

Guidelines Master's Thesis Computer science

Science Faculty
University of Antwerp

Onderwijscommissie Informatica, 21 Februari, 2014

Guidelines Master's Thesis

Master of Computer Science Programme – Faculty of Science - Universiteit Antwerpen

Introduction and Terminology

1. In conducting a Master's Thesis a student is to demonstrate the ability to independently (under the supervision of a promotor) study a complex subject matter in depth in a scientific manner and the ability to produce a coherent text that describes his/her findings.
2. The *thesis document* is an original written text that is to demonstrate the student's theoretical insight in and practical experience with the methods, techniques and tools that are applied in scientific research within a particular subdomain of Computer Science. The delivery of an original contribution to said scientific domain is not a prerequisite for a successful thesis. Such a contribution is required for a *doctoral dissertation* (PhD).
3. The *promotor*, a member of the University's faculty (Zelfstandig Academisch Personeel (ZAP)), takes responsibility for the proper supervision of the process that leads to the submission and defense of a student's thesis. The promotor selects reviewers, organizes the thesis defense and takes responsibility for a fair assessment of the thesis.
4. An optional *co-promotor* is an expert in the thesis's domain who can take shared responsibility for the quality of the thesis's content.
5. An *assistant* is a member of the Teaching Assistants (Assisterend Academisch Personeel (AAP)) or Research Assistants (Bijzonder Academisch Personeel (BAP)) of the University who can be the student's first point of contact for support.
6. An *internship supervisor* is a member of an organization outside of the University that has commissioned an internship within the context of which a Master's Thesis can be completed.
7. A *reviewer* is a person that takes shared responsibility for assessing the thesis. A reviewer needs to have obtained at least a Master's degree.
8. The *research group* is the group of researchers (PhD students, postdocs) for which the promotor is (partially) responsible. At least one of the thesis reviewers must be part of a research group different from the promotor's group.
9. The student submits a thesis before a predetermined date (cfr. Article 33). Submission implies the student's request to defend his/her thesis.
10. The thesis *defense* is an oral presentation of the work described in the thesis that is followed by a round of questions from the reviewers and, potentially, other members of the audience.

Content and form of the Master's Thesis

Learning outcomes

11. The Master's Thesis serves as an aptitude test for the Master in Computer Science. It thereby aims to realize the following learning outcomes within the program:

- You are able to clearly formulate a research question, motivate its relevance, and describe its context [*Fundamental Research*].
- You are capable of correctly relating your work to existing scientific literature [*Fundamental Research*].
- You are able to describe your own work in a correct, verifiable, and well-founded manner [*Reporting / Fundamental Research*].
- You have gained theoretical insight and practical experience with the methods, techniques and tools that are used within a given subdomain of Computer Science [*Research and Development*].
- You are able to apply published research results or techniques to a new context independently [*Fundamental Research*].
- You are competent to make well-founded choices with regards to alternatives in aforementioned methods, techniques and tools that present themselves while conducting research [*Selection of techniques, methods, languages, architectures, ... / Research and Development*].
- You can draw correct conclusions with respect to the implications of your own work and the research question [*Fundamental Research*].
- You are capable of reporting both orally and in written form on the research conducted at an academic level [*Reporting*].
- You are competent to organize and plan research activities independently under the guidance of a promotor [*Leading a group of computer scientists*].

Content

12. The content and associated structure of the thesis depends on the type of research question addressed (cfr. appendix A). As a rule, the following aspects should be reflected in the thesis's content:

- a) Formulation of the problem statement and context.
- b) Formulation of the research question.
- c) Description and motivation of the research method.
- d) Description and discussion of the research results.
- e) Formulation of a conclusion.

Structure

13. With respect to the thesis's text, its structure naturally reflects the content. Other artifacts that are produced during the course of the Master's Thesis, such as source code, documentation of developed software, design documentation, etc. are to be delivered to the promotor as electronic supplements to the text, and are therefore not an integral part of it.

Form

14. As a rule, the thesis is 60 to 100 pages long. In addition, the student is obliged to attach a short summary (1 page maximum) to the thesis. The summary sets out the essential elements with respect to content, method, results and points of reference of the research.
15. The thesis is to be written in English.

Procedure**Choice of subject and promotor**

16. A list with possible subjects available to the student is permanently made available through the ESP system. The ESP-system is accessible through Blackboard. In addition, an informative session is organized in the beginning of May of the first Master's year during which an overview of the different subjects and the procedure is given. It is possible for students to propose their own subject, given that a promotor is found who agrees to take responsibility for it.
17. The student acts upon his/her own initiative to contact and negotiate with the different promotors of the subjects of interest. During this negotiation process, a promotor can refuse to provide guidance to a student and a student can decide to choose a different subject/promotor.
18. The choice of the thesis subject and promotor is made through the Blackboard platform (cfr. the "Time Schedule" section for important deadlines in this regard).

Supervision

19. The following are eligible to take on the role of promotor: all faculty members associated with the student's field of study. The list of faculty members associated with a given field of study can be found in the curriculum description.
20. All individuals that have obtained a PhD can act as a co-promotor. As a rule, a co-promotor is an expert in the subject matter of the thesis.
21. The following can act as an internship supervisor: all individuals who are not a member of the Computer Science Education Committee at the University of Antwerp. An internship advisor is associated with a company or organization in which a part of the Master's Thesis is conducted. In general this relates to practical or experimental activities that are conducted in the context of a specific assignment that aligns with the subject of the Master's Thesis.
22. The following can act as a teaching assistant: all members of the Teaching Assistant staff (Assisterend Academisch Personeel (AAP)) or Research Assistant staff (Bijzonder Academisch Personeel (BAP)) of the University of Antwerp.
23. The student and promotor define a work plan, possibly in consultation with a co-promotor, internship supervisor or teaching assistant, for completion of the Master's Thesis. The plan also defines how the supervision of the work will be arranged. (When will the parties concerned meet (bi-weekly / monthly / ...) ? How will they contact each other (telephone / e-mail / after class / Skype) ? Who takes the initiative (student / teaching assistant / ...?)
24. The student carries the final responsibility for the execution of the planning, for promptly pointing out potential problems, and for the submission of the thesis.
25. The promotor presents the student with the necessary feedback regarding to intermediate results, corrective supervision of the work, and suggests solutions for problems raised. This is done in possible cooperation with the co-promotor, internship supervisor and teaching assistant.

Defense

26. The promotor chairs the thesis defense and sees to its proper course.
27. The defense is public, open for all to attend.
28. All reviewers and (if applicable) the teaching assistant must attend the defense. In exceptional circumstances (e.g. a foreign co-promotor), a reviewer or teaching assistant can be excused from the defense. In that case a review is to be sent to the promotor prior to the defense.
29. The defense consists of an oral presentation during which the student concisely summarizes his work, followed by a question and answer session. Every attendee is entitled to ask questions to which the student is to respond to the best of his/her abilities.

Time Schedule

30. **Although the Master's Thesis is formally registered in the curriculum as a 2nd semester course, students are obliged to work on their thesis during the entire academic year, given the magnitude of the work.** Therefore, the subject and promotor choice can already be prepared in the year that precedes the Master's Thesis. In any case the choice has to be made in the first weeks of the year in which you enroll for the Master's Thesis.
31. **The registration of the subject and promotor choice through Blackboard is to be completed before the end of the 4th week (of the first semester) of the academic year in which you enroll for the Master's Thesis at the latest, and at the start of that academic year at the earliest. The instructions for making this choice are made available through Blackboard.** The promotor is to approve the choice before the end of the 5th week of said semester through Blackboard.
32. **If these deadlines are not respected, the Faculty Student Administration will cancel the enrollment for the Master's Thesis.** A notification is sent through e-mail of this fact.
33. **The thesis is to be submitted 14 days before the end of the exam period.** The thesis must be submitted in digital form (PDF) through the Blackboard electronic learning platform. In addition, the student must take responsibility for sending an email with this PDF attached to all reviewers at the time of submission. The respective email addresses are provided to the student by the promotor.
34. **The thesis defense is scheduled in the last week of the exam period.** The promotor fixes a date, time and location in consultation with the student and reviewers.

Assessment

Who?

35. The promotor will select two reviewers for each thesis. That number can be extended if called for.
36. The departmental administration will ask all promotors for the names of the selected reviewers before the submission deadline (cfr. Article 33).
37. At least one reviewer must be associated with a research group different from the promotor's.
38. A co-promotor (if present) always fulfills a reviewer role.
39. An internship supervisor (if present) always fulfills a reviewer role.
40. A teaching assistant (if present) *never* fulfills a reviewer role, but takes on an advisory role.
41. The promotor is to contact the reviewers, ask for their willingness to participate in the thesis' assessment and contact alternative reviewers if this is not the case.

Assessment criteria

42. The assessment can take into account the *process* (permanent evaluation), the *final product* (single evaluation) or both.
43. Regardless of the assessment methodology, each Master's Thesis must at a bare minimum demonstrate that the student :
 - (a) has independently gained insight in the subject matter;
 - (b) is able to present a complex subject matter at a level understandable by his fellow students.
44. The detailed assessment criteria and their impact on the final grade can be found in the assessment forms included in Appendix A.
45. If the thesis jury deems the aforementioned assessment methodology unfit for the thesis in question, the jury can, ad hoc and in consensus, propose their own motivation for the assessment made.
46. The assessment forms or motivation records must make note of the promotor, co-promotor and other reviewers.

Appendix: Assessment forms

Assessment criteria Master's thesis

1. User guide

A thesis is evaluated by a three-person jury, which includes the promotor. This jury decides by consensus, although in practice, the promotor steers the decision. The assessment results in a grade out of 20 (integer numbers only), differentiating between [0 ... 9[which is a failing grade, and the following degree honours :

- [10 ... 13[or pass,
- [13 ... 15[or distinction,
- [15 ... 17[or great distinction
- [17 ... 20] or greatest distinction

Two possible evaluation methods for theses exist: evaluating either the *process* (permanent evaluation) or the *product* (one-time evaluation). In both cases, a text will have to include a truthful description of either the product or the process. Moreover, this text will have to be defended. In many cases, the promotor will clarify to the jury, the process (independent efforts, efficient working methods, etc.) and/or the developed product (quality, originality, etc.).

2. Rough criteria

In order to maintain the advantage of diversity, theses are divided according to the research methods that have been employed. The methods have been selected on the basis of popular research methods in the field of Computer Science (more precisely Software engineering¹). They were adjusted to take into account the limited scope of a Master's thesis.

The commonly accepted research methods for a thesis are:

Feasibility Study

A feasibility study is a scientific method to determine whether a (combination of) technique(s) is *usable* for solving a specific type of problem. An essential factor in a feasibility study is the novelty of the technique. Therefore, a typical experiment will consist of building a prototype, and subsequently applying the technique to one problem example. The conclusions are primarily of qualitative nature in the form of "lessons learned".

A feasibility study has the following characteristics:

- (a) The problem is *relevant*: The solution is not trivial and useful to at least some people.
- (b) The technique is *innovative*: It is not yet known whether it will lead to a solution.
- (c) The application of the technique seems *reasonable*: There are reasons to believe that the technique can lead to a solution.

Case Study

A case study is a scientific method that aims to determine to what degree a (combination of) scientific technique(s) is *appropriate* for solving a certain kind of problem. Unlike a feasibility study, the technique is not very new (it has already led to solutions in the past), but it is unclear to what degree the solutions are always equally good. For this reason, a typical experiment will build a tool, experimenting with the technique on different problem instances. Subsequently, the technique's effect is quantified in order to make comparison possible.

A case study has the following characteristics:

- (a) The problem is *relevant*: The solution is not trivial and useful to at least some people.
- (b) The technique is *useful*: There are known cases in which the technique has led to a solution.
- (c) The technique's results are *uncertain*: There is reason to believe that the technique does not always lead to good solutions.

Comparative Study

A comparative study is a scientific method to *compare* different techniques (tools, methods) in order to solve a certain kind of problem. Similar to a case study, the technique is not very new (it has already led to solutions in the past), but it is unclear to what degree the solutions are always equally good. For this reason, a typical experiment will make up a list of criteria (that don't favour any particular technique over the other(s)). Subsequently, the techniques are compared based on these criteria.

A comparative study is characterized by the following:

- (a) The problem is *relevant*: The solution is not trivial and useful to at least some people.
- (b) At least *two* techniques to solve the problem exist.
- (c) The techniques' usefulness is *uncertain*: There is reason to believe that one technique is better than another.

Literature Study

A literature study is a scientific method to find out which techniques are *applicable* to solving a certain kind of problem. For a literature study, it is essential that the problem is well documented and that several solution techniques have already been described. But the solutions' diversity range is so large that there is no clear overview of which techniques result in the best results and in which cases they do so. For this reason, a typical literature study analyses the different solutions according to a well-determined list of criteria, in order to compare the advantages and disadvantages of each technique. The conclusions are both qualitative and quantitative in nature.

A literature study can be recognized by the following characteristics:

- (a) The problem is *relevant*: The solution is not trivial and useful to at least some people.
- (b) There are several *applicable* techniques: Several sources describe solutions to the problem.
- (c) The techniques are *well specified*: The advantages and disadvantages for each technique are known.

Formal model

A formal model is a scientific method to determine to what degree it is possible to make a mathematical abstraction of a certain problem, and to prove a number of important properties based on that abstraction. The method emphasizes a good comprehension of the problem, in order to determine which factors should be included in the formal model. Therefore, a typical experiment will build a model of the problem domain, using a mathematical technique (analytical model, stochastic model, logical model, rewriting system, ...), defend the choice of factors included in the model and draw conclusions w.r.t. the degree to which the problem can be solved.

A formal model has the following characteristics:

- a) The problem is *relevant*: The solution is not trivial and useful to at least some people.
- b) The problem can be *abstracted*: Many factors exert an influence, but are not equally relevant.
- c) There are a number of important properties that, once proved, facilitate the construction of solutions to the problem (e.g., synthesize a correct software solution).

Simulation

A simulation is a scientific method to study phenomena in the real world in detail and to make predictions about what can happen under certain situations (e.g., how a system reacts to external stimuli). Simulations are used when circumstances do not allow real observations (e.g., too expensive, physically impossible). Similar to a formal model, a good understanding of the problem is necessary to determine what will be included in the simulation model and what will be excluded. A typical experiment will build a model of the problem domain, using a series of events and their relationships to test the model using real observations and draw conclusions about hypothetical situations.

A simulation has the following characteristics:

- a) The solution is *relevant*: Non-trivial and useful to at least some people.
- b) The problem can be *abstracted*: Many factors exert influence, but they are not all equally relevant.
- c) The problem requires *prediction*: Real observations (on a large scale) are practically impossible, but simulations can provide answers to “what-if” questions.

Process

Finally, there is also a separate category for assessing the process, using permanent evaluation. A process evaluation does not emphasize a student's ability to apply a certain scientific method, but rather a student's discipline and maturity to solve a complex problem within a limited period of time.

For each of the categories, the assessment form lists the prerequisites that have to be attained in order to reach a certain degree (pass, distinction, great distinction, greatest distinction). Note that the nature of the research method plays an important role for a pass or distinction degree, but becomes irrelevant for great and greatest distinctions.

3. Fine-grained criteria

Once the degree has been decided on, the fine-grained criteria can refine the final grade. Extraordinary scores, both positive and negative, can lead to an increase or decrease of the degree.

- *Clarity*: The degree to which the text is written clearly and comprehensively.
- *Presentation*: The way the thesis was publicly defended.
- *Independence*: The degree to which the student has taken the initiative to solve any unanticipated problems.
- *Workload*: The degree to which the student has had a “normal” load during the final Masters year. A normal load corresponds to that of a student who graduates in the one-but-last year during the first exam period, begins to work on the thesis around September, is enrolled in the regular study program during both semesters of the final year and submits the thesis at the end of May. An above-normal load would be, for example, an Erasmus/Socrates/...-student (those who reside abroad for at least one semester), and, to a lesser degree, late starters (those who participated in the second exam period in their one-but-last year and start work on their thesis sometime in October). A below-normal load is a student who is enrolled in a thesis year (has already passed all other subjects and is taking an extra year to work exclusively on the thesis) and, to a lesser degree, those who hand in their work late (students who hand in their thesis during the second exam period of the final year).

4. Out of scope criteria

The following elements will explicitly NOT be used as criteria

- *Difficulty*: A subject's difficulty will not be seen as a criterion, as it is too relative a term, for both the promotor and for the student.
- *Amount of work*: The final grade for a thesis judges the end result. The amount of work needed to achieve this result is irrelevant. This, too, is too dependent on both promotor and student.
- *Source code and documentation*: If an experiment requires the development of software, the quality of the code and documentation (readability, maintainability, ...) is largely irrelevant, unless it is an essential element of the experiment. The motivation is that students writing a thesis are implicitly expected to hand in high-quality work.

Assessment form: Feasibility study

Student:

Promotor:

Jury member:

Jury member:

Assistant:

Title:

Pass [10 .. 13]

Is the problem described precisely?	Yes / No / No reply
Is the applied technique described precisely?	Yes / No / No reply
Is the technique's application to the problem described precisely? (Is the experiment —the prototype— described clearly?)	Yes / No / No reply
Are conclusions being drawn? (Which of the techniques' steps are <i>useful</i> ? Which steps need to be improved or even replaced?)	Yes / No / No reply

If the thesis committee answers “no” on two or more criteria, the thesis will be given a FAIL grade. The fine-grained criteria will then determine the exact grade.

Distinction [13 .. 15]

Is the question “why a feasibility study” answered convincingly? (Is it clear that the problem is relevant, the technique innovative and the application reasonable?)	Yes / No / No reply
Is there a summary of applicable techniques? (Is there information about several alternatives, apart from the applied technique?)	Yes / No / No reply
Is there a convincing motivation for the choice of experiment? (Is there an explanation why the problem example is representative? Is there more information about the applied technique as a function of the problem?)	Yes / No / No reply
Can the experiment be repeated? (Are enough details given so that outsiders could replicate the experiment?)	Yes / No / No reply
Are the conclusions convincing? (Is the problem presented in a sufficiently abstract way so that the conclusions are also relevant for other problems?)	Yes / No / No reply

If the thesis committee answers “no” on two or more criteria, the thesis will be given a SATISFACTORY grade. The fine-grained criteria will then determine the exact grade.

Great distinction [15 .. 17]

Is the problem well situated within its context? (Is there a precise explanation of the greater problem the thesis needs to be situated in? Is there a convincing motivation for the choice of the smaller problem that the thesis intends to solve?)	Yes / No / No reply
Is a broad overview of the popular solution techniques given? (Is the overview of the different solution techniques almost complete?)	Yes / No / No reply
Is there a repeatable weighting of the pros and cons of the popular techniques? (Can the same kind of weighting of the pros and cons be used for a similar problem, without the solution having to be the same?)	Yes / No / No reply
Is the experiment representative? (Is it clear to which degree the experiment's results are applicable for similar problems?)	Yes / No / No reply
Do the conclusions show a deep insight into the greater problem? (Are the conclusions drawn about the smaller problem that the thesis has solved linked back to the greater problem? Is there a realistic prognosis toward the future?)	Yes / No / No reply

If the reading committee answers “no” on two or more criteria, the thesis will be awarded with **DISTINCTION**. The fine-grained criteria will then determine the exact grade.

Greatest distinction [17 .. 20]

Does the thesis introduce a novel way of looking at the problem? (Are there elements in the text that shed inspiring new light on the problem?)	Yes / No / No reply
Do the conclusions provide a significant contribution to the problem domain? (Will the thesis be cited within the problem domain?)	Yes / No / No reply

If the reading committee answers “no” to at least one criterion, the thesis will be awarded with **GREAT DISTINCTION**. If not, it will be awarded with **GREATEST DISTINCTION**. In both cases the fine-grained criteria will determine the exact grade.

Fine-grained criteria

Clarity (text):	Insufficient / Unclear / Average / Good / Excellent / No reply
Presentation (defense):	Insufficient / Weak / Average / Good / Excellent / No reply
Independence:	Insufficient / Small / Average / Good / Excellent / No reply
Workload:	Below average / Average / Above average / No reply

Assessment form: Case study

Student:

Promotor:

Jury member:

Jury member:

Assistant:

Title:

Pass [10 .. 13]

Is the problem described precisely?	Yes / No / No reply
Is the applied technique described clearly?	Yes / No / No reply
Is the technique's application to the problem described clearly? (Is the experiment —the technique's application to the problem instances — described clearly?)	Yes / No / No reply
Are conclusions being drawn? (To which problem instances is the technique (un)suited?)	Yes / No / No reply

If the thesis committee answers “no” on two or more criteria, the thesis will be given a FAIL grade. The fine-grained criteria will then determine the exact grade.

Distinction [13 .. 15]

Is the question “why a case study” answered convincingly? (Is it clear that the problem is relevant, the technique useful and the application uncertain?)	Yes / No / No reply
Is there a summary of applicable techniques? (Is there information about several alternatives, apart from the applied technique?)	Yes / No / No reply
Is there a convincing motivation for the choice of the experiment? (Is there an explanation why the problem instances are representative? Is there more information about the applied technique in function of the problem?)	Yes / No / No reply
Can the experiment be repeated? (Are enough details given so that outsiders could reproduce the experiment?)	Yes / No / No reply
Are the conclusions convincing? (Is the problem presented in a sufficiently abstract way so the conclusions are also relevant for other problems?)	Yes / No / No reply

If the thesis committee answers “no” on two or more criteria, the thesis will be given a SATISFACTORY grade. The fine-grained criteria will then determine the exact grade.

Great distinction [15 .. 17]

Is the problem well situated within its context? (Is there a precise explanation of the greater problem the thesis needs to be situated in? Is there a motivation for the choice of the smaller problem that the thesis intends to solve?)	Yes / No / No reply
Is a broad overview of the popular solution techniques given? (Is the overview of the different solution techniques almost complete?)	Yes / No / No reply
Is there a repeatable weighting of the pros and cons of the popular techniques? (Can the same kind of weighting of the pros and cons be used for a similar problem, without the solution having to be the same?)	Yes / No / No reply
Is the experiment representative? (Is it clear to which degree the experiment's results are applicable for similar problems?)	Yes / No / No reply
Do the conclusions show a deep insight into the greater problem? (Are the conclusions drawn about the smaller problem that the thesis has solved linked back to the greater problem? Is there a realistic prognosis toward the future?)	Yes / No / No reply

If the reading committee answers “no” on two or more criteria, the thesis will be awarded with **DISTINCTION**. The fine-grained criteria will then determine the exact grade.

Greatest distinction [17 .. 20]

Does the thesis introduce a novel way of looking at the problem? (Are there elements in the text that shed inspiring new light on the problem?)	Yes / No / No reply
Do the conclusions provide a significant contribution to the problem domain? (Will the thesis be cited within the problem domain?)	Yes / No / No reply

If the reading committee answers “no” to at least one criterion, the thesis will be awarded with **GREAT DISTINCTION**. If not, it will be awarded with **GREATEST DISTINCTION**. In both cases the fine-grained criteria will determine the exact grade.

Fine-grained criteria

Clarity (text):	Insufficient / Unclear / Average / Good / Excellent / No reply
Presentation (defense):	Insufficient / Weak / Average / Good / Excellent / No reply
Independence:	Insufficient / Small / Average / Good / Excellent / No reply
Workload:	Below average / Average / Above average / No reply

Assessment form: Comparative study

Student:

Promotor:

Jury member:

Jury member:

Assistant:

Title:

Pass [10 .. 13[

Is the problem described precisely?	Yes / No / No reply
Are the techniques (their similarities and differences) clearly described?	Yes / No / No reply
Are the criteria for comparison clearly described?	Yes / No / No reply
Are conclusions drawn? (when should one use which technique?)	Yes / No / No reply

If the thesis committee answers “no” on two or more criteria, the thesis will be given a FAIL grade. The fine-grained criteria will then determine the exact grade.

Distinction [13 .. 15[

Is the question "why a comparative study" answered convincingly? Is it clear that the problem is relevant, different usable techniques exist and the results seem uncertain?)	Yes / No / No reply
Is an overview of the applicable techniques presented? (Are the differences and similarities between the different techniques framed in a broader context?)	Yes / No / No reply
Are the chosen criteria well motivated? (Are the different criteria explained? Is the choice for the given criteria explained with respect to the problem?)	Yes / No / No reply
Are the criteria and their application reproducible? (Is sufficient detail given, its application by a third-party would lead to the same results?)	Yes / No / No reply
Are the conclusions convincing? (Is the problem presented in a sufficiently abstract way so that the conclusions are also relevant for similar problems?)	Yes / No / No reply

If the thesis committee answers “no” on two or more criteria, the thesis will be given a SATISFACTORY grade. The fine-grained criteria will then determine the exact grade.

Great distinction [15 .. 17]

Is the problem well situated within its context? (Is there a precise explanation of the greater problem the thesis needs to be situated in? Is there a convincing motivation for the choice of the smaller problem that the thesis intends to solve?)	Yes / No / No reply
Is a broad overview of the popular solution techniques given? (Is the overview of the different solution techniques almost complete?)	Yes / No / No reply
Is there a repeatable weighting of the pros and cons of the popular techniques? (Can the same kind of weighting of the pros and cons be used for a similar problem, without the solution having to be the same?)	Yes / No / No reply
Is the experiment representative? (Is it clear to which degree the experiment's results are applicable for similar problems?)	Yes / No / No reply
Do the conclusions show a deep insight into the greater problem? (Are the conclusions drawn about the smaller problem that the thesis has solved linked back to the greater problem? Is there a realistic prognosis toward the future?)	Yes / No / No reply

If the reading committee answers “no” on two or more criteria, the thesis will be awarded with **DISTINCTION**. The fine-grained criteria will then determine the exact grade.

Greatest distinction [17 .. 20]

Does the thesis introduce a novel way of looking at the problem? (Are there elements in the text that shed inspiring new light on the problem?)	Yes / No / No reply
Do the conclusions provide a significant contribution to the problem domain? (Will the thesis be cited within the problem domain?)	Yes / No / No reply

If the reading committee answers “no” to at least one criterion, the thesis will be awarded with **GREAT DISTINCTION**. If not, it will be awarded with **GREATEST DISTINCTION**. In both cases the fine-grained criteria will determine the exact grade.

Fine-grained criteria

Clarity (text):	Insufficient / Unclear / Average / Good / Excellent / No reply
Presentation (defense):	Insufficient / Weak / Average / Good / Excellent / No reply
Independence:	Insufficient / Small / Average / Good / Excellent / No reply
Workload:	Below average / Average / Above average / No reply

Assessment form: Literature study

Student:

Promotor:

Jury member:

Jury member:

Assistant:

Title:

Pass [10 .. 13[

Is the problem described precisely?	Yes / No / No reply
Are the applied techniques described clearly?	Yes / No / No reply
Are the criteria used to compare and classify the applicable techniques clearly described?	Yes / No / No reply
Are conclusions drawn? (Which technique is most appropriate in which case?)	Yes / No / No reply

If the reading committee answers “no” on two or more criteria, the thesis will be given a FAIL grade. The fine-grained criteria will then determine the exact grade.

Distinction [13 .. 15[

Is the question “why a literature study” answered convincingly? Is it clear that the problem is relevant, the techniques applicable and the techniques are well-specified?)	Yes / No / No reply
Is a high-quality summary provided of the applicable techniques? (Are sufficient references to independent sources described?)	Yes / No / No reply
Is there a convincing motivation for the choice of the criteria? Are the criteria fair, and not biased towards a particular technique?)	Yes / No / No reply
Is the study reproducible? (Is it possible to verify the sources?)	Yes / No / No reply
Are the conclusions convincing? (Is the problem presented in a sufficiently abstract way so the conclusions are also relevant for similar problems?)	Yes / No / No reply

If the reading committee answers “no” on two or more criteria, the thesis will be given a PASS grade. The fine-grained criteria will then determine the exact grade.

Great distinction [15 .. 17]

Is the problem situated within its context? (Is there a precise explanation of the greater problem the thesis needs to be situated in? Is there a convincing motivation for the choice of the smaller problem that the thesis intends to solve?)	Yes / No / No reply
Is there a broad overview of the common solution techniques? (Is the overview of the different solution techniques complete?)	Yes / No / No reply
Are the used criteria re-usable? (Can the same criteria be re-used for similar problems?)	Yes / No / No reply
Are the criteria representative? (Is it clear to what extent the criteria are applicable to similar problems?)	Yes / No / No reply
Do the conclusions show a deep insight into the greater problem? (Are the conclusions drawn about the smaller problem that the thesis has solved linked back to the greater problem? Is there a realistic prediction towards the future?)	Yes / No / No reply

If the reading committee answers “no” on two or more criteria, the thesis will be awarded with **DISTINCTION**. The fine-grained criteria will then determine the exact grade.

Greatest distinction [17 .. 20]

Does the thesis introduce a novel way of looking at the problem? (Are there elements in the text that shed inspiring new light on the problem?)	Yes / No / No reply
Do the conclusions provide a significant contribution to the problem domain? (Will the thesis be cited within the problem domain?)	Yes / No / No reply

If the reading committee answers “no” to at least one criterion, the thesis will be awarded with **GREAT DISTINCTION**. If not, it will be awarded with **GREATEST DISTINCTION**. In both cases the fine-grained criteria will determine the exact grade.

Fine-grained criteria

Clarity (text):	Insufficient / Unclear / Average / Good / Excellent / No reply
Presentation (defense):	Insufficient / Weak / Average / Good / Excellent / No reply
Independence:	Insufficient / Small / Average / Good / Excellent / No reply
Workload:	Below average / Average / Above average / No reply

Assessment form: Formal model

Student:

Promotor:

Jury member:

Jury member:

Assistant:

Title:

Pass [10 .. 13]

Is the problem described precisely?	Yes / No / No reply
Is the formal model described clearly?	Yes / No / No reply
Are some important properties proved based on the mathematical model?	Yes / No / No reply
Are conclusions being drawn? (Are the proven properties really important?)	Yes / No / No reply

If the reading committee answers “no” on two or more criteria, the thesis will be given a FAIL grade. The fine-grained criteria will then determine the exact grade.

Distinction [13 .. 15]

Is the question “why a formal model” answered convincingly? (Is there an explanation of why the problem is relevant, why it can be abstracted and that it has important characteristics?)	Yes / No / No reply
Is there an overview of the factors that influenced the problem? (Is there also an explanation of why certain factors were NOT included in the model?)	Yes / No / No reply
Is there a convincing motivation for the choice of the formal model? (Is there an explanation for the choice of the mathematical basis/formalism? Is there an explanation of the factor selection in function of the characteristics that need to be proved?)	Yes / No / No reply
Is the model reproducible? (Are enough details given so that outsiders can verify the proof?)	Yes / No / No reply
Are the conclusions convincing? (What insight was acquired? Why is it now easier to construct solutions for the problem?)	Yes / No / No reply

If the reading committee answers “no” on two or more criteria, the thesis will be given a PASS grade. The fine-grained criteria will then determine the exact grade.

Great distinction [15 .. 17]

Is the problem well situated within its context? (Is there a precise explanation of the greater problem the thesis needs to be situated in? Is there a convincing motivation for the choice of the smaller problem that the thesis intends to solve?)	Yes / No / No reply
Is there a broad overview of the factors that had an influence on the problem? (Is there an explanation of why the listed factors are complete?)	Yes / No / No reply
Can the formal model be re-used? (Is there an explanation of which class of problems can make use of the model?)	Yes / No / No reply
Is the model representative? (Is there an explanation of why the formal model is applicable to an entire class of problems?)	Yes / No / No reply
Do the conclusions show a deep insight into the greater problem? (Are the conclusions drawn about the smaller problem that the thesis has solved linked back to the greater problem? Is there a realistic prognosis towards the future?)	Yes / No / No reply

If the reading committee answers “no” on two or more criteria, the thesis will be awarded with DISTINCTION. The fine-grained criteria will then determine the exact grade.

Greatest distinction [17 .. 20]

Does the thesis introduce a novel way of looking at the problem? (Are there elements in the text that shed inspiring new light on the problem?)	Yes / No / No reply
Do the conclusions provide a significant contribution to the problem domain? (Will the thesis be cited within the problem domain?)	Yes / No / No reply

If the reading committee answers “no” to at least one criterion, the thesis will be awarded with GREAT DISTINCTION. If not, it will be awarded with GREATEST DISTINCTION. In both cases the fine-grained criteria will determine the exact grade.

Fine-grained criteria

Clarity (text):	Insufficient / Unclear / Average / Good / Excellent / No reply
Presentation (defense):	Insufficient / Weak / Average / Good / Excellent / No reply
Independence:	Insufficient / Small / Average / Good / Excellent / No reply
Workload:	Below average / Average / Above average / No reply

Assessment form: Simulation

Student:

Promotor:

Jury member:

Jury member:

Assistant:

Title:

Pass [10 .. 13]

Is the phenomenon that will be studied described precisely?	Yes / No / No reply
Is the simulation model described clearly?	Yes / No / No reply
Are prognoses being made? (Are predictions of what will happen in certain situations being made on the basis of the simulation?)	Yes / No / No reply
Are conclusions being drawn? (Why are the predictions useful?)	Yes / No / No reply

If the thesis committee answers “no” on two or more criteria, the thesis will receive a FAIL grade. The fine-grained criteria will then determine the exact grade.

Distinction [13 .. 15]

Is the question “why a simulation” answered convincingly? (Why is the problem relevant, why it can be abstracted and that it has important characteristics?)	Yes / No / No reply
Is there an overview of the factors that influenced the problem? (Is there also an explanation of why certain factors were NOT included in the model?)	Yes / No / No reply
Is there a convincing motivation for the choice of the simulation? (Is the choice of included phenomena as a function of the performance measures explained?)	Yes / No / No reply
Is the simulation repeatable? (Are enough details given so that outsiders can reproduce the simulation model/experiment?)	Yes / No / No reply
Are the conclusions convincing? (Are the predictions correct/relevant? What insight was acquired?)	Yes / No / No reply

If the thesis committee answers “no” on two or more criteria, the thesis will receive a PASS grade. The fine-grained criteria will then determine the exact grade.

Great distinction [15 .. 17]

Is the problem well situated within its context? (Is there a precise explanation of the greater problem within which the thesis needs to be situated? Is there a convincing motivation for the choice of the smaller problem that the thesis intends to solve?)	Yes / No / No reply
Is a broad overview presented of the factors that influence the problem? (Is there an explanation of why the listed factors are complete?)	Yes / No / No reply
Can the simulation be re-used? (Is there an explanation of which class of problems can make use of the simulation?)	Yes / No / No reply
Is the simulation representative? (Is there an explanation of why the simulation is applicable to an entire class of problems?)	Yes / No / No reply
Do the conclusions show a deep insight into the greater problem? (Are the conclusions drawn about the smaller problem that the thesis has solved linked back to the greater problem? Is there a realistic prognosis toward the future?)	Yes / No / No reply

If the thesis committee answers “no” on two or more criteria, the thesis will be awarded with **DISTINCTION**. The fine-grained criteria will then determine the exact grade.

Greatest distinction [17 .. 20]

Does the thesis introduce a novel way of looking at the problem? (Are there elements in the text that shed inspiring new light on the problem?)	Yes / No / No reply
Do the conclusions provide a significant contribution to the problem domain? (Will the thesis be cited within the problem domain?)	Yes / No / No reply

If the reading committee answers “no” to at least one criterion, the thesis will be awarded with **GREAT DISTINCTION**. If not, it will be awarded with **GREATEST DISTINCTION**. In both cases the fine-grained criteria will determine the exact grade.

Fine-grained criteria

Clarity (text):	Insufficient / Unclear / Average / Good / Excellent / No reply
Presentation (defense):	Insufficient / Weak / Average / Good / Excellent / No reply
Independence:	Insufficient / Small / Average / Good / Excellent / No reply
Workload:	Below average / Average / Above average / No reply

Assessment form: Process evaluation

Student:

Promotor:

Jury member:

Jury member:

Assistant:

Title:

Pass [10 .. 13]

Is the problem described precisely?	Yes / No / No reply
Was there a clear and verifiable work plan?	Yes / No / No reply
Is the process described clearly? (When was the plan respected? When were there deviations from the plan? Why?)	Yes / No / No reply
Are conclusions being drawn? (Is the problem solved?)	Yes / No / No reply

If the thesis committee answers “no” on two or more criteria, the thesis will be given a FAIL grade. The fine-grained criteria will then determine the exact grade.

Distinction [13 .. 15]

Is there an overview of the decisive moments in the process? (When was there a search for alternatives, and which alternatives were selected?)	Yes / No / No reply
Is there a motivation for the choice between two or more alternatives?	Yes / No / No reply
Was the process adjusted in time? (Was sufficient initiative taken to hand in solutions within the time limit?)	Yes / No / No reply
Are the conclusions convincing? (Is the problem abstracted sufficiently so that the conclusions are also applicable to similar problems?)	Yes / No / No reply

If the reading committee answers “no” on two or more criteria, the thesis will be given a PASS grade. The fine-grained criteria will then determine the exact grade.

Great distinction [15 .. 17[

Is the problem well situated within its context? (Is there a precise explanation of the greater problem the thesis needs to be situated in? Is there a convincing motivation for the choice of the smaller problem that the thesis intends to solve?)	Yes / No / No reply
Is a broad overview of the popular solution techniques given? (Is the overview of the different solution techniques almost complete?)	Yes / No / No reply
Is there a repeatable weighting of the pros and cons of the popular techniques? (Can the same kind of weighting of the pros and cons be used for a similar problem, without the solution having to be the same?)	Yes / No / No reply
Is the process re-usable? (To what would extent a similar process would lead to a similar solution?)	Yes / No / No reply
Do the conclusions show a deep insight into the greater problem? (Are the conclusions drawn about the smaller problem that the thesis has solved linked back to the greater problem? Is there a realistic prognosis toward the future?)	Yes / No / No reply

If the reading committee answers “no” on two or more criteria, the thesis will be awarded with DISTINCTION. The fine-grained criteria will then determine the exact grade.

Greatest distinction [17 .. 20]

Does the thesis introduce a novel way of looking at the problem? (Are there elements in the text that shed inspiring new light on the problem?)	Yes / No / No reply
Do the conclusions provide a significant contribution to the problem domain? (Will the thesis be cited within the problem domain?)	Yes / No / No reply

If the reading committee answers “no” to at least one criterion, the thesis will be awarded with GREAT DISTINCTION. If not, it will be awarded with GREATEST DISTINCTION. In both cases the fine-grained criteria will determine the exact grade.

Fine-grained criteria

Clarity (text):	Insufficient / Unclear / Average / Good / Excellent / No reply
Presentation (defense):	Insufficient / Weak / Average / Good / Excellent / No reply
Independence:	Insufficient / Small / Average / Good / Excellent / No reply

Workload:	Below average / Average / Above average / No reply
-----------	--