
Research Concepts & Skills
Volume 3: The UT/ITC thesis process

Text with self-test questions

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Contents

1	The MSc thesis process at UT/ITC	2
1.1	Study regulations	2
1.2	The thesis proposal	2
1.3	Supervision	4
1.3.1	PhD Advisors	7
1.4	Midterm assessment	7
1.5	Final examination	9
1.6	Time management	9
1.7	Data and file management	11
1.8	Problems during the thesis period	12
1.8.1	Extensions	12
1.8.2	Problems between student and supervisor	12
1.9	Answers to self-test questions	12
2	MSc thesis quality	14
2.1	Concepts of quality	14
2.1.1	What is “quality”?	14
2.1.2	Conformance to obligations	16
	Absence of defamatory statements	16
2.1.3	Conformance with applicable laws	17
	Conformance to a code of conduct	17
2.1.4	Conformance to specifications	18
	Language	19
	Document organization	20
	Format (page style, typography)	21
	Abstract	22
	Acknowledgements	22
	Dedication	23
	Table of contents, list of figures, list of tables	23
	List of abbreviations	23
	Glossary	24
	Numbers	24
	Equations	25
	Statistical results	25
	Tables	25
	Figures	26
	List of references	26
	Appendices	26

Terminology	26
Organisms	27
Soils	27
Hints for the use of Microsoft Word	28
2.1.5 Conformance to requirements	28
2.1.6 Meeting or exceeding expectations	29
2.1.7 Answers to self-test questions	31
2.2 Assessing the quality of a UT/ITC MSc thesis	32
2.2.1 Examination procedure	32
2.2.2 Evaluation criteria	35
Scientific scope and depth	36
Scientific method	36
Reporting	37
Presentation and defense	37
Process	37
2.2.3 Answers to self-test questions	39
2.3 References	40

This third volume of the text *Research Concepts & Skills* explains ITC-specific requirements and procedures for the MSc thesis.

1 The MSc thesis process at UT/ITC

This chapter deals with the schedule and procedures that take the student from novice to certified junior researcher.

Key points

1. The purpose of a **research proposal** is to convince the research sponsor that you know the previous work on a subject and that you have a workable plan on how to go beyond it (§1.2).
2. Supervisors may give advice and comments, but the MSc thesis is the **student's responsibility** (§1.3).
3. Effective **time management** is necessary to produce a good-quality thesis in the allotted time (§1.6).

1.1 Study regulations

MSc degrees at ITC are all in the field of “Geo-Information Science and Earth Observation”. They are accredited within the Netherlands, and thus Europe, via the University of Twente and the Nederlands-Vlaamse Accreditatie Organisatie (NAVO) [Dutch-Flemish Accreditation Organization]. To maintain this accreditation, defined quality control measures must be maintained.

The current study regulations for the UT/ITC MSc degree can be accessed on the ITC intranet¹. §5.4 deals with admission to the thesis period, §5.3 with supervision.

1.2 The thesis proposal

After mastering research skills, the candidate will have several weeks to prepare a detailed research proposal, with the guidance of a supervisor or “coach”. This proposal is used to decide if the candidate will be admitted to the research phase.

The **purpose** of a research proposal is to **convince** the research sponsor that you know the previous work on a subject and that you have a **workable plan** on how to go beyond it. A reviewer should be able to read a

¹ <http://www.itc.nl/assessment-regulations.aspx>

proposal and be taken along a path from a **research problem** (what is not known) – supported by a **literature review** that shows that there is really a problem that has not been solved – to **research objectives** and then a sound **research methodology**, also backed up by literature.

The study regulations §5.4 stipulate that:

- The Course Director will nominate, and the Examination Board will appoint, a **Proposal Assessment Board**. This Board will assess the proposal and the presentation by the participant. The Proposal Assessment Board is accountable, via the Course Director, to the Examination Board.
- Each Proposal Assessment Board has four members: the **research theme leader** or delegate (chair), the **first supervisor**, the **second supervisor** or delegate, and the **Course Director** or Course Coordinator. The involved **PhD students or AiO's** may be present as advisors.
- The research proposal will be assessed based on the **written proposal**, a **presentation** and **oral defence** ...
- The participant will receive the **assessment result in writing**.
- The oral defence of the research proposal is **open** and will be announced as such. In exceptional cases the Course Director can decide to have the oral defence of individual participants closed to observers other than ITC staff.
- When the Proposal Assessment Board is of the opinion that the research proposal is not of a level required for the start of the individual research period, the participant will receive a letter with extensive feedback and will have a **second opportunity** to defend a revised proposal within two weeks. This feedback is used for the check on improvements in the second opportunity of proposal presentation. In case the second proposal presentation is not satisfactory, the candidate will **not be admitted** to the individual research period.

Evaluation is necessarily subjective, but is always based on two questions:

1. Does this candidate have the **ability** to conduct MSc research and write a thesis about it?, assuming that the candidate will receive a normal amount of supervision? This is evidenced by the candidate's ability to prepare a proper proposal and the response to questions.

2. Is the proposed research **feasible** within the time allocated, and given the resources (secondary data, field support, ...) available?

Q1 : *How does the candidate convince the assessment committee of their “ability to conduct MSc research”?* *Jump to A1 •*

Q2 : *What should be done in the case of a poorly-organized and written proposal which none the less contains some interesting scientific questions and a feasible plan for data collection?* *Jump to A2 •*

•

1.3 Supervision

Ultimately, **the contents of the thesis are the responsibility of the student** (candidate), not UT/ITC in general, nor the Course or supervisor in particular. The student designs the thesis project, collects the data (if applicable), performs the analysis or builds a system or model, writes the thesis, and defends it.

Note that the design of the project is within the context of the research project (linked PhD research or ongoing ITC research). The general direction and outline are defined by ITC but elaborated and operationalized by the student, as part of the research proposal.

Supervisors are appointed by UT/ITC from its research staff according to the research topic. Other staff, including PhD candidates and AIO's (PhD students also working for ITC), may be involved in the research project (e.g. in joint fieldwork) as **advisors** but are not supervisors (see §1.3.1 below). In some cases a collaborator is invited from outside UT/ITC, for example a researcher at an partner institution (University, Institute, company or government), for collaborative work; but these are not formally supervisors.

The relevant regulation (§5.3.1) reads:

“In module 11, in consultation with the research theme leader and the MSc participant, the Course Director shall recommend a primary and secondary supervisor to the supervisor’s department(s). PhD students and AiO’s may be involved in the supervision as advisor and support the work of the supervisors. Supervisors and advisors are appointed by the management team of the department.”

The supervisor may more properly be called a **coach**; the student does

not work under the supervisor's direction, but rather works independently, with advice from the supervisor.

The supervisor is responsible for:

- Critically examining the student's ideas;
- Reading the student's writing (proposal and draft) and suggesting improvements;
- Some editing (not re-writing) of student's writing;
- Suggest key references or literature search strategies;
- Give ideas for promising directions;
- Keeping the student clear of known dead ends or poor methods;
- Advising on priorities and time management.

The relevant regulation (§5.3.3) reads:

“Supervisor(s) shall:

(1) Guide the MSc participant in the formulation of a detailed research proposal.

(2) Establish a schedule of regular supervisory meetings with the MSc participant (on an average once per fortnight). Additional meetings may be arranged by agreement.

(3) Provide general advice and guidance on the execution of the research.

(4) Provide feedback on draft written work, normally within 10 days of receipt.

(5) Where appropriate, forward any comments on the performance of the participant to the Course Director.

(6) Inform the Course Director when the progress of a participant gives cause for concern so that action can be taken in accordance with these regulations.”

! → Note that the supervisors **do not rewrite** student work – they are not co-authors of the thesis. Editing is generally restricted to representative parts of the writing, and the student is expected to edit the rest of the text in a similar manner. The term “feedback” means commenting, not re-writing.

Supervisors have different styles of working with students, and indeed each student and project is different. The following are **guidelines for supervision**:

- Each student is allocated about **two hours of staff time per week** in the thesis phase of their MSc study. This includes face-to-face meetings, but also the time that the supervisor needs to read drafts, check calculations, check literature, etc.
- Time spent in fieldwork is included in this average, so time allocation in the non-fieldwork phases is generally reduced.
- During some periods the supervision will be more intense than in others.
- The student can **not** expect **instant attention**; the UT/ITC regulations specify that the supervisor can take as much as **ten days** to read and evaluate a thesis draft.
- Supervisor and student establish a schedule for **regular meetings**; this varies by supervisor. Some like a few long meetings, others frequent short meetings.

In any case, the student should make optimal use of supervisor time by preparing a list of points to be discussed.

- By regulation, **Written work** must be returned to the student, with comments, within **ten days** (UT/ITC regulation) but usually within a week.
- **The supervisor does not do routine work for the student.** For example, if a satellite image needs to be georeferenced, and the student has forgotten how, the supervisor may point to the relevant section of a program documentation or lecture notes, but then the student must review the method and do the work.
- The MSc period is **not for individualised teaching**. If you have to learn things that were not taught during the course, you will have to learn them on your own, with advice from the supervisors of course, but they do not have time to give you individualised lectures or tutorials.

Often, new computer programs that you want to learn come with tutorials and set-up guides; new statistical techniques are explained in textbooks of various levels of difficulty and often in the documentation of computer programs.

- The primary supervisor may be **absent** for several weeks at a time, either due to other work (e.g. consulting) or personal reasons (e.g. vacation). You will have a designated **second supervisor** to work with during those times. It is expected that the primary supervisor will brief the secondary supervisor about your status before s/he leaves, and vice versa on her or his return.

The supervisor is not expected to tell the student what to do, or what to think. Supervisors can give ideas, keep the student clear of known dead ends or poor methods, suggest references, etc. But **the student** is responsible for the work. During the thesis defence, the candidate can **never** say something like “I did it this way because my supervisor told me to”. A correct response is: “I did it this way because my supervisor suggested it; I then compared it with other methods and decided this is indeed best, because ...”.

1.3.1 PhD Advisors

The UT/ITC MSc regulations allow the possibility for PhD students or AIO's to be part of an MSc supervisory team. In general, this is because the MSc topic is closely linked to the PhD topic. Regular academic staff are always appointed as first and second supervisors, and are responsible for supervision; this does not change whether or not a PhD student is involved in the team.

As part of the overall learning process to become a researcher, the PhD student has to acquire experience to supervise others, and this is expressed in the term “MSc advisor”, which means “apprentice supervisor”. The PhD student is present at supervision meetings throughout the MSc research period, including qualifying exam (§1.2), midterm exam (§1.4), and final exam (§1.5); however, as an advisor (not a supervisor) the PhD student can express an opinion on the MSc student's performance but can not vote on qualifying or on a final mark.

1.4 Midterm assessment

About half-way through the thesis phase of the MSc is the **midterm assessment**. The purpose of this assessment is to:

- Review progress, compare with plan;
- Identify research objectives and questions that are no longer feasible;
- Identify new research objectives and questions that can be met with the data in hand;
- Identify any difficulties that might prevent the timely completion of the thesis project.

This is a key moment to evaluate progress so far and plan for a successful conclusion of the thesis project.

To prepare for the midterm, the candidate should:

1. Convert the research proposal into MSc thesis format.

- Use UT/ITC thesis document style (Word, \LaTeX) or other consistent style which meets specifications;
 - Introduction and Literature review may need updating but format should not need to change;
 - Change verb tenses as necessary: “will” → “were” etc.
 - Begin glossary and/or list of abbreviations if needed
 - Add placeholder chapters on results, discussion, conclusion (or per-topic)
 - Remove expected outputs, these will be in the results
2. Review (and then rewrite) the Objectives and Questions to see:
 - If they can still be answered with data in hand; if not, these should be removed;
 - If they should be revised, deleted, or sharpened;
 - If new objectives and questions can now be met.
 3. Rethink the title
 - Does it now reflect your (new, revised, updated) main objectives and results?
 - Can it be made more attention-grabbing or descriptive?
 4. Rewrite the Methods chapter or section, reflecting what was actually done.
 - It must be clear what you actually did;
 - It should be possible for someone else to verify or duplicate the work from your description (including references);
 - This includes a thorough description of any secondary data.
 5. Begin the Results chapter(s), showing analysis so far.
 - At least thorough description and summary of the primary data actually collected
 - Preliminary results and their interpretation
 - This allows planning of further analysis
 6. Prepare (and practice) a brief presentation of these points.
 - Highlight what was actually done;
 - Explain what could not be done as planned;
 - Describe the fieldwork, e.g. photos and maps;

- Show preliminary results;
- Present proposed revisions to objectives and questions;
- Discuss difficulties and your proposed solutions;
- Present plan for the remaining time.

Q3 : *Why might there be additional objectives and questions?* [Jump to A3](#) •

The midterm procedure is as follows:

- Candidate gives a brief presentation:
 - **Original** problem, objectives and questions
 - **Progress** (data collected, analysis, ...)
 - Preliminary **results**
 - **Revision** of objectives and questions (if necessary)
 - **Plan** for finishing the thesis
- Committee discusses the presentation and asks questions

No grade is given; the candidate receives comments and suggestions. Clear problem cases are referred to the course director.

1.5 Final examination

The completed thesis is defended in a final examination; the procedures and criteria are explained in §2.2 “Assessing the quality of an UT/ITC MSc thesis”.

1.6 Time management

UT/ITC MSc students (and other researchers) often complain that “time is too short”. Yet, some produce outstanding work. How can you cope with the perceived lack of time? Here are a few suggestions.

- **The work must fit the time available**; design it accordingly. Time can not be expanded but work can be reduced.
- **Your MSc thesis is not your life’s work!** It is a well-defined original piece of work in a well-defined scientific context answering a well-defined research question; however, it must be feasible in the given time and with the given data-gathering possibilities. You will have plenty of time in your career to improve on and extend the

work you begin in your thesis. So, **limit the scope** of your work accordingly.

- The **quantity** of work is not as important as its **quality**. It is rare that an MSc thesis gives the definitive answer to a research question, because the time for data collection is short. However, it can be placed within the larger research context and well-argued.
- **Set priorities**; concentrate on the most important points. For example, if you are comparing several methods of image classification, in your research proposal you should already have established which are the most relevant (i.e. which ones you really want results from) and which are more speculative (i.e. ones where results would be nice but are not vital).
- **Work smart**: Before undertaking tedious calculations or samplings, be sure you are calculating or sampling the right thing.
- Do the **simple** things before moving to the **complicated** ones. There should be no problem in quickly writing up the Methods, for example.
- Estimate how much time should be spent on each section of the thesis; **work from an outline**. Don't get stuck in any section; if it is proving too time-consuming, discuss with your supervisor ways to limit that part of the work.
- **Plan ahead**: Make a work plan (in consultation with your supervisor) and stick to it, as much as possible. You have to limit the work you do in each phase.
- **Be realistic** in your time planning. A human being is not a machine and needs food, sleep, social time and relaxation. Also, you should plan for the unexpected: setbacks both personal (e.g. sick time) and professional (e.g. slower-than-anticipated progress).
- Do creative work at the times you work best; for example, some people write well in the morning, others while burning the midnight oil. Save routine tasks for other times.
- Take time to relax and re-focus your energy.
- Don't waste time writing things that are not central to *your* thesis.
- Keep a **log book** of your work; this will allow you to show your supervisors what you have done, how you did it, and where you had difficulties.
- Leave time to **check and revise** your work. In particular, you should not be still producing results in the last weeks before the

thesis is submitted; rather you should be putting the finishing touches on the conclusions and making sure the format is correct.

- **Do not let problems sit!** You are responsible for progress, so if something is blocking the path (e.g. data not supplied, computer program not installed or working), you must attack that problem and solve it. Supervisor, course director and staff can of course help, but the responsibility for pursuing the problem is with the student.

1.7 Data and file management

UT/ITC thesis work always involves a large amount of data management. Without a sound data organization and documentation, the researcher will not be able to effectively find and use these extensive data.

- **Organize** your digital files logically, and **document** this organization.
- Each directory or file should have sufficient **metadata**, most conveniently in a text file:
 - What does it contain?
 - How was it produced?
 - Who produced it?
 - What is its format?
- Make sure to **back up your computer files** at regular intervals.
 - Material stored on the UT/ITC file servers (M: drive) are backed up every night by the IT department.
 - There are many low-cost or free file servers on the internet, so that your work is saved in **more than one physical location**.
 - Burn a CD once a week; and/or back up to an external plug-in drive (disc or flash drive).
 - Especially, make several archival copies of your **primary data** as soon as possible; store this away from your primary computer.
- Keep copies of each thesis **draft**; you may want to go back to (parts of) a previous version.

Q4: *What should be done in the case of a student whose computer, with*

the only copy of the data, analysis and thesis, has been stolen? [Jump to A4](#) •

1.8 Problems during the thesis period

1.8.1 Extensions

According to the Study Regulations §5.5.5, postponement of the submission date of the thesis (which results in **extension** to the research period) can be given when:

1. The **main cause** of the unsatisfactory level of the thesis has been **beyond the control of the participant** – as decided by the Course Director;
2. The extension could lead to an acceptable thesis and examination – as decided by the supervisors;
3. **Financing** for the extension is available;
4. The request is made **before the thesis is submitted**.

The participant must take the initiative to **apply in writing** to the Course Director.

The Course Director will forward the request, with a recommendation to approve or decline, and the proposed length of an extension, to **Head Education** for a final decision.

Extensions are only given in **exceptional** circumstances – they are not given for normal problems or slow progress, or for problems that should have been foreseen by the participant. Poor time management (§1.6) is not beyond the participant's control.

The main reasons are health (as certified by the medical history) and promised data or collaboration not being supplied as promised.

1.8.2 Problems between student and supervisor

Regulations §5.3.4: “If an MSc participant considers that he/she is not receiving the quality of supervision required in the regulations, the participant should report this to the Course Director.”

Of course, this should be after open communication about the perceived problems.

1.9 Answers to self-test questions

***A1** : By writing a satisfactory research proposal and defending it. [Return to](#)*

Q1 •

A2 : *The candidate should still be stopped, because she or he has not shown evidence of the ability to write a satisfactory thesis. The interesting scientific question can be the topic for another student.* [Return to Q2](#) •

A3 : *Among the reasons are: (1) data collected may be “richer” than anticipated; (2) experience in the fieldwork area may have led to a better understanding of the underlying social or research problems, leading to new objectives and questions ; (3) preliminary analysis may reveal phenomena that need to be explained.* [Return to Q3](#) •

A4 : *The student should not receive any extension; it was their responsibility to make backups.* [Return to Q4](#) •

2 MSc thesis quality

This chapter reviews the concept of “quality” as it applies to an ITC MSc thesis.

2.1 Concepts of quality

Key points

Quality is defined as “meeting defined standards”; it may be divided into four aspects:

1. Conformance to **obligations** (§2.1.2);
2. Conformance to **specifications** (§2.1.4);
3. Conformance to **requirements** (§2.1.5), and
4. Meeting or exceeding **expectations** (§2.1.6).

Before getting to the technical details, let’s start with a **common-sense definition of quality**:

“The ingredients of good science are obvious – novelty of research topic, comprehensive coverage of the relevant literature, good data, good analysis including strong statistical support, and a thought-provoking discussion.

“The ingredients of good science reporting are obvious – good organization, the appropriate use of tables and figures, the right length, writing to the intended audience.

“Do not ignore the obvious.” [3]

2.1.1 What is “quality”?

The word “quality” in English has many uses and shades of meaning, as the perusal of a good dictionary will reveal. But what is a “good-quality thesis” (equivalently, a “thesis of high quality”)?

In the context of MSc research the concept of “quality” may be divided into four aspects, in increasing levels of abstraction:

1. **Conformance to obligations**: the document was prepared according to defined standards of ethical behaviour, e.g. without fraud;

2. **Conformance to specifications:** the document as delivered fulfils defined standards, e.g. of format and bibliography;
3. **Conformance to requirements:** the document meets the requirements of scientific reporting, e.g. structure, logic, language, proper scientific method;
4. **Relation to expectations:** the document reports research of sufficient innovation, depth, and independence to qualify as MSc-level work.

Conformance to obligations places the work within societal norms. Conformance to specifications is mechanical, requiring no intellectual effort, just careful work. Conformance to requirements requires scientific thinking, proper use of language, and logical argumentation. Finally, expectations are for significant scientific work.

So a submitted thesis document could fall in several categories:

1. **Violates ethical rules and obligations**
 - The work can not be published, so can't be evaluated.
2. **Does not meet specifications**
 - Not a properly-prepared document. Do not read.
3. **Meets specifications but does not meet requirements**
 - Properly-prepared but not logical, not expressed in correct language, or poorly-structured. Not possible to judge scientific quality.
4. **Meets specifications and requirements, does not meet expectations**
 - Work is properly presented but not significant, it does not reach the level of an MSc thesis.
5. **Meets specifications, requirements, and expectations**
 - Work is a proper MSc thesis and is accepted as partial fulfilment of the requirements for an UT/ITC degree.
6. **Meets specifications and requirements, exceeds expectations**
 - Work is an outstanding MSc thesis and is so recognized by its mark.

Q5: *Can a thesis exceed expectations but not conform to specifications? If so, should it be accepted as fulfilling the requirements for an MSc degree?* *Jump to A5 •*

2.1.2 Conformance to obligations

The main obligation for an MSc thesis is that it be prepared according to accepted standards of scientific ethics and applicable laws.

1. The work must be the **creative effort of the named author(s)**. Unless explicitly stated or clear from the context, the reader expects that all writing is the author's, that all work (field, lab.) was done by the author, and that all ideas are the author's.
 - Material assistance must be acknowledged, e.g. if some of the data were collected by others;
 - Editing by supervisors or colleagues must have been reviewed and accepted by the author;
 - Ideas or concepts not from the author must be acknowledged by citations.
2. The work must be free from **fraud**, defined as any action which wilfully mis-represents the truth, including:
 - **Fabrication**: making up data, lying about procedures;
 - **Falsification**: manipulating data to obtain a desired outcome;
 - **Plagiarism**: taking credit for someone else's work.
3. The work can not violate any **legal** obligations.

A publisher, such as UT/ITC, and the author as a person have legal obligations, leading to the following requirements:

1. Absence of defamatory statements;
2. Conformance with applicable laws; and
3. Conformance to a code of conduct to which the institution (UT) has subscribed.

Absence of defamatory statements

The thesis can not contain any **libel**, i.e. a false published statement damaging to someone's reputation. Normal scientific disagreement (e.g. your conclusions contradict the opinion of previous work) is not considered libel, but to question the motives or ethics of another worker, let alone accuse them of misconduct, is dangerous and should not be included in an UT/ITC thesis.

2.1.3 Conformance with applicable laws

The thesis can not break any laws. For example, the Netherlands has a strict privacy law, whereby personal information on a research subject can not be printed without their permission. Photographs taken illegally (e.g. of military installations) can not be reproduced. Commercial information protected by non-disclosure agreements signed by UT, ITC, another institution where the information was stored, or the researcher can not be printed. Results obtained with illegal copies of computer programs can not be presented.

Q6 : *What could be the consequences of violating laws?* [Jump to A6](#) •

Conformance to a code of conduct

The University of Twente is part of the Dutch university system, so research conducted at Faculty ITC must conform to the “Netherlands Code of Conduct for Scientific Practice”¹ [2]. This is discussed in the topic “Scientific Ethics”.

In brief, the code of conduct has five principles which guide the conduct of research:²

1. **Scrupulousness**: “Scientific activities are performed scrupulously, unaffected by mounting pressure to achieve”;
 - Translation to plain English: Don’t take short-cuts, do the research properly or not at all.
2. **Reliability**: “Science’s reputation for reliability is confirmed and enhanced through the conduct of every scientific practitioner. A scientific practitioner is reliable in the performance of his research and in the reporting, and equally in the transfer of knowledge through teaching and publication.”;
 - Translation to plain English: Follow best practices in doing research and publicizing it.
3. **Verifiability**: “Presented information is verifiable. Whenever research results are publicized, it is made clear what the data and conclusions are based on, where they were derived from and how they can be verified”;
 - Translation to plain English: Research must be reproducible.

¹ <http://www.vsnu.nl/>

² Please do not blame me for this mangled English, it was written by a committee of the Association of Universities in the Netherlands in Dutch and then translated by parties unknown, according to the translator’s concept of “official”-sounding English.

4. **Impartiality:** “In his scientific activities, the scientific practitioner heeds no other interest than the scientific interest. In this respect, he is always prepared to account for his actions”;

- Translation to plain English: Don’t let political or social pressures influence the results of your research.

5. **Independence:** “Scientific practitioners operate in a context of academic liberty and independence. Insofar as restrictions of that liberty are inevitable, these are clearly stated”.

- Translation to plain English: If you were not allowed to investigate freely, explain how and why.

Each of these “Principles” is followed by a list of “Best practices” which implement them.

At ITC, supervisors must be familiar with this code and advise their students accordingly.

2.1.4 Conformance to specifications

A properly-presented research work must conform to certain standards, without (yet) any regard to the scientific merit of the work. This requires no special scientific insight, only careful and consistent work.

The ITC specifications for a thesis are similar to specifications for a scientific journal, all of which have “Instructions to Authors” which cover the following points:

1. Language
2. Document organization
3. Format (page style, typography)
4. Abstract
5. Acknowledgements
6. Table of contents, list of figures, list of tables
7. List of abbreviations
8. Glossary
9. Equations
10. Tables
11. Figures
12. List of references
13. Terminology

The ITC thesis template should be used for documents prepared with Microsoft Word; this already has the required overall structure (a set of heading styles with appropriate font sizes) and the set text.

There is also an ITC L^AT_EX thesis style [4] which conforms to these specifications. L^AT_EX is a document preparation language developed by Lamport [15]; there are many good texts and references for this system, e.g. Kopka & Daly [14].

These specifications are now explained in more detail.

Language

The document must be written in **English**, with spelling and word usage according to a standard reference, by preference one of the Oxford English Dictionaries [12, 19, e.g.].

Spelling by preference is British but American, Australian, Canadian or any other standard spelling is allowed; whatever spelling is used must be applied **consistently**. Spelling of references should not be changed.

For direct quotations, use the author's original spelling, but correct obvious misspellings [16, §13.1.6].

You may need to add text to direct quotations to provide context for the reader; if so use square brackets “[...]”, e.g.

According to one local farmer, “We haven't seen anyone from the Ministry [of Agriculture] for five years”.

If there is a compelling reason to do so, **non-English text** may be used as supplementary information. It may be relevant to the thesis argument to quote an original source, for example, a legal document, declaration, or survey responses, where the specific wording is important.

The original can be quoted either in the original script or a romanization but must be then translated to English. Even then, a standard romanization is preferable to using the non-Latin script. See topic “Literature review” for details about non-Latin scripts.

For example:

“Among the reasons given for not participating in community meetings were: ‘No me hacen caso’, ‘No me siento cómodo’, and ‘Si uno no forma parte de su grupito, no tiene voz.’ (‘They don't pay attention to me’, ‘I don't feel comfortable there’, ‘If you're not part of their clique, you are ignored’).”

In this example the reader may be familiar with the Spanish language and can then judge the exact tone of the remarks, and does not have to trust the translator's interpretation.

Document organization

The document must have the following overall structure:

1. Cover page: title, author's name, month and year of publication. When this is printed, it will also include the UT and logo
2. Title page: same information as the title page; also the composition of the thesis assessment board (names and titles), and the authoritative statement, as a set phrase:

“Thesis submitted to the Faculty of Geo-information Science and Earth Observation of the University of Twente in partial fulfilment of the requirements for the degree of Master of Science in Geo-information Science and Earth Observation. Specialisation:”, followed by the specialisation name
3. Disclaimer page, also a set phrase:

“This document describes work undertaken as part of a programme of study at the International Institute for Geo-information Science and Earth Observation of the University of Twente. All views and opinions expressed therein remain the sole responsibility of the author, and do not necessarily represent those of the Faculty.”
4. There is no explicit copyright © statement; the copyright is implicitly with the publisher (UT/ITC) but the author (MSc candidate) retains so-called “intellectual rights”. This implies that any paper which uses original data or interpretations from the MSc thesis must include the student as a co-author, or acknowledge their contribution; see Volume 1 “Concepts”, Section 5.3 “Authorship”.
5. Abstract page (see below)
6. Acknowledgements page (see below).
7. Thesis body
8. List of references
9. Appendices (optional, see below)

Q8 : *What is the purpose of the disclaimer?*

Jump to A8 •

Format (page style, typography)

ITC has no formatting rules as such, however it is expected that the document format be consistent and clear. The ITC thesis template (Microsoft Word) or \LaTeX thesis style can be used to ensure that some of the following specifications are met.

Whatever format is adopted:

- **Headings** (chapters and sections) must have a consistent style of font and numbering (see for example this document);

The ITC thesis MS-Word template uses the following font sizes:

- thesis title: 18 point;
- document section headings (e.g. Abstract): 18 point;
- chapter headings: 20 point;
- first-level subheadings: 12 point;
- second-level subheadings: 11 point;
- running text: 11 point

These may not be optimal according to best typography standards, but that's what is on offer.

The ITC thesis \LaTeX template defaults to 11 point running text, and the other sizes according to the standard \LaTeX book document class.

- Page **headers and footers**, including page numbers, must be consistent;
- **Running text** must be in one font and one size (the main document font);
- A consistent font variant must be used for highlighting (e.g. **bold** or *emphasis*).
- **Bold** text is very strong and should generally be avoided; use *emphasis* instead.
- For definitions of technical terms, either use emphasis or quotes, consistently; e.g. "This is called a *raster*" or "This is called a 'raster'"; further uses should not be emphasized; e.g. "The raster has fixed resolution."
- **Computer code** must be in one monospaced font, different from descriptive text. For example:

```
model.1 <- lm(log10(Cd) ~ x.coord + y.coord)
```


- **Mathematical notation** must be in one font, and clearly distinguished from running text, whether in-line (in the text) or set apart. Either of these is acceptable:

‘ If $\mathbf{W} = \mathbf{I}$, the diagonals are 1 and the off-diagonals 0, then these formulas give the same results as those for unweighted \hat{k} . ’

‘ These are then combined to produce weighted \hat{k} , as shown in Equation 2.1: ’

$$\hat{k}_w = \frac{\theta_{w1} - \theta_{w2}}{1 - \theta_{w2}} \quad (2.1)$$

Abstract

The abstract gives a brief (no more than 350 words, on a single page) description of the work. Abstracting following the “paper in miniature” style is explained in detail in another topic of this series (“Critical Reading and Abstracting”).

Acknowledgements

All persons or institutions that contributed materially to the work must be named, along with their specific contributions. This is most important for data, materials, logistic support or facilities.

For example (adapted from the MSc thesis of Fekerte [8]):

“I am greatly indebted to Mr Bekele Neguisse, Planning Division manager of the Ethiopian Roads Authority for arranging my field work in Addis. I would also like to thank Mr Tekeste of SUR Construction Company, who kindly arranged for laboratory testing, and Mr Aderajew and colleagues for performing the tests.”

Acknowledge any organization that provided financial assistance, for example the Netherlands Fellowship Programme.

“I would like to thank the Netherlands Fellowship Programme (NFP) and my employer, the Ethiopian Roads Authority, for giving me the opportunity to study at ITC.”

Other people may be mentioned at the author’s discretion. It is understood that the thesis supervisors did their job, this does not have to be explicitly acknowledged.³

³ However, burnt toast may be easier to swallow if it is well-buttered.

Dedication

It is possible, but not required, to include a single page, without title or header, naming someone to whom the work is dedicated. This can prove embarrassing in later years (like a tattoo), so be careful.

Table of contents, list of figures, list of tables

These are ordered lists of each heading, figure and table, with page numbers. They allow the reader to quickly find a relevant section of text, illustrative figure, or table.

In addition, the table of contents (ToC) shows at a glance the overall structure of the research. Grammatical style should be consistent within the table.

Use short captions for all of these, and if necessary explain in text.

List of abbreviations

A list of abbreviations can make the thesis easier to read. It is optional, and may be placed after the lists of figures and tables, or as an appendix. The list is alphabetical by abbreviation, and has at least the full text, and possibly a definition or reference:

Example:

ADB Asian Development Bank
CTI Compound Topographic Index
DEM Digital Elevation Model

Define each abbreviation the first time it appears in the text, with the abbreviation in parentheses; subsequently the abbreviation only should be used.

“An important terrain parameter is the Compound Topographic Index (CTI), defined as ... The CTI has been shown to be a good predictor of hydromorphic soils ...”

This is required whether or not there is a list of abbreviations.

Non-English acronyms should be spelled out in the original language, and then translated to English in parentheses ‘(...)’. This can be an official translation if it exists, otherwise your own translation:

Example:

DPAE Dirección de Prevención y Atención de Emergencias, Bogotá
(District Office of Emergency Prevention and Management)

In the text the English equivalent only should be given at first use, whether or not there is a list of abbreviations:

“In the capital district, the DPAE (District Office of Emergency Prevention and Management) is responsible for disaster management planning. In its coordinating role, the DPAE ...”.

Glossary

A glossary is a list of technical terms used in the thesis along with their definitions. It is particularly useful in a thesis where definitions form an important part of the argument, and so must be precisely specified. The glossary is optional. It may be placed after the lists of figures and tables, or as an appendix. It is alphabetical by term, and has the definition. If the definition is not by the author, it must be quoted and cited.

Example:

Land characteristic	Any measurable property of the land (atmosphere, soil, water, substratum, occupation, location) at a defined geographic location, either point or area
Land evaluation	“The process of assessment of land performance when [the land is] used for specified purposes” [9]

These terms are then used in exactly these senses in the main text. In this example one definition is taken verbatim from the FAO [9] (and so is shown as a quotation “...”), while the other is the author’s own definition (and so has no quotation marks).

Numbers

Numbers should be reported with an appropriate number of **significant digits**, justifiable by the precision of measurement and calculation by which they were obtained.

Correct: Soil depth at the 20 sites ranged from 12 to 135 cm, with a mean of 45.8.

Incorrect: Soil depth at the 20 sites ranged from 12 to 135 cm, with a mean of 45.837.

(If the original measurements were in whole cm, a mean value with more than one more significant figure is false precision.)

Powers-of-ten exponential notation should generally be used for any number with more than two leading or trailing zeros.

Correct: 0.023, 120.3, $1.03 \cdot 10^6$, $1.03 \cdot 10^{-6}$

Incorrect: 1030000, 0.00000103

But some well-established conventions retain the zeroes:

- Map scales 1 : 1'000 000; but this can also be written 1:1M, where M is the standard abbreviation for 'mega', i.e. 10^6 .
- Population or areas: e.g. "The population of Cameroon in 1990 was estimated as 13 560 000; Cameroon has a surface area of 475 000 km²."

In both these cases, the trailing 000 is understood to be approximate. But this is less transparent than if these were written in scientific notation, where the last digit is by definition significant: $13.56 \cdot 10^6$, $475 \cdot 10^3$.

Note the conventional use of powers of 10: 10^0 , 10^3 , and 10^6 , in steps of 10^3 , in accordance with the SI system.

Equations

- Equations should have a consistent format.
- All symbols used in equations must be defined, either in the explanatory text or in a glossary.
- Symbols must be consistent.
- Equations may be numbered for easy reference in the text. Otherwise they can only be discussed immediately before or after their presentation. For example:

'The GLS estimate of the regression coefficients is (Eq. 2.2):

$$\hat{\beta}_{glS} = (q^T \cdot C^{-1} \cdot q)^{-1} \cdot q^T C^{-1} \cdot z \quad (2.2)$$

where z is the data vector, q is the design matrix; and C is the covariance matrix of the residuals.'

Statistical results

Follow a consistent style for reporting the results of statistical tests or summaries.

Tables

- Every table must be referenced in the text.
- Table captions must be short but self-explanatory.
- Tables must add to understanding, i.e. the organization and formatting of the table should lead the reader to the most important information.

For more details see topic "Topic: Graphic presentation" in Volume 2 "Skills".

Figures

- Every figure must be referenced in the text.
- Figure captions must be short but self-explanatory.
- Figures must be legible.
- Avoid colour except when it adds understanding, i.e. it conveys extra information to the reader beyond what a grey-scale figure would.

For more details see topic “Topic: Graphic presentation” in Volume 2 “Skills”.

List of references

- Every citation in the text must be in the list of references.
- Every item in the list of references must appear in the text.
- A standard citation style must be used in the text.
- A standard bibliographic style must be used in the list of references.

For more details see topic “Topic: Literature review, Citations, and List of references” in Volume 2 “Skills”.

Appendices

An appendix to a document contains additional relevant information that is too detailed to be included in the main text. The information may be needed to fully evaluate the work, or to reproduce it, but, if presented in the main text, would distract the reader and obscure the overall argument.

Typical examples are:

- Complete tables of stream gauge readings, daily weather data;
- Detailed laboratory results;
- Computer programs, database queries.

In a scientific paper these are typically included as “on-line supplementary information”, not published with the paper but indicated with a URL.

Terminology

Follow standards for the field, as given in a relevant style manual. Some choices:

- The American Society of Agronomy “Publications Handbook and Style Manual” [1] gives rules for the presentation of formulas, the use of SI units of measurement, as well as specialized terminology such as crop growth stages and soil classification. This has the advantage that is available on-line.⁴
- Many biologists and ecologists follow the Council of Biology Editors (CBE) style manual [6].
- The Chicago manual of style [11] is a general reference for style not specific to any area, and is used as a basis by many journal styles, for example by the IEEE Computer Society.
- The Oxford University Press style manual [16] covers both general and specialized usage.

Terminology must be **consistent**. For example, don’t use common plant names in some places and scientific names in others.

Here are examples of common terminological issues for ITC theses. For other specialist topics consult your supervisor.

Organisms Organisms must be named by the scientific (Latin) name in the italic font variant of the main font, with the genus name capitalized but the species (and subspecies) not, and the authority, in normal font, given according to standard botanical or zoological references. Details and many examples are given in relevant style manuals [1, 6]. If you plan to use a common name, identify all organisms with both names the first time they are mentioned in the text, for example:

‘ Sorghum [*Sorghum bicolor* (L.) Moench] is the most common grain crop in this semi-arid region. Sorghum is generally sown after the first rains ... ’

‘ Millets [*Panicum* and *Pennisetum* spp.] are used as emergency crops in very dry years. ’

Soils Soils must be named according to either of two international systems: the World Reference Base [13] (or its predecessor FAO legends) or USDA Soil Taxonomy [18]; specify the version of either. This is the only way a study can be compared to those in other areas. Local names (e.g. soil series) may also be used, once they are correlated to one of the international systems. Follow the formatting rules of these systems.

An example of correct usage is given in Table 2.1.

An example of proper in-text usage is adapted from Galbraith *et al.* [10]:

⁴ <https://www.agronomy.org/publications/style/>

Landform	Soil Taxonomy [17] subgroup	WRB [7] Soil Subunit
Plateau	Typic or Rhodic Kandiustox	Areni-Acric Ferralsol
Escarpment	Ustoxic Quartzipsamments	Rubi-Ferralic Arenosol
Residual Hills	Typic Ustorthents	Episkeleti-Humic Regosol
Upper interfluve	Ustic Kandihumults	Umbri-Humic Acrisol
	Ustic Kandihumults	Profondi-Vetic Acrisol
	Typic Kanhaplustults	Ferri-Abruptic Acrisol
Lower interfluve	Typic Plinthaquults	Gleyi-Orthiplinthic Acrisol
	Plinthustults	
	Plinthohumults	
Floodplain	Aeric Endoaquents	Orthiplinthi-Umbric Gleysol
Riverbank	Oxyaquic Quartzipsamments	Epidystri-Arenic Fluvisol

Table 2.1: Relation between landform and dominant soils (adapted from [5])

‘ Soil series were correlated to Soil Taxonomy [17]. The uplands are mainly covered by Orthods and Udepts with Aquods and Aquepts in low-lying or level areas and Histosols in the numerous glacial potholes.

The 1:250 000 scale maps contained a few small areas of Berkshire soils (well-drained, coarse-loamy, isotic, frigid Typic Haplorthods formed in dense till). Since this soil was not sampled in our study, SOC value for the Worth series (well-drained, coarse-loamy, mixed, frigid Typic Fragiorthods formed in dense till) was used as a substitute. ’

Note in the last sentence both local and correlated names are given; the local names may be used in the subsequent text.

Hints for the use of Microsoft Word

If using Microsoft Word, ensure that you:

- Use paragraph styles rather than formatting blocks of text directly;
- Use outline-numbered heading styles for the document structure and table of contents;
- Use cross-references for figures and tables, and lists of these.

2.1.5 Conformance to requirements

These deal with the **internal quality** of the thesis, i.e. does it properly present the scientific work undertaken? This does not (yet) consider the

significance of the work, only that it is correctly performed and reported.

- **Structure:** The thesis must follow a clear structure; links between sections must be clear; each section must contain (only) relevant material;

This is explained in detail in Topic “Purpose, structure and logic of research” of this lecture series.

- **Logic:** Argumentation must be logical;

This is explained in detail in Topic “Argumentation and Technical Writing” of this lecture series, in the section on “Flawed argument”.

- **Language:** Writing must be correct English, using proper vocabulary (the right word in the right place) and grammar;

This is explained in detail in Topic “Argumentation and Technical Writing” of this lecture series, in the section on “Technical English”.

- **Scientific methods** (field, laboratory, modelling, statistical) must be appropriately-selected and correctly-applied;

- Methods must be sufficiently described for someone else to reproduce the work; this ensures **replicability**;

- **Equations** must be correct and complete (either in the thesis or in a cited source);

- **Proper credit** must be given for other’s ideas, work, or writing (i.e. no plagiarism)

These are all dealt with in other topics of this lecture series.

2.1.6 Meeting or exceeding expectations

Once a thesis conforms to specifications and requirements, the question arises as to whether the science it presents is sufficient for an MSc project. This is the **external quality** of the thesis; how much does it contribute to science?

- **Scientific scope and depth**

- Is the problem significant and novel?
- Has it been treated thoroughly?

- **Critical approach**

- Are the assumptions and limitations of the research clearly and correctly stated?
- Is the argumentation sufficient?

- **Innovation:**

- To what degree is the work original?
- Is it just repeating previous work with some small modifications, or has something really new been developed?

- **Scientific context**

- Has the work been linked to previous work, both in problem formulation and conclusions?
- Is it clear to the reader where this work fits into the wider context?

Some aspects of these will be dealt with in detail in the following section (§2.2) on thesis quality.

Q9 : *Why should an MSc thesis be **critical**? What does 'critical' mean in this context? Give some examples of critical questions one can ask about one's own thesis, and which should be answered in the thesis. [Jump to A9](#) •*

Q10 : *Why should the work reported in an MSc thesis be discussed in its scientific context? [Jump to A10](#) •*

Several of the issues discussed as requirements (§2.1.5) also play a role in excellence.

- Language: Writing should be idiomatic, succinct (concise) and clear, with correct choice of words.

2.1.7 Answers to self-test questions

A5 : Yes, there can be work of high scientific quality that is not presented according to defined standards. For example, no title or no table of contents. The work must be revised to meet standards before it can be evaluated. [Return to Q5](#) •

A6 : Both the UT and the student could be liable to legal action, either civil or even criminal. [Return to Q6](#) •

A7 : These standards present the scientific information in a consistent, and therefore easily-accessible, way. [Return to Q7](#) •

A8 : The UT wants to avoid any legal problems arising from the student's work. It also wants to disassociate itself from opinions. [Return to Q8](#) •

A9 : The thesis should be critical because science is never certain, it is always a work in progress.

“Critical” in this context means self-reflective: not just reporting objectives, questions, methods and results, but **challenging** them within the document.

Examples of critical questions one can ask about one's own thesis, and which should be answered in the thesis:

- Why are the objectives important?
- Why were these methods chosen?
- Could there have been other methods chosen, and if so, why are the ones that were indeed chosen better than the alternatives?
- How much confidence should we have in the results?

[Return to Q9](#) •

A10 : This places the work in relation to similar work, and shows where it adds to collective knowledge. The innovations and conclusions (confirming, denying or modifying previous work) are clearly brought out for the reader.

[Return to Q10](#) •

2.2 Assessing the quality of a UT/ITC MSc thesis

Key points

1. A UT/ITC thesis is judged by a **Thesis Assessment Board** (TAB). (§2.2.1).
2. UT/ITC has an approved list of evaluation criteria (§2.2.2):
 - (a) **Scientific scope and depth:** the research addresses a well-formulated, relevant and novel problem of sufficient scope and depth linked to relevant literature;
 - (b) **Scientific method:** the research is undertaken with an appropriate, clear and transparent methodology with proper use of concepts, methods and techniques;
 - (c) **Reporting:** the thesis is well-structured and readable with a clear layout;
 - (d) **Presentation & defense:** the research is well-presented, followed by a discussion with proper argumentation.

The quality of the completed MSc thesis and the degree to which the candidate understands what was done and can defend it against other approaches are assessed by a Thesis Assessment Board.

- ! → The completed thesis is available from the UT/ITC library for any interested party, and, if the mark received is 75 or higher, is also placed *on-line* as a PDF file for access from anywhere in the world. Thus it must be a reliable piece of work.

2.2.1 Examination procedure

The current study regulations for the UT/ITC MSc degree can be accessed on the ITC intranet⁵. §5.5 explains the thesis submission procedure, and §5.6 the examination procedure..

A UT/ITC thesis is judged by a **Thesis Assessment Board** (TAB), which is finally accountable to the ITC-wide Examination Board.

For degrees **conferred at UT/ITC** itself, this consists of three to five persons:

1. An **ITC professor or associate professor** in a relevant discipline (who cannot be one of the supervisors);
2. An **external examiner**, either from outside Faculty ITC (usually an academic staff member of a university or a knowledge institute) or

⁵ <http://www.itc.nl/assessment-regulations.aspx>

from a scientific department of ITC that has not played a major role in the course and research theme;

3. The thesis **supervisor(s)**;
4. Depending on the specialized knowledge required to fairly judge the thesis, there may also be other UT/ITC scientific workers specialized in those aspects of the thesis;

Generally the (Associate) Professor chairs the examination.

Two other people may attend the exam in a formal capacity, but not as voting members:

- The UT/ITC Course Director or representative to ensure proper procedures are followed;
- If the student has a PhD or AIO advisor (§1.3.1), the advisor attends and may be asked to question the candidate.

Q11 : *Why is an external examiner included?*

Jump to A11 •

For degrees **conferred by UT/ITC and a partner institute**, i.e. Joint Education Programmes (JEP), the composition is slightly different, depending on the academic regulations in the partner's country and the logistics of the thesis exam. In general the exam is held at the partner institute, and the TAB consists of:

1. The **partner institute Chair** of the academic department responsible for quality control of the joint course;
2. The **UT/ITC Chair** or, in some cases, Associate Professor, responsible for quality control of the joint course;
3. The partner institute thesis **supervisor**;
4. Depending on the thesis topic, there may also be one or two other partner institute scientific workers.

The UT/ITC supervisor is asked to give written comments on the thesis quality and the candidate's performance during the research and thesis writing phase. Increasingly there is the use of videoconferencing, so that the ITC supervisor can take part.

The TAB reads the thesis and hears the candidate's defense, and then reaches one of the following decisions:

1. The thesis is **satisfactory**. One single mark is given.

2. Subject to **minor corrections** that can be implemented within **three working days** and implemented before the official end of the course, the thesis is satisfactory. One single mark is given, subject to the corrections in the thesis being made.
3. The written thesis is **not satisfactory** and a FAIL grade is given. However, the presentation and defence have shown that the participant is capable of performing principal research tasks. Subject to **major changes**, the participant may re-submit the written work within **three months** and a new oral examination will be scheduled.
4. The thesis is **not satisfactory** and is given the FAIL grade.

Note that for option (3) no ITC supervision is provided; this is *not* an extension of the study period. A resubmission is graded pass/fail, so the maximum mark is 60.

If a grade is given, the following scale is used:

- | | |
|----------|---|
| 100 | “Perfect” : outstanding innovation, superb writing and interpretation, no more could be expected in an MSc thesis period; |
| 90 or 95 | Excellent : publication quality, no flaws, quite innovative, could easily be adapted as a journal article or a chapter in a PhD thesis; |
| 80 or 85 | Very Good ; well above expectations, only minor flaws, innovative, research has no serious questions and can be incorporated into a journal article; |
| 70 or 75 | Good ; meets expectations of a typical work within the time allowed and with the facilities available; nothing special but nothing really bad; |
| 60 or 65 | Pass : meets minimum standards, passing; not innovative, serious flaws; |
| | Fail : does not meet minimum standards; no mark is given |

The interpretation of terms such as ‘good’, ‘well above expectation’ etc. is **completely up to the discretion of the Board**. Most Boards give points in steps of 5, e.g. 75 for a thesis which is not “outstanding” but has features that make it more than simply “good”.

The mark for a satisfactory thesis is combined from three elements:

1. the **written thesis**;
2. the **oral defense** of the thesis contents;
3. assessment of the **learning process**.

Of these the written thesis receives by far the highest weight.

Q12 : *Why should the written thesis count for much more than the defence?* *Jump to A12 •*

The Board assesses a thesis on the basis of quality criteria only; **mitigating circumstances** such as illness, family problems, or difficulty in field work or data collection are not taken into account.

Q13 : *How should mitigating circumstances be taken into account?* *Jump to A13 •*

The thesis grade is adjusted **downwards** if, during the exam, the candidate does not appear to understand the work or is not able to defend it. In this situation the committee wonders how the student managed to submit the thesis. In case of serious doubt the committee may fail the student even if the thesis is of sufficient quality.

Q14 : *Under what circumstances should a candidate fail, even if the written thesis is evaluated as satisfactory?* *Jump to A14 •*

The thesis grade is adjusted either **upwards** or **downwards** according to the candidate's independence, initiative, effective communication with supervisors, etc.; in short, the student's performance in the thesis period. This depends on the opinion of the supervisors, backed up by documentation. This adjustment is no more than a half-step (5 points).

UT/ITC maintains quality equal to Dutch universities, so the opinion of the external examiner is of utmost importance. **The external examiner must sign the exam results in order for the student to pass**, so it is clear who is the primary audience for your thesis. UT/ITC asks the external examiner to ensure that UT/ITC grades correspond to those in the Dutch universities.

2.2.2 Evaluation criteria

This section is adapted from the "Instructions for Thesis Assessment Board" approved by the ITC Examination Board in September 2011⁶. The checklist is given to the TAB; however, the grade is a **holistic** summary of the thesis, not simply the sum of points from the checklist.

Q15 : *Why are there no points assigned to each question?* *Jump to*

⁶ <http://intranet.itc.nl/education/staff/regulations/other.aspx>

Scientific scope and depth

The research addresses a well-formulated relevant problem of sufficient scope and depth linked to relevant literature.

- Is the research problem clearly defined? (E.g. through well-formulated research questions).
- Is a relevant research problem being addressed?
- Has the research problem been placed in the context of the scientific field concerned?
- Is there a critical discussion of and link to relevant contemporary literature?
- Is the research undertaken of sufficient scope and depth?
- Is there evidence of a thorough understanding and mastering of the subject and discipline?
- Is there an innovative part in the research?

Scientific method

The research is undertaken with a clear and transparent methodology with proper use of concepts, methods and techniques.

- Were the research methods appropriate to answer research questions (conceptualization and operationalisation of the research questions)
- Is the research process and methodology clearly described and well structured?
- Are the methods and techniques for data collection and analysis properly selected and applied?
- Was the data collection and analysis performed using the correct methods and with proper reference to literature?
- Have the objectives been reached and/or are research questions answered?
- Are conclusions drawn correctly after analysis of data?
- Are the conclusions and statements supported by evidence?
- Is there a critical discussion and reflection on the research findings and awareness of the limitations of the research?

Reporting

The thesis is a well-structured and readable, with a clear layout.

- Is the thesis well and clearly written?
- Is the thesis well-structured?
- Is the thesis logically written?
- Is proper use made of literature references, and was proper referencing applied?
- Has effective use been made of visualization tools like maps, tables and graphics?

Presentation and defense

The research is well-presented, followed by a discussion with proper argumentation.

- Did the presentation provide a clear and concise summary of the research?
- Was the candidate capable to respond adequately to questions, criticisms and comments?
- Did the candidate make proper use of the thesis during the defense?

Q16 : *Why is presentation and defense included in the thesis assessment?*

Jump to A16

-

Process

The candidate worked in a structured and rather independent way, while making adequate use of the guidance of the supervisor.

- Does the thesis reflect the candidates' own research ideas and efforts?
- Was the research planned and undertaken in an independent and structured way?
- Did the candidate take initiatives?
- Was there a good communication between the candidate and the supervisors/staff?

Q17: *Why is credit given for independence, but also for communication with the supervisor?* [Jump to A17](#) •

2.2.3 Answers to self-test questions

A11 : (1) To ensure quality equal to Dutch universities; this is required for accreditation of UT/ITC degrees; (2) To avoid conflict of interest, where UT/ITC might be tempted to boost its graduation rate. [Return to Q11](#) •

A12 : What is written is what is in the library to support further scientific work. Explanations or results presented only during the defence may show that the candidate can think and has done work, but do not contribute to science. [Return to Q12](#) •

A13 : By an extension of the thesis period. [Return to Q13](#) •

A14 : If the student can not explain the thesis and appears not to know its contents; this is strong evidence that someone else did the work for the student. [Return to Q14](#) •

A15 : The thesis is more than the sum of its parts, and so the grade must also be a holistic assessment. [Return to Q15](#) •

A16 : Scientists must be able to present and explain their work in public. [Return to Q16](#) •

A17 : A scientist must think independently, but also make use of the wisdom of others, in particular more senior scientists. This does not mean that the student has to accept the supervisor's advice, only that the student understand and consider comments. [Return to Q17](#) •

2.3 References

Bibliography

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