



PhD IN CLINICAL AND EXPERIMENTAL MEDICINE

PLANNING DOCUMENT

1. INTRODUCTION

The Doctorate in Clinical and Experimental Medicine (DMCS) is offered by the Department of Translational Medical Sciences at the University of Naples Federico II and lasts three years. The number of doctoral students that can be trained in each cycle is 25.

The program aims to provide doctoral students with basic pathophysiological knowledge related to human health and the specific skills to innovatively address experimental problems in the study of human diseases. The program provides in-depth training that covers a broad range of clinical and experimental skills and promotes synergies between the areas of immunology, cardiovascular, gerontology, endocrine-metabolic, dermatology, pediatrics, and dentistry.

The Doctoral Course is divided into 4 different Curricula: 1) Cardiovascular and Gerontological Sciences (SCG), 2) Translational Medical Sciences (SMT), 3) Translational Pediatric Sciences (SPT) and 4) Odontostomatological Sciences (SO).

The teaching staff is composed of full and associate professors as well as qualified experts in the following sectors:

MED/05 - CLINICAL PATHOLOGY

MED/09 - INTERNAL MEDICINE

MED/11 - CARDIOVASCULAR DISEASES

MED/28 - DENTAL DISEASES

MED/35 - SKIN AND VENEREAL DISEASES

MED/38 - GENERAL AND SPECIALIST PEDIATRICS

The Board ensures an adequate number of faculty members for the specific topics of the four curricula. As per ministerial provisions, Board members are selected based on a criterion of high scientific qualification (ref. art. 4, paragraph 1, letter b, of Ministerial Decree no. 45/2013). The following link provides a list of the composition of the Board of Faculty members for the last six PhD cycles:

https://www.medicinatrslazionaleunina.it/didattica_dottorati_ricerca.html

Since its establishment, to foster integration with the production system and collaboration with companies in the sector, the DMCS has promoted the funding of scholarships in addition to those provided by the University, through specific agreements between companies and the University. Furthermore, the PhD program has participated in all MUR initiatives that anticipated the objectives formalized in the PNRR, receiving numerous additional scholarships both in the "Innovative Research



Doctorates with Industrial Characterization" and the "Doctorates on Innovation Topics" areas funded by the PON R&I 2014-2020.

A group of dedicated professors [Prof. Nella Prevete (+390817463604 nella.prevete@unina.it) and Prof. Anna Maria Malfitano (+390817463846 annamaria.malfitano@unina.it)] work on the management of the PhD program, in particular for incoming orientation (Welcome Meeting) and ongoing orientation (bureaucracy, research and grant opportunities, etc.).

The Teaching Office of the Department of Translational Medical Sciences handles administrative tasks related to the Doctorate (Office Head: Dr. Armando Chianese +39 081 2532988 armando.chianese@unina.it). An additional technical-administrative staff member manages the research budget for Doctoral students (Dr. Carmen Dell'Aversano +39 081 7464374 carmelamaria.dellaversano@unina.it).

The DMCS has a Doctoral Course Quality Management Unit (UGQ-PHD) whose tasks, as identified by the Teaching Staff, are: i) analysis of the results of the survey of doctoral students' and research doctors' opinions one year after obtaining the degree, carried out annually; ii) analysis of the trend of the quantitative indicators envisaged by AVA3 and any additional indicators adopted; iii) analysis of weaknesses and any critical issues; iv) proposal for the implementation of improvement actions for the critical issues identified.

2. OBJECTIVES AND TRAINING COURSE

The aim of the PhD in Clinical and Experimental Medicine is to train researchers capable of carrying out research in both academic and industrial settings. To this end, the training program is based on the following common framework:

- 1) didactic training to provide the cultural foundation necessary for research;
- 2) experimental work in the laboratory or clinical setting under the supervision of a tutor;
- 3) training periods abroad or in Italy.

The three-year course provides in-depth training that covers a broad range of clinical and experimental skills and promotes synergies between the immunological, cardiovascular, gerontological, endocrine-metabolic, dermatological, pediatric, and odontostomatological areas.

At the beginning of the course, all doctoral students, having assessed their specific aptitudes and skills, are assigned to a tutor and placed in one of the 4 Curriculums with the aim of initially acquiring the skills typical of that Curriculum and then broadening their scientific horizons through participation in interdisciplinary activities.

Research activities involve the inclusion of all doctoral students in departmental research projects. The goal is to enable PhD students to acquire the experimental skills typical of the relevant Curriculum and to promote their participation in collaborative research projects. This latter aspect is addressed both through synergies between researchers from other curricula and through synergies with other national



and international research groups. Thanks to these synergies, the training program includes doctoral students undergoing training internships at prestigious Italian and international research institutions.

2.1. Didactic activity

Teaching activities are structured according to a training program that promotes the acquisition of multidisciplinary and integrated knowledge through series of formal lectures and seminars led by members of the Teaching Board, by faculty members with teaching assignments, and, in the case of seminars, by eminent Italian and international researchers. Teaching activities are delivered in a blended format: remotely on the University's digital platform Microsoft Teams, available free of charge to all PhD students, and in person in dedicated classrooms. The final schedule, along with the calendar with dates and times, is available on the PhD program website, shared via an electronic calendar, and communicated periodically by email to all PhD students.

Graduate students earn 18 credits over the three-year period, corresponding to 432 hours of classroom teaching. Cross-disciplinary and interdisciplinary courses offered for all curricula pertaining to the Doctorate cover 240 hours over the three-year period. Each doctoral student is also required to complete an additional 192 hours of teaching delivered through specialized courses for each curriculum.

With a view to innovation in teaching and the internationalisation of training and knowledge, it is important to emphasize that teaching activities are structured according to a curriculum that promotes the acquisition of multidisciplinary and integrated knowledge. Furthermore, the program plans the inclusion of all doctoral students in departmental research projects, with the aim of developing the experimental skills typical of the relevant Curriculum and promoting their participation in collaborative research projects. The program also promotes the valorization of doctoral students' scientific research results by supporting the publication of original discoveries in international scientific journals. This latter aspect is addressed through synergies among researchers from other curricula, with other national research groups, and with international groups affiliated with prestigious foreign research institutions. Taking advantage of these synergies, PhD students undertake a training and research stay abroad of at least 6 months, which is an integral part of the training program and constitutes one of the minimum requirements formalized in the Core Curriculum of the training program.



Finally, the DMCS has actively participated in the process of innovation of educational paths that has affected the entire university system in recent years. This innovation process has encompassed all aspects, including the improvement of university teaching at all levels (course design, classroom teaching strategies, use of distance learning, etc.). The DMCS currently aims to promote student-centered teaching, attentive to the professional skills of each doctoral student, operating within a framework of inclusion and capable of strongly mobilizing new technologies (including digital skills), according to the logic of personalized learning and teaching. The training program was designed according to the logic of participatory action research, aiming to derive concrete insights from the experience gained, which can be used to reflect on the training program and implement it for possible modeling and systematization.

The manifesto of educational activities is available at https://www.medicinatraslazionaleunina.it/didattica_dottorati_ricerca.html in the "Course Organization and Teaching Activities" section.

2.2. Research activities

Research activities involve the inclusion of all doctoral students in departmental research projects. The goal is to develop experimental skills typical of their respective curricula and to promote their participation in collaborative research projects. This latter aspect is addressed both through synergies between researchers from other curricula and through synergies with other national and international research groups. Research activity represents most of the commitment required of doctoral students, for a total of 110 credits. The research lines activated within the structures where the School's doctoral students are trained concern the molecular and pathophysiological bases of cardiovascular diseases, immune system diseases, diseases of the elderly, endocrine and metabolic diseases, neoplastic diseases, skin diseases, pediatric diseases, and odontostomatological diseases.

During their training, PhD students have access to financial resources specifically dedicated to the research projects they are involved in. Furthermore, starting in the second year of the program, all PhD students have access to an annual budget dedicated to supporting their training and research activities in Italy and abroad.



The PhD students' scientific training follows a common framework, consisting of experimental work conducted in the laboratories of the associated University Departments under the supervision of a tutor. The faculty members' research areas encompass many aspects of the most advanced basic research in molecular medicine and modern clinical and applied research (see the section on "Thematic Areas and Research Lines"). This practical learning program is made possible thanks to a wide availability of instrumental resources and advanced technologies in the laboratories of the related University Departments (see section dedicated to resources). Members of the Faculty have initiated numerous scientific collaborations with prestigious international research groups, aimed at exploring specific research topics in greater depth.

The research areas of the Doctoral Program are aligned with the scientific disciplines of the members of the Faculty Board. The research lines implemented within the structures where the School's Doctoral students train, concern the molecular and pathophysiological bases of cardiovascular diseases, immune system diseases, diseases of the elderly, endocrine and metabolic diseases, neoplastic diseases, skin diseases, pediatric diseases, and odontostomatological diseases. Further details on the research topics are available at: https://www.medicinatraslazionaleunina.it/didattica_dottorati_ricerca.html

2.3 Intermediate and final tests

Completion of the program, in addition to the 18 credits of classroom teaching and 110 credits of research, also requires:

- at the end of each year of the Doctoral Program, a final assessment exam both to verify the acquisition of the skills taught during the courses and to certify the completion of adequate research (2 credits in the three-year period)
- an experimental thesis (50 credits)

2.4 Core Curriculum

With a view to implementation in the training program, the DMCS Teaching Board has identified some fundamental requirements in the training program that constitute the Core Curriculum.

Doctoral students must meet at least three of the four requirements described below to receive a final grade of "Excellence" in the Teaching Board's Final Report.

Minimum objectives to be achieved in the three-year program (at least 3 out of 4)

- 1) Obtain a language certification of at least level B1, certifying English proficiency according to the guidelines established by the Common European Framework of Reference for Languages (CEFR), issued by an accredited institution.



In this regard, mandatory courses for PhD students include an English language course for linguistic improvement and the achievement of English language certifications according to the guidelines established by the CEFR (Common European Framework of Reference for Languages). The CLA (University Language Center) of the University of Naples Federico II organizes English language courses to prepare PhD students for one of the Cambridge ESOL certifications. Participation in the courses for doctoral students is free. At the end of the courses, students will take an exam to obtain the Cambridge ESOL language certification.

2) Stay abroad for at least 6 months at prestigious research institutions for training and research activities in collaborative projects.

During their training abroad, scholarship holders receive a 50% increase in their scholarship for a maximum period of 18 months. Among the major international universities and research centers with which the College maintains collaborations are: the Department of Pediatrics at Duke University Medical Center (Durham, NC, USA); The Lundberg Laboratory for Diabetes Research at the University of Gothenburg (Sweden); INSERM at the University of Nice (France); the Department of Medicine at Weill Cornell Medical College (New York, NY, USA); and the Center for Translational Medicine at Thomas Jefferson University (Philadelphia, PA, USA).

Doctoral students' stays abroad are supported by:

- University initiatives such as the three-year program for "Study and research training experiences abroad" which provides funding for doctoral students who undertake training periods abroad or the STAR program for territorial support for research activities - Mobility of Young Researchers
- Specific departmental initiatives such as the MSCA Staff Exchange, which funds short-term international and cross-sector exchanges of staff members, including doctoral students, involved in research activities at participating organizations. The aim of this program is to develop sustainable collaborative projects between various academic and non-academic organizations based in Europe and beyond.

3) Co-author of at least 2 scientific articles or alternatively co-author with the first name of at least 1 scientific article, published during the three-year training period in scientific journals with strict editorial control that are registered in the two citation databases (Scopus and Web of Science) approved by the MUR for the National Scientific Qualification (ASN) procedures.

Scientific communication relies on the publication of research products. Within the Doctorate program, authorship, i.e., intellectual paternity and responsibility, is recognized to anyone who has contributed sufficient scientific input to a research product to warrant its designation as such. Doctoral students work on many aspects of the most advanced basic research in molecular medicine and modern clinical and applied research, which facilitates the publication of scientific contributions in international journals with strict editorial control.

4) Participation as a speaker (oral communication or invited presentation) in at least 2 national scientific conferences or alternatively in at least 1 international scientific conference.



The educational objectives of the Doctorate include the ability to present research results at national and international conferences. To encourage participation in high-profile conferences, the Teaching Committee has established that each Doctoral student's annual budget can also be used for travel expenses and memberships in scientific societies.

3. RESOURCES

3.1 Equipment and Laboratories

The proposing Departments have numerous laboratories available for research activities, equipped with the most modern instrumental resources for biomedical research. These include, but are not limited to: animal facilities for genetically modified animals, gene sequencers and equipment for recombinant DNA technologies, automated microscopes for high-content screening, ICycler for Real-Time PCR, flow cytometers with cell sorting, protein sequencers, etc.

3.2 Book Heritage.

The proposing Departments have libraries with a rich collection of treatises and specialized volumes for consultation, as well as subscriptions to highly qualified scientific periodicals covering all the scientific fields of the Doctoral Program. Specifically, there are over 80 subscription journals, most of which date back to the early 1970s. These journals comprehensively cover the topics and research areas of the Doctoral Program.

Furthermore, computer stations are available within the libraries and laboratories for consulting online periodicals available at the University of Naples Federico II virtual library (www.biblio.unina.it/sire).

3.3 Electronic Resources.

The participating departments have numerous computer workstations with computers and scientific equipment connected to the Internet and Intranet. Additionally, the facilities include multimedia classrooms of various sizes, equipped with modern audiovisual projection equipment and Wi-Fi connectivity. Thanks to this electronic and structural support, doctoral students will have access to a series of experimental databases and patient databases enrolled in multicenter clinical trials as part of the experimental program. Furthermore, nearly all the equipment required for biomedical research is managed by native software provided by the manufacturers, which allows for the operation of the equipment itself, the management of generated results, and statistical analysis. Each doctoral student will also have access, using personal credentials, to numerous software programs for teaching and research, such as the entire Office 365 ProPlus suite, MATLAB, Simulink, and other MathWorks tools.

4. JOB OPPORTUNITIES

The PhD program in Clinical and Experimental Medicine represents a launching pad for young researchers entering the workforce, offering a variety of career opportunities thanks to the multidisciplinary nature of the skills involved, the high level of theoretical and practical training, the ability to attract funding from public and private entities, and collaborative relationships with prestigious national and international institutions.



UNIVERSITÀ DEGLI STUDI DI NAPOLI “FEDERICO II”

DIPARTIMENTO DI SCIENZE MEDICHE TRASLAZIONALI

Dottorato di Ricerca in Medicina Clinica e Sperimentale

Coordinatore: Prof. Francesco Beguinot

Specifically, those aiming for academic careers can leverage the experience gained through participation in departmental research projects and collaborative relationships with other research groups. Similarly, those aiming for industrial careers can take advantage of research projects conducted in collaboration with biomedical industries (PON Innovative PhD Scholarships with Industrial Characterization, Additional Grants under Agreement, and PNRR Grants). Furthermore, PhD students aiming for placement in leading research groups can maximize the opportunities offered by training periods abroad. Finally, those wishing to enter the field of advanced clinical practice can delve deeper into specific topics, acquiring specific diagnostic and therapeutic skills through participation in clinical studies and collaboration with cutting-edge national and international hospitals.