PhD Programme in EARTH AND ENVIRONMENTAL SCIENCES AND TECHNOLOGIES Curriculum 1: GEOLOGICAL EVOLUTION OF THE TERRITORY Curriculum 2: APPLIED GEOLOGY AND ENVIRONMENTAL TECHNOLOGIES Curriculum 3: GEOSPHERE-BIOSPHERE INTERACTION	
DISCIPLINARY SCIENTIFIC AREAS	04 - EARTH SCIENCES; 05 - BIOLOGICAL SCIENCES; 08 - CIVIL ENGINEERING AND ARCHITECTURE; 09 - INDUSTRIAL AND INFORMATION ENGINEERING; 03 - CHEMICAL SCIENCES; 07 - AGRICULTURAL AND VETERINARY SCIENCES
COORDINATOR	PROF. GABRIELE CRUCIANI
HEAD DEPARTMENT	DEPARTMENT OF CHEMICAL AND GEOLOGICAL SCIENCES
DURATION	3 YEARS
LEARNING OUTCOMES AND RESEARCH TOPICS	The PhD in Earth and Environmental Sciences and Technologies promotes a concrete and conscious knowledge of the territory and its resources, as well as the protection and promotion of the natural environment in its biotic and abiotic aspects. The qualifying cultural core of the training project is represented by a systemic, integrated and interdisciplinary approach at all scales (from the molecular to the regional and ecosystem) to the study of the territory understood as a physical-natural environment and of the technologies necessary for its conservation or rehabilitation. The interweaving between basic and applied disciplines, and between abiotic and biotic skills, in line with current international research trends, is underlined. The Doctorate includes courses, seminars and schools, participation in national and international conferences, training and improvement internships in Italian and foreign research structures. The primary educational objective is the achievement of autonomy in research, in particular the ability to produce scientific publications in international journals. For Cycle XXXIX, the Academic Board has identified, for each curriculum, the following research topics as priorities, although not exclusive: The GEOLOGICAL EVOLUTION OF THE TERRITORY curriculum includes research topics in the main basic disciplines of Earth Sciences such as: regional geology, geomorphology, mineralogy, paleontology, petrology, sedimentology, stratigraphy, tectonics, volcanology, genesis and prospecting of mineral deposits. The main themes of the research are aimed at the study, knowledge, evolution and mapping of the territory and possibly of its resources. The APPLIED GEOLOGY AND ENVIRONMENTAL TECHNOLOGY curriculum includes research topics in the field of applied geology and environmental science and technology, also aimed at promoting the circular economy. The main topics are: the characterization and reclamation of contaminated sites, defense of the soil, the environment and cultural heritage, the cultivation and enhancement of mineral resources, hydrogeology and the qualitative and quantitative protection of water resources, also in relation to changes climate change, remote sensing, management, treatment and valorisation of waste, wastewater and gaseous emissions. The GEOSPHERE-BIOSPHERE INTERACTION curriculum includes topics in the research fields of botany, pedology, mineralogy and interactions between the geosphere and the biosphere also aimed at environmental recovery and/or restoration through the enhancement of native flora and agrodiversity. The main topics are: plant systematics, environmental botany,

	the physiological processes of plants at the interface with the soil and the atmosphere, such as photosynthesis and transpiration, rhizobiology including the study of plant secondary metabolites, the biogeochemical dynamics of soil-plant-atmosphere systems, plant ecophysiology and biominerals, paleo and archaeobotany.
ELIGIBILITY AND OTHER REQUIREMENTS FOR CANDIDATES (ART. 2 - NOTICE OF COMPETITION)	EVERY ITALIAN 2ND CYCLE DEGREE (*LAUREA MAGISTRALE/SPECIALISTICA/VECCHIO ORDINAMENTO*) AND EQUIVALENT AND SUITABLE FOREIGN ACADEMIC DEGREES Adequate knowledge of scientific English; basic computer skills (word processing programs, spreadsheets, databases and GIS) Foreign candidates: Degrees equivalent to those mentioned above; adequate knowledge of Italian or English and, in any case, scientific English; basic computer skills (word processing programs, spreadsheets, databases and GIS).
ADMISSION TESTS	ASSESSMENT OF QUALIFICATIONS AND CURRICULUM VITAE, AND INTERVIEW The interview will aim to ascertain the candidate's ability to orient on the main areas of study inherent in the doctorate and to verify his/her analytical, processing and communication skills. During the interview, a three-year research project (min. 8,000/max 16,000 characters - excluding title and bibliographic references) proposed by the candidate will be discussed, which must be presented, in addition to the documents required by art. 3 of the call for applications (Annex A "Titoli valutabili e Curriculum Vitae'; Annex B 'Dichiarazione sostitutiva di certificazioni del/i titolo/i di accesso con esami e voti'; two-sided coloured scanned copy of a valid ID, with a clear photo), by uploading it to the system by the call expiry date (file name: research_project_surname_name). The interview may also be conducted in English (other foreign languages may be taken into consideration). During the interview, the knowledge of scientific English will be ascertained by reading and translating a passage proposed by the Committee. Candidates unable, for justified reasons, to take the interview at the established venue, may be granted the possibility of carrying it out by videoconference, on the same date and time established for face-to-face interviews, according to the procedure indicated in the notice of competition.
ADMISSION TESTS FOR FOREIGN CANDIDATES APPLYING FOR RESERVED POSITIONS SUPPORTED BY A SCHOLARSHIP	ASSESSMENT OF QUALIFICATIONS AND CV, VIDEO CONFERENCE INTERVIEW During the interview, a three-year research project (min. 8,000/max 16,000 characters - excluding title and bibliographic references) proposed by the candidate will be discussed, which must be presented, in addition to the documents required by art. 3 of the competition announcement (certificate attesting the award of a 2nd level foreign degree needed to access a PhD programme, including exams and marks, with a translation in Italian or English; certificate attesting the award of a 1st level foreign degree, including exams and marks, with a translation in Italian or English; signed Curriculum Vitae preferably in EU format, in English or Italian; additional qualifications, certifications, publications), by uploading it to the system, by the expiry date of the announcement (file name: research_project_surname_name).The interview can also be conducted in English. The interview, via video conference in order to verify the identity of the candidate, will take place in English or, possibly, in Italian, and will focus mainly, but not exclusively, on the experience gained by the candidate in the specific topics of the doctorate and on the topics that the same would propose as a possible object of the activity to be developed during the three-year doctorate.

	Reference letters (up to 3) must be written in English, using the form available on the webpage https://unica.it/dottoratiricerca (How to apply for PhD selection: Guidelines and forms- Annex D), by a university professor or an expert in the research fields of the PhD programme, on letterhead of their institution, dated and signed. Evaluators will send their letters directly to the email address phdcall_referenceletter@unica.it (object: surname and name of the candidate being evaluated and name of the PhD programme for which he/she is applying).
POSITIONS	5 (1 of which, with scholarship, reserved for a foreign candidate with a foreign degree)
SCHOLARSHIPS	4: 1 funded by UniCa; 3 funded by Ministerial Decree no. 118/2023: 2 NRRP Research, 1 Digital and Environmental Transitions
POSITIONS WITHOUT SCHOLARSHIP	1
CONTACT PERSON	PROF. GABRIELE CRUCIANI EMAIL: gcrucian@unica.it - TEL. + 39 0706757709
WEBSITE	http://dottorati.unica.it/stta/
SCHOLARSHIPS FUNDED BY MINISTERIAL DECREE NO. 118/2023	
SCHOLARSHIP 1	
TYPOLOGY	Digital and Environmental Transitions
RESEARCH PROJECT	Digitization of the production process in the quarry and related environmental parameters
PRINCIPAL INVESTIGATOR	Prof. Nicola Careddu
DESCRIPTION OF DOCTORAL TRAINING	The research topic requires basic knowledge of geology, excavation engineering and economics; the Ph.D. student will develop subjects related to sustainable innovation and artificial intelligence during the course, in order to train a professional with multidisciplinary skills. The path includes an in-company period of at least 6 months where skills will be acquired related to both the quarry production cycle from an environmental perspective and related to digitization. A period abroad, of at least 6 months, is planned to deepen and gain knowledge in the area of identifying Key Performance Indicators needed to compile the environmental matrix. The Ph.D. student will be supervised by supervisors, scientific and corporate, tutors to coordinate knowledge about the quarry cycle with digitization through new software.
COMPANY/RESEARCH INSTITUTION/PUBLIC ADMINISTRATION	The company/research institution/public administration where the activity will be carried out and the relative contact person will be defined after the conclusion of the selection proceedings.
NO. OF MONTHS TO BE SPENT IN THE COMPANY/RESEARCH INSTITUTION/PUBLIC ADMINISTRATION	6
FOREIGN INSTITUTION	The foreign institution where the activity will be carried out and the relative contact person will be defined after the conclusion of the selection proceedings.
NO. OF MONTHS TO BE SPENT IN THE FOREIGN INSTITUTION	6
SCHOLARSHIP 2	
TYPOLOGY	NRRP Research
RESEARCH PROJECT	Vulnerability of the environmental heritage induced by geological processes and natural events. Multifactorial analysis of degradation, possibility of intervention, conservation and enhancement
PRINCIPAL INVESTIGATORS	Prof. Stefano Columbu
DESCRIPTION OF DOCTORAL	The proposed project, by virtue of the interdisciplinary approach, offers

TRAINING	training characteristics of high cultural relevance, with particular attention to issues related to the degradation of environmental heritage present in the area and the necessary monitoring technologies for interventions aimed at its conservation, management and enhancement. The activities that the PhD student will carry out at national and international research facilities will focus on both basic and applied disciplines. An integral part of the candidate's training will be the experimental activities carried out in the laboratory and in the field, also in collaboration with the partners, aimed at optimizing study methods and analysis of processes and factors affecting the degradation of the environmental heritage. In addition, the candidate will participate in national and international congresses, as well as training and improvement internships, withheld priorities for training and updating purposes.
COMPANY/RESEARCH INSTITUTION/PUBLIC ADMINISTRATION	University of Naples Contact persons: Prof. Piergiulio Cappelletti and Dr. Concetta Rispoli Legal head office: University Campus Monte Sant'Angelo, Via Vicinale Cupa Cintia 21 - 80126 Naples
NO. OF MONTHS TO BE SPENT IN THE COMPANY/RESEARCH INSTITUTION/PUBLIC ADMINISTRATION	3
FOREIGN INSTITUTION	Laboratorio HERCULES and Departamento de Geociências da Escola de Ciências e Tecnologia - Universidade de Evora Contact person: Prof. José António Paulo Mirão Department of Architectural Graphic Expression of the Polytechnic University of Valencia Contact person: Prof. Pablo Rodriguez-Navarro
NO. OF MONTHS TO BE SPENT IN THE FOREIGN INSTITUTION	3 (Evora) + 3 (Valencia)
SCHOLARSHIP 3	
TYPOLOGY	NRRP Research
RESEARCH PROJECT	Photosynthetic characterization and ecophysiological correlations in *Posidonia oceanica L.*: a tool for monitoring climate change and Mediterranean Sea fluctuations
PRINCIPAL INVESTIGATORS	Prof. Dr. Dario Piano
DESCRIPTION OF DOCTORAL TRAINING	The candidate will be trained in the collection of P. oceanica samples and in the isolation of photosynthetic complexes by protein chromatography. The subsequent parts of morpho-functional characterization at different levels (from plant to photosynthetic complexes) will require further training steps consisting of: i) the in vivo use of spectrofluorimetry and oxygen evolution assays by Clark electrode on leaf discs in order to monitor the photosynthetic activity; ii) the use of absorption and fluorescence spectroscopy, photo-oxidation assays, and high-resolution optical and cryo-electron microscopy in order to obtain a functional and structural analysis of the photosynthetic complexes. The training of the candidate and the optimization of part of the experimental procedures will be in collaboration with the foreign partner Prof. Dr. Hazem M. Kalaji, Ph.D., and similarly the chromatographic procedures will be optimized in collaboration with the startup ReGenFix.
COMPANY/RESEARCH INSTITUTION/PUBLIC ADMINISTRATION	Regenfix s.r.l. Contact person: Dr. Domenica Farci, Ph.D., CEO Legal head office: Via Carducci 34, 09030 Sardara (SU)
NO. OF MONTHS TO BE SPENT IN THE COMPANY/RESEARCH INSTITUTION/PUBLIC ADMINISTRATION	6

FOREIGN INSTITUTION	Warsaw University of Life Sciences – SGGW. Contact person: Prof. Dr. Hazem M. Kalaji, Ph.D. Legal head office: Nowoursynowska Str. 159, 02-776 Warsaw, Poland
NO. OF MONTHS TO BE SPENT IN THE FOREIGN INSTITUTION	12