



**Curriculum  
for  
Aalto Doctoral Programme in Chemical  
Engineering 2022-2024 (Aalto CHEM)**

10 November 2021

## 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 6 [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 student 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 general research 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 future is built upon a foundation of high-quality research, education, impact and shared values – responsibility, courage, and collaboration. The purpose of the university is to shape a sustainable future.

Each doctoral student makes a personal study plan (DPSP), which includes plans for the content, scope and duration of his or her studies, research, supervision, financial funding, and a career plan. The implementation of DPSP is followed up by the supervising professor. The supervising professor is also responsible for the supervision arrangements of the doctoral student. 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.

### 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 general research studies in total of 40 ECTS. A doctoral degree is the equivalent of four years of full-time study.

<b>Doctoral thesis</b>	General research studies (5-20 ECTS)
	Research field studies (20-35 ECTS)

### 4. Content of studies

Doctoral studies are completed in the form of study modules<sup>1</sup>. 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. General research studies

- General research studies
- Learning outcomes of the module
- The scope of the module: 5-20 ECTS

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

*Jointly developed national courses, offered via findocnet.fi*

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<sup>1</sup> Degree Regulations on Doctoral Education as of 1 August 2018.

Courses on open science, research ethics, theory of science, as well as research grants, project management and writing research proposals are available from national <https://findocnet.fi>

- The extent of this module is 5–20 ECTS. The content of the module is confirmed individually for each doctoral student.
- The Toolkit for the Doctoral Studies (CHEM-L1000) is compulsory for new doctoral students.
- The aim of the scientific principles and practices module is to provide doctoral students 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 students 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](https://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 student 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](https://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 student has chosen and that has been approved by the doctoral programme committee of the School of Chemical Engineering and the supervising professor<sup>2</sup>. The thesis includes an authors' contribution information to clarify the role and impact of the author and co-authors. Doctoral student 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](https://into.aalto.fi) webpages.

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<sup>2</sup> [Appendix 'Section 43A Degree regulations on doctoral education' in the Aalto University General Regulations on Teaching and Studying \(OOS\)](#).

#### **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 student is provided with an opportunity to comment on the choice of the opponent(s) and the pre-examiners, concerning their impartiality.

The electronic 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.