KTH Electrical Engineering

Electric Power Systems Lab

EG201X DEGREE PROJECT IN ELECTRIC POWER SYSTEMS

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Master Thesis Projects at Companies

This instruction is for supervisors and students of master thesis projects in electric power systems at companies. Both the external supervisor at the company and the student should read the course syllabus that is available at the course web pages before starting the master thesis project.

You are most welcome to suggest improvements for this document to the course coordinator.

Principle of Public Access to Official Records

In Sweden we have the principle of public access to official records, which makes documents that concern the working of public authorities open for everyone. Public authorities must keep records of these documents. In other words KTH is obliged to keep records of the master theses. Even though if a report is not available on the KTH web pages the report must still be available on request. This implies that the main work of the thesis can not be confidential. However, detailed data might sometimes be confidential and can then be excluded from the report.

If the report has confidential data that the company do not want to be public this can be solved in two ways:

- The student may use fictitious data or summarized data in the thesis. If summarized data is used, the student must still present his/hers sources and an overview of the input data that is sufficiently detailed to make the results reasonable.
- The student may write two reports; one internal report for the company and one for KTH either using fictitious data or using summarized data. Remember that it is the KTH report that will be graded. This means that it is important to give input data that is sufficiently detailed to make the results reasonable.

Examiner and Supervisors

If the project is initiated outside KTH for example at a company the initiator should contact the course responsible who will find a KTH supervisor and an examiner. A student at a company will have two supervisors; one at the company (preferably the initiator of the project) and one at KTH.

The student that take on a project that is in cooperation with a company has a twofold assignment. Both to fulfil the assignment given by the company and to fulfil the requirements for a mas-

ter thesis project at KTH. If the master thesis fulfil the KTH requirements will be decided by the examiner at KTH.

Formulating Projects

There should be a project description for each master thesis that is started. Some projects can be initiated and formulated by the students themselves or by the industry. Projects are also formulated by the Electric Power Systems Lab. If you have an idea for a master thesis project, you should write a project description and send to the course coordinator. The project description will then be published on the course web pages.

The project description should be two or three pages and must include the following points:

- **Background.** This section provides a general background for the project. The background should for example explain why this project is interesting, who has initiated the project and how will the results of the project be used.
- **Problem definition.** Here it is stated what the objectives of the project are, i.e., which engineering and scientific challenges will be studied. It should be clear which problems that are expected to be solved within the master thesis work and if there are any further questions that will be addressed only if time allows.
- **Time plan.** The time plan should divide the project in smaller tasks, where it is stated for each task what should be done. If possible, it should also be stated which method that will be used to solve the task.
- **Qualifications.** State which background that is required for students who want to apply for the project. The requirements can be general (for example "interest for power system dynamics"). You can also require that the candidate has passed specific courses. You may also require that the student has passed with a specific grade (for example "EG2050 System Planning, grade C or higher"). You may also add recommended courses (for example "It is preferable if the student has passed one or more of the courses EG2040 Wind Power Systems, EG2060 Electricity Market Analysis and EG2080 Monte Carlo Methods in Engineering). Finally, you can require that the student has some special knowledge (for example "The student must be familiar with the GAMS optimization software").
- **Contact person.** E-mail and telephone number to one or more contact persons that can provide more information about the project.

In addition to the points above, it may be good to add the following information in the project description:

- **Time line.** Is there a deadline for applications? When can the project start? Does it have to be finalised by some specific time?
- **References.** Literature or web sites providing further background on the project.

Mandatory Presentations and Exercises

There are three mandatory presentations during the thesis project; the start-up presentation, the mid presentation and the final presentation. All three presentations are described in the course syllabus.

If the student is performing the thesis project at a company in another country and cannot be at KTH it is possible to do the start-up and mid presentations over telephone. Both the KTH supervisor and the examiner should take part in the start-up presentation and the mid presentation. It is preferable if the external supervisor also can participate in the presentations. If the student will do the presentations over telephone the external supervisor could be present when making the telephone call.

When the examiner has assessed that the technical report is completed the student can give the final presentation at KTH. This presentation is not allowed to do over telephone. The final presentation will be given as a seminar at KTH. The opponent, the KTH supervisor and the examiner are three persons in the audience. Of course the external supervisor is also very welcome to the seminar.

The KTH supervisor and the external supervisor should give feedback on the start-up presentation and the mid presentation. Both supervisors should also give feedback on the introduction chapter that the student handed in before the start-up presentation as well as on the technical report before the mid presentation and before the final presentation.

In the course syllabus and on the course web pages the mandatory exercises in the course are described. It is the KTH supervisor that will give feedback on the mandatory exercises (direct meeting or telephone meeting).

Technical Presentations at Company

In one of the four mandatory exercises the student should attend two final presentations of other master thesis projects and write a small evaluation of the presentation and the following discussion. If the student performs the master thesis project at a company and has no possibility to attend final presentations at KTH, the student could attend other technical presentations at the company. Examples of technical presentations at companies are seminars, workshops or internal company meetings. Presentations outside the company is also possible such as presentations at a nearby university, conferences, seminars, and workshops. The requirement is that it should be technical presentations of an advanced topic with a following discussion. The supervisor at the company should help the student to see what technical presentations that are given at the company.

Supervision

It is reasonable for the students to expect the KTH supervisor to spend in average one hour every week to meet the student for advice and discussions. External supervisors may be prepared to put more or less time on supervision, depending on the nature of the project. In addition to that, the supervisors can be expected to read and comment the written report from start to beginning at least twice, for example before the mid presentation and before the final presentation. It is up to the student and supervisors to agree on exactly how the supervision is to be organized. Even though the student receives the most supervision by the external supervisor it is still important to keep the KTH supervisor updated. In the end it is both the supervisors that will recommend a grade for the master thesis project to the examiner.

Continuous telephone meetings where the student, external supervisor and KTH supervisor discuss the work together is recommended.

Grading

The master thesis work is graded on a scale A-F based on the student's performance within six different aspects of the degree project. The grade is set using a grading matrix. The external supervisor and the KTH supervisor should suggest a grade to the examiner. It is therefore important that the external supervisor study the grading matrix given in the course syllabus. The final decision on grade is taken by the examiner.

The aspects of the student's performance that the external supervisor will give feedback on are: planning, initiative, content and report. More details about how these aspects are evaluated are given below.

Planning

In the beginning of a master thesis project, the student and the supervisors (both external and KTH supervisors) agree on a time plan for the project, and the student is then expected to follow this plan. If necessary the plan can be modified in agreement between the student and the supervisors.

The following criteria are used to evaluate the student's planning:

- **Good.** The student can plan and mostly carry out the project within agreed time frames. All larger changes of the time plan must be reported in advance to the supervisor.
- **Delayed.** The student can plan the work, but has difficulties to carry out the project within agreed time frames. It has occurred that changes of the time plan has been reported to the supervisor at a later time.
- **Insufficient.** The student can either not plan the work or has not respected agreed time frames.

Initiative

An important part of the master thesis work is to learn to work independently. This means that the student should be able to show initiative and solve the problem without detailed instructions from the supervisor. To achieve this, the student must be able to learn new methods, adapt old methods to new problems, collect data, discuss with experts in the field, etc. The supervisor can provide advice to the student where to find the knowledge necessary to solve the task. In some cases it might be the supervisor who is the best source of knowledge for the student! A student who asks technical questions on a high level to the supervisor may thus be showing good initiative.

The following criteria are used to evaluate the student's initiative:

- **Excellent.** The student can independently identify one's own need for new knowledge and acquire this knowledge.
- **Good.** The student can acquire new knowledge from different sources.
- **Low.** The student does not search for new knowledge, but can acquire new knowledge after detailed instructions from a supervisor.
- **Insufficient.** Lacks the ability or desire to acquire new knowledge.

Contents

The contents of the master thesis refers to the ability of the student to manage the engineering and scientific problems that are part of the project, for example problem definition, modelling, analysis, development and evaluation. The review of the contents is based on what the student has achieved in comparison to the questions raised in the project description. However, sometimes it can turn out that a problem is far more complex when what was predicted in the project description. In those case the student can after agreement with the supervisor choose a simplified solution methodology or remove the problem from the project.

The following criteria are used to evaluate the contents of the master thesis:

- **Above expectation.** The student has solved the basic problems and also addressed further questions or managed challenges that were not foreseen in the project description.
- **As expected.** The student has solved the basic problems. Challenges that were not foreseen in the project have, after consultation between the student and the supervisor, been either considered superficially or neglected entirely.
- **Below expectation.** The student has not been able to or have run out of time to solve the basic problems, even though they have not been more difficult than foreseen in the project description.
- **Insufficient.** Significant lack of engineering-related or scientific skills or lack of methodology despite request from supervisor.

Report

The review of the report is depending both on how well the student describes the work performed and the conclusions, as well as language and format. Good language means that the report does not contain language errors that makes the reading difficult, i.e., occasional spelling errors or grammatical errors are acceptable. Format refers to the rules for report described under the heading *Technical Report* above.

The following criteria are used to evaluate the report:

- **Good.** The report is well-written, i.e., the presentations of the background, methods and models as well as results are easy to follow. Moreover, the conclusions must be clearly supported by results from the report. Finally, good language is necessary and the instructions for structure and format must have been followed correctly.
- **Some flaws.** The report as a whole gives the reader a good understanding of the work that has been done, although some parts of the report does not fulfil the requirements for a good report.
- **Serious flaws.** The report as a whole gives the reader an understanding of the work that has been done, but there are such flaws in detail level, argument, structure or something else, that a reader without very good prior knowledge will have difficulties in understanding the contents of the report.
- **Inferior.** •The student has not corrected important flaws in the report in spite of requests from the supervisor.