

Statutes of the Doctoral Program in Physics and Materials Science of the DSSE

approved by the General Assembly on 21st April 2022

Preamble

This document describes the program-specific statutes of the Doctoral Program in Physics and Materials Science (DPPM) and complements the main statutes of the Doctoral School in Science and Engineering (DSSE) and the regulations of doctoral education at the University of Luxembourg (UL). The statutes reiterate some of the DSSE and UL regulations to highlight their importance in the DPPM context.

More information on DPPM can be found on

https://wwwen.uni.lu/formations/fstc/doctoral_program_in_physics_and_materials_science

The DSSE statutes can be found here:

https://wwwen.uni.lu/fstc/doctoral_school_in_science_and_engineering_dsse/presentation

The university law, the internal UL rules, and the study regulations can be found here:

https://wwwen.uni.lu/university/official_documents

Art. 1. Research topics and environment

The aim of research performed within DPPM is to understand the fundamental and applied aspects of condensed-matter physics and materials science. The doctoral school program comprises supervisors from the Department of Physics and Materials Science (DPhyMS) at UL and from the MRT department at Luxembourg Institute of Science and Technology (LIST). Both institutions aim at performing fundamental and applied research at the forefront of science and technology. This research relies to a large extent on the contributions from young researchers, i.e., postdoctoral researchers and doctoral candidates. The objective of this doctoral program is thus to give an organizational and scientific framework to the structured education of doctoral candidates in physics and materials science.

The doctoral school program is rooted in the fundamental understanding of the physics and chemistry of matter, with specific focus on the condensed phases (solids, liquids and intermediate states). The activities span a spectrum from synthesizing new materials and testing the foundations of physics to the control of interactions and coupling in order to tailor materials for specific functions. Translating cutting edge research in physics and materials science to applicable technology is equally a goal of the program.

Art. 2. Supervision concept and quality assurance

The aim of DPPM is to provide a nurturing and challenging environment for doctoral candidates. Doctoral candidates need supervision and assessment. Supervision is required to guide the DPPM candidates in becoming independent researchers with, e.g., the following skill sets (see also Art. 44 of the Study Regulations of 13th September 2018):

- Ability to formulate hypotheses.
- Ability to design and carry out experiments or simulations or develop theories to test hypotheses.
- Ability to interpret and analyze data and to draw correct conclusions from complex datasets.
- Awareness of the requirements of ethics in research.
- Ability to collaborate with persons of different scientific and/or cultural backgrounds.
- Ability to present their research results in a manner and quality to allow presentations at relevant international meetings and publication in international peer reviewed journals.
- Ability and desire to address a variety of audiences, academic, industrial as well as the general public, communicating the value of the produced knowledge.
- Awareness of the procedures that must be followed to protect intellectual property and ability to assess the value of new results in terms of deciding whether or not they should be protected.

The responsibility of the supervisor is (non-exhaustive list):

- To suggest a stimulating, realistic and up-to-date research topic.
- To listen to the candidate, respect the candidate and her or his ideas, discuss results, guide the writing, suggest conferences, suggest additional information or skills courses to attend, encourage in building up local and international network, read and give feedback in a timely manner on manuscripts for articles and the doctoral thesis, etc.
- To conduct personal meetings with the candidate at regular intervals. The exact timing is agreed between the candidate and the supervisor. But once or twice a month seems typical.
- Provide access to all necessary resources and contacts.

The progress of each doctoral candidate and her or his work is monitored according to UL regulations by the Comité d'Encadrement de Thèse (CET). The composition and tasks of the CET are described in Art. 37 (5) of the University Law, and Art. 50 of the Study Regulations of 13th September 2018. An explanatory text can be found on the website of DPPM.

The defense is in front of a jury, as described in Art. 37 (6) of the law of the university of 27th June 2018 and in Art. 51-54 of the Study regulations of 13th September 2018. DPPM-specific regulations for the PhD defense are explained in Art. 9 of these Statutes.

Art. 3. Program committee meetings and General Assembly of the DPPM

The DPPM Program Committee consists of the Program Coordinator and at least two more members. At least one of the members will have LIST as main affiliation and at least two will have

UL as main affiliation. They are elected for five years. The committee meets at least once per semester. The candidates' representatives are generally invited to these meetings. The task of the committee is to decide on all program specific issues, like courses and events on DPPM level which are relevant for all candidates inside the program, etc. The committee proposes changes in the statutes. The PC is supported by the DS facilitator and administrative assistants.

Once a year a General Assembly (GA) of all members of the DPPM (supervisors and doctoral candidates) is organized. Part of the GA is a supervisor meeting, whose tasks and options contain but are not limited to electing members of the PC, changing these statutes, strategic and organizational issues. Decisions are taken by the supervisors meeting by a majority vote. In case of tie the Program Coordinator has a casting vote. The PC can arrange more meetings, with or without the doctoral candidates' representatives.

Art. 4. Doctoral candidate representatives and activities

Two doctoral candidates, preferably one from MRT and one from DPhyMS, represent the doctoral candidates in the DPPM. They are elected for one year (renewable) by the doctoral candidates that are enrolled in the DPPM.

They represent DPPM in the doctoral candidates' council of DSSE and are generally present at the program committee meetings in an advisory role.

Art. 5. Funding by the doctoral program

The budget of the DPPM can be used for organizing courses and events for DPPM PhD students. In addition to this, doctoral candidates affiliated with DPhyMS can request support for travel or equipment or software that are of immediate use for their doctoral research. The impact on the doctoral studies has to be explained. Forms for application (one for travel support and one for other needs) can be found on the DPPM website. The applications are approved by the program coordinator or in case of conflict of interest by another member of the program committee.

Art. 5. ECTS requirements for successful completion of the DPPM

Doctoral candidates receive their degree, in agreement with UL regulations and in fulfilment of specific DPPM requirements, upon obtaining 20 ECTS, publishing at least two papers, submitting their thesis, acceptance of the thesis by the CET, and successful defense of the thesis in front of a jury.

According to the law and UL regulations, 20 ECTS are required, at least 5 from transferable skills courses (Art. 49 of the study regulations of 13th September 2018). The participation is generally confirmed by the supervisor or by the person responsible for the course, the ECTS are validated by the program coordinator.

(Inter)disciplinary training:

- Modules of the program, ECTS depending on the actual module
- Courses offered within DTUs or UL Courses, ECTS depending on the actual course

- 1 week summer/winter school: 2 ECTS per event
- Talk at international conference: 2 ECTS
- Poster at international conference: 1 ECTS
- Participation in a lecture of the master program: ECTS of the lecture (maximum 5 ECTS) (attending a course must be authorized by the program coordinator, the course teacher, and the supervisor. PhD students need to prove that they did not follow a similar course during their Master's studies).

Transferable skills:

- **Mandatory:** Course on Science Ethics (Good scientific practice), typically 1 ECTS, depending on the actual course
- Modules of the program, ECTS depending on the actual module
- Courses offered within DTUs or the UL Courses (e.g., Scientific Writing, Conference Presentation, Career Development, Mediation, IPR, Time and Project Management): typically 1 ECTS, depending on the actual course
- Language Courses (max. 2 ECTS in total)
- Outreach (Sciences Festival, school visits etc.): 1 ECTS per 25 hours of work

Other events can be validated by the coordinator upon recommendation of the supervisor. No ECTS points are awarded for CET presentations.

Art. 6. Teaching requirements for DPPM PhD students

Every doctoral candidate affiliated with UL *must* and every doctoral candidate affiliated with LIST *should* contribute at least 2 full semesters to the teaching activities in the physics bachelor and master, generally in the form of exercises (TD) or lab classes (TP). The work during the semester is typically a day per week. ECTS for teaching can be awarded if the doctoral candidate participates in a course on teaching (before or after the teaching activity) and writes an essay on the teaching experience (max.5 ECTS).

Art. 7. Requirements for peer-reviewed publications or patents

To defend their PhD, PhD students enrolled in DPPM are required to have:

- One first-author publication in an international peer-reviewed journals or peer-reviewed conference proceedings AND
- One of the following:
 - a second first-author publication OR
 - two co-author publications OR
 - one co-author publication and one patent, where the supervisor confirms that the main contribution is from the doctoral candidate

The CET checks these requirements when authorizing the PhD defense. One of those papers can be submitted, the others should be at least accepted. Well-founded exemptions from these rules can be granted by the program committee upon request from the CET. Exceptions are generally meant for situations where publications are delayed for reasons which the candidate is not responsible for; they are not meant for situations where a shortage of results is the reason for an insufficient number

of publications.

Art. 8. Form of the PhD thesis

According to the UL study regulations, the doctoral thesis can be written either as a monograph (“monographie”) or a cumulative thesis (“thèse par articles”). In both cases, the thesis can be based on previously published or submitted work by the PhD candidate.

A monograph should be a self-contained text, similar to a book, describing the motivation, the approach, the results of the research activities and an outlook. Moreover, it should be written in correct English and should be accessible to Master’s students in a related field. A typical length of a monographic thesis is 100-200 pages. More detailed recommendations about how to write a thesis can be found in the document “Hints for Writing the Doctoral Dissertation within the Doctoral Program Physics and Materials Science”.

A cumulative thesis contains reprints of the published articles of the candidate, as well as: an abstract, a table of contents, a substantial introduction to the thesis, including a literature review, a detailed introduction for each of the articles, putting the paper into context, as well as a summary and outlook, acknowledgements, and a publication list. In the case of a cumulative thesis, the new text authored by the PhD candidate should be at least 40 pages.

The ability to write scientific texts is a required skill for obtaining a PhD degree at the DPPM. The DPPM therefore recommends writing the thesis as a monograph. A monograph accepted by the PhD jury constitutes proof of scientific writing skills. In the case of a cumulative thesis, the PhD students have to demonstrate scientific writing skills in his or her published papers. Therefore, the candidate must document precisely his/her contribution to each of the articles of a cumulative thesis. Moreover, at least three first-author papers, submitted or published at the latest on the date of the submission of the thesis to the jury, are required in the case of a cumulative thesis. If the candidate has at least three papers, but less than three as first author, a cumulative thesis is allowed if the CET confirms that at least three publications were mainly written by the PhD candidate. A given publication can only be used in the cumulative thesis of one PhD candidate.

Art. 9. PhD defense

Further to the rules for PhD juries explained in the University law and the study regulations, in DPPM the jury must contain at least two members who have not published or prepared a publication together with the doctoral candidate.

The PhD defense consists of an oral presentation by the PhD candidate (about 45 minutes) followed by questions from the external jury members, the internal jury member as well as the supervisor (in total about 45 minutes). Afterwards, the jury chairman can ask questions and can allow questions from the audience.

The final verdict of the jury is based on the quality of the thesis, the quality of the presentation as well as on how well the PhD student was able to answer to the questions.