Main course information	
Academic subject	Environmental Geology and Geomorphology
Degree course	Bachelor's Degree in Nature Sciences
Classe di laurea	L/32
ECTS credits (CFU)	6
Compulsory attendance	Strongly recommended
Teaching language	Italian
Accademic Year	2020/2021

Docente responsabile	
Name & SURNAME	Massimo Angelo Caldara
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Tutorial time/day	Monday 11 am-1pm at the studio located on the second floor of the Earth Sciences building, University campus

Course details	Study area	SSD code	Type of class
	exam with mark	GEO/04	Lecture/

Teaching schedule	Year	Semester
	III	II

Modalità erogazione	CFU/ECTS	Lessons (hours)	CFU/ECTS lab	Lab hours	CFU/ECTS tutorial/workshop	Tutorial/workshop hours	CFU/ECTS field trip	Field trip Hours
	6	48	0	0	0	0	0	0

Time management	Total hours	Teaching hours	Self-study hours
	150	48	102

Academic Calendar	First lesson	Final lesson
	1 marzo 2020	11 giugno 2020

Syllabus		
Course entry requirements	A good knowledge of physical geography and geology	A g
Expected learning outcomes (according to Dublin Descriptors) (it is recommended that they are congruent with the learning outcomes contained in A4a, A4b, A4c tables of the SUA-CdS)		
Knowledge and understanding	The student will have to learn and understand: the agents and mechanisms of exogenous morphogenetic processes and their relationships with climatic and structural conditions; the forms of the terrestrial relief deriving from the exogenous and endogenous morphogenetic processes; the causes and effects of relief modelling processes; the dominant processes and forms in the various current morphoclimatic regions; the occurred climatic variations during the history of the Earth and awareness of the modifications of the morphoclimatic regions in relation to them. He/she will also need to know and evaluate the effects of anthropic interventions on the territory over time and space; know the basic principles of a good environmental education (such as not wasting food, how to recycle materials and separate waste collection, pollution in cities and how to improve the quality of life).	
Applying knowledge and understanding	The student must learn, in a multidisciplinary context, the methodological bases for the study of geomorphology with particular reference to the climatic geomorphology in order to understand morphogenetic processes and their spatial and temporal variability in function of both natural and man-induced climate changes. He/she will have to know and distinguish the predisposing and triggering factors of the different calamitous phenomena on a global and/or national scale.	

Making informed judgements and choices	The student will have to demonstrate aptitude in researching the documents needed to develop a conservation and enhancement project for a geosite. The results will be discussed during the classroom exercises.
Communicating knowledge and understanding	Ability to describe the natural and anthropic landscape from various types of cartography. Ability to recognize from satellite images (Google Earth) the forms and processes that originated them by linking them to the climatic conditions of the area. Ability to understand, and therefore educate human beings to manage their behaviours in relation to ecosystems in order to live in a sustainable way, without altering the natural balance.
Capacities to continue learning	Ability to deepen the understanding of complex concepts by interpreting forms and geomorphologic processes in a naturalistic context and highlighting the positive or negative aspects that shape the landscape

Sylabus	
Course content	Geomorphology: generalities, fields of application, endogenous and exogenous processes, scale factor, the natural and anthropic landscape. Glacial morphology. Generalities, terminology and meaning of the various parts of a glacier. Longitudinal and transverse profile. Glacier movements. Persistent snow limit and its variations. Classification of glaciers. Morphogenetic action of glaciers: exarative action of a glacier and forms of erosion. Forms of glacial and fluvio-glacial accumulation. Evolution of a glacial landscape. Periglacial or crionival phenomena. Frost conditions in the soil. Various types of permafrost. Criergic processes and forms. Forms related to nivation processes. Volcanic morphology. The products of volcanic activity. Classification of forms: positive (plateaux, shield volcanic buildings, volcano and minor forms) and negative (craters and calderas). Forms related to late events. Slope modeling. The denudation processes. Review of the morphogenetic action of the atmosphere. The gravitational processes: debris falls, mass movements: slow movements (reptation, soliflux), landslides (nomenclature, preparatory and determinant causes, Varnes classification). Regularization of slopes. Smoothing surfaces, Davis cycle, polycyclic findings, strengths and weaknesses. Other theories on slope backward (pediment, erosion and accumulation glacis, inselberg). Structural geomorphology. The large morphological units of the continents (orogens, shields and platforms, tectonic rifts, basaltic expansions, sedimentary basins). Tabular morphostructures, monoclinals, folds. Jurassic, Alpine, Appalachian relief; domi and diapiri. Tectonic forms. Climatic geomorphology: equatorial and tropical humid and semi-humid regions; the arid and semi-arid tropical and subtropical regions; the Mediterranean regions; the humid temperate regions; the so-called periglacial regions. Regional geomorphology. The landscape of the foreland: Massif of the Gargano, Murgia plateau, the Salento greenhouses and the Taranto Murge. The landscape of the Adriatic foredeep: the bradanic through, the Tavoliere, the tarantina-metapontina plain and the Brindisi plain. The landscape of the Apennine chain: the subappennino dauno, Environmental geology: Interaction between Man, environment and climate from the Neolithic to the present in southern Italy. Natural "disasters". The resources of the environment. Renewable and non-renewable resources. Sustainable development. Environmental education. The concept of danger, vulnerability and environmental risk. Desertification. Main types of human intervention in the environment: Destruction of vegetation cover, Agricultural and pastoral practices, Engineering works and urbanization, Mining and mining activities, Atmospheric modifications. Waste and its disposal: regulatory framework and waste and landfill classification; types of disposal with strengths and weaknesses: incinerator, controlled landfills, composting, recycling, storage. Soil contamination. Local examples. Environmental impact assessment: regulatory elements and guidelines; phases of the study; recognition of impacts; methods: check lists, matrices, graphs, overlapping maps, quantitative methods; various examples Low impact accommodation techniques. Materials used: organic (living plants, natural

	aggregates, industrial aggregates) inorganic (natural, industrial). Examples of accommodation: dunes, mountain streams, etc. Outline of environmental legislation. Cultural Heritage and World Heritage List. Geosite, geotope and geodiversity. Data sheet of the geosites and examples with particular reference to the geomorphological ones.
Course books/Bibliography	1) Bell. F.G., *Geologia ambientale.Teoria e pratica*. Zanichelli 2) Castiglioni G. B. (1989) - *Geomorfologia.* - UTET. 3) Ciccacci S. (2010) - *Le forme del rilievo. Atlante illustrato di Geomorfologia* . Mondadori-Università La Sapienza, Roma. 4) Mcknight T. & Hess D. (2005) - *Geografia Fisica. Comprendere il paesaggio*. Piccin 5) Ricci Lucchi F. La scienza di Gaia. Ambienti e sistemi naturali visti da un geologo. Zanichelli 6) Strahler A. N. (1984) - *Geografia Fisica.* - Piccin
Notes	All texts are available in the library of the building of Earth Sciences.
Teaching methods	Frontal lessons supported by multimedia projections and photographic material collected over the years by the teacher during the various missions in Italy and abroad. Multimedia material will be provided to students who request it.
Assessment methods (indicate at least the type written, oral, other)	The exam is integrated with the Environmental Geology and Geomorphology Laboratory course. The theoric part takes place with an oral interview that starts from two papers created by the student. The first related to the compilation of a geosite file and the second to the discussion of 10 shapes chosen by the candidate on Google Earth.
Evaluation criteria (Explain for each expected learning outcome what a student has to know, or is able to do, and how many levels of achievement there are	Knowledge and understanding: The student must demonstrate to know and understand all the contents of the teaching both in the field of geomorphology and in environmental geology. Ability to apply knowledge and understanding: The student must be able to apply, in the most appropriate way, the knowledge of morphogenic processes and their spatial and temporal variability in function of both natural and human induced climatic changes. He/she will have to acquire the ability to assess the total risk for the various calamitous phenomena on a global and/or national scale. Autonomy of judgment: In addition to ascertaining the acquisition of the notions, it will be evaluated the ability to recognize and discuss the various morphologies from satellite or cartographic images and the ability to highlight the salient features of a geosite that contribute to the constraint of the same. Consequently, the student will have to show that he/she is able to find and carefully choose the data derived from the institutional sites useful for the creation of the geosite constraint. Communication skills: The mastery of the scientific vocabulary, the clarity and simplicity of exposure, essential elements for teaching and scientific dissemination, will be assessed very positively.
Further information	