

 <p>A.D. 1308 <b>unipg</b> UNIVERSITÀ DEGLI STUDI DI PERUGIA</p>	<p><b>Documento di pianificazione e di organizzazione delle attività formative e di ricerca (DPO)</b></p>	<p><b>MODOT AQ 3</b> <b>Rev 1</b> <b>Data 30.01.2023</b></p>
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*Il Documento di pianificazione e di organizzazione delle attività formative e di ricerca viene richiesto al Corso di Dottorato prima dell'inizio di un nuovo ciclo del corso di dottorato. Ai contenuti del DPO viene data adeguata visibilità nel sito web del corso ai fini dell'attrattività e della trasparenza. Il DPO viene eventualmente aggiornato annualmente in caso di modifiche e si può redigere anche solo in lingua inglese.*

## **Calendario delle attività formative (D.PHD.2.1)**

### **Training calendar**

*Indicare:*

- *l'elenco dei corsi organizzati, specificando la durata in ore, i cfu, il SSD, l'anno e il docente (componenti del Collegio dei docenti, studiosi ed esperti italiani e stranieri di elevato profilo provenienti dal mondo accademico, dagli Enti di ricerca, dalle aziende, dalle istituzioni culturali e sociali)*  
*the list of organized courses, specifying the duration in hours, credits, SSD, the year and teacher (members of the PhD Board, high-profile Italian and foreign scholars and experts from the Academia, research institutions, companies, cultural and social institutions)*

The doctoral training program includes the following courses (Board members are indicated with \*):

Dr. Maurizio Ercoli (University of Perugia)

**Ground Penetrating Radar in geosciences: principles and applications**

Duration: 18 h

Credits: 3

Year: Students of all PhD years can attend the course

Dr. Paolina Bongioannini Cerlini (University of Perugia)

**Introduction to Atmospheric Physics, Climate and COPERNICUS DATA STORE (CDS)**

Duration: 20 h

Credits: 3

Year: Students of all PhD years can attend the course

Prof. Maurizio Petrelli\* (University of Perugia), Dr. Alessandro Mondini\* (CNR-IRPI)

**Machine learning for data analysis, and image classification in the Earth Sciences**

Duration: 18 h

Credits: 3

Year: Students of all PhD years can attend the course

Dr. Filippo Carboni (University of Perugia)

**From Seismic Interpretation to Balancing and Restoration using Move**

Duration: 24 h

Credits: 4

Year: Students of all PhD years can attend the course

Dr. Andrea Sorci (University of Perugia)

**Sedimentary petrology applied to reservoir characterization**

Duration: 21 h

Credits: 3

Year: Students of all PhD years can attend the course

Dr. Alessandro Pisello (University of Perugia), Dr. Maximiliano Fastelli (University of Perugia), Dr. Mickael Baquè (DLR)

### **Frontiers in Solar System Studies and Exploration**

Duration: 21 h

Credits: 3

Year: Students of all PhD years can attend the course

The courses are international, interdisciplinary, and multidisciplinary and do not attain at any specific Italian SSD.

- *la presenza di una serie di seminari specifici del corso (numero annuo, cadenza temporale, cfu riconosciuti)*  
*the presence of a series of specific seminars of the course (annual number, frequency, recognized credits)*

The doctoral training program includes the following seminars (scheduled weekly in the first semester):

1. Lorenzo Bonechi (INFN Florence) – Muon radiography: an innovative geophysical prospecting technique. Introduction and discussion of real cases
2. Michele Cenci (Regione Umbria) – Energy policy, burden sharing and renewable energies: Umbria's hard trek. Challenge for the next future. Are renewable electric energies enough?
3. Bernard Shmitt (IPAG Univ. Grenoble Alpes/CNRS) – The SSHADE European database infrastructure in spectroscopy of solids: its spectral and band list databases on ices, organics and minerals for astrophysics and geosciences
4. Antonia Elia (University of Perugia) – Microalgae as multifaceted environmental tool for assessing freshwater ecosystem health
5. Giovanni Boschian (University of Pisa) – South African hominins and caves under a microscope. New geological approaches to an old problem
6. Andrea Villa (Institut Català de Paleontologia Miquel Crusafont) – To juggle frogs: ectothermic tetrapods as palaeoenvironmental and palaeoclimatic proxies
7. Walter Dragoni (University of Perugia) – Climate changes and impacts on the environment

Students acquire 3 credits by attending at least 75% of the proposed seminars.

- *la presenza di altri eventi scientifici (numero annuo e cfu riconosciuti)*  
*the presence of other scientific events (annual number and recognized credits)*

The doctoral training program includes the following schools:

1. Scuola Pialli 2023 (6 credits)
2. School of Paleoanthropology (6 credits)
3. International Short Course on Application of Laser Ablation Inductively Coupled Plasma Mass Spectrometry to Earth Sciences (3 credits)

To complete their training (30 credits), PhD students can attend courses and schools offered by external national and international institutions, in agreement with the objectives of their training and research program.

## **Integrazione dei dottorandi nella comunità scientifica (D.PHD.2.2)** **Integration of PhD students in the scientific community**

*Indicare:*

- *la presenza di momenti formativi di scambio/presentazione dei risultati della ricerca (numero e cadenza temporale)*  
*the presence of training sessions for the exchange/presentation of research results (number and timing)*

The PhD Board encourages and advertises student participation in communication events, especially among peers (e.g., “PhD Day” Società Geologica Italiana; “Palaeontologist in Progress annual workshop” Società Paleontologica Italiana; BeGEO Scientists annual meeting; etc.).

Number and timing per PhD student: at least 1 event/Cycle.

- *la partecipazione a congressi e/o workshop nazionali e internazionali, anche in qualità di relatori (numero annuo per dottorando)*  
*participation in national and international congresses and/or workshops, also as speakers (annual number per PhD student)*

PhD students are strongly encouraged to participate in national and international congresses/workshops consistent with their research program.

Number and timing per PhD student: at least 3 conferences/Cycle.

- *la partecipazione a scuole di formazione nazionali e internazionali (numero annuo per dottorando)*  
*participation in national and international training schools (annual number per PhD student)*

PhD students can integrate their own training program by attending national and international training schools (see “other scientific events” in D.PHD.2.1), in agreement with their research program.

Number and timing per PhD student: at least 1 school/Cycle.

## **Autonomia del dottorando (D.PHD.2.3)** **Autonomy of the PhD student**

*Indicare:*

- *le attività organizzate per sviluppare l'autonomia del dottorando nel concepire, progettare, realizzare e divulgare programmi di ricerca e/o di innovazione*  
*activities organized to develop the autonomy of the PhD student in conceiving, planning, implementing and disseminating research and/or innovation programs*

The Board encourages the PhD students to attend the transversal courses organized by the University of Perugia to enhance their soft skills (e.g., English language improvement; Computer improvement; Management of research and knowledge of European and international research systems; Exploitation and dissemination of results, intellectual property and open access to data and research products). A minimum of 3 credits/Cycle for these courses is requested.

- *la presenza di componenti del Collegio dei docenti, tutor esterni di caratura nazionale/internazionale e/o professionale che svolgono funzioni di supporto e guida*  
*the presence of members of the teaching staff, external tutors of national/international and/or professional standing who perform support and guidance functions*

A member of the Board (Prof. Laura Melelli) acts as tutor for the students performing support and guidance functions.

- *la presenza di un co-supervisore all'interno dell'impresa per i dottorati industriali*  
*the presence of a co-supervisor within the company for industrial doctorates*

The PhD in Earth System and Global Changes is not an industrial doctorate.

- *le modalità di individuazione del tutor e il numero massimo di dottorandi assegnati*  
*the methods for identifying the tutor and the maximum number of doctoral students assigned*

The tutor for each PhD student is identified and appointed by the Board on the basis of research affinities/background.

Each tutor can supervise a maximum of 3 students (exceptional cases where a higher number of students are requested to be supervised must be evaluated and authorized by the Board).

#### **Risorse finanziarie e strutturali (D.PHD.2.4)** **Financial and structural resources**

*Indicare:*

- *le risorse fornite dall'Ateneo*  
*the resources provided by the University*

1 scholarship funded by Government funds  
3 scholarships funded by PNRR funds

- *le risorse fornite dal Dipartimento e/o dai supervisori*  
*resources provided by the Department and/or supervisors*

None

- *le strutture operative e scientifiche a disposizione dei dottorandi*  
*the operational and scientific structures available to doctoral students*

Equipment and/or Laboratories: Optical and Dielectric Spectroscopy; X-ray diffractometry and fluorescence; Dynamics of Complex Systems; Development of Radiation Detectors; Applied Geology and Geophysics, Hydrogeology, Photogeology and Cartography; Scanning Electron Microscopy; Space Test Laboratories (SERMS and CEM; Terni); Astrophysics/Astronomical Observatory; Fluid geochemistry; LA-ICP-MS microanalysis; high-T experimental volcanology; Rock sample preparation lab (thin sections, organic

matter samples, incoherent rock samples, etc.); Vertebrate paleontology; 3D scanning (high-resolution structured-light 3D scanners; laser scanner; photogrammetry) and printing (high-resolution 3D printer) hardware and associated software.

Library heritage: At the Library of Mathematical, Physical and Geological Sciences, a vast range of volumes, reference texts, and scientific journals are available for PhD students, who also have access to the other University libraries and online databases.

E-resources: The major international databases of interest to the PhD disciplines are accessible online and available to PhD students. Software packages (both proprietary and open-source) are available for data analysis, simulations, and design in the research fields of interest to the PhD. Moreover, in the Department of Physics and Geology there is a computer center managed in collaboration with INFN and CNR local sections. Resources include a central GRID system of 256 CPUs and individual computers, as well as shared print and mass storage facilities.

Other: For technological support to research there are service laboratories, such as: Mechanical Workshop; Sample Preparation and Analysis; Chemical and Mineralogical Analysis; Electronics; Electron Microscopy; Geology and Applied Geophysics.

### Attività didattiche e di tutoraggio (D.PHD.2.5)

#### Financial and structural resources

*Indicare:*

- *le attività di didattica e/o tutoraggio coerenti con il progetto di ricerca consentite ad ogni dottorando (numero massimo di ore annue)*  
*the teaching and/or tutoring activities consistent with the research project allowed to each PhD student (maximum number of hours per year)*

Each PhD student can carry out a maximum of **90 hours/year** for teaching and/or tutoring activities consistent with his/her research project.

### Relazioni scientifiche e mobilità dei dottorandi (D.PHD.2.6)

#### Scientific reports and PhD student mobility

*Indicare:*

- *la presenza di cotutele e/o il rilascio di titoli multipli*  
*the presence of co-tutorships and/or the issue of multiple titles*

None

- *la durata di periodi di mobilità obbligatoria dei dottorandi presso qualificate Istituzioni accademiche e/o industriali o presso Enti di ricerca pubblici o privati, italiani o esteri*  
*the duration of periods of mandatory mobility of PhD students at qualified academic and/or industrial institutions or at public or private, Italian or foreign research institutions*

Students with University scholarship - minimum period of stay in qualified foreign institutions: **3 months**.

Students with PNRR-related scholarship - minimum period of stay in qualified foreign institutions: **6 months**; minimum period of stay in Italian public or private institutions (if requested): **6 months**.

## Prodotti della ricerca (D.PHD.2.7)

### Research products

*Indicare:*

- *la tipologia e il numero dei prodotti della ricerca attesi per ogni dottorando (pubblicazioni su riviste, pubblicazione della tesi, deposito di brevetti, sviluppo di strumenti o software, etc...)*  
*the kind and number of research products expected for each PhD student (publications in journals, publication of the thesis, filing of patents, development of tools or software, etc...)*

By the end of the Cycle, each student is required to have **at least 2 papers** accepted in peer-reviewed indexed journals, concerning topics consistent with his/her research project.