Degree structure and coursework

- Structure of the degree
- Dissertation
- Licentiate thesis
- Theoretical studies 40 ECTS
  - Research field studies 20-35 ECTS
  - Scientific practices and principles 5-20 ECTS
- Research fields and professors

Structure of the degree

Doctoral studies at Aalto University consist of an approved thesis and study modules. In the field of technology, the study modules comprise research field studies as well as scientific practices and principles in total of 40 ECTS.

The Doctor of Science (Tech) degree consists of a doctoral dissertation and 40 ECTS of theoretical studies which equals to four years of full-time studies.

The Licentiate of Science (Tech) degree consists of a licentiate thesis and 40 ECTS of theoretical studies which equals to two years of full-time studies.

Dissertation

The doctoral dissertation 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 Science and the supervising professor. The thesis shall contribute to new scientific knowledge. Approval of the thesis includes a public defence after a pre-examination process.

A doctoral dissertation is a public document and is kept for public display at the university. Doctoral dissertations are evaluated on a scale of Pass/Fail.

Accepted forms of dissertations

Licentiate thesis

The licentiate 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 Science and the supervising professor. The thesis shall demonstrate good conversance with the field of research and the capability of independently and critically applying scientific research methods. Approval of the thesis includes a public presentation at the department.

A licentiate thesis is a public document and is kept for public display at the university. Licentiate theses are evaluated on a scale of Pass/Fail.

Accepted forms of licentiate theses

Theoretical studies 40 ECTS
Research field studies 20-35 ECTS

The aim of the research field studies is to support the writing of the doctoral thesis and prepare the doctoral students for research and other demanding work that requires expertise.

After completing the module, doctoral student:

- has specific research methodology knowledge appropriate to their doctoral thesis focus
- has knowledge of the background to their research field at an advanced level
- has experience of the practical implementation of appropriate research methodologies in a learning environment

Content of the module

The content of the module is confirmed individually for each doctoral student following the requirements of the Doctoral Programme in Science, please see Study plan.

The module may include the following:

- Postgraduate-level and advanced-level courses, which support the doctoral dissertation (Letters E and L denote these courses in the course codes, e.g. PHYS-E1234 or PHYS-L1234)
- Individual study attainments, to be agreed with the supervising professor

Compulsory courses

Engineering Physics

Full-time doctoral students in the research field of engineering physics must complete the following course:

- PHYS-L0666 Midterm review 10 ECTS

The course can be included either in the Research field -module or in the Scientific practices and principles -module.

Industrial Engineering and Management

Doctoral students in the research field of industrial engineering and management must complete two of the following three courses:

- TU-L0010 Advanced Organizational Theory (a joint course with Aalto BIZ and Hanken, 5 ECTS)
- TU-L1003 Doctoral Course in Strategy, Venturing, and Organizations (8 ECTS)
- TU-L2001 Doctoral Course in Operations Management (5 ECTS)

Courses are compulsory for those doctoral students in the research field of industrial engineering and management who have received their study right after 1 August 2018. Please see information about the corresponding courses.

Have you started your studies prior to August 2018? Please see information about the required courses.

Evaluation of the module

No grade is given for the module. Individual courses and study attainments are graded either as Pass/Fail or as grades 1-5.

Scientific practices and principles 5-20 ECTS

The aim of the 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.

After completing the module, doctoral students:

- are able to apply the principles of good scientific practice to their own research
- are able to apply the basic structure of scientific publications to their research reports
- know the key publication series of their fields
- have gained the ability to draft an appropriate and suitable structure for their doctoral thesis

Content of the module

The content of the module is confirmed individually for each doctoral student following the requirements of the Doctoral Programme in Science, please see Study plan.

The module may include the following:

Postgraduate-level and advanced-level courses in (Letters E and L denote these courses in the course codes, e.g. PHYS-E1234 or PHYS-L1234):

- Research methodology
- History or philosophy of science
- Transferable skills and competences:
Aalto University Communication courses
Pedagogical studies
Self-study courses
- Individual study attainments, to be agreed with the supervising professor

Compulsory courses

Industrial Engineering and Management

Doctoral students in the research field of industrial engineering and management must complete the following three methodology courses:

- TU-L0000 Research Methods in Industrial Engineering and Management (5 ECTS)
- TU-L0022 Statistical Research Methods (5-8 ECTS)
- TU-L0031 Qualitative Research Methods (3-6 ECTS)

Courses are compulsory for those doctoral students in the research field of industrial engineering and management who have received their study right after 1 August 2017.

Have you started your studies prior to August 2017? Please see more information about the required courses.

Evaluation of the module

No grade is given for the module. Individual courses and study attainments are graded either as Pass/Fail or as grades 1-5.

Research fields and professors

The Doctoral Programme in Science comprises six research fields, which are based on the strong research traditions of the departments. The programme is a joint effort of the Department of Neuroscience and Biomedical Engineering, Department of Mathematics and Systems Analysis, Department of Applied Physics, Department of Computer Science, and Department of Industrial Engineering and Management.

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

### Research fields 2020-2022

<table>
<thead>
<tr>
<th>Code</th>
<th>Name of the research field</th>
<th>Supervising professors (in alphabetical order)</th>
<th>Research groups of the field</th>
</tr>
</thead>
</table>
### SCI1 Teknillinen fysiikka
#### Teknisk fysik
- Alava, Mikko
- Ala-Nissilä, Tapio
- van Dijken, Sebastiaan
- Flindt, Christian
- Foster, Adam
- Groth, Mathias
- Hakonen, Pertti
- Ilkala, Olli
- Kalvola, Matti
- Kauppinen, Esko
- Lado, Jose
- Liljenroth, Peter
- Lund, Peter
- Pekola, Juukka
- Ras, Robin
- Rinke, Patrick
- Ruskola-Hyppä, Janne
- Sand, Andrea
- Sillanpää, Mikko
- Timonen, Jaakko
- Törmä, Päivi


### SCI2 Tietotekniikka
#### Datateknik
- Aura, Tuomas
- Babbar, Rohit
- Brzuska, Chris
- Chalermsook, Parinya
- Di Francesco, Mario
- Garg, Vikas
- Hyvönen, Eero
- Hämäläinen, Perttu
- Jiang, Shaofeng
- Jung, Alexander
- Kannala, Juho
- Kasik, Petteri
- Kasik, Samuel
- Kivelä, Mikko
- Kääpiö, Maarit
- Lampinen, Jouko
- Lassenius, Casper
- Lehtinen, Jaakko
- Lindqvist, Janne
- Lähdesmäki, Harri
- Malmi, Lauri
- Mannila, Heikki
- Marttinen, Pekka
- Mekler, Elisa
- Niemelä, Ilkka
- Nieminen, Marko
- Orponen, Pekka
- Paier, Alexandru
- Pentanen, Jussi
- Rousu, Juho
- Saramäki, Jarl
- Savolainen, Lauri
- Solin, Arno
- Suomela, Jukka
- Takala, Tapio
- Trieung, Heng-Linh
- Ulto, Jara
- Vehtari, Aki
- Vuorimaa, Petri
- Yli-Jääski, Antti

Research groups: [https://www.aalto.fi/department-of-computer-science/research-groups](https://www.aalto.fi/department-of-computer-science/research-groups)

### SCI2 Tuotantotalous
#### Industrial Engineering and Management
- Artto, Karlos
- Blinari, Marina
- Gustafsson, Robin
- Holmström, Jan
- Jääskeläinen, Mikko
- Liljrank, Paul
- Luoma, Jukka
- Maula, Mariku
- Rajala, Risto
- Saarinen, Elsa
- Saarinen, Lauri
- Schildt, Henri
- Schmidt, Jens
- Tanskanen, Karl
- Vuori, Natalia
- Vuori, Timo

Research groups: [https://www.aalto.fi/department-of-Industrial-engineering-and-management/research-groups](https://www.aalto.fi/department-of-Industrial-engineering-and-management/research-groups)