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Aalto University

Curriculum for Aalto Doctoral Programme in Chemical Engineering 2024-2026

Content

According to the Aalto University General Regulations on Teaching and Studying, a curriculum is a confirmed overall description of the learning outcomes of the degree programme, the goals and contents of the study modules, course selection and the organisation of teaching for a given period of the time. The course descriptions and organization of teaching is presented in Sisu.

1. Basic information on the programme

1.1. Name of the programme

Aalto Doctoral Programme in Chemical Engineering
Kemian tekniikan tohtoriohjelma
Doktorandprogrammet i kemiteknik

1.2. Title of the degree

Doctor of Science (Technology), abbreviation D.Sc.(Tech.)
Licentiate of Science (Technology), abbreviation Lic. Sc. (Tech.)

1.3. Languages of degree

Finnish, Swedish, English

1.4. Programme scope

40 ECTS and doctoral thesis / licentiate thesis

1.5. Target time

Doctoral degree: 4 years of full-time studies or 4-8 years of part-time studies
Licentiate degree: 2 years of full-time studies or 2-4 years of part-time studies

2. Education objectives and intended learning outcomes of the programme

After completing the degree, the doctoral student is able to carry out independent and original academic research.

Doctoral education at Aalto University is conducted within a multidisciplinary international academic community that provides opportunities for field-specific and multidisciplinary research, as well as for various forms of education and learning. High quality education, transferable skills training, and network-building ensure the development of doctoral students as independent researchers and experts of their research fields. Science communication skills are supported by providing tools for mastering the national languages in Finland.

The education prepares doctoral students for academic careers at top-level institutions. It provides competencies to pursue various career paths also outside of academia, for example working at demanding expert positions, as entrepreneurs or as independent artists.

The doctoral degree is a requirement to serve as a thesis advisor for doctoral students and as examiner for a doctoral degree.

3. Structure of the programme

<table>
<tr><td rowspan="2">Doctoral thesis / Licentiate thesis</td><td>General research studies (5-20 ECTS)</td></tr>
<tr><td>Research field studies (20-35 ECTS)</td></tr>
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The programme comprises three study modules:

- General research studies, 5-20 ECTS
- Research field studies, 20-35 ECTS
- Doctoral thesis / licentiate thesis

General research studies prepare students for research work, the application of research results and to learn the principles of responsible conduct of research. General research studies can include transferrable skill studies.

Research field studies and doctoral thesis help students to gain comprehensive and in-depth knowledge of their research field and prepares them for the dissemination of research findings.

Based on the Degree Regulations on Doctoral Education (https://www.aalto.fi/en/applications-instructions-and-guidelines/degree-regulations-on-doctoral-education-in-force-from-1-august-2021), doctoral students must prepare a doctoral personal study plan (DPSP), which includes plans for the contents, scope and duration of their studies, research, supervision, funding, and career. Students who wish to deviate from the approved curriculum of their programme must obtain approval for their doctoral personal study plan.

In addition to the courses taught at the School in Chemical Engineering, the degree can include other courses taught in Aalto University or other universities, as agreed in the doctoral personal study plan of the student (DPSP). Courses suitable for the doctoral degree are indicated with the letter L in the course code (doctoral level) or with the letter E (master level) in the course code system of Aalto University.

If the student does not want to finish the doctoral degree, the licentiate degree can be completed as an intermediate degree. The licentiate degree consists of an approved licentiate thesis and the same 40 ECTS of studies as for the doctoral degree. Licentiate degree can be obtained if the student has been granted doctoral degree study right for Doctoral Programme of Chemical Engineering.

3.1. General research studies

3.1.1. Intended learning outcomes

Depending on the studies chosen for this module, the doctoral student will be able to

- to comprehend and conscientiously address the fundamental ethical and sustainability considerations associated with their research.
- choose and apply appropriate research methods to the research question at hand.
- adhere to the principles of responsible conduct of research (RCR) in both their research work and interactions within the research community.
- work collaboratively within a multidisciplinary and international environment, engaging with diverse stakeholders.
- proficiently present their research in both scientific and professional settings.
- identify, utilize, and communicate their transferable skills, such as communication, interpersonal, project management, leadership, and pedagogical skills, to work successfully in academic and other professional positions.

3.1.2. Degree requirements

Doctoral studies in Chemical Engineering follow the frames and detailed instructions for content of theory study plan. The Doctoral Programme Committee has formed the frames and approved these instructions https://www.aalto.fi/en/programmes/aalto-doctoral-programme-in-chemical-engineering/curriculum-2024-2026

Compulsory courses

New course Toolkit for Doctoral Studies CHEM-L1100, 3 ECTS; or previous course CHEM-L1000 Toolkit for Doctoral Studies, 5 ECTS

New course Research Ethics course LC-L1000, 2 ECTS; or previous LC-L1010 Research Ethics for Doctoral Students, 1-2 ECTS

Elective courses

Responsible conduct of research, theory or history of science

LC-1333 Navigate your doctoral studies while learning about equity, diversity, and inclusion, 3 ECTS
LC-L1011 Open Science for Doctoral Students, 1 ECTS
LC-L1020 Theory of Science, 1 ECTS

General methodological and theoretical studies

https://www.aalto.fi/en/programmes/aalto-doctoral-programme-in-chemical-engineering/curriculum-2022-2024#0-structure-of-the-degree

Science communication and presenting doctoral research

CHEM-L2011 Presenting research poster at a conference I D (1 ECTS)– International conference poster presentation of your doctoral thesis research

CHEM-L2012 Presenting research (talk) at a conference II D (1 ECTS) – International conference oral presentation of your doctoral thesis research.

LC-1350 Writing Doctoral Research for Engineering and Science, 3 ECTS
LC-1335 Preparing for the Doctoral Defense (o), 1 credits
LC-1336 Popularize your Research (o,w), 1-3 credits
LC-7110 Tieteellinen kirjoittaminen tohtoriopiskelijoille, 3 ECTS
LC-L1017 Asiantuntijaesittämisen valmennus jatko-opiskelijoille
LC-L1018 Tutkimusraportoinnin tekstiretriitit jatko-opiskelijoille
LC-L1019 Tutkimustiedon yleistajuistaminen, 5 op

LC-1330 Presenting Doctoral Research (o), 3 credits
CHEM-L2070 Publishing research I D (2 ECTS)

CHEM-L2071 Publishing research II D (2 ECTS)

CHEM-L2072 Publishing research III D (2 ECTS)

Scientific community, teaching and working life skills

LC-L1012 Business Skills for Doctoral Students (1 ECTS)
LC-L1013 Career Course for Doctoral Students, (1 ECTS)
LC-L1014 Interactive Leadership Skills for Doctoral Students, (1 ECTS)
LC-L1015 Project Management for Doctoral Students, (1 ECTS)
LC-L1016 Writing Research Grant Applications for Doctoral Students, (1 ECTS)
PED-9011 A! Peda Intro (5 op)

Other pedagogical studies available https://www.aalto.fi/en/services/aalto-university-pedagogical-training-for-faculty

CHEM-L2050 Reviewing a scientific manuscript I D (1 ECTS)

CHEM-L2051 Reviewing a scientific manuscript II D (1 ECTS)

Finnish/Swedish language studies
Doctoral degree in Chemical Engineering may include at maximum of 6 ECTS of Finnish/Swedish language courses from Aalto University Language Centre starting from level A1. Equally the doctoral students with advanced proficiency in Finnish or Swedish, may include Finnish and Swedish language academic presentation and writing courses to their doctoral degree study plan at maximum of 6 ECTS.

For example:

LC-7210 Finnish 1, 3 ECTS
LC-7220 Finnish 2, 3 ECTS

LC-5771 Swedish 1, 3 ECTS
LC-5772 Swedish 2, 3 ECTS

3.2. Research field studies

The Aalto Doctoral Programme in Chemical Engineering comprises of research fields/majors confirmed by the Academic Committee of the School. The research fields and supervising professors are listed here: https://www.aalto.fi/en/doctoral-education/research-fields-and-supervising-professors-school-of-chemical-engineering.

3.2.1 Intended learning outcomes

After completing this module, the doctoral student will be able to:

- demonstrate advanced discipline-specific knowledge
- identify essential research methods for their own research and apply them proficiently.
- disseminate research findings through relevant research forums and to the wider public.

3.2.2. Degree requirements

Doctoral studies in Chemical Engineering follow the frames and detailed instructions for content of theory study plan. The Doctoral Programme Committee has formed the frames and approved these instructions https://www.aalto.fi/en/programmes/aalto-doctoral-programme-in-chemical-engineering/curriculum-2024-2026

Doctoral seminar

Department's / Research fields / Major's seminars

Methodological, theoretical and content studies (related to the thesis)

3.3. Doctoral thesis

Doctoral thesis for the Doctoral Progamme in Chemical Engineering must meet the criteria and follow the instructions of the Doctoral Progremme Committee https://www.aalto.fi/en/programmes/aalto-doctoral-programme-in-chemical-engineering/chem-instructions-for-doctoral-thesis

3.3.1. Intended learning outcomes

After successfully defending their thesis, doctoral students will demonstrate the ability to:

- plan, execute, and report on their research and manage their data in accordance with established standards of academic research.
- proficiently search for, critically evaluate, apply, and synthesize existing knowledge; formulate research questions; and employ scientific research methods to create new knowledge.
- independently carry out research that generates novel insights and theoretical advancements in their own field of research.
- make syntheses and critical assessments required for addressing and resolving complex problems in the realms of research, innovation, and societal challenges.

A doctoral thesis is a public document and is kept for public display at the university. All thesis works are public in Finland (law 621/1999).

3.4 Licentiate thesis

The licentiate thesis is written on a topic related to the research filed approved for the student. The author's contribution to the research work, related results and writing must be explained in detail. In a licentiate thesis, the student shall demonstrate

- good conversance with the field of research
- capability of independently and critically applying scientific research methods

A licentiate thesis is a public document and shall be kept for electronically available at the university.

4. Extracurricular studies

The degree structure of the programme in Sisu also includes a module called “Extracurriculum studies”. This module will not be included in the doctoral degree, but it can be used to register for courses which the doctoral student wishes to take in addition to their degree studies.