Writing your

MSc Thesis

at Department of Computer Science

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Plan

- Formalities
- Choosing advisor and topic
- The process
- The master's thesis report
- The examination

Formalities

you will be registered administratively to the MSc thesis without the possibility of cancelling the registration

Formalities

- 5 month of work, incl. exam ~ 30 ECTS
- Thesis written in Danish or English
- Advisor: a member of the permanent scientific staff at Department of Computer Science (+ co-supervisors)
- Individually or in groups (2-3 persons)
  - for group projects: the thesis must show which parts of the report the different members are responsible for (possibly “everybody is responsible for all of the thesis”)
  - from a study environment survey: “179 of 331 believe it will be lonely to write the thesis”
  - group theses are strongly encouraged!

MSc thesis contract
kontrakt.scitech.au.dk

- Done jointly by the student and the advisor before the thesis work starts
- States who, general title, hand-in date, etc.
- **Short project description and project plan**

From study regulations

Read the study regulations for your MSc education:
https://kursuskatalog.au.dk/en?department=15&search=thesis

"For the Master's thesis, the **student works independently** on an academic issue, on completion of which the graduate can:

- identify, define and formulate an academic issue on a scientific basis
- define and present testable hypotheses/research questions within a subject area
- independently plan and complete a major academic project using the subject's scientific methodology
- analyze, critically discuss and put into perspective an academic issue.
- assess, critically analyze and summarize the scientific literature within a defined topic area
- relay academic results objectively and concisely to a scientific audience."

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Choosing a project

- In principle the student's responsibility,
  but there are ways to get inspiration…
- Attend the annual Computer Science Day
- Contact a potential advisor – we often have ideas for new projects
  - avoid advisor surfing or “do you have something better?”
- Make sure to have flexibility in your project!
  - as opposed to “all-or-nothing” projects

Maturing your idea

- From a loosely defined **idea** to a concrete **problem statement** and an outline for your **work plan**

- Begin early – before your official starting date!

- “Individual project work” (5 or 10 ECTS) is a possibility if you are trying to define an area of interest before your master’s thesis work

Different project types

- Experimental evaluation of theoretical result
- New theoretical result
- Survey
- ...

- Many thesis projects originate from an existing research project
- 5-10% of the thesis projects lead to scientific publications

Industry collaboration

- Via advisor or your own initiative
- MSc thesis focuses on an ***academic*** issue
- Thesis advisor must approve the topic
- Be aware of AU technology transfer office offers templates for NDAs and collaboration agreements

  https://medarbejdere.au.dk/administration/forskning-talent/erhvervssamarbejde/samarbejdsaftaler/fast-track-agreements/

- Check out cs.au.dk/jobwall
- Examples and proposals after this presentation...

Courses while working on your thesis?

- Advantage:
  - variation from the thesis work
- Disadvantage:
  - “the urgent kills the important”

Requires self discipline!

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Challenges and concerns?

What will be the biggest challenges for you in the process of getting the work done and writing the necessary pages over a five-month period?

Working on your thesis

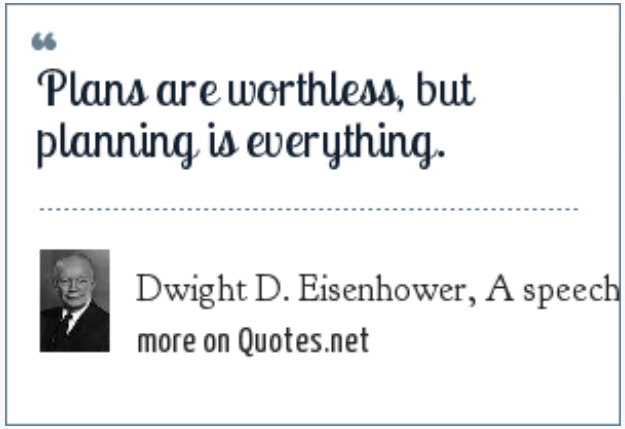
- Be aware of the different activities in the process:
  - stating the problem
  - reading literature
  - collecting data (test cases etc.)
  - implementing
  - experimenting
  - writing the report (begin writing early in the process!)
  - proofreading
  - …
- **Variation** is good for productivity
- Make a **work plan**, and revise it as often as necessary
  - the plan is not made so that you have to follow it – but it will make you aware if you don't follow it!

Guidance

- Weekly meetings (a luxury compared to other studies!), focused feedback
  - be prepared, you can for example email questions and the newest PDF 1-2 days before the meeting (with a description of what you would like to get feedback on!)
  - *you* have the overview – not your advisor
  - it is not the advisors job to ensure activity in your working process
  - *always* schedule time for the next meeting and make a plan for your work until the meeting
  - take notes at the meetings!
- Technical questions vs. “meta-issues”
- Mutual expectations
  - “is this good enough to pass/get 7/get 10?”

Procrastination and perfectionism

- "Thesis swamp"
  - the progression reform and thesis contracts have essentially eliminated that problem
- Planning, planning, planning…
  - work plan, deadlines
  - check availability of office spaces
- Have realistic ambitions



“My advisor doesn’t understand me”

Extra contact persons:

- Gudmund S. Frandsen (education committee)
- Marianne Graves Petersen (education committee)
- Søren Poulsen (education coordinator, IT)
- Nikolaj Beck Mikkelsen (student counselor)
- Andreas Birch Olsen (study environment coordinator)

Always ready to help! ☺

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Writing techniques

- Work **top-down**
  - make an early template (headlines, cues)
  - “stepwise refinement” (as in programming)
- Work **iteratively**
  - scientific texts are rarely formulated perfectly in the first try
- Use the report as a **working document**
  - mark ideas, to-do’s using colors, margin notes, or the like (e.g. using LaTeX macros)

Two understandings of the writing process

Writing for
recording knowledge

intended readers:

- the advisor as an evaluator
- the external examiner

Writing as a
tool for thinking

intended readers:

- you
- your advisor

time

Two understandings of the writing process

Use both approaches!

Often just write your ideas down: *recording thoughts*

- new ideas might arise
- feeling of progress
- avoid only writing ”final text” since this can result in a writer’s block

Go over all text again from the beginning: *product phase*

- rewrite, add examples etc., to make the understandable by the intended readers
- can be done throughout the writing process when ideas and results have settled (should not be postponed to last minute!)

Typical structure of a thesis

- Introduction
  - Motivation
  - Problem statement / hypothesis / research questions
  - Method and overview
- Background and related work
- [The technical content…]
- Implementation, experiments
- Conclusion (connected to the introduction), possibly ideas for further work
- References
- (Appendices with technical details)
- (Web page with programs and data)

About the introduction

- *What is the goal?*
  - background and topic (general introduction)
  - specific problem and hypothesis
  - definition of key concepts
- *Why is this important?*
  - motivation
  - relevance
- *How do you address the problem?*
  - the theory
  - methods (proofs / experiments / case studies / …)
  - outline of the structure of the thesis

Readability

Have particular attention to:

- Introduction
- Main arguments of the paper
- Meta-communication (continuously guide the reader through the text)
  - ”In this chapter we analyze X, which will be used in the analysis of Y in chapter Z”
- Use a clear language (avoid cryptic sentences and words not generally known)

Use of references

- Credibility of your sources? (the most credible from the top)
  - book (monograph)
  - dissertation
  - article from a journal
  - article from a conference
  - article from a workshop
  - master's thesis
  - technical report
  - homepage
  - personal communication

…I have read it on the internet

…it is written in the scientific article [foo]

…It is written in the article [foo] by the world leading expert [bar] and published in the top journal [baz]

- Refer to the most credible source you have!
- Layout (for example BibTeX)
- Curriculum for exam, possibly separate "secondary literature"

Avoid (self-)plagiarism!

- Always properly cite material you use
  - including your own material
    (from course projects, BSc thesis, etc.)

- Useful resources:
  - undgaasnyd.au.dk
  - studypedia.au.dk/en/literature-referencing/reference-management
  - studypedia.au.dk/en/formal-requirements/references-and-bibliography
  - library.au.dk/en/students/plagiarism

- If in doubt, ask!

Literature search

- ACM digital library acm.org/dl
  - online database
  - from au.dk network (possibly using VPN), full access to most papers
- DBLP dblp.uni-trier.de
  - based on the publishers' publication overview
  - covers practically all Computer Science journals, conferences, etc.
- Google Scholar scholar.google.com
  - number of *citations* gives an indication of impact
  - useful for finding relevant articles ("who is referring to this article?")
- The library (Nygaard 1) library@cs.au.dk
  - if you need a certain book or old article you cannot find elsewhere
  - … but ACM DL, Google Scholar, DBLP will likely cover 99% of your literature

Thesis front page

Must contain:

- Student ID number(s)
- Name(s)
- Thesis title
- Name of the advisor(s)
- Month and year
- The text: “Master’s Thesis”

LaTeX template

Handing in the report

via Digital Exam

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MSc thesis exam

- Missed hand-in deadline or failed exam
  - revised contract, 3 more months, new assignment
- As for other exams: max 3 exam tries

MSc thesis exam

- Exam question
  - is given a week before the exam
  - is typically chosen to give the student the possibility to shine
- Presentation (30 min.)
  - with the exam question as a starting point
- Examination (30 min.)
  - pleasant conversation in a friendly atmosphere (well, usually…)

MSc thesis exam

Preparation:

- read the exam questions (!)
- read your thesis (!!!)
- read the curriculum (=the references in your thesis)
- rehearse your presentation
- posibly get feedback from advisor on drafts of slides, structure of presentation, etc.

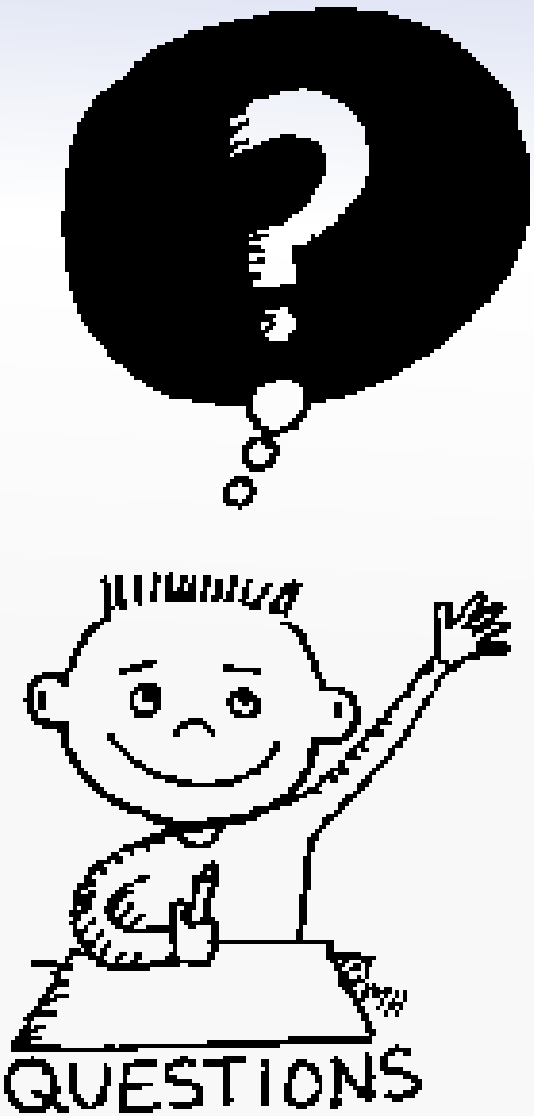
MSc thesis exam

The advisor's change of role:

- "why didn't you say this earlier?"
- probably the first time the advisor has seen the complete thesis report
- focused guidance meetings are the key to avoid surprises

Grading

- In principle the grade is given relative to the learning goals in the study regulations (see slide 6)
- In reality:
  - **results** according to the problem statement
  - **ambition level** of the problem statement
  - **readability** of the thesis
  - **coherence** between problem statement, methods, content and conclusion (“the red thread”)
  - the description of **related and future work**
  - **the presentation**
  - **the examination**
- Program code counts 0% - but is often a prerequisite for writing a good report


QUESTIONS