UNIVERSITÀ DEGLI STUDI DI PALERMO

DIPARTIMENTO DI SCIENZE E TECNOLOGIE BIOLOGICHE CHIMICHE E FARMACEUTICHE (STEBICEF)

PhD course in

Molecular and Biomolecular Sciences

Guidelines for the training activity of the PhD Course in

" MOLECULAR AND BIOMOLECULAR SCIENCES"

Approved by the Board of the Doctoral Program on 26.02.2025

Art. 1 – Objectives

The PhD program in Molecular and Biomolecular Sciences established starting from Cycle 29 stems from the need to combine diversified research skills essentially concerning Biology, Biotechnology and Chemistry (General and inorganic Chemistry, Organic Chemistry, Pharmaceutical Chemistry, Pharmaceutical Chemistry and Technologies and Food Chemistry). Taking into account the cultural and scientific evolution of the aforementioned reference sectors, the **crucial objective bringing together disciplines of the aforementioned areas is the study and development of molecules, compounds and/or systems of biological and evolutionary interest.**
To this purpose interdisciplinary, multidisciplinary and transdisciplinary expertise are needed, with particular attention to **chemical abilities** (useful for example for isolation, synthesis, molecular characterization), **technological abilities** (useful for example for the design and production of cutting-edge systems for bioactive molecule delivery and regenerative medicine) and **biological activities** (useful for example to evaluate the biological activity or the mode of action of bioactive molecules or to individuate their phylogenetic or evolutionary profile) in order to better design, produce and develop compounds and/or systems with high applicative interest and to understand the molecular basis of biological diversity. In particular, the presence of Professors from different scientific disciplinary sectors allows a continuous interaction between the different disciplines and constitutes a strength point of the Doctorate itself, consistent with the fields of study and research of national and international interest. The topics of the PhD in Molecular and Biomolecular Sciences and the specific skills of the members of the Board of the Doctoral Program, guarantee the PhD student the development of an entire supply chain that, starting from the knowledge of cellular and molecular mechanisms, from the synthesis of molecules and biomolecules, from the recognition and isolation of natural bioactive compounds, through chemical studies, biological, mechanistic and toxicological

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aspects, leads to the identification of products useful for health promotion and possible therapeutic agents and to the interpretation of biological and evolutionary phenomena.

Indeed, the **main objectives** of the PhD Program in Molecular and Biomolecular Sciences concern: **the design, synthesis of molecules/biomolecules, isolation, characterization, delivery and evaluation of the biological activity of molecules of interest in the biomedical, food and environmental fields as well as the study and understanding of biological diversity, with a focus on the genetic and molecular level**. A further objective is represented by **the training of highly specialized figures who can have a wide range of employment opportunities in various fields including the chemical, pharmaceutical, environmental, biological and food areas.**

Art. 2 - Training activity

Each PhD student will carry out research and training activities under the **guidance of an Academic Tutor, possibly supported by one or a maximum of two co-Tutors** (**not necessarily academic**), who will be responsible for overseeing the activities carried out and planning future ones to achieve the objectives of thesis project and for the training of the PhD student.

The PhD student is required to acquire a total of 180 credits in the three-year period, divided into 60 credits for each year.

The training activity (60 credits for each year) is divided into:

1. **Laboratory activity and experimentation** - PhD students carry out experiments related to their research project by carrying out experimental activities in the laboratories present in the Department of Biological, Chemical and Pharmaceutical Sciences and Technologies of the University of Palermo, administrative headquarters of the PhD in Molecular and Biomolecular Sciences, or in other Italian and foreign facilities planned in the PhD student's training course. Activities concerning the synthesis, the chemical, physicochemical and biological characterization, as well as the formulation and development of the systems defined in specific research projects are carried out. These experimental activities also include the isolation of substances of natural origin, their purification, characterization and evaluation of their possible activity as well as their potential use in various fields, such as the chemical, pharmaceutical, food and environmental fields. Experimental activities are also carried out concerning alternative energy sources and the evaluation of anthropogenic effects and environmental risks, as well

as activities aimed at the molecular study of biological diversity. Laboratory and experimental teaching allows the PhD student to acquire a good autonomy in carrying out experimental activities, in the processing of data in the post-experimental phase and in assuming responsibility for the results obtained individually and/or in collaboration with the research group within which he/she carries out his/her project: **minimum 40 CFU/year.**

2. **Frontal specialist courses, different from the courses provided in the Bachelor's, Master's and Single-Cycle Degree Courses and which are established during the planning phase /organization of the specific Cycle** - The educational courses, lasting 8 hours each, are delivered in Italian or English, include a final exam, which must be taken within the academic year, to allow the acquisition of 1 CFU for each course. The assessment methods are defined by the teacher in charge. **It is mandatory to follow and pass at least 50% of the planned courses and scheduled for each year.**

3. **Advanced training courses, participation in Doctoral Schools, *Summer Schools*: max 5 CFU/year.**

4. **Participation in Workshops, Congresses, Conferences: max 5 CFU/year.**

PhD students will be encouraged to present their results by participating in scientific congresses and highly specialized thematic schools (e.g. *winter* or *summer school*s) of national and international interest, in relation to the specificity of their activities and in agreement with their respective tutors. Participation in national and international higher education schools, congresses and workshops is considered an integral and primary part of the training activity. In agreement with their tutors, the PhD students will select the suitable activities to participate in.

5. **Other teaching activities (seminars, interdisciplinary, multidisciplinary and transdisciplinary training) also organized in synergy with the Doctoral School of the University of Palermo: max 20 CFU/year as specified below:**

- **Language improvement - PhD students are required to follow at least one foreign language course provided by the University Language Centre (CLA) of the University of Palermo**
- **Computer upskilling**
- **Research and knowledge management of European and international research systems**
- **Exploitation and dissemination of results, intellectual property and open access to research data and products**
- **Seminars** - PhD students **are required** to attend *ad hoc* organized seminars, pertinent both to topics of common interest and to specific aspects related to particular research projects in progress.
- **Activities at Research Infrastructures**
- **Fundamental principles of ethics, gender equality and integrity**

Art. 3 - Periods abroad

The **period abroad and its location** are defined by the PhD student together with the tutor, and will consist of **at least 6 months** spent at a research institution. Teaching activity is also compulsory for PhD students who carry out their research period abroad.

Art. 4 - Period at Entities/Companies/ public or private Institutions

Doctoral students can undertake training periods or internships in **companies as well as public and private entities, in relation to the type of scholarship or related financial support. The duration and frequency will be established by the call for access and/or by the specific agreement.**

Art. 5 - Evaluation of training activities

1. At the end of each year, the PhD student must submit to the Board of the Doctoral Program a written report of the training activities carried out, countersigned by the Tutor. The PhD student is solely responsible for the truthfulness of the statements made. In the event that the Board finds statements that do not correspond to the truth, the PhD student cannot be admitted into the next year of the course or to the final exam.

2. The research activity carried out along the year must be submitted for the evaluation of admission to subsequent years or to the procedure for the access to the final examination. The date and type of the exam will be communicated by the Coordinator.
3. The Board of the Doctoral Program, after consulting the Tutor, will decide on admission on the basis of the report on the activities carried out, its discussion and the achievement of the minimum requirements. The professors will critically examine the results discussed by PhD student and the research planned for the next period. In the event of a negative evaluation, the Board of the Doctoral Program may propose the non-admission of the student to the next year and the exclusion from the PhD program.

Art. 6 - Requirements for passing the 3rd year of the PhD and admission to the final exam

To be awarded with the PhD title, the PhD student must have demonstrated that he/she is able to carry out research activities in the scientific field of his/her project and be the author or co-author of at least **n. 1 (one) published scientific article or in press manuscript in a journal classified by ISI-WOS or SCOPUS at the time of admission to the final PhD exam**. Therefore, at the end of the 3rd year of the course, each PhD student and his/her Supervisor will provide the Board of the Doctoral Program with all the details on the status of the requested publication (if already published, under review or submitted for publication). In the absence of the required publication, the Board **will decide on passing the third year and therefore on admission to the final exam**, analyzing the scientific and educational path of the doctoral student and the results obtained.

Art. 7 –Other activities

The admission to the Course, in accordance with Ministerial Decree no. 226 of 14/12/2022, entails an exclusive full-time commitment, therefore any other activity to be carried out outside the doctorate must be authorized by the Board of the Doctoral Program. The request must be received by the Coordinator in good time and, except in exceptional cases, no less than one month before the start of the planned activity.