

Attachment 3 - Document of Planning and Organization of Training and Research Activities (DPO)

	Document of Planning and Organization of Training and Research Activities (DPO)	MODOT AQ 3 Rev1 Date May 20th 2024
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The DPO is requested from the doctoral course before the start of a new doctoral cycle. The contents of the DPO are given adequate visibility on the course website for the purposes of attractiveness and transparency. The DPO is updated annually if necessary in the event of changes and can also be drafted in English only.

Schedule of training activities (D.PHD.2.1)

- list of the courses, duration in hours, CFU, SSD, the year and the lecturer (members of the Faculty Board, high-profile Italian and foreign scholars and experts from the academic world, research organisations, companies, cultural and social institutions);

Teaching title	n. cfu (h)	SSD-SC teaching	Final test*	Professor/s	Professor tipology**	Distribution during the doctoral cycle (years in which teaching is active)
Modeling and simulation of stochastic processes	3 (18)	ICAR/08-08/B2	YES	Massimiliano Giofrè	Member of the Faculty Board	I
Transients in pressurized pipes	2 (12)	ICAR/01-08/A1	YES	Marco Ferrante	Member of the Faculty Board	I
Python for Numerical Computing and Development of Scientific Application	5 (30)	ICAR/08-08/B2	YES	Federico Cluni	Member of the Faculty Board	I
Soil-Structure Interaction under dynamic loading conditions	3 (18)	ICAR/07-08/B1	YES	Diana Salciarini	Member of the Faculty Board	I
Energy geostructures	2 (12)	ICAR/07-08/B1	YES	Diana Salciarini	Member of the Faculty Board	I
Continuum mechanics of porous media	5 (30)	ICAR/07-08/B1	YES	Claudio Tamagnini	Member of the Faculty Board	I
Smart Materials for Interactive Environments and Intelligent Structures	2,5 (15)	ING-IND/22-09/D1	YES	Luca Valentini	Member of the Faculty Board	I
	2,5 (15)	ICAR/09-08/B3	YES	Antonella D'Alessandro (cd ¹)	Member of the Faculty Board	
Graphical Languages for Research	5 (30)	ICAR/17-08/E1	YES	Valeria Menchetelli	Member of the Faculty Board	I
Science and Technology of Composite Materials	2,5 (15)	ING-IND/22-09/D1	YES	Luigi Torre	Member of the Faculty Board	I
	2,5 (15)	ING-IND/22-09/D1	YES	Debora Puglia (cd ¹)	Member of the Faculty Board	
Risk and Reliability in Civil and Environmental Engineering	3 (18)	ICAR/09-08/B3	YES	Marco Breccolotti	Member of the Faculty Board	I
Structural Health Monitoring based on Data Science techniques	1 (6)	ICAR/09-08/B3	YES	Filippo Ubertini	Member of the Faculty Board	I
	1 (6)	ICAR/09-08/B3	YES	Ilaria Venanzi (cd ¹)	Member of the Faculty Board	
Expeditious and large-scale assessment of seismic risk in historic built environment	2 (12)	ICAR10-08/C1	YES	Giovanni Mochi	Member of the Faculty Board	I
	2 (12)	ICAR/09-08/3B	YES	Antonio Formisano (cd ¹)	Member of the Faculty Board	

Flow Induced Vibrations of Engineering, Natural and Biological Systems	3 (18)	ICAR/08-08/B2	YES	Luca Caracoglia	Member of the Faculty Board	I
Environmental impact of plastics and bioplastics	2 (12)	AGR/13-07/E1	YES	Daniela Pezzolla	Member of the Faculty Board	I
	1 (6)	AGR/13-07/E1	YES	Nicolò Montegiove (cp ^{***})	Expert of high scientific profile	
Chemistry and Physics of Low-Dimensional Phases and Materials: Relevant Cases of Study	4 (24)	CHIM/07-03/B2	YES	Giacomo Giorgi	Member of the Faculty Board	I
INNOVABILITY: innovation for sustainability	4 (24)	iCAR/13-08/D1	YES	Benedetta Terenzi	Member of the Faculty Board	I
Design for alluminium alloy structures	3 (18)	ICAR/09-08/B3	YES	Antonio Formisano, Federico Mazzolani	Member of the Faculty Board	I
Probability theory, uncertainty quantification and bayesian-based methods for data analysis: basic concepts and applications.	2,5 (15)	ICAR/09-08/B3	YES		Contract Art. 23 c.1 or Art. 23 c.2	I
	2,5 (15)	ICAR/08-08/B2	YES	Chiara Pepi	Expert of high scientific profile	
Smart approaches for Structural Health Monitoring and risk evaluation of structures and infrastructures	3 (18)	ICAR/09-08/B3	YES	Andrea Meoni	Expert of high scientific profile	I
Waste materials for sustainable road construction	3 (18)	ICAR/04-08/A3	YES		Contract Art. 23 c.1 or Art. 23 c.2	I
Wave-based defect detection in pressurized pipelines	3 (18)	ICAR/01-08/A1	YES	Silvia Meniconi	Member of the Faculty Board	I
Architectural Drawing - Digital transitions	2 (12)	ICAR/17-08/E1	YES	Fabio Bianconi	Member of the Faculty Board	I
	2 (12)	ICAR/17-08/E1	YES	Marco Filippucci	Member of the Faculty Board	
Queering' the architectural space: Restoration and Cultural Heritage practices beyond the «logic of the monument	2 (12)	ICAR/08-08/B2	YES		Contract Art. 23 c.1 or Art. 23 c.2	I
Design Strategies for Architectural and Urban Regeneration	1,5 (9)	ICAR/13-08/D1	YES	Eliana Martinelli	Member of the Faculty Board	I
	0,5 (3)	ICAR/13-08/D1	YES	Paolo Belardi	Member of the Faculty Board	
Ablative materials for solid rocket motor nozzle assemblies	1 (6)	ING-IND/22-09/D1	YES	Maurizio Natali	Member of the Faculty Board	I
Modeling and simulation of stochastic processes	3 (18)	ICAR/08-08/B2	YES	Massimiliano Gioffrè	Member of the Faculty Board	II
Transients in pressurized pipes	2 (12)	ICAR/01-08/A1	YES	Marco Ferrante	Member of the Faculty Board	II
Python for Numerical Computing and Development of Scientific Application	5 (30)	ICAR/08-08/B2	YES	Federico Cluni	Member of the Faculty Board	II
Soil-Structure Interaction under dynamic loading conditions	3 (18)	ICAR/07-08/B1	YES	Diana Salciarini	Member of the Faculty Board	II
Energy geostructures	2 (12)	ICAR/07-08/B1	YES	Diana Salciarini	Member of the Faculty Board	II

Theory of plasticity: theoretical and computational aspects	5 (30)	ICAR/07-08/B1	YES	Claudio Tamagnini	Member of the Faculty Board	II
Smart Materials for Interactive Environments and Intelligent Structures	2,5 (15)	ING-IND/22-09/D1	YES	Luca Valentini	Member of the Faculty Board	II
	2,5 (15)	ICAR/09-08/B3	YES	Antonella D'Alessandro (cd ¹)	Member of the Faculty Board	
Graphical Languages for Research	5 (30)	ICAR/17-08/E1	YES	Valeria Menchetelli	Member of the Faculty Board	II
Science and Technology of Composite Materials	2,5 (15)	ING-IND/22-09/D1	YES	Luigi Torre	Member of the Faculty Board	II
	2,5 (15)	ING-IND/22-09/D1	YES	Debora Puglia (cd ¹)	Member of the Faculty Board	
Risk and Reliability in Civil and Environmental Engineering	3 (18)	ICAR/09-08/B3	YES	Marco Breccolotti	Member of the Faculty Board	II
Structural Health Monitoring based on Data Science techniques	1 (6)	ICAR/09-08/B3	YES	Filippo Ubertini	Member of the Faculty Board	II
	1 (6)	ICAR/09-08/B3	YES	Ilaria Venanzi (cd ¹)	Member of the Faculty Board	
Expeditious and large-scale assessment of seismic risk in historic built environment	2 (12)	ICAR/10-08/C1	YES	Giovanni Mochi	Member of the Faculty Board	II
	2 (12)	ICAR/09-08/B3	YES	Antonio Formisano (cd ¹)	Member of the Faculty Board	
Environmental impact of plastics and bioplastics	2 (12)	AGR/13-07/E1	YES	Daniela Pezzolla	Member of the Faculty Board	II
	1 (6)	AGR/13-07/E1	YES	Nicolò Montegiòve (cp ¹¹)	Expert of high scientific profile	
Chemistry and Physics of Low-Dimensional Phases and Materials: Relevant Cases of Study	4 (24)	CHIM/07-03/B2	YES	Giacomo Giorgi	Member of the Faculty Board	II
INNOVABILITY: innovation for sustainability	4 (24)	ICAR/13-08/D1	YES	Benedetta Terenzi	Member of the Faculty Board	II
Design for alluminium alloy structures	3 (18)	ICAR/09-08/B3	YES	Antonio Formisano, Federico Mazzolani	Member of the Faculty Board	II
Probability theory, uncertainty quantification and bayesian-based methods for data analysis: basic concepts and applications.	2,5 (15)	ICAR/09-08/B3	YES		Contract Art. 23 c.1 or Art. 23 c.2	II
	2,5 (15)	ICAR/08-08/B2	YES	Chiara Pepi	Expert of high scientific profile	
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practices beyond the «logic of the monument						
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*written, oral, execution of an essay (presentation, etc.)

**members of the Faculty Board, high-profile Italian and foreign scholars and experts from the academic world, research organisations, companies, cultural and social institutions; indicate the name of the Lecturer where possible or the type of contract to be stipulated.

†co-teaching

††co-presence

- presence of a series of seminars specific to the course (annual number, timing, recognised cfu);

The Doctorate systematically organises in-depth seminars with high-profile international scholars.

Below are the seminars already held in the last three years up to the date of this document

Seminars A.A. 2023-2024

- Prof. E. GARCÍA-MACÍAS (Department of Department of Structural Mechanics and Hydraulic Engineering, University of Granada), "A journey from data-driven to model-driven damage identification of structures. Perspectives for scalability to regional SHM", December 11th 2023, 12:30 a.m.
- Prof. Simon LAFLAMME (Dept of Civil, Construction and Environmental Engineering, Iowa State University, USA), "Fast Physics-Informed Machine Learning for High-Rate Structural Health Monitoring", October 12th 2023, 11:00 a.m.
- Prof. Keith WORDEN (University of Sheffield, UK), "An Introduction to Population-Based SHM: When is a Bridge Not an Aeroplane?", October 12th 2023, 12:00 p.m.

Seminars A.A. 2022-2023

- Prof. Ayan SADHU (Department of Civil and Environmental Engineering, Western University), "Artificial Intelligence-enabled Smart Structural Health Monitoring and Maintenance of Civil Infrastructures", September 14th 2023, 3:00 p.m.

- Prof. Mikiya FUJII (Nara Institute of Technology, Japan), “Introduction to Materials Informatics: Materials Design by machine learning”, December 13th 2022, 3:00 p.m.
- Prof. Günter BLÖSCHL (Institute of Hydraulic Engineering and Water Resources Management, Vienna University of Technology, Austria), “How science can ease application - Examples from hydrology”, November 15th 2022, 3:00 p.m.
- Prof. Gianni BARTOLI (University of Florence), “Andar per Cupole: un viaggio tra alcune Cupole della Toscana”, November 10th 2022, 10:30 a.m.
- Prof. Simon LAFLAMME (Dept of Civil, Construction and Environmental Engineering, Iowa State University, USA), “Soft Sensing Technology for Fatigue Crack Discovery and Monitoring”, November 11th 2022, 12:30 a.m.

Seminars A.A. 2021-2022

- Prof. Austin DOWNEY (Department of Mechanical Engineering, University of South Carolina, USA), “Developing rate-rate digital twins for structures under shock loading”, October 26th 2022, 11:30 a.m.
- Carlo BUONTEMPO, Erika COPPOLA, “Copernicus Climate Data Store, il database climatico europeo per la ricerca e la cittadinanza”, October 21st 2022, 9:30
- Prof. Petra Amparo LOPEZ-JIMENEZ and Prof. Modesto PEREZ-SANCHEZ (Escuela Técnica Superior de Ingeniería Industrial, Universitat Politècnica de València, Spain), “Sustainable Development Goals and the Hydraulic Engineering”, May 24th 2022, 10:30 a.m.
- Prof. Piervincenzo RIZZO (Laboratory for Nondestructive Evaluation and Structural Health Monitoring Studies, Department of Civil and Environmental Engineering, University of Pittsburgh, Pittsburgh, PA, USA), “Selected NDE and SHM applications using solitary waves”, April 26th 2022, 4:30 p.m.
- Dr. Federico GUSELLA (Department of Civil and Environmental Engineering, University of Florence), “Earthquake-resistant thin-walled cold-formed steel structures (the structural response of steel connections and concentric bracing systems)”, January 25th 2022, 11:30 a.m.

Generally, at least four to five seminars per year are delivered, mainly by international academic scholars, on an average monthly basis (not considering summer and winter holiday periods).

No specific CFUs are recognized for participation in individual seminars, as the seminar normally does not reach the minimum duration of 6 hours associated with 1 CFU. However, doctoral students are granted the possibility of obtaining CFUs by accumulating several seminars. The Board of Lecturers awards these credits once a year, when analysing the student's annual report. In any case, participation in in-depth seminars is reported by students in their end-of-year reports, helping to provide the Board of Lecturers with the information it needs to draw up the judgement for admission to the final examination.

- *the presence of other scientific events (annual number and recognised cfu)*

Once a year, a “PhD Day” is organised, a scientific “plenary” event of the course, typically lasting two days, also organised in parallel sessions, in which PhD students present the results of their research contextualised in the progress of their thesis work, without recognition of CFUs. The event is open to the technicians and business world, as well as to students of the Master’s degree courses, in order to disseminate the activities carried out in the Doctoral Course. The event may be opened by a scientific seminar held by one of the members of the Teaching Board or by a guest speaker with an international profile.

In addition, during the year students are invited to actively participate in the event *SHARPER – Researchers’ Night*, to which no CFUs are however recognised. However, this curricular activity is also considered by the Board of Lecturers in formulating the judgement for admission to the final examination.

Integration of doctoral students into the scientific community (D.PHD.2.2)

- *the presence of formative moments of exchange/presentation of research results (number and timing);*

During the academic year, two training events are scheduled, considered very important by the Faculty Board, aimed at the cultural exchange of research activities and the presentation of the results obtained in the current year. These events are organised in a hybrid manner: in person for doctoral students and Italian members of the Faculty Board and in remote for international members of the Faculty Board. The participation of the latter is generally significant and contributes greatly to the discussion.

A first moment, referred to as FLASH PRESENTATIONS, is addressed exclusively to new freshmen and is scheduled in January. At this time, first-year PhD students are invited to give a 5-minute presentation of the research topic they are about to tackle. This presentation is followed by a 2-minute discussion with the members of the Faculty Board.

A second moment, named FINAL YEAR MEETING (PhD Day), is open to all PhD students and is scheduled at the end of October. At this time, all PhD students will present the results of their research activities during the year. Particular attention is paid to third-year students, who must present the research activity carried out throughout their PhD. For first-year students, 15 minutes are scheduled followed by 5 minutes of discussion. For second-year students there will be 20 minutes followed by 5 minutes of discussion. For third-year students there is a sort of “pre-defence” of 30 minutes followed by 10 minutes of discussion.

- *participation to national and international conferences and/or workshops, also as speakers (annual number per PhD student);*

PhD students, supported by their tutors, are strongly encouraged to attend conferences and workshops, both national and international, especially as speakers. It is hoped that each student will be able to attend at least one national and one international congress per year. These aspects, which are reported in the annual reports, contribute significantly to the formulation of the final examination judgement by the Faculty Board.

- *participation to national and international training schools (annual number per doctoral student).*

Doctoral students are invited to attend training schools, both national and international. It is hoped that each student will be able to attend at least one training school during the three-year doctoral programme.

Doctoral student autonomy (D.PHD.2.3)

- *activities organised to develop the doctoral student's autonomy in conceiving, designing, implementing and disseminating research and/or innovation programmes;*

The growth in the development of the doctoral student's autonomy in conceiving, designing and implementing research activities is entrusted to individual tutors, both internal to the college and international, who closely follow the research activities and look after the student's progress and scientific maturity. During the presentations at the end of the year, considerable importance is attached to the

discussion phase during which the members of the Faculty Board, by asking specific questions, verify the growth and maturity of the doctoral students. The discussions are therefore never optional but always characterised by at least one question from the session chair identified in the programme, who is never represented by the tutor.

- *presence of members of the Faculty Board, external tutors of national/international and/or professional standing who provide support and guidance;*

Each doctoral student is supervised by an internal tutor belonging to the Faculty Board, with whom the student will be able to continuously work, and by an external tutor with an international profile, with whom the student will share some research topics especially during the mobility period, which will be spent in the location to which he/she belongs.

- *presence of a co-supervisor within the company for industrial PhDs;*

Industrial PhDs have an internal co-supervisor. These supervisors, as of A.Y. 2022-2023, are also included within the Faculty Board.

- *Procedures for tutor identification and the maximum number of doctoral candidates assigned.*

Internal tutors, i.e. belonging to the Faculty Board, are assigned in different ways. In the case of doctoral students who have been awarded a university grant, i.e. with a free theme, tutors are assigned on the basis of the student's research interests.

For industrial doctoral students, tutors are assigned on the basis of the topic of the doctorate, normally identified in agreement with the funding company.

For doctoral students who have been awarded a grant for external projects (such as PON, or funded by public or private bodies), the tutor is automatically defined as the Principal Investigator of the project.

There is no maximum number of PhD students that can be assigned to a single tutor.

Financial and structural resources (D.PHD.2.4)

- *resources provided by the University;*

The University provides each doctoral student with a fund equal to 10% of the grant for the second and third year of study, i.e. € 3068.00, which can be used by the student from the second year onwards for research purposes. Starting with the XXXVIII cycle, this amount has been increased to approximately € 4800.00 available for all three years of the course..

- *resources provided by the Department and/or supervisors;*

The tutors are free to make their funds available to the doctoral student for research-related purposes, including reimbursement of costs for experimental activities and/or participation in conferences.

- *operational and scientific facilities available to doctoral students..*

The spaces provided by the Department of Civil and Environmental Engineering are commonly used by PhD students for courses, seminars, research and study activities. In particular, the following are available

- 25 Classrooms (average capacity: 115 seats)
- 22 Laboratories (average capacity: 10 seats)
- 1 Library (capacity: 250 seats)
- 1 Doctoral room (capacity: 30 seats)

With reference to the above, the Teaching Rooms, Laboratories and Library are at the disposal of staff and students attending the Engineering Pole, while the Doctoral Students' Room is for the exclusive use of students on the Civil and Environmental Engineering PhD Course and the national PhD programs to which Department lecturers belong as members of the Faculty Board.

Teaching and tutoring activities (D.PHD.2.5)

- *teaching and/or tutoring activities consistent with the research project allowed for each PhD student (maximum number of hours per year).*

During their studies, doctoral students may carry out teaching and tutoring activities for students. There is no maximum number of hours allowed in this area, but these activities, both in terms of time commitment and topics covered, must be agreed upon with their tutor, who must certify their suitability.

Scientific relationships and mobility of doctoral students (D.PHD.2.6)

- *presence of cotutelles and/or multiple degrees;*

The Faculty Board is continuously stimulated to establish international relationships in order to develop theses in cotutelle and/or obtain multiple degrees. To date, there are 2 doctoral students with a cotutelle agreement with the University of Granada (XXXVIII cycle).

- *duration of mandatory mobility periods of doctoral candidates at qualified academic and/or industrial institutions or at public or private, Italian or foreign research organisations.*

Doctoral students are required to carry out a mobility period of at least six months at qualified foreign academic institutions, with the sole exception of industrial doctoral students, for whom different rules are laid down in the agreement, and doctoral students without a scholarship, for whom a period of international collaboration "remotely" is accepted on the basis of a written invitation from the international cotutor and endorsed by the cotutor himself. Exceptions allowing the online mode are possible in the case of impediments for documented health reasons.

Research products (D.PHD.2.7)

- *type and number of expected research products for each doctoral student (publications in journals, publication of the thesis, filing of patents, development of instruments or software, etc.)*

Each student is stimulated by his or her tutor to obtain research products, mainly in terms of scientific publications.

Below are the expected products for each doctoral student at the end of their studies:

- at least 1 publication in an international Scopus/IF indexed journal for bibliometric sectors or “Fascia A” journal for non-bibliometric sectors
- at least 2 publications in proceedings of national/international conferences, preferably with the doctoral student as speaker
- optionally, PhD students are invited to contribute to monographs, book chapters, to actively participate in public engagement activities and to communicate through web and social channels the most salient results of their research.
- optionally, doctoral students are invited to contribute to the development of patents and to participate in the establishment of academic spinoffs.

The quality and quantity of the publications produced, together with the reviews of the theses by two external reviewers (of which at least one international reviewer), constitute the preponderant factor in the judgement of admission to the final examination formulated by the Faculty Board.