



Curriculum
for
Aalto Doctoral Programme in
Engineering 2022-2024 (Aalto
ENG)

March 2022

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 in Engineering

1.1. Name of the programme

Aalto Doctoral Programme in Engineering

1.2. Degrees of the programme

Doctor of Science (Technology)

Licentiate of Science (Technology)

1.3. Language of the degree

Finnish, Swedish, or English

1.4. Research fields

The Aalto Doctoral Programme in Engineering comprises of 8 Research Fields.

The doctoral student chooses a research field when applying to the programme. The supervising professor being responsible of the doctoral studies is agreed upon at the same time ([TKTS 2021](#)).

The Research Fields for the academic years of 2022-2024 are following:

ENG026Z Mechanical Engineering

IA015Z Energy Technology

M103Z Geoinformatics

IA016Z Real Estate Economics

ENG023Z Spatial Planning and Transportation Engineering

ENG024Z Water and Environmental Engineering

ENG031Z Technology Education

ENG030Z Civil Engineering

1.5. Scope of the programme

40 ECTS credits + Doctoral Thesis

1.6. Timetable of the degree

4 years of full-time study

8 years of part-time study

1.7. Doctoral Programme Director

Professor Risto Lahdelma

The doctoral programme director is in charge of the planning, execution, assessment and development of the programme ([Koulun ohjesääntö](#)).

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

Our joint purpose is to educate doctors who *can* process and solve the huge global and societal challenges with scientific tools, also in interdisciplinary teams.

Education Objectives

Doctoral education prepares the doctoral student for academic career as highly qualified researcher or, *increasingly also* for diversity of career pathways outside of academia for example in most demanding expert positions or as entrepreneurs or creative practitioners.

The education is carried out in a multidisciplinary international scientific community through *both field-specific and multidisciplinary* research work and various forms of education and learning. High quality education and transferable skills training together with network-building ensure the development of doctoral student's competences.

Learning Outcomes

General research studies

- *have improved communication and interpersonal skills and project management 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.

Research –field studies

- *have deep and broad discipline-specific knowledge of their field of research*
- *be able to disseminate their results through relevant research fora and, where appropriate, to wider publics*
- be eligible to act as thesis instructor for doctoral student and examiner for doctoral degree.

Licentiate thesis

- be conversant with the field of research
- be able to independently and critically apply scientific research methods

Doctoral thesis

- *have competence to carry out independent and original academic research* /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 make such syntheses and critical assessments as are required to solve and process complex problems in research and innovation and in other areas of society.
- In the field of arts, they may also have the ability to independently create methods or products or performances that *high standards of art and creative practice*.

3. Structure of the programme

Doctoral studies at Aalto University consist of an approved doctoral thesis and study modules. In the field engineering the study modules comprise research field studies as well as general research studies in total of 40 ECTS. The completion of a doctoral degree equals four years of full-time studies. If the student wants the licentiate degree at Aalto Doctoral programme in Engineering can be completed. The licentiate degree consists of an approved licentiate thesis and the same 40 ECTS of studies as for the doctoral degree.

General research studies prepare students for research work, the application of research results, the dissemination of research findings 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. Doctoral studies can include studies from several Aalto doctoral programmes when agreed on in the doctoral personal study plan of the student (DPSP).

Doctoral thesis	General research studies (5-20 ECTS)
	Research field studies (15-25 ECTS)

Doctoral studies are completed in the form of study modules. Doctoral degree comprises three modules:

- General research studies of 5-20 ECTS
- Research field studies of 20-35 ECTS
- Doctoral thesis

4. Content of studies

Each doctoral student must prepare a doctoral personal study plan (DPSP), which includes plans for the contents, scope and duration of his or her studies, research, supervision, funding and career. [\(OOS\)](#)

Each doctoral students prepares their personal study plan for themselves on the basis of their programme's curriculum. Thereafter, the study plans are confirmed. The school shall provide its students with guidance for the preparation and updating of their study plan.

4.1. General Research Studies, 5-20 ECTS

Learning objectives:

- have improved communication and interpersonal skills and project management 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.

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 <https://into.aalto.fi/display/endoctoraleng/Courses+offered>.

Compulsory courses:

LC-L1010 Research Ethics or equivalent course

Aalto University [communication courses](#)

Jointly developed national courses, offered via findocnet.fi

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 aim of the general studies 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 webpages <https://into.aalto.fi/display/endoctoraleng/Courses+offered>

4.2. Research Field Studies 20-35 ECTS

These studies are the core element of the doctoral studies, decided jointly by the doctoral student and her/his supervising professor.

Learning objectives:

- have deep and broad discipline-specific knowledge of their field of research
- be able to disseminate their results through relevant research fora and, where appropriate, to wider publics
- be eligible to act as thesis instructor for doctoral student and examiner for doctoral degree.

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 ENG are available on the doctoral programme's into.aalto.fi webpages. Courses are found in [MyCourses](#), [SISU](#) or [courses.aalto.fi](#).

Research field studies need to be post-graduate courses (advanced level) or other studies eligible for doctoral degree. No credits are given for doing research.

Post-graduate courses are marked letter D in the course name, with letter L in the course code or as "doctoral" in the course description. For example:

- EEN-E2004 Mass Transfer **D**
- MEC-L1001 Design Science

Suggested ways to complete the module:

- Attending suitable courses in Aalto University or another university
- Completing and reporting practical assignments related to the research field
- Writing a literature review

- Oral or written examinations based on textbooks
- Studies in scientific summer and winter schools and courses organised by graduate schools
- Conference presentations
- Learning of university practices

4.3. Doctoral thesis

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 doctoral programme committee of the School of Engineering. The thesis shall contribute to new scientific knowledge. The thesis includes a public defence after a pre-examination process. The accepted forms of theses in Aalto are monographs, article-based doctoral theses, essay-based doctoral theses, thesis including artistic components, and other works meeting corresponding scientific criteria. The accepted forms of theses in the School of Engineering are monographs and article-based doctoral theses. 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 learning objectives of a doctoral thesis are to

- *have competence to carry out independent and original academic research* /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 make such syntheses and critical assessments as are required to solve and process complex problems in research and innovation and in other areas of society.
- In the field of arts, they may also have the ability to independently create methods or products or performances that *high standards of art and creative practice*.

See more about the evaluation process of the thesis from [degree regulations on doctoral degree education](#) and from the INTO pages <https://into.aalto.fi/display/endoctoraleng/Pre-examination+to+graduation> of the doctoral programme.

4.4. Licentiate degree

The licentiate degree in technology consists of theoretical studies of 40 credits and licentiate research. The full-time study period is two (2) years.

Licentiate studies consist of the following three modules:

- General research studies of 5-20 ects
- Research field studies of 20-35 ects
- Licentiate Thesis