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Introduction to MSc thesis work

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Examination process

- Find a thesis project
- Registration
- Plan and Work
- Report
- Presentation and opponent

Thesis project - Requirements

MSc Program Students:

- Must have passed >60 credits on advanced level in computer engineering in order to start the thesis work.

Civilingenjör:

- Avslutade kurser om minst 240 hp, varav Matematik 30 hp, Datateknik AV 45 hp samt 15 hp inom ett objektorienterat programmeringsspråk.

Easiest is that you as student check in LADOK before you start searching for a MSc thesis work

Deviations from the formal requirements shall be approved by the examiner

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Thesis project - Requirements

Thesis work requires:

- Written report, approved by MIUN examiner
- Oral presentation at MIUN, approved by examiner
- Act as opponent on another student's presentation

- Internal (at MIUN) or External (abroad or in industry)
  - Same requirements (report + presentation, opposition at MIUN)

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External and internal thesis work

External project

- Apply directly at a company, in competition
- Contact coordinator at MIUN to find examiner
- Meeting with industry supervisor + MIUN examiner
- Students reports both to company and MIUN examiner
- **MIUN examiner must approve before project starts**
- Project must have a clearly defined goal
- Many companies offer financial support

Internal project

- Most departments host several student projects every year
- Apply to the contact person for respectively project

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Project proposal

The description of the thesis assignment must be submitted to the examiner well in advance of the start of the thesis and contain the following parts. Submit as pdf.

1. **Your name and email address**
2. **Preliminary title:** What is the thesis be about?
3. **Background/prerequisites:** Why and where should the practical part of the degree project be carried out?
4. **Scientific question:** A degree project shall investigate a specific scientific/technical question. Enter tentatively:
    - *The question* to be investigated.
    - The *research area* in which the issue is relevant.
    - *Link to research/development:* Describe how the data relate to current research or development. Explain why the question is of interest and to whom?
    - *Survey method:* How should the stated question be investigated?
    - *Hypothesis:* What are possible/probable outcomes of the study?
    - *Evaluation:* How can one determine whether the goal of the degree project has been fulfilled and whether the question has been answered sufficiently?
5. **Your background:** Describe what knowledge (courses and/or experiences) you have that makes this an appropriate task for you.
6. **Supervisor for the degree project**:
    - **For degree projects at companies:** Describe who will supervise you at the company and what their role and involvement is in the thesis. Bring contact information to supervisors at your company, including your email address and phone number.
    - **For the degree project at the university:** Describe which person at the university has proposed the thesis, how it relates to the research carried out, and what involvement the researcher will have.
    - **For your own thesis proposal:** Describe the type of supervision you will need to be able to implement your idea and feel free to give suggestions for supervisors.
7. **Demarcation/resources:** What is already available at the client in the form of previous work, software, skills, etc.?
8. The description shall ensure that there is sufficient preparation to ensure that the thesis worker does not have to do all the practical work from scratch, so that there is no time left for the scientific investigation.

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Registration, supervisors, and examiners

- Before you start the thesis work, you need to be registered – This is done by your examiner!
- All thesis students need a supervisor from the University (even if you do an external thesis work). **Supervisors are assigned by the examiner!**
- Who can be supervisors?
  - At DET, it is typically staff members with preferably an MSc degree. It can be professors, assoc. professors, assistant professors, postdoctoral researchers, PhD students, and lecturers.
- Who are the examiners in Computer Engineering at the advanced level?
  - Prof. Mikael Gidlund
  - Prof. Mårten Sjöström

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Educational Goals

After passing the thesis, the student should be able to:

- Manage their time in order to solve a larger problem
- Formulate the task and its scope
- With a scientific method solve the task, or parts of it, and thereby contribute to the development of knowledge
- Present the solution orally and in writing
- Examine and evaluate technical reports
- Actively follow and participate in the evaluation of a report and its presentation
- Make judgments taking into account relevant **scientific, social and ethical aspects, and demonstrate awareness of relevant ethical aspects of research and development in the field of computer engineering**
- Demonstrate understanding of the possibilities and limitations, its role in society and the responsibility for its use
- Identify their need of further knowledge and take responsibility for developing their knowledge

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Examination

- Oral presentation + Written thesis report + opponent (written and oral)
- The MSc thesis is graded using the Bologna model (A-E). **Recall that deviations from the time plan will have an impact one the final grade!**
- Method for grading, 0-3 in each category (0 = non existing, 3 excellent)

Abstract	Layout&Structure	Introduction
Purpose&Problem	Background	Method
News Value	Construction Work	Evaluation
Conclusions	References	Length
Language	Presentation/Opposition	Ethical and social aspects

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Examination

- How to reach **grade D-E**?
  - Be ambitious and aim for at least grade C! But if you still “just” want to pass with grade E, you need to fulfil all the learning goals for MSc thesis work
- How to reach **grade B-C**?
  - Good English language, good formulated research problem and methodology, many scientific references, and try to use mathematics in a good way (even if you write SW algorithms..) and include many scientific articles to support the work in your thesis.
  - Fulfil all the learning goals for MSc thesis work
- How to reach **grade A**?
  - The results in your thesis should be good enough to be published in an international conference or journal.
  - Excellent English language, excellent formulated research problem and methodology, use mathematics in a good way (even if you write SW algorithms..), and many scientific references supporting the work.

Recall that your MSc thesis will most likely be available in DIVA and many potential employers will search for it and some will even ask to add it in your job application!

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What kind of work is acceptable as thesis on advanced level?

- **New concepts, methodologies and technologies (typical grade A-C category)**
  - Propose novel ideas, methods and/or technologies
  - Examples of good theses: *A Deterministic MAC Protocol to Handle Emergency Traffic in IWSN* (Won the Sundsvall 42 Prize as best IT-thesis on advanced level 2016)
  - *Increasing the Trustworthiness of AI-based In-Vehicle IDS using eXplainable AI (Paper published in IEEE Access 2022)*

- **Proof of concept (typical grade A-C category)**
  - Verify a new working, design or implementation method through pilot project
  - Example: Parallel simulations (A good thesis example is: *Parallel computing for high performance LTE radio network simulations Design and Implementation*)

- **System Evaluation, Measuring (typical grade A-E category)**
  - Comparing and evaluating different technologies by extensive simulations or implementation in embedded devices.

- **“State of art”, or tools and system comparison (typical grade B-E category)**
  - General study and compare certain kind of systems and tools
  - Example: Tools for Business Intelligence (A good thesis example is: *A comparison between Cognos 8 BI, Microsoft BI and SAP BW/NetWeaver*)

Writing an “**app**” is not valid as thesis work on advanced level!

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Project Planning

- Provide a project plan within the first 3 weeks:
  - A primary title
  - A primary problem formulation
  - A list of (about 30) literature related to the topic
  - A primary description of the working method
  - A time plan
  - A date for the half-time check
- The work plan should be approved by the supervisor (or examiner) in DET.

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Half-time check

- Meeting with your supervisor and examiner to see that you are progressing according to plan or if there are deviations. **The STUDENT plan and arrange this meeting.**
- Three possible outcomes from this half-time check:
  1. The work is according to plan, and the student can continue.
  2. The work has been done but with some deviations from the original plan but the examiner and supervisor judge that the work can be finalized according to plan after minor adjustments in problem formulation, methodology and/or time plan.
  3. The work has deviated heavily from the time plan and there is a major risk that the thesis will **not be accepted (Grade F).** A new time plan needs to be done, and a new half-time check is needed.

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Oral and written presentation

- You SHALL use the template provided by the University.
- The report should be sent to the *supervisor* first who then decides if the student is allowed to orally present the work.
- Final report should be ready and send to examiner at least 2 weeks before presentation day. (Note: This means that your supervisor should have notified the student that he/she can present her work)
- The student should after the oral presentation update the written thesis with the comments received at the presentation (from examiner, opponent, and others). **That will be the report the examiner will grade.**

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Oral Opposition

The main role of the opponent's role at the presentation is to stimulate a constructive discussion that clarifies the degree project's content, strengths and weaknesses. It is also important that the opponent is active in the discussion, which means that it is normally required to have follow-up questions and/or comments in response to the presenter's answers, not only separate questions without context.

At the discussion, the opponent can use the following questions as starting point:

- Are objectives, problem formulations and demarcations clear and relevant?
- Is the working methodology well described and suitable for the purpose and objectives of the work?
- Are there ambiguities at work?
- What are the results of the degree project and what comes from other sources?
- How does work contribute to the development of knowledge?
- Is the argument for claims, interpretations and conclusions well founded, logical, convincing and credible?
- Are the conclusions reasonable in relation to the content and results of the work?
- Do conclusions and results meet the purpose and objectives of the work?
- How does the work take into account relevant societal and ethical aspects?
- Is the linguistic processing correct and adapted to the target group?
- Is the outline good and are tables and charts illustrative and easily accessible?
- Are sources and references to related work relevant and well described? Missing references or are there with unnecessary references?
- What can be improved and what could have been done differently?

Consider the following:

- The time for the discussion and examination is limited (approximately 10-15 minutes) and it is therefore important to focus on the most important elements;
- The discussion and examination should be interesting to other audience members so that the discussion is also relevant for those who have not read the report;
- The opponent should also give positive feedback to the respondent;
- Detailed comments and a general judgement of the degree projects are submitted in the written opposition and therefore do not need to be repeated verbally;

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Written Opposition

Read the report carefully and critically. Fill out the opponent record and send the complete record (as a pdf-file) by e-mail, not later than ***15:00 on the day before the presentation*** take place, to the author's supervisor and authors examiner at Mid Sweden University. The student who has written the degree project will also receive the record, but not until after the presentation.

The opponent record to be used can be found in Moodle

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Hints and suggestions

- Start the writing process early – We know by experience that you will be running out of time.
- Use the checklist for degree project! It can be found in Moodle.
- Each internal supervisor has **25 hours** dedicated for supervision – use them in an efficient manner!
- Ask some friends to read the report before it is submitted to the opponent, supervisor and examiner.

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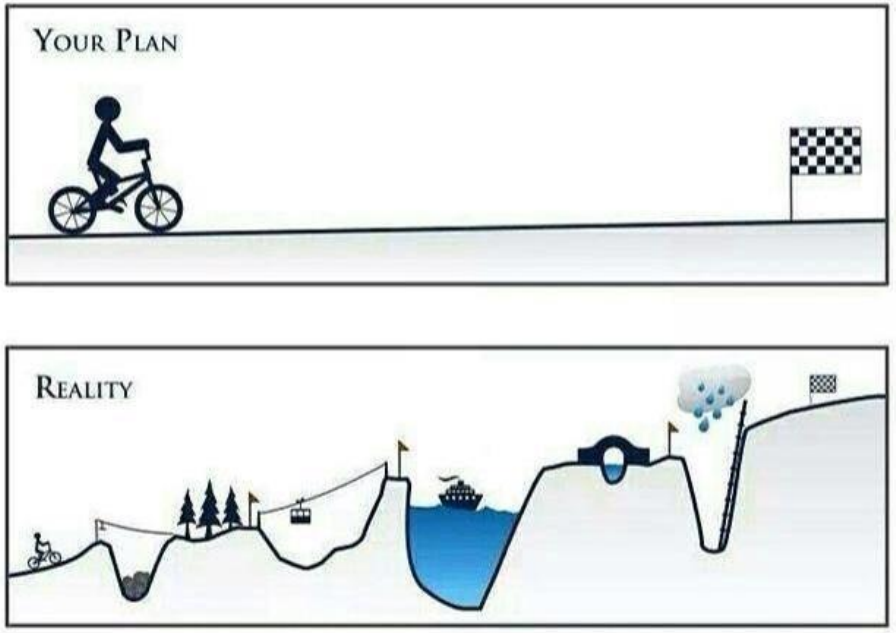
Road towards your degree..

- …is rather bumpy!



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Honor Code

- Academic dishonestly taken very seriously at MIUN
- Exams at MIUN are individual efforts
  - Any form of cheating results in a failing grade and disciplinary actions
- Homework
  - Are individual efforts unless otherwise stated explicitly
  - Non-permitted collaboration or copying from other students results in a failing grade and disciplinary actions.
- Master thesis
  - Must consist of original text authored by the student (unless it is a quotation)
  - Plagiarism in any form, for example copy-and-paste from other documents or from the Internet is not permitted and generally results in a failing grade for the thesis and disciplinary actions.