



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze della Terra e del Mare
ACADEMIC YEAR	2023/2024
MASTER'S DEGREE (MSC)	GEORISKS AND GEORESOURCES
SUBJECT	APPLIED GEOMORPHOLOGY AND GEO-HYDROLOGICAL RISK
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50570-Discipline geomorfologiche e geologiche applicative
CODE	19213
SCIENTIFIC SECTOR(S)	GEO/04
HEAD PROFESSOR(S)	ROTIGLIANO EDOARDO Professore Ordinario Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	86
COURSE ACTIVITY (Hrs)	64
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	1
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	ROTIGLIANO EDOARDO Wednesday 15:00 17:00 Studio del docente: Via Archirafi, 22 II piano.N.B. ulteriori o differenti incontri possono essere concordati con il docente: edoardo.rotigliano@unipa.it Friday 15:00 17:00 Per gli studenti del CdS in Biodiversità e Innovazione Tecnologica, presso le strutture del polo didattico di Trapani O della struttura "Principe di Napoli".I ricevimenti, su richiesta, possono essere svolti anche su piattaforma teams.Ulteriori o differenti incontri possono essere concordati con il docente: edoardo.rotigliano@unipa.it.

DOCENTE: Prof. EDOARDO ROTIGLIANO

PREREQUISITES	Knowledge (at a bachelor level) of basic concepts of Geology, Physical Geography and Geomorphology.
LEARNING OUTCOMES	KNOWLEDGE AND UNDERSTANDING Students will be requested to acquire advanced knowledge on the mechanisms of interaction between external forcing (rainfall, earthquakes) and geo-hydrologic responses (landslides and floods). They will acquire a full comprehension of the physics of geo-hydrologic phenomena and the role of the controlling physical-environmental variables. Besides, they will reach a slope/basin scale vision and modelling attitude for the studied geo-hydrologic phenomena. Finally, students will be able to associate susceptibility, hazard and risk conditions to the studied geo-hydrologic dynamics. APPLYING KNOWLEDGE AND UNDERSTANDING Under the supervision of the lecturer, students will autonomously plan a study in an assigned study catchment, including geologic and geomorphologic field survey, climatic and hydrologic study, instability landform recognition, controlling factors layers preparation. MAKING JUDGEMENTS Students will be asked to critically discuss the data of their study area and to make hypotheses on the recognized active dynamics and their preparatory and triggering causes. COMMUNICATION SKILLS Students will be requested to present and discuss data and results of their assigned study area using a rigorous language, but also being clear to a non-expert audience. To be capable to critically discuss the obtained results in strong interaction with lecturer and other students, will be considered as compulsory. LEARNING SKILLS Being able to autonomously study research paper from scientific literature as well as from technical manuals and guides. At the end of the course, students will be ready to attend II level Masters and specialized seminars on the studied topics.
ASSESSMENT METHODS	The exam includes a written test, an elective oral test and a presentation/discussion of a technical report. Theoretical contents (4 CFU) The written test will consist of a two open queries essay, which will be evaluated in the 0-30 range on the basis of the level of: comprehension, skill of presentation with a proper technical jargon, capacity of synthesis and original rephrasing/reorganizing of the concepts, as well as on the capacity of making transversal links between the issues of the course. (The written test will be also submitted as a course test; students who pass the course test will access directly to the elective oral test). Students passing the written test (o the corresponding course test) will have the possibility to take an integrative oral test. The oral test will be based on two queries. The same ability which are evaluated in the written test will be considered. The final score will be given by averaging the written and oral scores. Applications: presentation/discussion of an individual or workgroup study on landslide or fluvial phenomena in a study area. This test will allow to evaluate the ability in presenting and discussing an applicative case, in an open workshop session in front of an expert audience. The score obtained from the written+oral tests will be eventually increased/decreased by 2/30 at most.
EDUCATIONAL OBJECTIVES	The main goal of the course is to give students theoretical knowledge and analysis tools for a full and advanced comprehension of the geo-hydrologic instability phenomena. The course is in fact strongly focused on landslides and flood-related fluvial processes. With this aim, the main topics of the course will be hydrology, landslide and fluvial phenomena, with a slope and catchment view. For each of these topics, the main governing functional relationships and their controlling variables will be studied, together with the tools for their quantitative characterization (instrumental or archive) and modelling techniques through which processes can be described. A perspective to application for susceptibility, hazard and risk assessment will be also given. At the end of the course, students will be able to recognize (remotely and on the field) instability landforms, connecting their activity to slope/catchment processes and associating possible hazard scenarios. A very important component of the course objectives is to make students able to properly discuss their data (acquired during the laboratory activities) and their

	interpretative hypothesis.
TEACHING METHODS	Theoretical contents: 32 hours (4CFU) of lectures Applicative : 32 hours (2CFU) of laboratory activity Two field trips are associated to the course.
SUGGESTED BIBLIOGRAPHY	CIABATTI M. (1982) – Elementi di Idrologia superficiale. CLUEB Bologna, pp. 232. VALLARIO A. (1992) – Frane e territorio. Liguori Ed. Napoli., pp.556. Guide e manuali disponibili on line: Guides and manuals available on line: 1) A.A.V.V. (2006) - Fenomeni di dissesto geologico - idraulico sui versanti. APAT Manuali e Linee Guida 39/2006 2) ARTA (Assessorato Regionale al Territorio e all'Ambiente della Regione Sicilia (2004) - PAI, Relazione Genrale. 3) RINALDI M., SURIAN N., COMITI F., BUSSETTINI M. (2014) - Sistema di valutazione idromorfologica, analisi e monitoraggio dei corsi d'acqua – ISPRA – Manuali e Linee Guida 113/2014. Roma, giugno 2014. 4) MATTM-Regioni, 2018. Linee Guida per la Difesa della Costa dai fenomeni di Erosione e dagli effetti dei Cambiamenti climatici. Versione 2018 - Documento elaborato dal Tavolo Nazionale sull'Erosione Costiera MATTM-Regioni con il coordinamento tecnico di ISPRA, 305 pp 5) Paganelli D., La Valle P., Ercole S., Lisi I., Teofili C., Nicoletti L., 2014 - Linee guida per gli studi ambientali connessi alla realizzazione di opere di difesa costiera. ISPRA, Manuali e Linee Guida 105/2014: 73 pp. 6) USGS (2008) – The Landslide Handbook— A Guide to Understanding Landslides, pp. 147 (http://pubs.usgs.gov/circ/1325/). Verranno inoltre messi a disposizione sul sito del docente dispense e manuali in formato elettronico. Supplementary lecture notes will be also make available.

SYLLABUS

Hrs	Frontal teaching
3	Hydrologic cycle at slope and basin scale.
3	Water into soils: infiltration and drainage. Pore pressure, cohesion and saturated weight.
3	Water onto soils: drainage network and hydric and fluvial erosion processes.
4	Fluvial geomorphology.
3	Hydro-morphologic hazard assessment. Floods EU directive and IDRAIM approach.
3	Landslides: failure mechanisms, morphodynamic and classification criteria. Hazard factors and mitigation criteria. Front/Scarp landslides: fall, rebounds and lateral spreads.
3	Landslides: failure mechanisms, morphodynamic and classification criteria. Hazard factors and mitigation criteria. Substratum slope landslides: slides and large earth/debris flows.
3	Landslides: failure mechanisms, morphodynamic and classification criteria. Hazard factors and mitigation criteria. Shallow slope landslides: earth/debris flows/avalanches, flow-slides. Long run-out rapid slope/stream landslides: debris flows s.s. and related debris floods.
3	Landslide hazard and susceptibility assessment. The PAI method.
4	Coastal morphodynamic and risk.
Hrs	Workshops
32	Study on geo-hydrologic phenomena for a given study area: setting, inventorying (remote and filed recognition) and temporal evolution of phenomena, factors and related susceptibility/hazard. Depending on the available economic resources, part of the lab activities will be carried out on the filed.