



**Curriculum
for
Aalto Doctoral Programme in Chemical
Engineering 2020-2022 (Aalto CHEM)**

23 March 2020

Contents

In accordance with the [Aalto University General Regulations on Teaching and Studying](#), the curriculum is a confirmed overall description of the learning outcomes of a doctoral programme, the goals and contents of its study modules and the courses offered as well as the organisation of teaching within a given period of time as indicated in the Aalto University General Regulations on Teaching and Studying (Section 2). When the curriculum is being designed, at least the following details must be specified for each course: name, scope in credits, timing, learning outcomes, implementation method, language of instruction, assessment methods, grading scale, prerequisites (if any), the unit responsible for and the teacher-in-charge of the course.

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1. Basic information about the programme

1.1. Name of the programme

Aalto Doctoral Programme in Chemical Engineering

1.2. Degree of the programme

Doctor of Science (Technology)

1.3. Language of the degree

Finnish, Swedish, or English

1.4. Research fields and Supervising Professors

The Aalto Doctoral Programme in Chemical Engineering comprises 7 [fields of research](#). The Departments of Bioproducts and Biosystems, Chemistry and Materials Science, and Chemical and Metallurgical Engineering are jointly responsible for the programme.

The doctoral candidate chooses a research field when applying to the programme. The professor supervising the doctoral/licentiate studies is agreed upon at the same time.

1.5. Scope of the programme

The expected duration of the programme is four years of full-time study. In addition to the thesis itself, the programme consists of scientific principles and practices studies, which include the option to learn transferable skills, as well as studies related to the research field itself.

1.6. Timetable of the degree

4 years of full-time study

8 years of part-time study

1.7. Doctoral programme director

Professor Markus Linder

The doctoral programme director is in charge of the planning, execution, assessment and development of the programme.

2. Education objectives and intended learning outcomes of the Doctoral Programme in Chemical Engineering

Aalto University's strategic objective is to educate game changers — professionals with the knowledge and capabilities to build a sustainable society and to increase well-being through disruptive change¹. These capabilities need to be rooted in disciplinary excellence augmented by art, creativity, multidisciplinary collaboration and entrepreneurship.

Each doctoral candidate makes a study plan, research plan, supervision plan, financial plan, and an optional career plan; the implementation of which is followed up by the supervising professor. The supervising professor is also responsible for the supervision arrangements of the doctoral candidate. Aalto University has defined [the duties of the supervising professor and thesis advisor\(s\); and the rights and responsibilities of doctoral candidates](#).

Chemical Engineering is a broad multi-disciplinary study programme providing graduates with the skills to work in a variety of fields ranging from chemical engineering and the biomass sector to biomedical engineering, materials bioeconomy, nanotechnology, new materials for energy storage and green engineering. Based on a strong natural science foundation, the curriculum is flexible, allowing doctoral candidates to compile their own combination of courses and research according to their own interests and individual needs. The programme covers all disciplines of the School of Chemical Engineering and fosters multi-disciplinary co-operation across Aalto University, scientific community and society.

The Doctoral Programme in Chemical Engineering prepares doctoral candidates for professional careers in academia, industry or in other fields. After completion, graduates of the doctoral programme, will:

- have the high competence to search for and apply knowledge, and most importantly, the ability to independently formulate research questions and use scientific research methods to create new scientific knowledge.
- be able to publish scientific results in peer-reviewed publications and disseminate their results in scientific forums.
- be eligible to act as thesis instructor for doctoral student and examiner for doctoral degree.
- be able to make such syntheses and critical assessments as are required to solve complex problems in research and innovation and in other areas of society.
- have versatile written and oral communication skills.
- work responsibly in the light of ethical and sustainability considerations and their conduct in the scientific community will follow good scientific practice.
- have the ability to work in a multidisciplinary and international environment together with various actors.

¹ [Aalto University Policies on Curriculum Design for 2020-2021 and 2021-2022, section 1.2.](#)

3. Structure of the programme

Doctoral studies at Aalto University consist of an approved doctoral thesis and study modules. In the field of science and technology, the study modules comprise research field studies as well as scientific principles and practices, totalling 40 ECTS. A doctoral degree is the equivalent of four years of full-time study.

Doctoral thesis	Scientific principles and practices (5-20 ECTS)
	Research field studies (20-35 ECTS)

4. Content of studies

Doctoral studies are completed in the form of study modules². Those admitted to the Doctoral Programme in Chemical Engineering shall:

- i) pursue studies that prepares the doctoral candidates for research work, the application of research results and the dissemination of research findings;
- ii) gain comprehensive and in-depth knowledge of a research field;
- iii) learn the principles of responsible conduct in research.

4.1. Scientific principles and practices

- Scientific principles and practices
- Learning outcomes of the module
- The scope of the module: 5-20 ECTS

Together with his/her supervising professor, every doctoral candidate plans the studies that should be included in this part of the personal study plan. Thereafter, the personal study plans are confirmed. The studies might include, for example, transferable skills. [Further instructions](#) are available on the doctoral programme's into.aalto.fi webpages.

At Aalto CHEM, all doctoral candidates must include the course CHEM-L1000 Toolkit for Doctoral Studies on their study plan. The course also includes lectures and practical discussion about ethics in research work.

Aalto University [communication courses](#)

² Degree Regulations on Doctoral Education as of 1 August 2018.

Jointly developed national courses, offered via findocnet.fi

- Research Ethics for Doctoral Students, LC-L1010 (1-2 ECTS)
- Open Science for Doctoral Students, LC-L1011 (1 ECTS)
- Business Skills for Doctoral Students, LC-L1012 (1 ECTS)
- Career Course for Doctoral Students, LC-L1013 (1 ECTS)
- Interactive Leadership Skills for Doctoral Students, LC-L1014 (1 ECTS)
- Project Management for Doctoral Students, LC-L1015 (1 ECTS)
- Writing Research Grant Applications for Doctoral Students, LC-L1016 (1 ECTS)

Further details of research methodology and method specific courses are available on the doctoral programme's into.aalto.fi webpages

- The extent of this module is 5–20 ECTS. The content of the module is confirmed individually for each doctoral candidate.
- The Toolkit for the Doctoral Studies (CHEM-L1000) is compulsory for new doctoral candidates.
- The aim of the scientific principles and practices module is to provide doctoral candidates with knowledge of the basic concepts of science, the key characteristics of scientific research and scientific knowledge, familiarisation with the most important research methods of their research field, and to develop their transferable skills. In addition, doctoral candidates learn to implement the principles of good scientific practice into their own research and apply the basic structure of scientific publications in their research reports with confidence.
- The study module may include studies in research methodology, presentation skills, research ethics, and principles of scientific writing. Some of the module may also consist of pedagogical studies. Language studies generally cannot be included in the degree, except for a few specific language and communication studies that are listed separately.

Further details are available on the doctoral programme's into.aalto.fi webpages

4.2. Research field studies

- Research field studies
- Learning outcomes of the module
- The scope of the module: 20-35 ECTS

Together with his/her supervising professor, every doctoral candidate plans which studies should be included in this part of the personal study plan. Thereafter, the personal study plan is confirmed. These studies might include, for example, general and specific studies related to student's thesis topic. [Further instructions](#) and [courses organized](#) by Aalto CHEM are available on the doctoral programme's into.aalto.fi webpages.

4.3. Doctoral thesis

[Aalto University has decided on the formats, content and general quality requirements for doctoral dissertations](#). The doctoral thesis is written on a topic related to the research field that the doctoral candidate has chosen and that has been approved by the doctoral programme committee of the School

of Chemical Engineering and the supervising professor³. The thesis includes an authors' contribution information to clarify the role and impact of the author and co-authors. Doctoral candidate must have a significant independent contribution in the thesis and related publications.

The thesis shall contribute to new scientific knowledge. The thesis process includes a public defence after a pre-examination process. The acceptable forms of theses are monographs, article-based doctoral theses and other works meeting corresponding scientific criteria. A doctoral thesis is a public document and is kept for viewing at the university. All theses works are public in Finland (law 621/1999). The School of Chemical Engineering has [detailed instructions for the doctoral thesis](#) on the [into.aalto.fi](#) webpages.

4.3.1. Public examination of the doctoral thesis

The doctoral thesis shall be examined and defended at a public examination for which the school determines the date and language and appoints a custos to supervise the examination and one or two opponents after the pre-examination on which you find instructions from the [into.aalto.fi –pages](#) of the programme. The doctoral candidate is provided with an opportunity to comment on the choice of the opponent(s) and the pre-examiners, concerning their impartiality.

The printed doctoral thesis shall be on display for public examination for *a minimum of ten days* before the public examination.

The school may issue further provisions on the arrangements and proceedings of the public examination. Please see programme's [into.aalto.fi –pages](#).

4.3.2. Evaluation and grading

No overall grades are assigned for individual study modules. Doctoral theses are graded on the following scale based on the opponent(s) statement(s) in the doctoral programme committee of the school in question:

Field of technology: Chemical Engineering

Doctoral theses are evaluated on a scale of Pass/Fail.

³ [Appendix 'Section 43A Degree regulations on doctoral education' in the Aalto University General Regulations on Teaching and Studying \(OOS\).](#)