How to make a useful bachelor contract

- **Bachelor contract**
  - Language for the report (Danish / English)
  - Title of report (in Danish and English)
  - Tools to be used (for text processing / for programming)
  - Description of your project
  - Work tasks (things to be done)
  - Time plan (deadlines)
  - Table of contents (with estimated number of pages)
- **You need to write things down**
  - The importance of written notes cannot be overestimated
- **Bachelor course**
  - Deadlines and lectures
  - Use the **Webboard** and read the **Important Announcements**
- **Meeting with your advisor (12.15 – for some of you)**

DISCLAIMER

- **Traditions and work methods vary a lot from research area to research area (and from advisor to advisor)**
  - If there is a conflict between the **general** advise and directions in this talk, and the more **specific** advise and directions given by your advisor, you should always do as your advisor tells you
- **The advice and directions given in this talk have proved to be valuable for many students**
  - I do not care whether you follow my advice 
  - It is up to **you** (and your advisor) to optimize your working methods, so that you get the best result out of your bachelor project
  - However, it is stupid to reject the advise in this talk – without due consideration

Bachelor contract

- **This week you will make the first version of your bachelor contract**
- **The contract will help you**
  - organise your work in a suitable way, so that you achieve a good final result
  - adjust expectations between individual group members and between the group and the advisor
  - make an informed judgement of how much you will be able to do within your project
- **The contract should be updated with regular intervals during your project**
- **The contract is a 1-3 page document containing**
  - Provisional title, advisor, group members, language, word processing tool and other tools to be used in the project
  - A short description of your project (at least 10-20 lines, which may be an slightly modified version of the project proposal)
  - Provisional table of contents with a number of sections (corresponding to work tasks), and the proposed number of pages for each section
  - A time plan describing when the different work tasks should be finished
- **Templates for the bachelor contract can be found on Blackboard together with the slides from this talk**

Choice of language

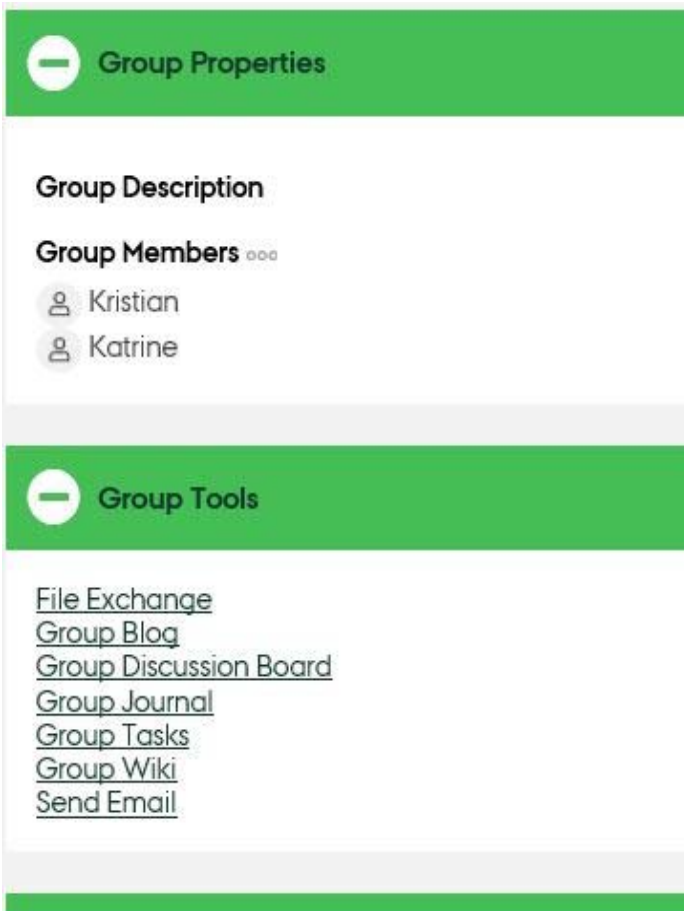
- **One of the first crucial decisions to be made, is whether you will write your bachelor report in Danish or English**
  - This is a **very important** decision
- **The project report is the product of your work**
  - Together with your oral presentation at the exam this is the **only thing** the censor sees and evaluates
  - Hence, it is very important that it is well-written and easy to understand
  - A few grammatical errors are ok, but too many errors will make the reading difficult, and distract the reader from the subject matter (this differs a lot from person to person)
- **Writing in Danish should be easy (for most of you)**
  - You should only write in English if you are sure that you are able to do this in a satisfactory way
- **Writing in English has some advantages**
  - It is required if you have chosen an advisor who do not speak Danish
  - In most subject areas the "standard terminology" is in English, and you do not have to invent Danish translations (which can be difficult)
  - The potential audience (readers) are much larger (the world instead of Denmark)
- **If you choose to write in English, you should also make your working notes, section drafts, etc. in English**

Title for the bachelor project

- **It is important to choose a good, informative title for your report**
  - When searching for literature, many potential readers only see your title (and the names of the authors)
  - Based on the title, they decide whether they want to read the abstract
  - If the title does not catch their attention, they will never see your brilliant work
- **The title should describe the contents of your work as precisely as possible without being extremely long**
  - Some authors like to make a catchy or fun title
  - This is seldom a good idea (because information of the contents is lost)
- **For your bachelor project, there must be both a Danish and an English title**
  - To avoid confusion, they should be identical (straightforward translations of each other)

Tools to be used in the project

- **You should agree on the tools to be used in your project**
  - Word or Latex (or something third)?
  - Programming environment – do you need version control?
- **Consider if any of the Group Tools available via Blackboard are interesting for you**
  - Many of them may be "overkill" for your project, while others may be useful
  - It depends on your experiences and working style



Short textual description of your project

- **The description should be at least 10-20 lines**
  - Can be a slightly modified version of the project proposal
  - Try to focus on what you intend to achieve in the project
  - Describe what you intend to do to achieve the goals
  - It is also a good idea to identify things, which you do **not** intend to investigate and things which you will only investigate if you have sufficient time
- **It is ok to include a lot of ideas and considerations in this part**
  - The 10-20 lines is minimum – if you use 1-2 pages it is fully ok
  - Then you remember your ideas
  - If some of them become obsolete, they are easy to remove
- **Give a brief explanation for the choices you make**
  - It is surprisingly difficult to remember the arguments for your choices even a few weeks/days later
  - Later, you may decide to undo one of your choices – even though you (a few days ago) had solid arguments for that choice
  - This way you can loose considerable time

Production of the bachelor report

- **The production of a bachelor report (or another scientific paper) is typically done as follows**
  - First, write a short summary of the literature (scientific papers), which you study and use as the basis of your bachelor project
  - Then, produce the main parts of the report describing your own contributions (experiments, programming, tests, development of concepts, theory, proofs, evaluations …)
  - Finally, at the very end, add
    - Abstract
    - Introduction
    - Comparison to other approaches
    - Ideas for future work
    - Conclusions
    - Acknowledgements
    - Etc.

Work tasks (building blocks)

- **A typical bachelor project will consists of 3-4 work tasks which could be**
  - Read literature (one or more scientific papers)
  - Task A (experiments, development of prototypes or development of theories)
  - Task B (experiments, development of prototypes or development of theories)
  - Task C (experiments, development of prototypes or development of theories)
- **It is important that these tasks are "safe"**
  - With a reasonable effort, you should be able to finish them in a satisfactory way (within the planned time)
  - In a bachelor project there is little time to throw large chunks of work away
  - One of the last work tasks may be less trivial and with a more uncertain outcome
  - If you are lucky (and smart), you will finish that task, but if you fail you will still have a decent bachelor report

Typical time plan

- **First week of February (10 hours)**
  - Planning of activities, including the production of the bachelor contract
- **Rest of February and first half of March (5 x 10 hours = 50 hours)**
  - Read literature (one or more scientific papers)
  - At the end of the period, there should be a draft of the corresponding section in your final report
- **Rest of March and first week of April (1 * 10 + 2 * 25 hours = 60 hours)**
  - Completion of task A
  - At the end of the period, there should be a draft of the corresponding section in your final report
- **Rest of April (3 * 25 hours = 75 hours)**
  - Completion of task B
  - At the end of the period, there should be a draft of the corresponding section in your final report
- **First three weeks of May (3 * 25 hours = 75 hours)**
  - Completion of task C
  - At the end of the period, there should be a draft of the corresponding section in your final report
- **Last week of May and first half of June (3 * 25 hours = 75 hours)**
  - Write the missing parts, put drafts together, make things consistent, and do a lot of proof reading

Typical table of contents

- **Abstract (10-20 lines)**
- **Section1: Introduction (1-2 pages)**
- **Section 2: Review of literature (4-8 pages)**
- **Section 3: Description of Task A (4-8 pages)**
- **Section 4: Description of Task B (4-8 pages)**
- **Section 5: Description of Task C (4-8 pages)**
- **Section 6: Comparison to other work and ideas for future work (2-4 pages)**
- **Section 7: Conclusions (1-2 pages)**
- **Acknowledgements (3-5 lines)**
- **References (½-1 page)**
- **Appendix with programming code, tables, full proofs, etc (5-20 pages)**
  - It **must** be possible to read and understand your report **without** reading the appendix
  - Critical things **must** be in the **main part** of your report
  - The appendix is for readers who want to study additional details
  - Censor will probably only take a quick glance at the appendix

The bachelor report is extremely important

- **Together with your oral presentation at the exam, the bachelor report is the only thing that censor sees and evaluates**
  - Hence, you should be sure to have **plenty of time** to write a good report
  - It is stupid to do a lot of brilliant work that you do not have time to document in a good report, and hence get limited or no credit for it
- **The production of the bachelor report should start immediately**
  - When you read literature, write working notes about the papers you study
  - When you make experiments and write programs/prototypes, make section drafts describing your efforts (remember to include arguments for major choices/decisions)
  - When you formulate definitions, lemmas and theorems, make them as clear and comprehensive as possible (this includes the proofs)
- **When you have finished your experiments / programming / theoretical work, everything should be documented in working notes and section drafts**
  - Then it is "easy" to finish the report
  - Write the missing parts (abstract, introduction, comparison to other approaches, ideas for future work, conclusions, acknowledgements, etc.)
  - Put the working notes and drafts together to form the report
  - Make things consistent
  - Proof read to find logical and grammatical errors

You need to write things down

- **The importance of written notes cannot be overestimated**
  - Our memory is **extremely limited**
  - Make **written notes** of all ideas, decisions, insights, etc.
  - In a few minutes, many of them will be forgotten – or it will take considerable time to reconstruct them
  - If you have a white board full of ideas, take a photo
  - If you are walking or biking, send a sms or voice message to yourself
  - If you wake up in the middle of the night and have a bright idea, write a few words on a piece of paper so that you can investigate further next day
- **Taking a break often helps**
  - Take a run
  - Go for a walk
  - Get coffee / food
  - Chat with some friends
- **Relaxing in some way is the catalyst of many great ideas**
  - They must be written down **as soon as possible**
  - Otherwise, most of them will be forgotten

Use of comments and critique

- **In your bachelor project you will work intensively with a given subject**
  - Hopefully, you will take ownership of your work
  - It will be your "baby"
- **In such a situation, it is very natural to be "defensive" towards critique and proposals for changes**
  - This is, however, **very stupid**
  - Your advisor (and other people who look at your work) invests considerable time in making comments and proposals for improvements
  - They are not made to annoy you – but to **help** you to **improve** your project and hence your report (and your final grade)

Example

- **When reading a draft of one of the sections in your bachelor report, your advisor misunderstands one of your arguments**
- **The straightforward approach is the following**
  - You can see that this is because the advisor does not know your work well enough, or has read the corresponding paragraph too fast
  - Hence, you tell this to your advisor, and do not change anything in your report
  - The comment has **not** helped you to improve your report
- **A much more fruitful approach is the following**
  - A lot of your readers – including the censor – will be in the same situation as your advisor (not knowing your work in detail, and reading parts of your report very fast)
  - Hence, you should use the "stupid" comment made by your advisor to **thoroughly investigate** whether you can reformulate the paragraph in such a way that it becomes **less likely** that a "stupid", too fast" reader may misunderstand your argument
  - It is **your responsibility** that your text is as clear and unambiguous as possible
  - Using this approach, you have **improved** your report
- **By using all comments and proposals in a constructive way, you can significantly improve the quality of your report**

Time plan for the rest of this course

- **Monday February 4: Deadline for first version of bachelor contract**
  - Submit via the Blackboard page **Submission of Contract and Report**
  - You can resubmit (revise the report) as many times as you want
- **Monday February 11, 11.15-13.00**
  - **Publication traditions and literature search**
- **Monday February 18, 11.15-13.00**
  - **How to write an academic paper**
- **Monday May 6, 11.15-13.00**
  - **How to make proper charts and graphs (by Hans-Jörg Schulz)**
- **Saturday June 15 at 12 noon: Deadline for bachelor report**
- **Tuesday June 18, 11.15-13.00**
  - **How to make a good oral presentation**
  - Followed by a **Poster presentation** of all projects (from 13-15)
- **June 24-28: Oral examination**
- **If you have proposals for additional lectures (or other common activities), please send me a mail or make a posting on the webboard**
  - This also applies for common activities for the bachelor groups associated with a research group

Blackboard page for the course Link

- **Each research group has a separate webpage**
  - You will find these pages under the subheader "Material from"
  - Here you can find different kinds of material from the research group
- **You should read the "Important Announcements"**
  - They contain important information which you must take into account
- **You should also read and participate in the postings on the Webboard**
  - There is a forum for each research group plus some general fora
  - You can choose to receive a mail (to your AU account) when postings are made
- **We will send mails to you via Blackboard**
  - Such mails are sent to your AU mail account
  - You should read (and react to) these on a daily basis

Now it is time to meet with your advisor

- **Research groups**
  - Computer-Mediated Activity (Turing-395)
  - Cryptography and Security (Nygaard-295)
  - Data-Intensive Systems (Nygaard-298)
  - Logic and Semantics & Programming Languages (Nygaard-327)
  - Ubiquitous Computing and Interaction (Nygaard-395)

  - The ALG and BIO groups will meet with their advisors at an alternative time (you will receive a mail about this)

That's all for now… … questions