

Statutes of the Doctoral Programme in Computational Sciences

Preamble

This document presents the statutes of the transversal *Doctoral Programme in Computational Sciences (DP-CS)* at the University of Luxembourg (UL). These statutes complement the *Main Statutes of the Doctoral School in Science and Engineering (DSSE)*. If there is any discrepancy between the two documents, the *Main Statutes of the DSSE* will have precedence.

The DP-CS has close links to the multi-disciplinary research carried out within the context of the Data Modelling and Simulation theme of the University of Luxembourg (UL)¹ as discussed in the 2018-2021 Strategic Plan. The programme focuses on research training and aims to

(1) build core competences in:

- Applied Mathematics
- Computer Science
- Computational Science²
- Data Science

(2) train doctoral candidates to apply these skills to solving complex questions within and across specific domains such as:

- Engineering Sciences
- Natural Sciences
- Social Sciences

The proposed training is in line with the UL Doctoral Education Framework (2012) and the National Quality Framework for Doctoral Training.

Computational Sciences are multidisciplinary fields based on the idea that Mathematics and Computer Science theories are used to address application domains within Engineering, the Natural Sciences and the Social Sciences. Obtaining meaningful computational results for various research areas demands both domain knowledge and a command of mathematical and computer modelling tools and their implementation, verification, validation and uncertainty quantification. These problems are typically (though not necessarily) solved using the latest generation of high-performance computing (HPC) platforms. In addition, DCS also includes novel approaches for data acquisition, archiving, management (including meta data) and subsequent processing of data.

¹ https://www.en.uni.lu/research/focus_areas/computational_sciences

² <https://www.siam.org/Students-Education/Resources/For-Graduate-Students/Detail/research-and-education-in-computational-science-and-engineering>

Art. 1 Integration of the DP-CS in Doctoral Education at UL

The DP-CS is hosted by the DSSE. The current statutes are subordinated to the DSSE statutes. Interdisciplinary cooperation with other faculties and interdisciplinary centres of UL are actively promoted through joint training and other joint activities as well as through the DP-CS certification as laid down in Art. 5.

Art. 2. Programme Committee (PC)

2.1. Members. In alignment with the regulations laid down in the *Main Statutes of the DSSE*, a Committee for the DP-CS is constituted. The committee consists of the Programme Coordinator(s) and other elected members of the programme (c.f. 2.4. below) as well as the *Doctoral Candidate Programme Representative* (DCPR) (c.f. 2.5. below). The members of the PC are published online at the website of the DSSE.

2.2. Meeting, deliberation and voting. The PC may be called to meet upon the request of at least 50% of the members or upon request of the Programme Coordinator. Decisions will be made informally. Should significant differences of opinion arise, a majority vote will be undertaken only if at least three members are present. Voting may be electronic. In case of equality, the vote of the Programme Coordinator prevails. Decisions of the PC may not violate other relevant regulations of the DSSE or the UL.

2.3. Reporting. The PC informs all supervisors and doctoral candidates of the meeting agenda and the PC decisions. Meeting minutes will be made available to the programme members on the programme's website.

2.4. Election of the Programme Coordinator. The Programme Coordinator is elected by a majority of DP-CS's supervisors for a period of five years. If there is a request for an election for a new Programme Coordinator, an election will be held if supported by at least 50% of the members of the DP-CS, even if the end of the mandate of the acting Programme Coordinator has not yet been reached.

2.5. Doctoral Candidate Programme Representative(s). The doctoral candidates subscribed to the DP-CS elect programme representative(s) from other candidates registered in the programme for a term of one year. Re-election is possible. In case there are several candidates running for the post, an election is carried out via a runoff vote. The programme representative(s) liaise with the Programme Coordinator and advise the DP-CS Programme Committee. They can become a member of the DSSE's Doctoral Candidate Council (c.f. DSSE main statutes, Art. 4.5).

2.6. External Advisory Board To become a member of the Programme Committee for a period of two years with a renewable mandate, the External Advisory Board shall be composed of 3 to 5 leading experts from society, industry (preferably from Luxembourg), and science. The external board advises the Programme Committee on issues related to the integration of the research into the Luxembourg context, including topics such as:

- Societal challenges (Ethics, Employability, etc.)
- Doctoral training
- Policies
- Fund raising
- R&D/Entrepreneurship

The External Advisory Board may also propose keynote speakers from the wider landscape who will give motivational and inspirational lectures to the doctoral candidates. The board will meet once annually with members of the Programme Committee. The External Advisory Board furthermore advises on all reporting activities.

Art. 3. General Assembly

3.1. Definition. The general assembly (GA) consists of all doctoral candidates who have subscribed to the DP-CS, and all supervisors officially in the program.

3.2. Meetings. Meetings of the GA are held at least once per year or on request. The Programme Coordinator, the Programme Committee or at least half of the cohort of Doctoral candidates, or half of the supervisors are sufficient to call a GA meeting.

3.3. Aim. The GA is a forum to discuss the educational and scientific strategy of the DP-CS. Important information is communicated.

3.4. Rights. The GA elects the Programme Committee (c.f. 2.1.) The GA has also the right to demand a new constitution of the Programme Committee with a 2/3rd majority of all members.

Art. 4. Training Modules

A core set of training modules will be required of all candidates in the DP-CS. A list of topics to be covered can be found in Art. 5.1.3.

4.1.1. General rules. The approval of training modules follows the rules in the Statutes of the DSSE as long as the modules are aligned with the most current UL Study Regulations.

4.2.1. Certifiable Activities. Certifiable activities are activities, which can be awarded with ECTS. Courses and training activities offered by the DP-CS must be approved by the PC and must be in line with the UL Study Regulations to be eligible for ECTS awards. Other activities offered by the UL can be approved by the PC as eligible for the DP-CS as long as they are in line with the UL Study Regulations. On request, external activities can be approved for individual doctoral candidates by the PC and the supervisor. A certifiable activity can be awarded with ECTS only once. The following activities are eligible for ECTS award as long as they primarily deal with data and computational sciences or their applications:

- Approved seminars/lectures
- Doctoral school courses
- Summer/Winter schools

4.2.2. Approval of ECTS ECTS are approved by the Programme Coordinator. ECTS approval is done in alignment with the doctoral candidates' Doctoral Education Agreement. The Programme Coordinator will consult the Programme Committee to validate the ECTS. Courses offered by the DP-CS are approved prior to the activity by the Programme Coordinator.

4.2.3. Activities that can be awarded with ECTS in conjunction with a formal training.

The following activities are eligible as certifiable activities for the DP-CS if a related formal training was attended beforehand:

- Teaching topics of data and computational sciences

In its decisions, the PC will furthermore take the following guidelines into account:

- All transferable skills courses offered by UL will be accepted by default. 5 transferable skills ECTS are counted towards the fulfilment of the programme requirements. It is possible for doctoral candidates to acquire additional transferable skills ECTS upon formal approval by the Programme Committee.
- Standard teaching of doctoral candidates (e.g. exercise class, TD) is eligible as a module upon certification by the supervisor that this teaching took place and including a timesheet detailing preparation, delivery and marking time as well as a final report discussing teaching methods and reflective thinking upon the course (maximum 2 ECTS).
- Writing a Q1 (Scopus, ISI) international journal research article as first author is eligible as a certifiable activity of 1 ECTS per paper (two papers maximum).

- Outreach activities are eligible as a certifiable activity in transferable skills upon submission of a timesheet and report to the Programme Committee.
- Secondments to an academic or industrial research partner can be an important part of the training of doctoral candidates. Therefore, we recognise such training by validating 1 ECTS point for 1 month of secondment (maximum 10 ECTS).
- Contribution to event organisation can be validated with transferable skills up to 1 ECTS upon submission of a document by the supervisor verifying the engagement of the candidate (Maximum 2 ECTS).

Art 5. Transversal integration of the Doctoral Programme into doctoral education at UL.

As an alternative to the affiliation to the DP-CS and to integrate doctoral candidates from other doctoral programmes at UL, the DP-CS offers a certification upon fulfilment criteria as described under 5.1 below. The DP-CS certification is an initiative of the DP-CS in collaboration with doctoral programmes across the UL. The completion of the DP-CS certificate will be mentioned on the Diploma Supplement. If the certification rules are in conflict with the regulations and statutes of other cooperating doctoral schools and/or programmes at UL, individual deviating agreements can be laid down per doctoral candidate in a Doctoral Education Agreement (DEA), as long as the resulting agreements do not violate the quality guidelines of any of the participating bodies or higher-level regulations.

5.1 Requirements of the DP-CS certificate

5.1.1. Eligibility. Any doctoral candidate registered at UL except for the candidates who are enrolled in DP-CS.

5.1.2. Number of ECTS. To get the DP-CS certificate awarded, candidates have to follow training activities worth at least 7 ECTS in the fields as described in 5.1.3.

5.1.3. Content. With a view to acquire qualities and skills needed for a successful implementation of their doctoral research, candidates will be given the opportunity to configure – in close coordination with their supervisors – a specific training programme based on the list of topics detailed below and offered e.g. in Applied Mathematics, Computer Science, Computational Science, and Data Science within the DP-CS. The alignment with Art. 49 [4] of the UL Study Regulations is assured by the supervisor.

The following topics should be covered by courses offered by the University of Luxembourg:

- Numerical methods
- Statistics
- Mathematical optimisation
- High performance computing
- Machine learning
- Mathematical modelling
- Skills for research computing

ECTS can be only awarded upon successful passing of related exams.

Art. 6 Cumulative thesis

The PhD thesis can be written in the form of a monograph or as a collection of articles. In the latter case, it must be authorized by the CET members who will detail the modalities. In case of a collection of articles, an introduction must be provided which puts the articles into a common context. The student must provide a statement of contribution for each article.