

**Teaching plan - PhD programme in Chemical, Geological and Environmental Sciences**

36°Cycle a.y. 2020/2021

<b>Course</b>	<b>Teacher(s)</b>	<b>SSD</b>	<b>hrs</b>	<b>credits</b>	<b>Educational form*</b>	<b>Type of activity**</b>	<b>Mandatory/Chosen activity</b>
Scanning and Transmission Electron Microscopy, Principles and Applications	Giancarlo Capitani, Paride Mantecca, Maurizio Acciarri	GEO/06, BIO/06, FIS/01	30	3	Lecture & laboratory training	Intercurricular	Chosen activity
Earth Observation data for environmental monitoring	Micol Rossini	GEO/04	16	2	Lecture	Intercurricular	Chosen activity
Open source software for spatial data analysis	Micol Rossini	GEO/04	16	2	Lecture	Intercurricular	Chosen activity
Online tools for atmospheric research	Samuel Albani	GEO/04	10	1	Lecture & laboratory training	Intercurricular	Chosen activity
Climate Journal Club	Claudia Pasquero	Vari	20	2	Seminar	Intercurricular	Chosen activity
Environmental sustainability	Elena Collina, Valeria Mezzanotte, Emilio Padoa-Schioppa, Francesco Romagnoli	CHIM/12, BIO/07	10	1	Lecture & laboratory training	Intercurricular	Chosen activity
Machine Learning for Multivariate Data Analysis	Davide Ballabio	CHIM/01	16	2	Lecture	Intercurricular	Chosen activity

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New lignin-based sustainable materials: science and technological aspects.	Luca Zoia, Ruggero Barni, Antonello Cerullo, Jerome Vachon, Massimo Benocci, SABIC	CHIM/01, FIS/03	8	1	Lecture	Intercurricular (mutuato dal Corso di Dottorato in Fisica e Astronomia)	Chosen activity
Seminar Course	Seminario A cura dei dottorandi	Vari	12	1	Seminar	Chemistry Curricular	Mandatory activity
Introduction to photochemistry	Luca Bertini, Claudio Greco, Antonio Papagni	CHIM/02, CHIM/03, CHIM/06	16	2	Lecture	Chemistry Curricular	Chosen activity
NMR spectroscopy applications to ligand-receptor studies	Cristina Airoidi	CHIM/06	20	2,5	Lecture & laboratory training	Chemistry Curricular	Chosen activity
Crystallography and Laboratory of X-ray powder diffraction	Massimo Moret, Chiara Ferrara	CHIM/03, CHIM/02	18	2	Lecture & laboratory training	Chemistry Curricular	Chosen activity
Separability in quantum chemistry and effective potential theories	Piercarlo Fantucci	CHIM/03	20	2,5	Lecture	Chemistry Curricular	Chosen activity
NMR spectroscopy of molecular Inorganic and Organometallic Compounds	Roberto Della Pergola	CHIM/03	8	1	Lecture	Chemistry Curricular	Chosen activity

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Seminar Course	Seminario A cura dei dottorandi	Vari	12	1	Seminar	Geology Curricular	Mandatory activity
UAV/ROV and Immersive Virtual Reality for research in volcanically, tectonically and climatically sensitive areas.	Fabio Luca Bonali Alessandro Tibaldi Alessandra Savini	GEO/03, GEO/04	16	2	Lecture & Laboratry training	Geology Curricular	Chosen activity
Field and remote-sensing techniques for the advanced characterization of rock fractures in outcrops	Federico Agliardi, Andrea Bistacchi	GEO/05, GEO/03	20	2	Lecture & Laboratry training	Geology Curricular	Chosen activity
Provenance analysis: how to integrate single grain and bulk techniques	Sergio Andò, Alberto Resentini	GEO/02	16	2	Lecture	Geology Curricular	Chosen activity
Detrital geochronology and thermochronology	Igor M. Villa, Marco G. Malusà	GEO/08, GEO/02, GEO/03	16	2	Lecture	Geology Curricular	Chosen activity
Introduction to geodynamic and landscape evolution numerical modeling	Pietro Sternai	GEO/02, GEO/03, GEO/04, GEO/10	20	2	Lecture, computer work	Geology Curricular	Chosen activity
Geotechnical modelling) for slope stability and underground geostructures	Riccardo Castellanza	ICAR/07	20	2	Lecture & Laboratry training	Geology Curricular	Chosen activity

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Advanced experimental testing and monitoring on geomaterials (laboratory and in situ)	Riccardo Castellanza	ICAR/07	20	2	Lecture & Laboratory training	Geology Curricular	Chosen activity
Fluids In the Earth	Robert J Bodnar, Maria Luce Frezzotti, Leonid Danyuchevsky	GEO/07, GEO/08	40	4	Lecture & Laboratory training	Geology Curricular	Chosen activity
Critical raw materials and their environmental impact	Alessandro Cavallo	GEO/09	16	2	Lecture	Geology Curricular	Chosen activity
Seminar Course	Seminario A cura dei dottorandi	Vari	12	1	Seminar	Environment Curricular	Mandatory activity
Spatial variability of environmental characteristics and mapping methodologies - Variabilità spaziale delle caratteristiche ambientali e metodi cartografici	Roberto Comolli, Chiara Ferré	AGR/14	22	2	Lecture & Laboratory training	Environment Curricular	Chosen activity
Native plant assemblages to restore degraded lands	Rodolfo Gentili, Sandra Citterio	BIO/01	8	1	Lecture	Environment Curricular	Chosen activity
Antimicrobial resistance in the environment and risk assessment of veterinary medicinal products (VMPs)	Sara Villa, Andrea Franzetti	BIO/07, BIO/19	16	2	Lecture	Environment Curricular	Chosen activity
Seafloor mapping & tutela dello spazio marino	Daniela Basso Alessandra Savini	GEO/01, GEO/04	8	1	Lecture	Environment Curricular	Chosen activity

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Isotopes as environmental tracers	Barbara Leoni	BIO/07, GEO/05	16	2	Lecture & Laboratory training	Environment Curricular	Chosen activity
Computer-Aided Statistical Course For Marine Ecologists	Paolo Galli	BIO/07	24	3	Lecture & Laboratory training	Environment Curricular	Chosen activity
Environmental Risks Assessment of Chemicals	Antonio Finizio	BIO/07	16	2	Lecture	Environment Curricular	Chosen activity
Data analysis applied to the environment: Soundscape as index	Giovanni Zambon	FIS/07	20	2	Lecture & Laboratory training	Environment Curricular	Chosen activity
Tot: 33			558	62			

**Educational form\***

lecture  
laboratory training  
seminar

**Type of activity\*\***

curricular  
cross-curricular