DOCTORALREGULATIONS DM 226/2021

PH.D. COURSE
IN ADVANCED MODELLING, MATERIALS AND TECHNOLOGIES (AMOMAT)

UNIVERSITÀ DEGLI STUDI NICCOLÒ CUSANO – TELEMATICA ROMA
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Art. 1) Establishment of the Doctoral Program

At the Niccolò Cusano University of Rome (hereinafter "Unicusano"), the PhD Program in *Advanced Modelling, Materials and Technologies* (hereinafter "program") is established.
This Regulation governs its organizational and educational aspects.

Art. 2) Description and Educational Objectives of the Program

The PhD program *AMoMAT – Advanced Modelling, Materials and Technologies* aims to provide a third-level education that is strongly multi- and interdisciplinary, focusing on broad-spectrum and cross-disciplinary research topics such as advanced modelling, formulation, characterization and application of materials, and the development of innovative technologies.
Research topics are explored in areas of industrial engineering ranging from materials engineering, applied mechanics, machine design, fluid dynamics, mechanical technology, mechanical measurements, and mechatronics, including transversal aspects of mathematics and structural mechanics.
The AMoMAT PhD program is designed to train highly qualified professionals capable of meeting the needs and dynamics of the industrial and related market, which demand inter-/multidisciplinary skills as well as the ability to apply innovative approaches, methodologies, and technologies to the design and development of new products.
The program covers the following research areas:

- Geometry and Algebra, with particular focus on the development of graphs, mathematical structures able to model relationships between objects, with applications in numerous fields such as Chemistry, Physics, Statistical Mechanics, Biology, and Social Network studies.
- Mechanical Modelling and Design, for the development of computational models through innovative methodologies, and the development of systems for the experimentation and validation of models.
- Manufacturing Technologies and Systems, for the production of innovative polymeric and composite materials and products.
- Materials Science and Technology, for the formulation, production and characterization of materials (including from waste materials in the framework of Circular Economy and zero waste standards) for applications in various sectors, particularly biomedical, environmental and food.
- Mechanical Measurements and Mechatronics, with specific expertise in the design of robotic devices, characterization of measuring instruments, and development of measurement methods.
- Structural Mechanics, focused particularly on the modelling of composite materials.

To this end, the educational path includes courses and research activities in boundary areas between traditional disciplines, while enhancing the multidisciplinary character of the PhD.
The wide range of scientific expertise and research activities of the Academic Board, together with the availability of laboratories and a broad network of international collaborations, ensures a stimulating environment for study and research.

Art. 3) Program Objectives

The main objective of the PhD program is to train experts with a high scientific profile, capable of operating in research and development across different sectors, with a homogeneous methodological approach enriched by the cultural and research experiences within the Academic Board.

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A key element in the training of PhD candidates is the cross-fertilization of knowledge, providing them with the necessary tools to contribute effectively and concretely to innovation.
Highly specialized researchers and technicians will be trained in advanced areas of Industrial Engineering, such as:

- Modelling and design of new materials, components and systems;
- Fluid dynamics modelling and fluid/structure interaction;
- Development of material synthesis processes;
- Process technology development;
- Knowledge of main diagnostic and analytical techniques.

Doctoral candidates will acquire the skills necessary to identify and effectively address issues and challenges associated with their specific research fields, applying problem-solving strategies autonomously. They will also develop soft skills such as teamwork, organization and management of activities, interdisciplinary knowledge sharing, and effective dissemination of results, both through scientific publications and oral presentations at conferences.
Dedicated courses will focus on multidisciplinary knowledge, advanced methodological approaches, tools for bibliographic research of scientific documents, drafting reports and scientific papers, and technical/scientific skills oriented towards applied research with concrete applicability in the labor market, thanks to interaction with companies and research institutions involved in the program design.
Scientific-Disciplinary Sectors involved:

- CEAR-06/A – Structural Mechanics
- IIND-01/F – Fluid Dynamics
- IMIS-01/A – Mechanical and Thermal Measurements
- IIND-02/A – Applied Mechanics of Machines
- IIND-03/A – Mechanical Design and Machine Construction
- IIND-04/A – Manufacturing Technologies and Systems
- IMAT-01/A – Materials Science and Technology
- MATH-02/B – Geometry

Art. 4) Career and Professional Opportunities

The professional qualification acquired makes PhD graduates eligible for national and international collaborations with public and private institutions such as universities, research organizations, central and local administrations, and companies operating in all scientific sectors characterizing the PhD program, particularly in the fields of innovation and production development, advanced design, planning, programming, and management of complex systems.
The main career opportunities include:

- Academic research (postdoctoral fellowships, research grants, or researcher contracts in Italian and foreign universities),
- Research in public and private institutions, development and/or services, technology transfer,
- Aerospace industries and space agencies,
- Automation and robotics industries,
- Manufacturing companies for production, installation, testing, maintenance, and management of machinery,
- Professional roles in companies in manufacturing and service sectors, industrial automation, and IT applied to industry.

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Art. 5) Governing Bodies of the PhD Program

The governing bodies of the PhD program are:

a) The Coordinator

b) The Academic Board

c) The Review Committee

Art. 6) The Coordinator

The role of Coordinator is held by a full-time Full Professor or, in case of justified unavailability, by a full-time Associate Professor meeting the requirements set out in Art. 4, paragraph 1, letter a), no. 3), of Ministerial Decree 226/2021. The Coordinator may serve in only one PhD program.

The Coordinator:

1. Is responsible for the PhD program, directs its activities and represents it;
2. Coordinates and organizes the educational and administrative activities of the PhD program;
3. Convenes and chairs the Academic Board, ensuring implementation of its resolutions;
4. Authorizes PhD candidates, in agreement with their supervisors, to travel within Italy or abroad for training and/or research activities of up to six months;
5. Appoints a Vice-Coordinator able to replace him/her in case of impediment or illness;
6. Promptly notifies the University administration of any change in the status of a PhD candidate.

Art. 7) The Academic Board

The Academic Board carries out all tasks provided for by these regulations and, in particular:

1. Designs and implements the PhD program;
2. Meets periodically, also online, to verify the proper progress of activities and, if necessary, to take corrective action;
3. Prepares the annual report on activities carried out for evaluation purposes according to the guidelines of the University Evaluation Committee;
4. Authorizes any work activities of PhD candidates, provided these do not compromise participation in the program's overall activities;
5. Proposes to the Rector the exclusion of PhD candidates from the program;
6. Grants extensions for submission of the final thesis or suspension of the program, at the explicit request of the candidate and for justified reasons, in accordance with Art. 8 of DM 226/2021;
7. Assigns each candidate a supervisor and, if necessary, one or more co-supervisors, at least one of whom must be academic, also chosen from outside the Board if meeting the required qualifications;
8. Allows other individuals to attend Board meetings or discussions of specific points, without voting rights, upon invitation of the Coordinator;
9. Is convened by the Coordinator, who sets the agenda and notifies members by email;
10. Annually prepares the educational plan and calendar;
11. Monitors the research progress of each candidate;
12. Approves the educational program of candidates at the beginning of each academic year, setting deadlines and methods for submission and review of intermediate works;

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13. Approves candidates' participation in internships at public or private institutions, in Italy or abroad, when lasting more than three months;
14. May authorize candidates to carry out teaching support, supplementary teaching, and extracurricular research activities;
15. Approves, at the end of each academic year, the admission of candidates to the next year of study;
16. Promotes connections with other Italian and foreign universities and with public and private institutions to enhance research activities;
17. Proposes to the Rector the members of the admission examination committees;
18. Appoints, after consulting supervisors, at least two reviewers for the thesis before the public defense, pursuant to Art. 8, paragraph 6, of Ministerial Decree No. 45/2013;
19. Proposes to the Rector the members of the final examination committees;
20. Approves the PhD Program Regulations and their amendments.

For meetings to be valid, at least half plus one of the members must be present, excluding justified absences. Resolutions are adopted by majority vote; in case of a tie, the Coordinator's vote prevails.

Art.8) The Review Committee

The Review Committee is composed of the PhD Coordinator, who also chairs it, one or more faculty members elected from the Academic Board, and one or more PhD candidates elected by their peers. The Committee serves for up to three years and is convened by the Coordinator.

The Review Committee is responsible for:

1. Drafting the review report at least every five years;
2. Preparing an annual monitoring report on the PhD program indicators;
3. Proposing to the Academic Board possible improvement actions for approval;
4. Monitoring the implementation of improvement actions undertaken;
5. Preparing the draft self-assessment of periodic accreditation requirements as required by ANVUR.

Art.9) The Supervisor

Each PhD candidate is assigned a faculty supervisor by the Academic Board during the first year.

The main functions and responsibilities of the Supervisor are:

a) To prepare, together with the candidate, the training plan and define any teaching activities;

b) To guide the candidate's scientific activity;

c) To provide an evaluation of the candidate's activities to be submitted to the Board for progress assessment.

The Supervisor is responsible for guiding the candidate in research activities through periodic meetings, with the primary goal of promoting the candidate's progressive autonomy in conducting scientific research, including the written and oral dissemination of research results, preparation and management of parts of research projects, and integration into the international scientific community.

The Supervisor must notify the Board if the candidate's research work does not meet program standards. The Board may revoke the Supervisor's appointment if obligations are not fulfilled.

The Board may assign one or more co-supervisors, including external to Unicusano.

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Art.10) Admission Requirements and Procedures

Admission requirements and procedures are regulated according to the University's Doctoral Regulations. Admission is based on a competitive selection process assessing the candidate's preparation and research aptitude. Admission procedures and selection criteria are published in the official Call for Applications. Admission is granted according to the merit ranking drawn up by the examining committee.

Art.11) Training Activities

Training activities are dedicated to acquiring fundamental knowledge related to the program's fields. Educational paths are tailored for each student, depending on their previous academic background. However, in-depth knowledge of core areas of the PhD program is considered essential and will be identified by the student together with their Supervisor and in line with the Board's guidelines.

Training activities, to be completed within the first two years, require the acquisition of at least 30 credits. One credit corresponds to 25 hours of study, including individual study and laboratory or lecture attendance. One credit should normally correspond to at least 6 hours of lectures.

The credits are generally distributed as follows:

- 15 credits for courses specifically offered within the PhD program or other doctoral programs at Italian or foreign universities (or institutions). If a final exam is required, the student must pass it to earn credits.
- 15 credits for courses from Master's Degree programs offered by Unicusano or other universities.

Exceptions may be considered by the Board if well justified.

Each year, the Board approves a set of training activities, published on the PhD website at the start of the academic year. Throughout the year, courses, seminars, meetings, and research-related events are offered, often in collaboration with external partners.

Credits may also be earned by participating in Workshops and/or Summer Schools, organized within the PhD program or by Italian or foreign universities, subject to prior approval by the Board.

The educational path normally includes a research stay abroad, in compliance with current regulations, for a total period not exceeding 18 months, during which the candidate may carry out part of their research at qualified foreign institutions (universities, research bodies, or companies conducting R&D).

The Board strongly encourages participation in national and international conferences, considered highly valuable for the PhD training.

The program also allows candidates to undertake tutoring or supplementary teaching, limited to 40 hours/year, defined together with the supervisor and subject to Board approval.

PhD candidates may also tutor Bachelor's and Master's students and collaborate in supervising theses. In total, supplementary teaching and tutoring must not exceed 400 hours over the three years.

Art.12) PhD Candidates' Training Plan

The training plan, containing the objectives and study/research activities for each year, including possible research stays abroad, must be submitted by each candidate, in agreement with their Supervisor, for approval by the Board as follows:

- At the start of each academic year, the candidate submits their proposed training plan to the Coordinator.
- The Board, having reviewed the plans, approves them, normally within 90 days of the academic year's start.

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Approved plans, with any modifications decided by the Board, serve as a reference for the annual evaluation of candidates' fulfillment of training obligations.

Art.13) Evaluation for Admission to the Next Year and Final Examination

At the end of the first and second year, by January, candidates must take an oral exam (in English) presenting the research carried out. The exam takes place before the Academic Board. By the exam date, candidates must submit a written report (in English) covering all activities and credits earned to date. Based on this report and the exam outcome, the Board decides on admission to the next year.

Before the program ends, final-year candidates must apply for admission to the final exam, submitting a report (in English) covering all activities and credits earned to date.

The Board, having reviewed the Supervisor's opinion on the thesis and the submitted report, decides on admission to the final exam. Only if the Board gives a positive evaluation of the performed activities will the candidate be admitted to the final exam.

for candidates admitted, the supervisor appoints two or more reviewers to evaluate the thesis. The candidate sends the thesis manuscript to the reviewers designated by the Board.

The Board's opinion, together with the reviewers' reports, is attached to the copies of the thesis sent to the examination committee at least 30 days before the final exam date, except for special needs.

Art.14) Award of the Degree

The final exam consists of a public presentation and defense of the thesis, usually in English, before the examination committee appointed by the Rector by decree.

The committee normally consists of at least three members, two external and one internal to the Board, none of whom have served as Supervisor or collaborated with the candidate in their research activities.

If necessary, the examination committee may meet via videoconference.

Art.15) Final Provisions

The PhD program carries out self-assessment and verification of achieved results, also through periodic Review Committee activities.

This regulation supplements, for matters expressly provided herein, the applicable national legislation and the University's Doctoral Regulations, which remain fully applicable.

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