Curriculum
for
Licentiate Degree in Chemical Engineering 2022-2024

15 Nov. 2022
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 licentiate 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).

Contents

1. Basic information about the degree
   1.1. Name of the degree
   1.2. Language of the degree
   1.3. Research fields
   1.4. Scope of the degree
   1.5. Admission to the licentiate degree
   1.6. Timetable of the degree
   1.7. Licentiate degree director

2. Learning outcomes of the Licentiate Programme in Chemical Engineering

3. Structure of the programme

4. Content of studies
   4.1. Scientific principles and practices
   4.2. General research studies
   4.3. Licentiate thesis
      4.3.1. Examination and approval of the licentiate thesis
      4.3.4. Evaluation and grading
1. Basic information about the degree

1.1. Name of the degree

Licentiate of Science (Technology), Lic.Sc.(Tech.)

1.2. Language of the degree

Finnish, Swedish, or English

1.3. Research fields

The Aalto Doctoral Programme in Chemical Engineering comprises 6 fields of research. The Departments of Bioproducts and Biosystems (Bio2), 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.

1.4. Scope of the programme

The expected duration of the licentiate studies is two years of full-time study. In addition to the licentiate 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.

1.5. Admission to the licentiate degree

According to degree regulations, no new students are taken to the licentiate programme. Doctoral programme students can, if desired, decided to take out the licentiate degree during the studies. In this case, this curriculum is to be followed.

1.6. Timetable of the degree

- 2 years of full-time study
- 4 years of part-time study

1.7. Licentiate degree in Doctoral Programme and director

Professor Markus Linder

The doctoral programme director is in charge of the planning, execution, assessment and development of the programme and degrees.
2. Learning outcomes of the Licentiate Degree 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 students 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 the licentiate degree holders for professional careers in academia, industry or in other fields. After the completion of degree, the licentiate holders will:

- have the competence to search for and apply knowledge, and most importantly, the ability to use scientific research methods to create scientific knowledge as members of research group.
- be able disseminate their results in scientific community.
- be eligible to act as thesis instructor for licentiate thesis work.
- be able to make critical assessments as are required to solve problems in research and innovation and in other areas of society.
- have good 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

Licentiate studies at Aalto University consist of an approved licentiate 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 licentiate degree is the equivalent of two years of full-time study.

<table>
<thead>
<tr>
<th>Licentiate thesis</th>
<th>General research studies (5-20 ECTS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Research field studies (20-35 ECTS)</td>
</tr>
</tbody>
</table>

4. Content of studies

Licentiate studies are completed in the form of study modules\(^1\). Those admitted to the doctoral education shall:

i) pursue studies that prepares the licentiate students 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 of research.

4.1. General research studies

Together with his/her supervising professor, every licentiate/doc doctoral student 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 students 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, hence Toolkit course rules out Research Ethics for Doctoral Students course* from the study plan.

Aalto University communication courses

---

\(^1\) 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 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 licentiate/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 webpages.

4.3. Licentiate thesis

The licentiate thesis is written on a topic related to the research field that the licentiate student has chosen and the topic has been approved by the doctoral programme committee of the School of Chemical Engineering and the supervising professor. Section 23 of the Government Decree on University Degrees (794/2004): “A licentiate thesis shall demonstrate good conversance with the field of research and candidate’s capability of independently and critically apply scientific research methods.” With licentiate thesis manuscript the candidate shall demonstrate the capability to do independent work within the field of research. This includes entirely theoretical work, or a combination of experimental and theoretical work, all based on research hypothesis.

Appendix ‘Section 43A Degree regulations on doctoral education’ in the Aalto University General Regulations on Teaching and Studying (OOS).
A licentiate thesis may be a monograph or an article-based compilation which deal with the same set of problems and a summary of the findings, or some other work which meets corresponding scientific criteria. The licentiate thesis includes an author’s contribution chapter to clarify the role and impact of the author. An accepted licentiate thesis is a public document and is kept for viewing at the university. All thesis works are public in Finland (law 621/1999).

4.3.1. Examination and approval of the licentiate thesis

The licentiate thesis is presented at the school. For the thesis to be examined, the student shall submit it and an application for its examination to the school. The application for examination must be approved by the supervising professor. The school appoints two examiners for the licentiate thesis and obtains statements from all of them. The student is provided with an opportunity to reply to the statements, and to make corrections. After this, the school decides on the publication of the thesis. The student gives an oral presentation of the work at the department. The school decides of the acceptance of the thesis.

Without reasonable grounds, the examination of a licentiate thesis shall not take more than two months from the date of the appointment of the examiners.

4.3.4. Evaluation and grading

No overall grades are assigned for individual study modules. Licentiate theses are accepted for publishing in the Doctoral Programme Committee. Licentiate thesis are evaluated on a scale of Pass/Fail.