAL GEOLOGY WITH FIELD ACTIVITY
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50566-Discipline geologiche e paleontologiche
CODE	20605
SCIENTIFIC SECTOR(S)	GEO/03
HEAD PROFESSOR(S)	GASPARO MORTICELLI MAURIZIO Ricercatore a tempo determinato Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	86
COURSE ACTIVITY (Hrs)	64
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	1
TERM (SEMESTER)	2° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**GASPARO MORTICELLI MAURIZIO** Wednesday 15:30 16:30 Via Archirafi 20, Terzo Piano, Stanza III-2

DOCENTE: Prof. MAURIZIO GASPARO MORTICELLI

PREREQUISITES	Basic knowledge of sedimentary rocks and geological surveying-techniques, familiartity with the interpretation of geological maps, geology, stratigraphy, geomorphology, paleontology. (characterizing courses envisaged during the first three years of the Degree LM)
LEARNING OUTCOMES	Knowledge and ability to understand: Knowledge of the elements necessary to understand the main geologicalstructural characters of study area and the modalities of representation through geo-thematic maps. Ability to model the evolution of portions of orogenic chains. Ability to apply knowledge and understanding: Field collection and mapping of geological data useful to reconstructing the depositional and deformation evolution of a region. Realization of geological cross section in poly-deformed region and depth-projection of outcropping structures. Autonomy of judgment: Ability to relate the mesoscale- deformation-geometries with regional geological models, tectonic processes with sedimentation, all through the reading of structural geological maps and the analysis of field collected data and the relationship with data coming from previous studies. Communication skills: ability of expository synthesis, using appropriate technical language, in the description of the geological model from structural geological map. Ability to synthesis even to an audience without geological background. Ability to learn: Ability to update through the consultation of scientific papers concerning tectonics, structural and regional geology aimed to compare data from previous studies with those personally field collected.
ASSESSMENT METHODS	Oral examination, including: creation of a geological cross section on geological maps at scale 1: 25.000; discussion of the geological data collected by the student in assigned areas and contained in the geological map realized at scale 1: 25.000 accompanied by illustrative report; discussion of course topics, with particular attention to the techniques of collecting of field geological data and its representation on thematic maps. The final vote, expressed in thirtieths, will take into account of the geological cross section (10/30), the project of the construction of structural geological map at scale 1: 25.000 (10/30) and of the discussion of the topics of the course (10/30).
EDUCATIONAL OBJECTIVES	This is a course for students training for a professional career in geology and applied geology. It offers the opportunity to experience in: - field observation of outcropping rocks; - collection of structural data; - realization of a thematic mapping project (realization of a geological-structural map). The purpose is to illustrate the methods of collecting geological and structural data, to processed (using software) and to depict them on a topographic map. The activity includes recognition and mapping of tectonic structures, measurement of linear and planar elements, stereographic projections of structural data, analysis of the geometry of tectonic structures, realization of geological cross sections, balancing and palinspastic restorations and reconstruction of the geological model of the study area.
TEACHING METHODS	Frontal lessons. Laboratory activities about processing of structural datas aimed at the realization and interpretation of structural maps. The laboratory activity includes 8 hours of practical laboratory carried out in the classroom and, compatible with the available funds to the Degree Course, 24 hours of field work during 4 daily exscursions
SUGGESTED BIBLIOGRAPHY	Haakon Fossen. Geologia Strutturale (traduzione a cura di Giulio Viola). Zanichelli Editore. . Stephen M. Rowland, Ernest M. Duebendorfer, and Ilsa M. Schiefelbein. Structural Analysis and Synthesis: A Laboratory Course in Structural Geology. 3rd ed. Blackwell Publishing Ltd . Venturini C – Realizzare e leggere carte e sezioni geologiche - Dario Flaccovio Editore; . Lisle R. J., Brabham P. and Barnes J. – Basic Geological mapping – Wiley-Blackwell, A John Wiley & Sons, Ltd., Publication . Allmendinger R.W.- Modern Structural Pratice. V. 1.7.0 2015-2017. Appunti on-line http://www.geo.cornell.edu/geology/faculty/RWA/structure-lab-manual/

SYLLABUS

Hrs	Frontal teaching
3	The evolution of geological cartography. Introduction to thematic maps (isobate, isopache, substrate structural maps).
4	Basic principles of stratimetry and structural geological survey techniques
3	Stereographic projections for the cartographic representation of the tectonic structures.
4	Cartographic representation of the units' surface and reconstruction of the events tectono-sedimentary that characterize a chain (the example of the Sicilian chain).
3	The geological-thematic cartography available in the literature and the main databases available on the net. Official geological cartography. The Italian national geological cartography project (CARG). Codifications and libraries of the symbols used in the project.
3	Stress and deformation principles.
4	Folds and Folding: classification of folds, folding mechanisms, minor folds and cleavages.
4	Faults and faults: classification and fault zones, kinematic indicators, deformation field and tectonic structures.
2	. Palinspastic restoration and balanced geological cross sections. Cross sections and three-dimensional models
2	Contourline Map: map of the top and bottom of a geological unit; map of the isopache of a geological unit.

Hrs	Workshops
12	The laboratory activity includes 16 hours of practical laboratory carried out in the classroom and (if available the financial support) 16 hours of field work during 3 daily trips. As an alternative, students will follow further laboratory activities. Measurement, processing and mapping techniques of plicative structures and associated minor structural elements. Descriptive terminology. Criteria for recognition and definition of plicative systems on field. Measurement techniques, processing and cartographic representation of fragile structures (faults, fractures, veins) and kinematic characterization on field. Descriptive terminology. Field recognition criteria.
3	Traditional and modern equipment for structural geological survey and representation of field data on map. Use of smartphones with specific applications. General features of the geological map, organisation of the legend, conventional symbols, colour scheme, index paper, stratigraphic and structural elements accompanying the map
6	Basic knowledge to use of stratigraphic logs, their correlation and realization of contour line maps.
3	Elaboration of geological-structural map by means of graphic programs.
3	Use of software for stratistic analysis of structural data
5	Use of software for the construction of the 3D geological model of the substrate and for the palinspastic restoration and of balanced geological cross sections.