

THIRD-CYCLE PROGRAMMES AT SCHOOL OF ENGINEERING (JTH) – PROCESS, RECONCILIATION POINTS AND THESIS REQUIREMENTS

The third-cycle study process

For doctoral students at Swedish universities and colleges, third-cycle courses and study programmes can be viewed as a general process, irrespective of faculty and subject area affiliation. The third-cycle study process runs in parallel with a number of other processes in which the doctoral student participates, such as first-cycle courses and study programmes, administrative tasks, etc. When planning third-cycle courses and study programmes, attempts should be made to achieve synergy between the various processes. Figure 1 provides a general view of the third-cycle study process and its different phases and reconciliation points.

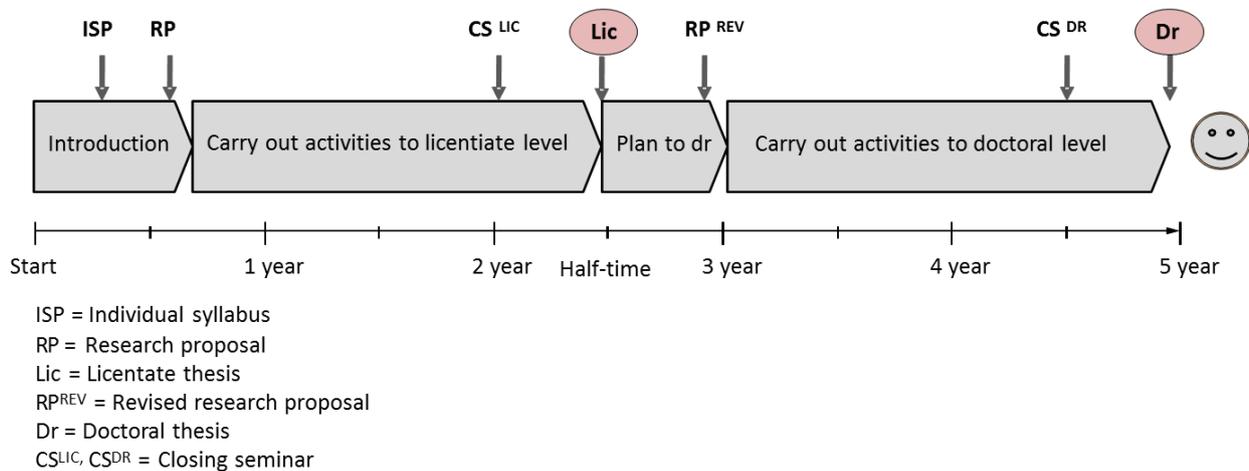


Figure 1. Third-cycle study process and its different phases and reconciliation points

Introductory phase

Doctoral students are introduced to the research area and the third-cycle study process by responsible supervisor and appointed doctoral mentor (a senior doctoral student). From the start, doctoral students should participate in seminars held within the Graduate School in order to get familiar with the defined field of degree-awarding powers (Industrial product realisation), and to establish networks with the other doctoral students and researchers. The courses available to doctoral students are important in order to provide depth and breadth in third-cycle courses and study programmes, but also to provide knowledge of the academic working method. Most students follow doctoral courses over the first few years of the programme. All third-cycle subject areas have their mandatory courses, as can be seen from the general syllabus for the respective third-cycle subject areas. For other appropriate courses which are available to doctoral students, please see ongoing national and local graduate schools and doctoral courses at individual institutions at other colleges and universities. Doctoral students often have part of their time allocated for teaching, and in these cases it is recommended that the course *Teaching and learning in higher education* (or similar course) is planned early.

During the introductory phase, and within three month from admission, an individual syllabus (ISP) is compiled for doctoral students which includes a schedule for reconciliation points according to

the third-cycle process. The doctoral student's ISP is followed up annually by the main supervisor with regard to course results, publications, etc.

Defining the research task, with its purpose and research questions, is of course a fundamental element when it comes to carrying out research correctly and successfully. This work must take place with the active support of the supervisor. The research task leading to a doctorate is defined as a whole, with planned debriefing at licentiate level. If the research task is already defined when the doctoral student is admitted, the doctoral student should be given time to adapt to the task. Besides the above work, planning takes place with regard to what courses the doctoral student should complete and when.

The introductory phase ends with a reconciliation seminar, not later than nine months after admission, in which the doctoral student presents his or her research plan (RP) and schedule up to licentiate level, for further details see section *Reconciliation points in the third-cycle programmes*.

Carry out activities to licentiate level

How the work to licentiate levels is planned and carried out is determined by the nature of the research project. However, besides carrying out their own research, doctoral students must also follow seminars and complete doctoral courses.

Publishing scientific articles based on the research carried out is a way of compiling research results and disseminating these to, primarily, the academic world. This means that the doctoral student should also take part in international and national conferences at which these conference articles are presented. From the start, the examiner/main supervisor should clarify the requirements concerning publications for the licentiate theses, for further details see section *Requirements on theses*.

Throughout the entire third-cycle programmes, various reconciliation seminars (research plan, Work-in-Progress (WiP), article or manuscript) are held regularly at which the doctoral student presents and discusses his or her results at the graduate school for and with other doctoral students and senior researchers in the field of Industrial product realisation. The intention is to ensure high research quality in terms of academic level and industrial relevance, and to provide the doctoral student with valuable opinions on strengths and weaknesses for their ongoing work, based on the material presented

When articles have been written and published, the research results must be compiled into a licentiate thesis, normally in the form of a compilation dissertation. Before the licentiate thesis is completed, the doctoral student will be given the opportunity to present his or her research results at what is known as a closing seminar (CS^{LIC}) which essentially resembles the previous reconciliation seminar and which is attended by all seniors and doctoral students, who provide opinions on the material presented. The purpose of the closing seminar is to ensure the quality of the research before the licentiate essay goes to print, for further details see section *Reconciliation points in the third-cycle programmes*.

The licentiate thesis is to be presented at a final seminar where the opponent at least holds a PhD degree or is an industrial representative who is knowledgeable about research and the research area. To be awarded a licentiate degree, the courses up to licentiate level, according to the general syllabus, must be completed in addition to approval of the licentiate thesis.

Carry out activities to doctoral level

After the presentation of the licentiate thesis, research for the doctoral thesis must be reconsidered or planned. In many instances, its focus will need to be reviewed; which means that both the

purpose and research questions relating to the research must be reformulated. This work resembles the work conducted when the licentiate work was planned, but differs in that work already carried out is used as a basis.

As with the licentiate, the research results are compiled; but this time they are compiled into a doctoral thesis. Before the thesis is completed, the doctoral student should present his or her research results at a closing seminar (CS^{DR}). As with earlier presentations of research work, all senior researchers and doctoral students should be present at the seminar to give their views on the material presented. The purpose of the seminar, as before, is to ensure the quality of the research before the thesis goes to print and is then defended.

When the doctoral thesis is completed the doctoral student must apply to defend the thesis. Public defence of the thesis is the final examination. The doctoral student has to verbally defend his or her thesis with an opponent who is a reader or professor and has the relevant scientific expertise. The opponent will be appointed by the Board of Education and Research Education (NUF) subject to suggestions from the School of Engineering (for further details see instruction IE-JTH-20-011). When the thesis is successfully defended and all courses completed, the doctoral student can apply for the doctoral exam.

Reconciliation points in the third-cycle programmes

As a part of the graduate school in Industrial product realisation there is a number of reconciliation points, aiming at quality assurance of the work carried out by the doctoral students. The different reconciliation points are also joint arenas for senior and junior researchers within the different research areas.

Work-in-progress seminars

Doctoral students are at different occasions invited to present their current status in so called Work-in-Progress (WiP)-seminars, which is arranged at least two times a year. The suggested content for these seminars are as follows:

- Short background (what is the problem area)
- Purpose and research questions addressed by the doctoral student
- Selected research method/s
- Accomplished and planned studies/experiments
- Results so far
- Scientific and industrial contributions
- Planned time for licentiate/doctoral defence, depending on where in the process the doctoral student is

If written report is required, the extent should not exceed one A4. A verbal presentation should not take more than 15 minutes.

Research plan seminar

The research plan should be presented at a seminar held within nine months after admission to third-cycle programmes. The main supervisor is responsible for appointing a senior researcher (with completed doctoral degree) as reviewer. The main supervisor is also responsible to inform the research coordinator about time and place for the seminar. During the seminar all participants,

senior researchers and other doctoral students, should be given the opportunity to give comments on the presented research plan, in order to quality assure the research carried out.

The research plan should include (a template is available on the intranet):

- Background (what is the problem area)
- Objective/purpose and research questions
- Way of completion/research methods
- Planned studies/experiments
- Expected results
- Scientific and industrial contributions
- Planned time for licentiate/doctoral defence
- Planned publications and places for publication (conferences and scholarly journals)

The research plan should be available at least a week before the planned seminar. Information about the seminar and distribution of the research plan is carried out by the research coordinator. At least one hour should be allocated for the seminar. The format of the research plan seminar is as follows:

1. The research plan is briefly presented by the doctoral student (maximum 15 minutes).
2. Discussion about the research plan is led by the appointed reviewer.
3. Time should be available for the other participants to ask questions to the doctoral student.

Closing seminar

Closing seminar should be held before the defence of the doctoral thesis (according to *Regulations and guidelines for first, second and third-cycle education at Jönköping University*), and it is strongly recommended that a closing seminar is held before presentation of the licentiate thesis as well. The main supervisor is responsible for appointing reviewer, who should be faculty from another university and be eligible as main supervisor. A remuneration payment is given to the reviewer when the closing seminar is held before a doctoral defense (according to vd-beslut 2012/080 or later).

The chair for the seminar can be the main supervisor, research leader or the academic leader of the school. Depending on the extent and the form of the thesis the length of the seminar might vary. A monograph or a compilation thesis with several unpublished contributions requires normally more time than a compilation thesis with only published contributions. It is important to remember that the main purpose with the seminar is quality assurance of the theses from JTH and therefore it is advisable that enough time is allocated to make this possible.

The format of the closing seminar is as follows:

1. The thesis work is presented by doctoral student (maximum 15-20 minutes). This is also an opportunity to practice a brief presentation for the final seminar, and it gives the audience an orientation about the work.
2. Discussion about the work is led by the appointed reviewer, reasonable time for the discussion is 1-1½ hour.
3. Time should be available for the other participants to ask questions to the doctoral student.

The manuscript should be available at least a week before the planned seminar. Information about the seminar and distribution of the thesis is carried out by the research coordinator.

After a closing seminar a review protocol should be established (form B-JTH-20-005), which should be appended when applying/reporting the defense to the Board of Education and Research Education (NUF).

Requirements on theses

A thesis from JTH should present the scientific results achieved by the doctoral student, based on the research carried out. The quality of the scientific results should hold a quality, allowing publication in peer-reviewed, scholarly journals of a good international standards. The contribution of the doctoral students should clearly be stated when there are joint studies or co-authored contributions included.

As a standard, a thesis from JTH is written as a compilation thesis, which means a cover section together with a number appended papers. A thesis is normally written in English. Only as an exception a monograph thesis should be allowed. The quality and quantity requirements of the thesis are the same, no matter thesis type.

Licentiate thesis of compilation type

- The cover section should provide a coherent and uniform picture of the research carried out. It should contain a scientific contribution based on a synthesis of the appended papers. The cover section should be perceived as a coherent work that can be understood without reading the appended papers.
- The number of appended papers should normally be three to four. However, the number might vary between the different subject areas depending on the prevailing tradition. At least one of the appended papers should hold a quality allowing for publication in scholarly journals.
- The contribution of the doctoral student in joint studies and co-authored papers should be clearly stated in the thesis.
- Depending on the prevailing tradition in the subject area in question, the extent of the cover section varies. As a guideline, a range between 30-50 pages might be appropriate for a licentiate thesis.
- Papers included in the licentiate thesis might be part of the subsequent doctoral thesis.

Doctoral thesis of compilation type

- The cover section should provide a coherent and uniform picture of the research carried out. It should also contain a scientific contribution based on a synthesis of the appended papers. The cover section should be perceived as a coherent work that can be understood without necessarily reading the appended papers.
- The number of appended papers should normally be in the range from five to eight. However, the number might vary between the different subject areas depending on the prevailing tradition. The appended papers should have the status as published, accepted for publication or hold a quality allowing for publication in scholarly journals, or as an alternative be accepted for presentation at conferences with good international standard. At least two of the papers ought to be published or accepted for publication in scholarly journals.

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- At least one of the papers should be single-authored by the doctoral student. The purpose is to show independence in their research.
 - The contribution of the doctoral student in joint studies and co-authored papers should be clearly stated in the thesis.
 - Depending on the prevailing tradition in the subject area in question, the extent of the cover section varies. As a guideline, a range between 40-80 pages might be appropriate for a licentiate thesis.

Licentiate and doctoral thesis of monograph type

- A thesis of monograph type should provide a coherent and uniform picture of the research carried out, and contain a significant scientific contribution.
- Based on the prevailing tradition in the subject area in question, the extent of a monograph thesis varies. As a guideline, for a licentiate thesis between 100-200 pages might be appropriate and for a doctoral thesis 200-300 pages.
- When the thesis (licentiate or doctoral) is of monograph type, there should also exist publications to the same extent and standard as for theses of compilation type, see above.