TDDD89: Course description

Ola Leifler, Fall 2017

- Discussions during seminars 4
- Passing requirements 5
- Masters' theses 7
- Seminar 1 8
  - Purpose 8
  - Preparations 8
    - Gitlab and groups 8
    - Review 9
  - Questions 9
  - Submissions 9
  - Reading material 9
  - The seminar 10
- Seminar 2 12
  - Purpose 12
  - Reading material 12
  - Preparations 13
    - Review 14
  - Questions 14
  - Submissions 14
  - The seminar 14
- Seminar 3 16
  - Purpose 16
  - Preparations 16
  - Questions 16
  - Submissions 17
  - Reading material 17
  - The seminar 17
- Seminar 4 18
  - Purpose 18
  - Preparations 18
    - Review 19
  - Questions 19
  - Submissions 19
  - Reading material 19
  - The seminar 19
- Seminar 5 20
  - Purpose 20

Preparations 20
Reading material 20
Questions 21
Submissions 22
The seminar 22
Seminar 6 23
Purpose 23
Preparations 23
Thesis revision 23
Thesis plan 23
Method chapter 24
Questions 24
Submissions 24
Reading material 24
The seminar 25
Final submissions (UPG1) 25
Re-submissions 25

The course consists of six seminars, where we alternate between reading about how to write a thesis, reading sections from published Masters' theses, and iteratively writing sections of our own theses.

This is the general outline for the seminars in the course:

Seminar	Read in published thesis	Write	Additional reading
1	Introduction, Background	Thesis plan	• Checklist • Instructions for theses • Minitutorial • On academic writing
2		Introduction	• Theme-specific papers • Group members' thesis introductions
3	Theory, Method		• How to read a scientific paper • Papers from Theory section of the given thesis
4		Theory	• Literature related to your thesis' subject area • Group members' theses
5	Results, Discussion, Conclusion		• Papers on assessing the wider effects of IT systems
6		Method	• Group members' theses

Also, the course includes five live lectures on the following topics:

Lecture	Topic	Prepares for seminar
1	Course introduction	1
2	Information search and evaluation	2-4
3	Introduction to academic writing in English	2,4,6
4	Research Methods	3-6
5	Feedback on language and grammar	4,6

You will be divided in topic groups, where all students in each group will have a common denominator such as the topic area or general method that will likely be employed in the thesis.

In preparation for each seminar, you will work individually or in pairs, depending on whether you have someone else to write a thesis introduction with during the course, and answer questions in preparation to the seminars. Each WebReg “subgroup” (pair or individual) A1-1 through D5-5 will make contributions that address the questions before each seminar.

For each seminar, there will be reading material specific to the seminar. Reading material pertaining to earlier seminars will be used at later seminars as well. Also, you may need to read more material than explicitly stated for the course in order to produce a good text (i.e., passing the course). The reading requirements listed should by no means be interpreted as an upper bound on the number of references required for a passing grade in the course.

For all seminars where you read sections from a published thesis, all students in the same group read the same thesis, from the ones listed in the section *Masters’ theses*.

For all seminars where you read sections from each others’ reports, make sure to provide enough detail in your feedback that your friends will be able to address the concerns you have. Be constructive, and write the kind of feedback you would want from your peers!

Those who write theses in pairs are still required to provide feedback individually on other theses.

Note: **You will need to make all submissions in the course in English**.

Discussions during seminars

To support discussions during seminars, each individual must bring electronic or physical copies of all items on the reading list pertaining to each seminar, along with answers to the seminar-specific questions. Smartphones are **not** allowed as a medium for electronic copies as they are difficult to share and use efficiently during seminars. Also, each individual must be able to take notes of feedback given during the seminar, meaning **either pen and paper or a laptop/tablet is required.**

As you discuss and compare answers to questions during the seminars, you may feel a little pressed for time. Start each seminar with an initial round of questions on what you felt was most difficult in assessing, or matters that you have struggled to understand. Make sure that everyone gets to express their main gripes with thesis writing at this stage. Then, divide the time given by your seminar leader evenly among yourselves, focusing on the issues that most group members thought important to discuss. It is ok if you do not get to review all questions during seminars, but everyone should feel that the time is well spent and that all submissions have been reviewed. Take help from your seminar leader if you wish to understand how to interpret questions or instructions.

Make the seminars valuable for yourselves. All your answers need to be justified, and you need to take into account the literature available when assessing submissions during the course. That way, you will be able to make the most out of the course.

Passing requirements

For each seminar, you are required to do the preparations for the seminar according to the instructions, and participate actively in discussions during the seminar.

Preparations for seminars:

- **For the writing seminars (2, 4 & 6):** Each *student* is required to make *at least five contributions* in the form of new issues or comments on existing issues on other students' theses in the same group on Gitlab in preparation for the *writing seminars* 2,4 and 6, along with possibly uploading other material as per the instructions for each seminar.
- **For the reading seminars (1, 3 & 5)**: Each *subgroup* in WebReg (pair or student) is required to upload answers to common questions pertaining to seminars 1, 3 and 5. Your answers need to be *properly justified by referring to the material that you have read*.

Plagiarism or copyright: Plagiarism or copyright violations are strictly forbidden. You are not allowed to self-plagiarize work submissions in other courses. See the LiU self-study guide on Plagiarism for more information. Cases of plagiarism will be filed with the Disciplinary Board.

Attendance: If you are unable to attend a seminar, you will need to inform your seminar leader in advance and

- interview at least two members from your group on what you discussed during the seminar, and
- submit a written reflection of 1-2 A4 pages on the outcome of the seminar discussions and joint conclusions to your seminar leader one week after the missed seminar at the latest.

Masters' theses

Masters' theses pertain to the groups' topics. Each thesis has a number of keywords describing it, and student groups are formed based on the similarity of the thesis proposals submitted by students and the topics of these theses.

1. **Case study, development processes**: "The impact of agile principles and practices on large-scale software development projects: A multiple-case study of two software development projects at Ericsson." by Lina Lagerberg and Tor Skude, Linköpings universitet 2013.
2. **FPGA development: "**SEU Mitigation Techniques for Advanced Reprogrammable FPGA in Space" by Fredrik Brosser and Emil Milh, Chalmers 2014
3. **Case study, software testing**: "Reducing Regression Testing Feedback Cycle Times Through Improved Testing Techniques" by Viktor Lövgren, Linköpings universitet, 2014.
4. **Usability + performance study, mobile application**: "An Approach towards user-centric application mobility" by Andreas Åhlund, Umeå universitet 2009
5. **Usability study, iterative development:** "SIGHTLENCE – Haptics for Computer Games" by Mathias Nordvall, Linköpings universitet, 2012
6. **Theoretical computer science, algorithm construction**: "Upper Bounds on the Time Complexity of Temporal CSPs" by Peter Stockman, Linköpings universitet 2016
7. **Experimentation, Machine Learning:** "Organ detection and localization in Radiological Image Volumes" by Tova Linder and Ola Jigin, Linköpings universitet 2017
8. **Security evaluation**: "Certificate Transparency in Theory and Practice" by Josef Gustafsson, Linköpings universitet 2016

Seminar 1

Purpose

To understand general requirements for a Master's level thesis, and to critically review research questions. To practice writing and reviewing a thesis plan.

Preparations

Read the material specified in the Reading material section pertaining to seminar 1. You will need to formulate a *thesis plan,* and review the first chapters of the thesis assigned as reading material to your WebReg group. Start with reading the introduction of the thesis given to your group, then consider what you would like to include as part of your thesis plan. The outline of your *thesis plan* should contain

- Your name(s)
- The title of your thesis
- Initial problem description
- Initial approach to address the problem
- Possible literature (keywords, databases, introductory publications) that will be of use to your thesis.
- Courses that you think will be relevant when working with your thesis project

Upload your outline to the *Thesis Plan* submission on LISAM the first week of the course, at the latest **Monday, November 6th, 2017.** The thesis outline will be used to assign you to thematic seminar groups with students doing similar theses on **Tuesday, November 7th, 2017**.

Gitlab and groups

After you have been assigned to a seminar group (WebReg groups), you will use Gitlab as a platform for collaboration within your groups. Gitlab is similar to Github, and you will use it to manage your theses. It is not mandatory to use the full potential of Gitlab with versioning and branching although it certainly helps in grading that you provide specific commits to address specific issues, but you will need to share thesis material with one another there. There is a video tutorial which suggests how to set up your projects, including how to use *Issues*, *Milestones*, *Labels* and *Members* for your projects. The main purpose in the course is to share documents and to make comments by posting *Issues*. If you write your documents online, using Sharelatex, Overleaf, Office 365 or something else, you may use post a link on Gitlab to your project page.

You will receive comments from each other during the course through peer-review, that you will use the Issue tracker on Gitlab for. As you make changes to your manuscript, you should make sure to state explicitly how you have amended your manuscript from one version to

the next. The best way to do this is to use your commit messages and make sure that your commits are limited in scope so that it is easy to track your changes.

Remember to add your seminar teacher as Reporter on Gitlab, so we may access your thesis reports during seminar discussions.

Most of the feedback from staff will be provided during seminars. You are expected to provide detailed enough feedback to each other to help each other in writing good thesis texts.

Review

Read the *Introduction* and *Background* sections of the published Master's thesis pertaining to your group, and answer the questions below. Each question makes explicit reference to one or several items from the reading list. Make sure to justify your reasoning by referring to the items from the reading list. At the seminar, each individual needs to have answers to each these questions available electronically or on paper.

Questions

1. Are the research questions in the published thesis easy to find, clear and with a reasonable scope, as required by the *instructions for final thesis reports*?
2. How would you assess the introduction of the thesis based on the grading rubric (attributes *Introduction*, *Organization* and *Language and form*)?
3. Based on Table 1 in the *Minitutorial*, what type of research question fits the published Master's thesis best? Is it clear?
4. Based on Table 3 in the *Minitutorial* and the Abstract of the given thesis, what types of results are said to be produced in the published Master's thesis?
5. Are there violations to the *Guidelines on plagiarism* in the report? For instance, is it clear that figures are created by the author, or used with express permission?

Submissions

Upload your answers to the questions above in plain text or Markdown to a folder of your common Gitlab project for your team pertaining to the seminar, named after the individuals who submitted the answers. That is, if your team has the Gitlab project TDDD89-HT2017-A1, your LiU-id is abcde123 and your partner's LiU-id is qwert456 you should upload your responses as **abcde123_qwert456_responses.txt** to a folder **Seminar_1.**

Your answers need to be available on Gitlab **at the seminar**.

Reading material

- M. Shaw. Writing good software engineering research papers: Minitutorial. In Proceedings of the 25th International Conference on Software Engineering, ICSE '03, pages 726-736, Washington, DC, USA, 2003. IEEE Computer Society.
- The LiU Checklist for degree project at the second cycle (Master's) level
- Instructions for final thesis reports:
    - For theses conducted at the Computer and Information Science department (IDA): J. Åberg (2015). *Instructions for final thesis reports.* (English, Swedish).
    - For theses conducted at the Electrical Engineering Department (ISY): J. Wikner (2015): Anvisningar för exjobbsrapport på ISY (Swedish).
- The *introduction* of one of the published Master's theses pertaining to your group.
- The NoPlagiat plagiarism self-study guide by the University Library @ LiU.
- Advice on academic writing in English from Academic English Support @ LiU
- The grading rubric used for peer review in the course.

The seminar

Start with reviewing the reading material and discuss the following questions:

- What makes a research result valuable, according to the paper by Mary Shaw?
- Do you think that the guidelines by Shaw are applicable to other fields than Software Engineering? How?
- How do you interpret the items in the grading rubric? Are any items difficult to understand?
- What are the most common causes of plagiarism or copyright infringement do you think? How can you work to avoid these issues?

Then, you will compare your answers to each of the questions you were to submit before the seminar.

Finally, you will present to one another your thesis plan and discuss it using the following questions:

- Does the outline describe a clear problem? Justify your answer.
- Does the problem seem generally interesting? Justify your answer.
- Does there seem to be relevant literature pertaining to the subject? Justify your answer.
- How does the plan compare to the thesis introductions from the published Master's thesis you have all read?

Make sure to take notes of comments you receive!

Seminar 2

Purpose

To practice formulating your own research questions and introduction. To practice formulating proper academic English.

Reading material

The reading material here pertains to a number of common themes of final theses. Within your teams, choose a theme and the two papers pertaining to that theme based on their applicability to the thesis that you will be working on during the course. Many will find the guidelines provided by Kitchenham, as well as Runeson & Höst to be generally applicable for theses in many industrial settings. However, if you have already read these references earlier or believe that your particular theses will have a different focus than what is targeted by these two guidelines papers, you also have an option to read references relevant for a number of other types of theses. We refer to the specific Master's thesis themes that you read below when referring to "themes".

- You will need to read the thesis introductions written by the others in your seminar group, as well as one of the following references on how to conduct certain types of studies.
- For those who plan to conduct studies on the effects of software systems in industrial settings **(primarily students in themes 1, 3, 4, 5):**
    - B. A. Kitchenham, S. L. Pfleeger, L. M. Pickard, and P. W. Jones. "Preliminary guidelines for empirical research in software engineering". IEEE Transactions on Software Engineering, 28(8):721–734, August 2002.
    - P. Runeson and M. Höst. "Guidelines for conducting and reporting case study research in software engineering". Empirical Software Engineering, 14(2):131-164, Apr. 2009.
- For those who plan to study usability aspects of software systems **(primarily students in themes 4, 5):**
    - Alonso-Ríos, David, et al. "Usability: a critical analysis and a taxonomy." International Journal of Human-Computer Interaction 26.1 (2009): 53-74.
    - M. Matera, F. Rizzo, and G. T. Carughi, Web Engineering, ch. Web Usability: Principles and Evaluation Methods, pp. 143–180. Berlin, Heidelberg: Springer Berlin Heidelberg, 2006.
- For those who plan to study software testing **(primarily students in themes 3):**
    - G. Fraser and A. Arcuri. Sound empirical evidence in software testing. In Proceedings of the 34th International Conference on Software Engineering, ICSE '12, pages 178-188, Piscataway, NJ, USA, 2012. IEEE Press.
    - Arcuri, Andrea, and Lionel Briand. "A hitchhiker's guide to statistical tests for assessing randomized algorithms in software engineering." Software Testing, Verification and Reliability 24.3 (2014): 219-250.

- For those who plan to study Machine Learning topics **(primarily students in theme 7):**
    - Vanschoren, Joaquin, et al. "Experiment databases." Machine Learning 87.2 (2012): 127-158.
    - Caruana, Rich, and Alexandru Niculescu-Mizil. "An empirical comparison of supervised learning algorithms." Proceedings of the 23rd international conference on Machine learning. ACM, 2006.
- For those who plan to make use of internal code quality evaluations (**primarily students in themes 1, 3, 4)**:
    - Moser, Raimund, Witold Pedrycz, and Giancarlo Succi. "A comparative analysis of the efficiency of change metrics and static code attributes for defect prediction." Proceedings of the 30th International Conference on Software engineering (ICSE). ACM, 2008.
    - Sjøberg, Dag IK, et al. "Quantifying the effect of code smells on maintenance effort." IEEE Transactions on Software Engineering 39.8 (2013): 1144-1156
- For those who plan to do hardware construction theses (**primarily students in theme 2)**:
    - Kuon, Ian, and Jonathan Rose. "Measuring the gap between FPGAs and ASICs." IEEE Transactions on computer-aided design of integrated circuits and systems 26.2 (2007): 203-215.
    - Reynoso-Meza, Gilberto, et al. "Controller tuning by means of multi-objective optimization algorithms: A global tuning framework." IEEE Transactions on Control Systems Technology 21.2 (2013): 445-458.
- For those who plan to do security evaluation theses (**primarily students in theme 8)**:
    - Holm, Hannes, Mathias Ekstedt, and Dennis Andersson. "Empirical analysis of system-level vulnerability metrics through actual attacks." IEEE Transactions on dependable and secure computing 9.6 (2012): 825-837.
    - Shahriar, Hossain, and Mohammad Zulkernine. "Mitigating program security vulnerabilities: Approaches and challenges." ACM Computing Surveys (CSUR) 44.3 (2012): 11.
- For those who plan to do theoretical theses (**primarily students in theme 6):**
    - Halmos, P. R. “How to Write Mathematics”, L'Enseignement Mathématique,16 (1970).
    - Knuth, D. et al. “Mathematical Writing”, Stanford University, 1987.

Preparations

Read the material specified in the **Reading material** section above pertaining to seminar 2. Each student needs to read *one* of the papers given above, and each team needs to divide the material appropriate for your theses so that you have two different papers to discuss as you come to the seminar.

Revise your *thesis plan* according to feedback from seminar 1. In particular, outline what literature you will need to read, and start reading introductory material on the topics you are to write about.

Write the beginning of your *thesis introduction.* Start using the appropriate document template for Master's theses at IDA/ISY from the start. The most important part of your thesis introduction is defining **research questions**. Try out a few tentative questions, and write them all down as part of your introduction. Later, you will get to remove and revise them. Make sure that the questions are somehow *possible to answer,* and relate to the *effects* of that which you expect to produce during the thesis project. Take inspiration from the material that you are to read as preparations. Do not fear writing down too many questions at the start as you will have ample opportunities to revise them and drop some of them later. Aim to write 2 A4 pages, not more.

Review

Read the other introductions from your group and answer the questions below.

Questions

For each thesis report that you read, consider these questions:

1. Are the research questions easy to find, clear and with a reasonable scope compared to the Master's thesis you read before Seminar 1? Justify your answer.
2. How would you assess the *introduction* of the thesis based on the grading rubric (attributes *Introduction*, *Organization* and *Language and form*)?
3. Based on Table 1 in the *Minitutorial* from seminar 1, what type of research questions fit the thesis draft best? Are they clearly written? Justify your answer.

For the paper that you have read, answer these questions:

A. What are the main results, or guidelines, of the paper that you read? Provide a summary, and give some concrete examples of what the authors suggest when writing a research paper.
B. How can you make use of the results or advice provided by the paper that you read, in order to make an assessment of your research questions?

Submissions

Push changes of your *theses* and revised *thesis plans* to Gitlab **two days** before the seminar. Make sure to have a PDF file in your project repository for everyone to read. Your theses need to be available to all other members of your teams as well as your seminar leaders (Ola, Azeem, Aseel or Oscar).

The introduction of your theses will also need to be available for review by Pamela Vang through LISAM, where you are required to submit, **two days after the seminar**. You will need to submit a Word document to Pamela, so if you write in LaTeX, make sure that you paste your text in a plain Word document before you upload it. No special formatting is required in your Word document.

Your answers to questions 1-3 as well as A-B need to be available on Gitlab **at the seminar**. Commenting on each others' theses (questions 1-3) should result in *issues* or *comments* on existing issues. Answers to A & B needs to be available in your personal Gitlab repository.

The seminar

During the seminar, you will first present the papers that you read and answer questions A and B, and then compare your answers to each question above in turn in your seminar groups. Each question makes explicit reference to one or several items from the reading list. Make sure to outline concrete suggestions for improvement. Be the critic you wish to have.

Seminar 3

Purpose

To practice reading and assessing scientific literature, and to critically analyze a method description.

Preparations

Read the *Theory* and *Method* chapters of the published Master's thesis pertaining to your group's main topic.

Search for **two of the cited papers** from the published Master's thesis' theory section and **read those references**.

As an example, the thesis you read may contain the following text in the Theory section "Continuous integration gives testers/quality engineers updates on the status of the end product [7]. Iterative development, with a constant fixing of defects, is reported to give a better overview of remaining work [4] and to give more frequent feedback of project status to managers than a plan-driven process [7]."

In the above text, references "[4]" and "[7]" are used to support claims about iterative development and plan-driven processes. Pick two such references from the published theses that you read. The references you choose shall be peer-reviewed scientific references (conference papers, journal papers, PhD theses). As you make submissions for seminar 3, describe the references that you read with all appropriate metadata.

As you read the reviewed references, **search for newer, peer-reviewed scientific references** that cite the same references, **or other papers in the same** area that you think would have been interesting to use instead. You do not have to read these papers in full, but **you need to specify how you found them** (what keywords, publications you based your search on, search engines or databases), and describe them in the same format as the references in the published thesis, along with their *abstract* (summary). You *shall* use a reference manager such as Mendeley for managing your own references.

Questions

For the thesis report that you read, consider the following questions. Justify your answer by referring to the course literature including the papers you read before seminar 2.

1) Does the theory chapter explain techniques relevant to the project and research methods employed in similar work? Is there material that seems superfluous given the research question? Justify your answer.
2) Are the references used in the published thesis relevant to support the claim in the thesis? Are they well cited? Are they specific to the claims that they are used to support? Justify your answer.

3) The other references that you found, did you consider them as better suited for the same purpose? Were they newer, more well-cited or a better match for the claims they could support? Do they seem to present similar or different results? How did you find them? Describe these references including how you found them and their abstracts. Justify your answer.
4) How would you assess the thesis based on the grading rubric (attributes *Introduction*, *Theory*, *Method*, *Organization* and *Language and form*)?
5) Is it clear that the research questions are well-formulated and relevant, based on contents of the *Theory* chapter? Are the research questions aiming at contributing new knowledge compared to what is already well-known in the literature? Justify your answer.
6) Is the method formulated clearly enough that someone else would be able to reproduce the study? Justify your answer.

Submissions

Upload your answers to the questions above in plain text or Markdown to a folder of your common Gitlab project for your team pertaining to the seminar, named after the individuals who submitted the answers. That is, if your team has the Gitlab project TDDD89-HT2017-A1, your LiU-id is abcde123 and your partner's LiU-id is qwert456 you should upload your responses as **abcde123_qwert456_responses.txt** to a folder **Seminar_3.**

Your answers need to be available on Gitlab **at the seminar**.

Reading material

- Keshav, S. (2007). "How to read a paper". ACM SIGCOMM Computer Communication Review, 37(3), 83-84.
- The *Theory* and *Method* chapters of the published Master's thesis pertaining to your group's main topic.
- Two references from the *Theory* chapter.
- Abstracts of other references that could be of use to support the same claims as the references that you read in full (see above).

The seminar

During the seminar, each seminar group will compare answers to each question in turn. You must have the material that your answers refer to available during the seminar.

Seminar 4

Purpose

To practice how to write a theoretical background for your thesis, including summarizing scientific results and describing related work.

Preparations

Revise the introduction of your thesis according to the feedback you received at seminar 2.

Based on your thesis plan, search for relevant literature and make sure to read *at least four publications* relevant to the topic and method you plan to employ as part of your thesis work.

Write parts of the *Theory* chapter of your thesis, and possibly a *Background* to describe the company context of the work. Make sure to adhere to the the *thesis instructions* and look at the *checklist* for thesis reports. Make sure to properly use the references that you have read. Mainly, you will summarize the results of three publications that you believe are relevant to your work. As you read those references and write summaries of them, you may realize that your research questions are vague, or that the question seems uninteresting, or that you would really like to write about something else. That is rather to be expected, and the purpose of writing this initial draft of a theory chapter is to start engaging with your topic, and learn about it through reading and writing.

The expected result is not a finished Theory chapter, and you will most likely revise it radically several times over before you find that which is really interesting to write about.

As a rule of thumb, expect to write 2-4 pages of your theory chapters thus far, but *make them count*. Do not include overly general background material, or descriptions of technical systems descriptions that may not be material to understand the specifics of your thesis issue.

For example, if you wish to study whether it would be economical to adopt the cross-platform mobile development framework PhoneGap for company X, you could start to write an introduction on company X's products, Android vs iOS specifics and how you write components in PhoneGap. However, this would not help the reader understand how you plan to conduct your study on the economics involved, or how you indeed define an economical choice.

Instead, you should opt for introducing a *theoretical framework* that explains what costs are involved in making this choice, and how they can be evaluated. You could find literature on the total cost of IT systems, with models that include development, testing, and maintenance. Such models may to take into account the cost of training staff to handle different codebases, or the cost of maintenance per line of code, or the estimated cost of upgrading software for new versions of platforms.

Share your theses and revised thesis plans on Gitlab **two days** before the seminar.

Review

Read all other theses from your group and answer the questions below.

Questions

For each thesis report that you read, consider the following questions. Justify your answer by referring to the course literature including the papers you read before seminar 2.

1. Does the theory cover both techniques relevant to the project and research methods employed in similar work? Is there material that seems superfluous given the research question? Justify your answer.
2. Are the references used in the thesis relevant to support the claim in the thesis? Are they peer-reviewed and well cited? Are they specific to the claims that they are used to support? Justify your answer.
3. How would you assess the thesis based on the grading rubric (attributes *Introduction*, *Theory*, *Organization* and *Language and form*)?

Submissions

Push changes of your *theses* and revised *thesis plans* to Gitlab **two days** before the seminar. Make sure to have a PDF file in your project repository for everyone to read. Your theses need to be available to all other members of your teams as well as your seminar leaders (Ola, Azeem, Aseel or Oscar).

Your answers to the questions need to be available on Gitlab **at the seminar**. Commenting on each others' theses should result in *issues* or *comments* on existing issues.

Reading material

- The *Theory* chapters of the Master's theses by the other students in your group.
- Four papers relevant to your theory sections

The seminar

During the seminar, each seminar group will compare answers to each question in turn. You must have the material that your answers refer to available during the seminar. As you discuss the questions during the seminar, make sure to engage in a dialogue on how to *improve* the proposed thesis topic, given the information available thus far. That is, instead of just answering "yes" or "no" to the questions above, use them as a reference point for discussions on how to improve the thesis. Compare with the published thesis you have read, as well as other publications.

Seminar 5

Purpose

To understand how to formulate and discuss results, and critically review results and methods employed in a thesis. To understand how to put a thesis in a wider context.

Preparations

Read the *Results, Discussion* and *Conclusion* sections of the published Master's thesis pertaining to your group.

IT systems have profound effects on users, organizations and society as a whole. IT systems have enabled us as a society to transform how we find partners, how we find work and learn, how we communicate and make our purchases. As we are working to understand the real effects of the Digital Economy, we have become increasingly aware of problems caused by our use of IT systems. As for the electronics themselves, IT systems are built using minerals from the conflict-ridden regions of eastern Congo, they consume enormous amounts of power, electronic waste products are for the most part just dumped in poorer regions of the world with no environmental concerns. Also, among the effects on people, we know that social media use leads to social ills and disorders and internal IT systems are often a cause of workplace stress. Also, more interconnected systems present us with more vexing security problems as we no longer have full control over where sensitive data is stored in the cloud, and have to be much more cautious about how we provide access to information.

As engineers, we therefore have a great responsibility in designing IT systems as they will have far greater effects than we often imagine. During your Master's thesis work you will get to analyze, develop and evaluate the effects of IT systems. Some of you will conduct studies on the design and requirements of software, others on the maintainability of software, and yet others will study the technical feasibility of certain technical platforms. Depending on the type of work that you do, you will need to place your work in a proper wider context and reason about the implications of your work. For this purpose, you will need to prepare by understanding some of the general effects of IT systems (see the links above), and also selecting one of the publications in the reading list. Each pair or individual will read one of the papers above that you find most relevant, not necessarily the same as the papers read by others in the same team.

If no suggested paper seems appropriate for understanding the wider implications of the type of thesis that you intend to write, you are allowed to choose another paper, as long as it is intended to provide guidance on understanding the wider implications of the type of work you intend to do in your final work.

Take notes while reading the paper, and make sure that you can present the main contents of the paper to the peers in your team.

Reading material

- The *Results, Discussion* and *Conclusion* chapters of the published Master's thesis pertaining to your group.

- **For theses on maintaining and developing software (applicable for thesis themes 1, 3)**:
    - Durdik, Zoya, et al. "Sustainability guidelines for long-living software systems." 28th IEEE International Conference on Software Maintenance (ICSM). IEEE, 2012.
- **For theses on designing hardward systems (applicable for thesis theme 2)**:
    - Komeijani, Mona, Erinn G. Ryen, and Callie W. Babbitt. "Bridging the Gap between Eco-Design and the Human Thinking System." Challenges 7.1 (2016): 5.
- **For theses on defining requirements for and designing software (applicable for thesis themes 3, 4, 5)**:
    - P. Lago, S. A. Koçak, I. Crnkovic, and B. Pensenstadler, "Framing sustainability as a property of software", Communications of the ACM, vol. 58, pp. 70–78, October 2015.
- **For theses in theoretical computer science (applicable for thesis theme 6)**:
    - Thurston, William P. "On proof and progress in mathematics." Bulletin of the American Mathematical Society 30.2 (1994): 161-177.
- **For theses on investigating machine learning or AI techniques (applicable for thesis theme 7)**:
    - Moor, James H. "The nature, importance, and difficulty of machine ethics." IEEE intelligent systems 21.4 (2006): 18-21.
- **For theses on IT security (applicable for thesis theme 8):**
    - Ren, Kui, Cong Wang, and Qian Wang. "Security challenges for the public cloud." IEEE Internet Computing 16.1 (2012): 69-73.

Questions

For the thesis that you read, consider the following. Justify your answer by referring to the course literature including the papers you read before seminar 2.

1. How can you explain the results, and how they have been obtained through the method described? Do they seem to address the research questions properly?
2. How is the replicability, validity and reliability of the results discussed? For definitions of validity and reliability, see the *Instructions for final thesis reports*, section 5.2.3 of Runeson and Höst (2009) as well as the other papers you may have read during the course.
3. How are ethical and societal considerations taken into account in the discussion? Refer to section 3.3 in Runeson and Höst (2009) for descriptions of some ethical considerations that are of importance during Case Study research, as well as the papers in the reading list above. If ethical and societal considerations are not taken into account appropriately, explain which considerations seem relevant for the thesis at hand and how you would have liked them to be taken into account.
4. How would you assess the thesis based on the grading rubric? Justify your answer.

For the paper that you read, answer the following questions:

1. How can you make use of the material in the papers when framing your own thesis work in a wider context?
2. How would you define the context of your thesis? Justify how you would frame this context, given the literature.

Submissions

Upload your answers to the questions above in plain text or Markdown to a folder of your common Gitlab project for your team pertaining to the seminar, named after the individuals who submitted the answers. That is, if your team has the Gitlab project TDDD89-HT2017-A1, your LiU-id is abcde123 and your partner's LiU-id is qwert456 you should upload your responses as **abcde123_qwert456_responses.txt** to a folder **Seminar_5.**

Your answers need to be available on Gitlab **at the seminar**.

The seminar

During the first half of the seminar, each seminar group will *compare answers to each question regarding the published Master's thesis* in turn. You must have the material that your answers refer to available during the seminar.

During the second half of the seminar, you will present to one another a *summary the paper that you read* as preparations and discuss your answers to the questions pertaining to the papers. Also, we will have a short joint discussion on assessing a Masters' thesis in a wider context.

Seminar 6

Purpose

To formulate and analyze a plan for a scientific study, and to formulate and analyze a method for a scientific study.

Preparations

Thesis revision

Revise your thesis according to the feedback you received at seminar 4. You should add at least *three more references* to your *Theory* chapter, as we expect that you will have found more information on your topic area compared to the submission for seminar 4.

You will need to include references to how studies are generally conducted in your area of research. In the *Reading Material* section for seminar 2, there is a list of references for you to choose from. If none of the references felt relevant to your particular thesis topic, feel free to use another, similar reference that provides guidance and examples of how to apply specific methods in your thesis. If there are no publications with guidelines for how to conduct studies in your particular area, feel free to use related publications as a point of departure, and write a *Related Work* section to describe other work in the area, borrow suitable ideas from other studies and compare them to your own.

Thesis plan

Add a 20 week time plan to your thesis plan with weekly activities, complete with mid-thesis review and final presentation. You should have some understanding of how long it takes to write different parts of your report, and to search for information. Take that into account as you formulate your plan for the subsequent work with your thesis. The time plan should be written as a Gantt chart where weekly activities are described, along with a more detailed description of the activities in the Gantt chart.

Based on your current understanding of the problem area that you will do your thesis in, also list **decision points and risks** in your thesis plan that you will need to manage during your work. There are a lot of potential pitfalls during a 20 week project (equipment unavailable, technical issues with your development/deployment environment, increased time to learn techniques or implement solutions), and you should try to imagine what those risks may be and how best to address them. Maybe you need to have a couple of parallel activities each week that you can select from, based on what is possible to work with? Maybe you need to have fallback options available if your main course of action proves more difficult than you imagined?

Make sure to plan writing on your report continuously, and to provide weekly, short written summaries of your work. These will be useful at the end, when you are required to write a reflection on your thesis work (in Swedish).

Method chapter

Write your *Method* chapter of your thesis. Make sure to adhere to the the *thesis instructions* and look at the *checklist* for thesis reports.

If your thesis is *mainly theoretical*, you will need to give examples of earlier publications you will take inspiration from when trying to prove results as part of your thesis, and write an extended *Related Work* section instead.

Review

Read all other theses from your group and answer the questions below.

Questions

For the thesis that you read, consider the following questions. Justify your answer by referring to the course literature including the papers you read before seminar 2.

1. Is it clear how the results will be obtained using the method described? Does the method seem relevant with respect to the research questions? Justify your answer.
2. Are alternative methods presented in a manner that demonstrates awareness of possible methods? Justify your answer.
3. Does the chapter describe clearly how to obtain results that will be *valid* and *reliable*? Justify your answer.
4. How would you assess the thesis based on the grading rubric (all attributes)?

Refer to the *Theme-specific paper* relevant to your group below when evaluating your peers' Method chapters (see Seminar 2).

Submissions

Push changes of your *theses* and revised *thesis plans* to Gitlab **two days** before the seminar. Make sure to have a PDF file in your project repository for everyone to read. Your theses need to be available to all other members of your teams as well as your seminar leaders (Ola, Azeem, Aseel or Oscar).

Your answers to the questions need to be available on Gitlab **at the seminar**. Commenting on each others' theses should result in *issues* or *comments* on existing issues.

Reading material

- The *Method* chapters of the Master's theses by the other students in your group.
- Earlier material used in the course.

The seminar

During the seminar, each seminar group reviews the thesis chapters that you have written until the seminar. You must have the material that your answers refer to available during the seminar.

Final submissions (UPG1)

After the final seminar, all subgroups (individuals or pairs) are required to submit their final versions to their respective assistant's URKUND e-mail address (listed on the Staff page on the course web) as well as pushing a final version of your thesis to Gitlab. URKUND is used to verify that your submissions are not plagiarizing other published material. You will need to have submitted your final version by **no later than January 6, 2018**.

As you revise your reports, you will need to take the following into account:

- You must follow the grading rubric used for the course and at least fulfill the requirements for a passing grade (yellow) in each category.
- The comments you received from your peers and from staff during the seminars shall form the basis for revising your thesis.
- No open issues shall remain on Gitlab at the time of making final submissions.
- Your final submissions shall comprise 10-15 pages of text, excluding introductory pages (title, table of contents, ...) and references.

Re-submissions

Those who fail final submissions will have two more opportunities to submit their reports to URKUND (as stated above) for approval. Reports submitted before these dates will be graded directly after these two dates:

- **April 3, 2018**
- **June 4, 2018**