

# Instructions for theses on the Master of Science in Engineering, Architecture and Master of Science Programmes

In force for theses initiated from 29 August 2016

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## 1 Background

These regulations are a reworking of the previous Rules for Master's thesis work, (Dnr C 2014-1392, Process 1.4 Leda utbildning). The document Guidelines for assessing the quality of degree projects on Chalmers' Master of Science in Engineering, Architecture and Master of Science programmes (Dnr C 2011/895) has also been included in the instructions.

## 2 Title

Chalmers' title in English for the independent work performed within the parameters of the Master of Science in Engineering, Architecture and other Master's Programmes is the *Master's thesis*, hereinafter referred to as the thesis.

## 3 The scope of the thesis

Chalmers shall as an education provider, an independent foundation university, apply Annex 2, the Qualifications Ordinance. According to this ordinance, the following provisions apply to theses

"A requirement for the award of a Degree of Master of Science/Architecture is completion by the student of an independent project (degree project) for at least 30 [higher education] credits.

For award of a Degree of Master of Science/Architecture, the student shall within the parameters of the course requirements have completed an autonomous work (thesis) for at least 30 credits within the main area of the course. The autonomous thesis may consist of less than 30 credits, although at least 15 credits, if the student has already produced an autonomous thesis at an advanced level of at least 15 credits within the main area of the course or the equivalent from a foreign course."

At Chalmers, the thesis is a course comprising of 30 or 60 higher education credits.

A thesis shall be produced by one or two students jointly.

## 4 Aim and learning objectives

The aim of the thesis is for the student to develop in-depth knowledge, understanding, ability and approaches within the parameters of the education. The thesis shall be produced at the end of the education and lead to a deepening and synthesis of previously acquired knowledge. The thesis shall

emphasise the technical, scientific and artistic content of the Master of Science in Engineering, Architecture or Master of Science programmes. The overall aim of the thesis is for the student to demonstrate the knowledge and ability required for autonomous work as Master of Science in Engineering, Architect, Master of Science.

The learning objectives for the Master's thesis are based on the objectives for the degree of Master of Engineering, Architecture and other Masters of Science programmes contained in the national Qualifications Ordinance and in Chalmers local Qualifications Ordinance (Dnr C2007/723). Specific learning objectives to be achieved in the Master's thesis are for the student to be able to:

1. Apply significantly specialised knowledge in the main area/specialisation of the programme in his or her project and relate this to current research and development work in a scientifically correct way,
2. Choose and justify the choice of method in the project, within the main area/specialisation of the programme,
3. Contribute to research and development work, and be able to relate his or her work to the relevant scientific and technical/industrially/architectonic contexts,
4. With a holistic approach, to identify, formulate and deal with complex issues critically, autonomously and creatively,
5. To plan and perform highly qualified tasks using adequate methods within given parameters, and to be capable of critically evaluating this work,
6. Create, analyse and critically evaluate different technical/architectonic solutions,
7. Integrate knowledge critically and systematically,
8. Present clearly and discuss his or her solutions in English, as well as the knowledge and the arguments on which these are based,
9. Identify, within the parameters of the specific project, the questions that need to be answered in order for the relevant societal, ethical and ecological aspects to be taken into consideration, and
10. Take into account and discuss ethical aspects of research and development work, both as regards *how* the work is to be performed, as well as *what* is to be investigated/developed.
11. Identify and discuss the need for additional clarification of various aspects of the project prior to decision and implementation, where relevant.

## 5 Examiner

An examiner shall be appointed for every thesis. The examiner bears the scientific and quality-related responsibility for the thesis, as well as for compliance with the learning objectives. The examiner sets the grade for the thesis.

Only persons who hold a post and who have a permanent association with Chalmers may be appointed as examiner. The Head of Department appoints the examiner.

The examiner may appoint one or more supervisors. The supervisor then provides scientific/technical/artistic support for the student and assists the student/s with the practical processes.

## 6 Preconditions for starting work on the thesis

In order to start work on the thesis, students on the Engineering/Architecture programmes must have earned at least 225 credits on the programme. Students who have only been enrolled on the Master's programme must have earned at least 45 credits within the programme.

As well as the general credit requirements, the courses provided necessary prior knowledge for the specific thesis shall have been completed. The examiner formulates and checks such prior knowledge requirements.

## 7 Initiation of work on the thesis

The thesis is normally initiated in one of the following ways:

- The student contacts a company or a department with a thesis proposal. The student contacts at the same time an examiner at Chalmers or the person responsible for theses at the department.
- A company contacts Chalmers and suggests a thesis topic.
- A department suggests a thesis.

The student shall autonomously produce a written thesis proposal. This description shall provide a sufficient basis for the examiner to determine whether the topic is suitable for a thesis. The description shall include background, aim, objectives and possible method.

The examiner shall assess and approve that implementation of the proposed thesis leads to the student/s developing the knowledge, abilities and approach included in the learning objectives for the thesis.

The Director of Master's Programmes (MPA) shall assess and approve that the proposal is within the main area of the Master's Programme. The MPA may make a decision on whether a specific thesis is within the main area of the Master's Programme, even if the department where the thesis is performed does not belong to the main area in accordance with decision C2008/280.

If the student/s is enrolled on the Master of Science in Engineering/Architecture Programme, the MPA shall also assess and approve that the thesis is relevant as regards the technological/artistic field.

Students that produce a thesis as a freestanding course only require approval as above from the examiner.

## 8 Implementation

### 8.1 Preparatory administration

- The student/s produces a brief written description of the thesis. This description shall be enclosed with the registration documentation. The description should include background, aim and possibly method.
- The examiner checks that the student/s complies with the general and specific requirements for prior knowledge for theses, and that the proposed thesis corresponds to the learning objectives for theses. The examiner signs the registration documentation.
- The Director of Master's Programme checks that the thesis is within the main area of the Master's Programme. If the student/s is enrolled on the Master of Science in Engineering/Architecture Programme, the MPA shall also assess and approve that the thesis is relevant as regards the technological/artistic field. The Director of Master's Programme signs the registration documentation.
- The student/students is responsible for sending the registration documentation to the Student and Education office.
- The Student and Education office registers the student in LADOK.
- The student/students is issued a work card from the Student Portal which is to be retained throughout the thesis period. The examiner signs for the compulsory components of the thesis course when these have been approved.

### 8.2 Planning report

The student/s shall produce a written planning report which is to state in detail the problem description/task. The planning report shall include background, preliminary aim, objectives, demarcations, method and timetable for production of the thesis. In the planning report, the student/s shall clarify the societal, ethical and ecological aspects that need to be taken into account in accordance with learning objectives 9 and 10. Reasons should be given if such aspects are not taken into consideration.

An interim objective for 30 credits should be included in the planning report for 60 credit theses.

### 8.3 Tutorials

During the process of production of the thesis, the student/s has the right to regular tutorials and other resources needed to perform the work.

#### 8.4 Interim presentation for 60 credit thesis

Students who are producing a 60 credit thesis shall report to the examiner on the status of the work after twenty weeks of work. Half of the work required to achieve the learning objectives for a 60 credit thesis shall have been performed by this time. An approved interim report entails that 30 credits is reported in Ladok.

#### 8.5 Public access and confidentiality

According to Chalmers instructions for first and second-cycle courses, theses shall be presented both in writing and orally. The written composition shall be public in its entirety. It shall constitute a sufficient basis for the examiner to set a grade.

#### 8.6 Copyright

The copyright rules are based on the Swedish Act on Copyright to Literary and Artistic Works (1960:729), commonly referred to as the "Copyright Act". Copyright consists of a financial and a moral right which are both held by the author. The author is the physical person who has created the work. The student/s hold the copyright to the thesis.

The author can choose by contract to wholly or partly transfer the financial rights to other parties, or to allow others to have the right of use of these. This transfer entails that the author waives and hands over the right of ownership to the financial rights on agreed terms.

The moral right consists of the author's right to be named in connection with the work, not to have to tolerate changes of the work, or for the work to be published in contexts where there is a risk of the author's artistic or literary reputation or distinctive character being encroached upon.

## 9 Examination

### 9.1 Grades

Theses are awarded the grade of Pass or Fail.

The following are required for the award of the grade Pass

- Approved planning report
- Approved presentation and defence
- Approved opposition to another thesis
- Attendance at two other presentations
- Approved essay
- The student shall have worked actively and autonomously and contributed to an extent corresponding to 30 or 60 credits.

### 9.1.1 Criteria for the grade of Pass for theses consisting of 30 credits

To be awarded the grade of Pass, theses consisting of 30 credits shall comply with at least the criteria for High Quality for all learning objectives (1-11). To comply with the criteria for High Quality for learning objective 5, the student shall have been approved on all components as above totalling 30 working weeks. The examiner may, if there are exceptional reasons, extend this time limit by 10 working weeks at a time. See Appendix.

### 9.1.2 Criteria for the grade of Pass for theses consisting of 60 credits

To be awarded the grade of Pass, theses consisting of 60 credits shall comply with at least the criteria for Very High Quality for learning objectives 1 and 2 and at least Pass for other learning objectives (3-11). See Appendix. To comply with the criteria for High Quality for learning objective 5, the student shall have been approved on all components as above totalling 50 working weeks. The examiner may, if there are exceptional reasons, extend this time limit by 10 working weeks at a time.

## 9.2 Written presentation

The essay shall be written in English. Exceptions may only be made for master's programmes where the language of tuition is Swedish. The essay shall be arranged in accordance with the template for "[Design and publish Master's thesis](#)". When two students have produced a joint thesis, the distribution of labour shall be made clear from a contribution report, which is appended separately. The essay shall be checked using an anti-plagiarism tool.

### 9.2.1 E-publication

Chalmers' theses shall be registered and published in Chalmers Publication Library, CPL. They will then be searchable in the service Studentarbeten and freely accessible and searchable on the Internet. The student can decline electronic publication but registration (i.e. a searchable post without the full text) is mandatory. It is a requirement for electronic publication of the full text that all authors have signed and approved the publication agreement on the work card.

The examiner is responsible for registration and e-publication.

## 9.3 Oral presentation

At the time of the oral presentation, the essay shall have been completed but not published; this is to permit points of view emerging during the presentation to be included in the composition.

Oral presentation including opposition shall take place at Chalmers. Additional reporting may, if so wished, take place at the company. In exceptional cases, for example, if the thesis is produced



abroad, the examiner may grant an exemption from the requirement for oral presentation, opposition and presence at other presentations at Chalmers.

Presentation of the thesis shall be announced at the department in question at least two weeks prior to the date of presentation. The presentation shall take place during the period 15 August to 15 June during normal working hours.

The oral presentation is initiated by the student/s presenting his or her work. This is followed by opposition and discussion.

The oral presentation is to take place in English. Exemptions can be granted for programmes where the language of tuition is Swedish. The presentation shall take 45-60 minutes, of which approximately a third of the time should be used for opposition and discussion.

#### 9.4 Opposition

The student shall have been an opponent on another thesis. At most two students may serve as opponents for one and the same thesis. The opponents have 10 minutes at their disposal and the whole time shall be made use of. After presentation of the opponents' points of view, others in attendance may ask questions.

The opponents shall examine the written composition. Language errors and less important comments shall be made in writing and handed over after the opposition.

The opponents' work is assessed by an examiner for the work presented and approved opposition is signed on the work card.

The student shall appoint the opponent/s for his or her own work.

#### 9.5 Attendance at other presentations

The student shall participate in two other presentations of theses. The examiner of the presented theses signs approved participation on the work card.

## 10 Check list roles and responsibility

### 10.1 Examiner

- Scientific and quality-related responsibility and responsibility for achievement of the learning objectives for the thesis.
- In the event of collaboration with companies, the examiner shall be cognisant with Chalmers' guidelines for collaboration with the business sector.
- Appoints any supervisors and provides necessary directives for supervision both for internal supervisors at Chalmers and external supervisors. The examiner and the supervisor may be the same person.

- Is responsible for it being possible to produce the thesis with the resources available.
- Checks that the student/s comply with the requirements for previous knowledge.
- Approves the planning report.
- Draws the attention of the student/s to Chalmers' policy for publicity and confidentiality.
- Is responsible for the student/s being offered regular tutorials.
- Approves interim report after 20 working weeks (corresponding to 30 credits) for 60 credit theses and is responsible for approved presentation being reported in Ladok.
- Is responsible for checking the essay with a plagiarism tool and undertaking measures in the event of suspected plagiarism.
- Examines theses and decides when the work may be presented.
- Is responsible for presentation of the work in accordance with current rules.
- Chairs the presentation.
- Approves the opposition to a thesis.
- Approves attendance at a presentation.
- Signs all approved components and approves the thesis when all components have been approved.
- Is responsible for the essay being registered in Chalmers Publication Library (CPL), and as full text if the student has approved this.

#### 10.2 Director of Master's programme

- Checks that the thesis is within the main area of the Master Programme.
- Checks and approves that the thesis belongs to the relevant technical areas (equivalent) if the student intends to take an Master of Science in Engineering/Architecture Master's degree.
- Signs the registration documentation.
- May make decisions that a specific thesis belongs to the Master Programme's main area even if the department where the thesis is being produced is not included in the main area in accordance with decision C2008/280.

#### 10.3 Supervisor

- Ongoing scientific/technical/artistic support for the student/s during production of the thesis and assisting them with the practical processes.

#### 10.4 Student

- Finds suitable problem for a thesis at a company or institution.
- Autonomously produces a written thesis proposal.
- Takes contact with a relevant institution and examiner for the topic.
- In order to have the registration documentation signed, the student shall contact the examiner and the Director of Master's Programme. If the student is enrolled on the Master of Science in Engineering/Architecture Programme, the Director of Master's Programme shall also sign the documentation.
- Submits registration to the Student and Education office.

- Prints out a work card from the Student Portal and keep this during the period of production of the thesis.
- Plans, performs and presents the work autonomously in accordance with the requirements described above.
- Examines Chalmers' policies for public access and confidentiality prior to starting work on the thesis.
- Examines Chalmers' information on theses and produces thesis in accordance with Chalmers' rules for "[Design and publish Master's thesis](#)" and for publication in Chalmers Publication Library (CPL).
- Contacts the examiner prior to any agreement on the thesis.
- Appoints opponent/s for the presentation of his or her own work.

#### 10.5 [Student and Education office](#)

- Registers the thesis in Ladok.

## 11 APPENDIX: Guidelines for quality assessment of theses at Chalmers Master of Science in Engineering, Master of Architecture and Master of Science Programmes

This appendix includes the guidelines in the document Guidelines for assessing the quality of degree projects under Chalmers Master of Science in Engineering, Architecture and Master of Science programmes, Dnr C2011/895.

These guidelines are based on the learning objectives for theses as part of the degree of Master of Science in Engineering, Master of Architecture, Master of Science in Chalmers' local Qualifications Ordinance, Dnr C2007/723.

Assessments are awarded on a three-grade scale: Insufficient quality (IQ), High quality (HQ) and Very High quality (VHQ).

Criteria for Very high quality are formulated only for certain learning objectives; those which are considered to be of a distinctive nature – significant specialisation in the main area, specialised knowledge of methods, problem formulation, ability to create and evaluate new solutions, written presentation and autonomy.

### 11.1 Learning objectives with guidelines for quality criteria

The criteria for Insufficient quality (IQ), High quality (HQ) and Very high quality (VHQ) for each learning objective are presented below.

#### **1. Use significantly specialised knowledge in the main area/specialisation for the programme in his or her project and relate to current research and development work in a scientifically correct way,**

VHQ	A significant specialisation in the main area has been demonstrated. The thesis makes use of knowledge from studies at an advanced level within the main area. It contains an extensive examination of existing literature and a reflection of the work's connection with the knowledge frontier in the main area. The work contributes in a clearly presented way to new knowledge in the main area. The work demonstrates an ability to make an autonomous contribution to the area.
HQ	A significant specialisation in the main area has been demonstrated. The thesis makes use of knowledge from studies at an advanced level in the main area. It contains a written review of existing literature and a reflection of the connection of work to the knowledge frontier in the main area.
IQ	The work's relationship to the main area is weak and lacking. Advanced level knowledge is not made use of. There is no compilation of literature and reflection of the connection of work to the appurtenant area of knowledge.

**2. Choose and justify choice of method in the project, in the main area/specialisation of the programme,**

VHQ	Potentially relevant engineering or scientific theories and methods have been identified. A well-motivated choice of theory and method has been made. Selected theories and methods have been applied in a correct and innovative way. The work demonstrates a deep and broad knowledge of methods.
HQ	Potentially relevant engineering or scientific theories have been identified. A well-justified choice of theory and method has been made. Chosen methods have been applied correctly.
IQ	The chosen theories and methods are not relevant. The student has not demonstrated a command of the chosen theories and methods.

**3. Contribute to research and development work, and be able to relate work to relevant scientific and technical/industrial/architectonic contexts,**

HQ	The contribution to research and development work is clearly presented
IQ	The thesis has been of such nature that it is difficult to relate it to research and development work

**4. Formulate and deal with complex issues critically, autonomously and creatively and in a holistic way,**

VHQ	The thesis has a clear and well defined question or formulation of objective. The question/formulation of objective has been worked up in an adequate, critical and reflective manner. There is a clear connection between the question/formulation of objective, result, discussion and conclusions. The conclusions of the thesis are well founded and correct.
HQ	The thesis has a clear and well defined question. The question has been worked up in an adequate way. There is a clear connection between the question, result and conclusions. The conclusions of the thesis are well founded and correct.
IQ	The work lacks or has an unclear issues or formulation of objective. Irrelevant method(s) are used. The work does not present an answer to the question or a result related to the objective. The conclusions are incorrect.

**5. Plan and carry out with adequate methods highly-qualified tasks within given parameters, and to be able to evaluate this work,**

HQ	A realistic plan for the thesis has been formulated. The deadlines communicated and agreed upon have been complied with in production of the thesis. The necessary adaptations for implementation have been documented and communicated.
IQ	The thesis has not complied with the deadlines communicated and agreed upon, nor has a documentation of relevant factors for discrepancies been communicated.

**6. Create, analyse and critically evaluate different technical/architectonic solutions,**

VHQ	New solutions have been produced in the thesis, which are critically analysed and evaluated. Alternative solutions have been produced and dealt with in a relevant and exhaustive way.
HQ	Solutions have been produced which are critically analysed and evaluated.
IQ	The thesis has not presented the above clearly.

**7. Critically and systematically integrate knowledge,**

VHQ	The thesis integrates knowledge and methods from several subjects in an innovative way.
HQ	Relevant knowledge and methods have been obtained and applied.
IQ	Relevant areas for the thesis have not been taken up or applied. Knowledge selected and obtained has not been clearly presented with reasons.

**8. To be able to present and discuss conclusions, and the knowledge and arguments on which these are based, in a clear way in English,**

VHQ	A very well written essay. The overall essay, structure and layout are of very high quality.
HQ	The thesis deals with the selected area using a relevant and correct use of language. The whole essay, its structure and layout are of good quality.
IQ	The thesis lacks mainly adequate use of language, which makes it hard to understand or to be assessed using the report as a basis.

**9. Within the parameters of the specific project, the questions that need to be answered to take into account relevant societal, ethical and ecological aspects are answered**

HQ	Presents and justifies the methods selected and discusses the result on the basis of a perspective focused on sustainable development.
IQ	Does not take this aspect into consideration. Justification not included in the planning report.

**10. Takes into account and discusses ethical aspects of research and development work, both as regards *how* the work is performed, and *what* is investigated/developed.**

HQ	Presents possible ethical consequences of the thesis produced
IQ	Does not take this aspect into account. Justification not included in the planning report.

**11. Identify and discuss the need of additional clarification of various aspects of the project prior to decision or implementation, where so relevant.**

HQ	The student has reflected on and presented the other aspects the need to be clarified/investigated prior to decision or implementation.
IQ	The student has shown himself/herself to be uncritical as regards other aspects that need to be clarified/investigated prior to decision or implementation.

**Overall objectives**

**After completing the thesis, the student shall demonstrate such knowledge and ability as required to work autonomously as an engineer/architect/master of technology.**

VHQ	Produced thesis in an autonomous way without extraordinary support measures or adaptations or otherwise requiring large additional resources for producing the thesis.
HQ	Work performed with reasonable support initiatives.
IQ	There has been considerable need for support measures. These support measures have been too extensive to make it credible that the student shall be able to work autonomously after the examination.

