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Thesis work for a Master of Science in Engineering Physics, 30.0 ECTS – Instructions for the examiner

1 Introduction

You have been chosen to be the examiner of the thesis work for a master of science (M.Sc.) degree in Engineering Physics—meaning that you are the one that will determine whether or not a student pass, or fail, his or her final work. This responsibility is given to you since the course director, and thereby also the managers of the programme, trust in your expertise and experience in the thesis topic and academia in general.

Note: If you are familiar with our routines you do not need to go through the entire instruction row-by-row since you can find a quick check-list in appendix A, that covers the responsibilities of each involved person.

Your task is to attest that your student shows a deep enough advancement in the chosen field and that his or her work is of high-enough quality. You will therefore have to keep up with how the thesis work progresses throughout the entire project. Besides evaluating the work of your student, you will also act as the chairman of his or her presentation, where you will examine the oral presentation of your student, and the performance from the opponent of that presentation. This document has been put together in order to facilitate your work and guide you through the course outline, routines, and what is expected from you as an examiner of the course.

1.1 Syllabus

As in any other course there is a course syllabus, which you can find in appendix C (only given in Swedish). Among other things the syllabus emphasises that one aim of the course is that the student should be able to lead and execute a time-limited project, in a context that resembles a potential work environment. This is in order to gain insight in the conditions necessary to execute an effective and a safe working process that leads to satisfactory results.

As stated, one can clearly see that the process to achieve the results is equally, or more, important than the final results. The key concept is that the student should show that he or she actually is capable of leading and finalising a project within the framework of the time-limited course. This concept is also a major part of both the national and the locally determined degree objectives, see appendix D (only available in Swedish), and that is one reason why your role as an examiner is of highest importance.

1.2 Examination

According to the syllabus there are three core elements of the course that the student will be examined on. These are:

- i. a written thesis,
- ii. an oral presentation and defence,
- iii. an opposition, i.e. an evaluation of another thesis work in connection to when it is presented.



UMEÅ UNIVERSITET

Out of these three core elements you will examine the first two for the student you are assigned, and the last element for the student taking on the role as the opponent for the presentation by your student. For each of these three elements a student is given either a Pass (G) or Fail (U), and in order to pass the entire course all elements must be approved. More information regarding the examination will follow in section 1.2.1.

However, it is worth emphasising that although there are elements in the course that are not examined directly, they are mandatory in the sense that the thesis work can only be carried out to satisfaction—while fulfilling the course objectives—if they are properly dealt with. These elements, should hence be indirectly examined by you, and include e.g., planning, response to feedback, reconciliation, and time management.

Table 1: A general assessment template guiding the thesis evaluation.

Moment	Element	Evaluation criteria
Planning	Project plan	Clarity, thoroughness, plausibility, limitations, etc.
	Time plan	Thoroughness, disposition, plausibility, etc.
	Other policy documents ¹	Attention to detail, risk awareness, etc.
Execution	Regular updates	Long-term planning, regularity, feedback and revision, follow up, time management, etc.
	Half-time presentation	Disposition of information and time, clarity, basis, discussion material, insight in the field, etc.
	Engineering / Scientific approach	Independence, problem solving and analysis skills, professionalism, etc.
Finalisation	Popular scientific summary	Easiness, is the text intriguing, relevance, language, disposition of information, etc.
	Written thesis	Disposition, layout, language, clarity, coherence and cohesion, balance, subject specialization, scientific correctness, analysis, reasonable conclusions, insight in the limitations of the work, the work from a broader perspective, etc.
	Oral presentation	Disposition of information and time, clarity, intelligibility, adaptation to audience, emphasis on own contribution and its basis, insight in the field, discussion material, professionalism when presenting and defending, etc.
Opposition²		Insight in the field, professionalism, constructiveness, phrasing of questions, disposition, relating to both thesis and presentation, etc.

1.2.1 Evaluation criteria

Each thesis is unique in one way or another, and it is extremely difficult to formulate a generic evaluation scheme; this is where your expertise and experience comes in. However, a template covering the overall topics and the corresponding evaluation criteria has been formulated, in order to facilitate your work as examiner. This general assessment template is shown in table 1, and it aims to emphasise the key points of each element and the importance of not only the final thesis but also the way the work was carried out. Since the template shown in table 1 has its heritage in a

¹Only if necessary for realizing the project.

²Assessed by the candidate's examiner.



UMEÅ UNIVERSITET

Swedish version, it might be interesting to check both if any confusion arises. You can find the original Swedish phrasing in table 2 of appendix B.

1.3 Persons involved in the course

There are basically (at least) four persons involved in the course: (i) the student carrying out the work, (ii) at least one supervisor, (iii) an examiner, and (iv) the course administrator. A short description of the role of each person in the course follows below.

1.3.1 The student

The student is the main responsible person that will lead and execute the thesis work. When accepted to the course the student is on his or her way to finalising his or her master's degree in Engineering Physics, and thereby has (at least) 270 ECTS worth of knowledge in his or her portfolio. The topic of the thesis, and where the work will be conducted, has been determined by the student.

1.3.2 The supervisors

To facilitate the student's work he or she will be assigned at least one supervisor. This supervisor will be assigned by the working place and is there to assist the student in his or her daily work. If the work is conducted outside of the department, an additional supervisor might be assigned by the Department of Physics. However, the department-associated supervisor stays with the student and embraces the role as co-supervisor in order to ensure a high academic level of the work.

It is primarily to the supervisor/supervisors that the student should turn when facing difficulties, or when in need to ventilate problems and/or questions. It is therefore important that you and the supervisor/supervisors keep an open dialogue throughout the entire course, so that your communication and feedback to the student is clear and coherent.

1.3.3 The examiner

Your role is to examine the work of the student, from initialisation to finalisation. You will be the person that has the final say in whether or not the student has passed the course criteria and thereby if he or she deserves a M.Sc. degree in Engineering Physics. Your role is to passively survey the progress, giving your input when asked for or if noticing something that would hinder the realization of the project. At the end you will also be the chairman of the thesis presentation and the one that iterates the final thesis to the student until you find it to be good enough for approval.

Primarily you will give your input to the student via his or hers supervisor/supervisors, although an open communication to everybody involved is also plausible.

1.3.4 The course administrator

The course administrator is the person that has the administrative responsibility. The course administrator is the main responsible one and thereby the one that assigned you and the department-associated supervisor. If you experience any problems or unclarities regarding routines, practicalities etc. during the course it is to the course administrator that you should turn.



UMEÅ UNIVERSITET

2 What we expect from you

The following subsections will cover more or less everything we expect from you as an examiner. The information is aimed to be rather short and concise. With that said you can always tend to the instructions handed out to the student, if you want to know more about what information the student is given. In those, more complete, instructions you will find e.g. what is suggested to be covered in the project plan, suggested structure, disposition and layout of the final thesis, details regarding the final presentation and publishing [1].

2.1 Initial phase

The student will be the person that initializes your contact, and he or she is recommended to establish a communication platform to which everybody involved in the project should have access. This could either be via the platform Canvas, which is provided and maintained by Umeå University, or something similar.

During the initial phase the student will make a pre-study upon which he or she will base the preliminary project plan. It is your task to respond whether or not the plan is plausible, if it is advanced enough to reach the course criteria, and if the time plan and limitations seem reasonable. If you have suggestions for improvements or if you need clarification on certain topics etc. you should communicate this to everybody involved so that changes can be made and the plan fixed. If you feel that the topic is way too simple and unacceptable, you should alert to the course administrator so that a discussion between everyone involved can be carried out; aim to find a way of adapting and establishing an acceptable plan.

Worth to emphasise is that it in some cases can be of interest for external partners to enter a confidentiality agreement, which could hinder or at least make it more difficult to publish the thesis. Such an agreement can thereby also hinder your evaluation of the work, and it is therefore of highest importance that any such agreements are discussed before anyone signs an agreement. In the case that a confidentiality agreement is required for initialising the project, all persons affected must be in agreement on how to handle the confidential data without hindering evaluation of the work. In these cases the course administrator should be advised.

2.2 Throughout the course

The student has the responsibility to keep you updated throughout his or her work. Since the student has at least one supervisor to tend to when in need, your responsibility is more to follow the progress and intervene only if necessary. This will enable you to have an impartial view on the work when it comes to your evaluation.

Half way through the project, i.e. about 10 weeks into the course, the student should call for a half-time presentation. This presentation should be held for you and possibly the supervisor/supervisors. The date for this presentation should preferably be set during the initial phase. The half-time presentation is supposed to be less formal than the final presentation, and could be held via video-link (e.g. Skype) or on site. The idea is that the student is given maximum 20 min to present his or her work so far, what he or she plans as the next steps, and what problems and risks he or she foresees. As seen in table 1, this presentation should be well prepared. After the presentation you should together discuss what the next steps of the project should be and what to focus the remaining time on.



UMEÅ UNIVERSITET

2.3 At the final phase

When the final thesis is more or less complete, i.e. when both the student and the supervisor/supervisors (after consulting you) consider that the thesis is ready for defence, the student will sign up for one (out of the yearly five) occasion for thesis presentation. When doing so he or she can wish for a specific time during the day if any involved part favours one. The sign-up for a specific occasion closes two weeks before the actual date, so that both you and the opponent have enough time to thoroughly go through the thesis before the “defence”. When doing so you should not forget to run the thesis via a plagiarism control, i.e. www.urkund.com, to make sure that the thesis is free from any form of plagiarism. The policy towards plagiarism is strict at Umeå University and you can find more information under [2,3]. Remember that a confidentiality agreement might require extra considerations before running the thesis via plagiarism control.

At the latest two days before the above mentioned “defence” you should have received a document from the opponent where he or she has formulated some questions, thoughts and possibly some critic to the defendant. This material is handed to you so that you can make sure that the opponent has gone through the work from your student and that he or she actually is well prepared for the opposition.

During the actual presentation from your student you will be the chairman, meaning that you will be the person giving out the word and making sure the schedule is kept. The maximum time for the entire “defence” is set to 50 min. The routines and time distribution for this procedure follows below:

- Introduction:** You should briefly introduce the defendant (i.e. the student) and his or her topic. Before giving her or him the word you should also inform the audience about your role, who the opponent is, and the overall routine of the presentation.
- Presentation:** The student is given maximum 30 min for the presentation. If he or she tends to exceed the given time, you should smoothly intervene and inform him or her about how much time is left so that he or she gets the chance to finish with grace. If, however, the presentation still overshoots in time you should interrupt the defendant and continue on with the routine.
- Opposition:** When the presenter is done with his or her presentation, you should give the word to the opponent. Remember that you are the examiner of that opposition. The time limit of the opposition is rather vague, since it depends on how good the discussion goes, but as a rule of thumb you should not let it last for more than about 10 min.
- Open discussion:** When the opponent is done with his or her feedback, questions, and comments, it is time for an open discussion. You should primarily leave the word open for the audience, but it is also here that you can, and should, post own questions to your student.

After the presentation you should report to the examiner of the opponent whether or not you could approve his or her student. It is also time to sit down with your own student to discuss the thesis in more detail and agree upon what is left to fix, improve, and/or add before the thesis reaches the quality necessary for your approval.



UMEÅ UNIVERSITET

2.4 If problem arises

Sometimes things do not go smoothly and that is when you should contact the course administrator. You are always welcome to contact the course administrator if you have questions or problems, so that you together can tend to the problem. With that said there are some situations when it is of extra importance get in contact: (i) if a confidentiality agreement is suggested, (ii) if the thesis work tend to drag on, (iii) if the final thesis is so poorly formulated that it would require major measures to get it up to an acceptable level, (iv) if you detect that parts of the thesis is plagiarised, (v) if you are unable to approve the student or his or her opponent.

2.5 After your verdict

Independent of whether the work from your student is approved or not you should report your verdict to the course administrator as well as the study administrator at the Department of Physics. The contact information follows below:

Course admin: Rasmus Öberg
Email: rasmus.oberg@umu.se

Study admin: Gabriella Allansson
Email: gabriella.allansson@umu.se
Phone no.: 090 786 6740

You will then receive a form to fill in. The form is relative simple but note that the course name is "Examensarbete för civilingenjörsexamen i teknisk fysik" and that it has the course code 5FY123.

If you have approved the thesis, the student will send it for printing and also upload it on the centralized digital archive DiVA. Remember that uploading and printing might be difficult if a confidentiality agreement has been signed, and hence extra considerations might be necessary.

2.5.1 Course evaluation

When everything is done, uploaded and reported, you will receive a web-based course evaluation form. This is sent out to everyone involved in the project so that we can continue with our work of continuously enhancing the quality of the course. Therefore we would greatly appreciate it if you took the time to carefully fill it in (so that we know where to focus our time and energy).

2.5.2 Remuneration for your work

The agreed remuneration for your work will be handed out as soon as your verdict and course evaluation have been reported. The invoice should be sent to the department of Physics and the agreed remuneration should be specified. If you have questions regarding your remuneration, feel free to contact: Ann-Charlott Dalberg via ann-charlott.dalberg@umu.se, or +46 (0)90 786 5047.

Good luck in evaluating the student and thanks for your hard work!

... and remember to fill in the evaluation.



UMEÅ UNIVERSITET

References

[1] Institutionen for fysik, Umeå universitet (2016). Examensarbete for civilingenjörsexamen i teknisk fysik, 30.0 hp - Anvisningar for studenten.

[2] Umeå universitet (2010). Fusk och plagiat.

http://www.student.umu.se/digitalAssets/60/60980_fusk-och-plagiat-101230.pdf (2015-09-01).

[3] Umeå universitet (2015). Upphovsrätt. <http://http://www.ub.umu.se/skriva/upphovsratt> (2015-10-14).



UMEÅ UNIVERSITET

A. A common check-list for main persons involved

Check-list: who does what?

The student

- Initializes contact with supervisor/supervisors and examiner.
- Establishes a communication plan and platform (e.g. via Canvas).
- Makes the pre-study and project plan.
- Leads the project forward and makes sure that the work progresses.
- Continuously monitors and revises the project plan.
- Maintains the communication plan and platform.
- Calls for half-time presentation.
- Writes the thesis.
- Signs up for final presentation.
- Prepares and presents the presentation.
- Evaluates the thesis work of another student—both in written form and orally as an opponent.
- Uploads the thesis to DiVA and sends it to print.
- Fills in a course evaluation.

The supervisor

- Supports and assists the student in his or her daily work, from the beginning to the end.
- Attends the half-time presentation (preferably).
- Takes part in the communication at the communication platform.
- Advises the student in terms of choice of method.
- Keeps an extra eye on the project plan and time plan.
- Gives feedback and support in the thesis writing.
- Fills in a course evaluation.



UMEÅ UNIVERSITET

The co-supervisor at the Department of Physics (if applicable)

- Actively follows the progress and gives support when necessary and/or asked for.
- Takes part in the communication at the communication platform.
- Attends the half-time presentation (preferably).
- Is the main responsible for advising the student in writing: to ensure high academic quality.
- Fills in a course evaluation.

The examiner

- Is the main responsible to ensure that the thesis is specialized enough.
- Evaluates the pre-study, both in terms of specialization and time management.
- Passively follows the progress and gives support when necessary and/or asked for.
- Keeps an open dialogue with the supervisor/supervisors.
- Attends the half-time presentation.
- Gives approval to present when the thesis is complete enough.
- Acts as chairman during the final presentation.
- Examines the opponent at the presentation.
- Runs the written thesis for plagiarism control.
- Examines the written thesis and the oral presentation of the student.
- Reports whether or not the student has passed the course criteria.
- Fills in a course evaluation.



UMEÅ UNIVERSITET

The course administrator

- Administrates the thesis work.
- Assigns the examiner and department-associated supervisor.
- Hands out the necessary information for initialisation of the project to all parties involved.
- Assists when asked for throughout the entire progress.
- Handles the administration of the final presentation (date, room, etc.).
- Checks that the examiner has made a plagiarism control.
- Reminds the student, the supervisor/supervisors, and the examiner to fill in the course evaluation.



UMEÅ UNIVERSITET

B Evaluation criteria in Swedish

Table 2: The original phrasing, in Swedish, of the general assessment template that summarizes the points that the examiner is to assess for each element.

Moment	Delmoment	Bedömningspunkter
Planering	Projektplan	Tydlighet, utförlighet, rimlighet, begränsningar, etc.
	Tidsplan	Utförlighet, disposition, rimlighet, etc.
	Övriga styrdokument ³	Detaljprecision, riskmedvetenhet, etc.
Genomförande	Löpande rapportering	Framförhållning, regelbundenhet, återkoppling och uppdatering, uppföljning, tidshållning, etc.
	Halvtidsavstämning	Disposition av information och tid, tydlighet, underlag, ämneskunskap, diskussionsunderlag, etc.
	Ingenjörsmässighet / Vetenskaplighet	Självständighet, problemlösningsförmåga, analysförmåga, professionalism, etc.
Framläggning	Populärvetenskaplig sammanfattning	Lättsamhet, intresseväckande, relevant, språk, disposition av information, etc.
	Skriftlig slutrapport	Disposition, layout, språk, tydlighet, "coherence and cohesion", balans, ämnesfördjupning, vetenskapligt hållbara resultat, analysförmåga, rimliga slutsatser, insikt i arbetets begränsningar, placering av arbetet i ett större perspektiv, etc.
	Muntlig presentation	Disposition av information och tid, tydlighet, förståelighet, anpassning för åhörare, underlag och belysning av egen insats, ämneskunskap, diskussionsunderlag, professionalism vid såväl presentation som respondering, etc.
Opponering ⁴		Ämneskunskap, professionalism, konstruktivitet, frågeformulering, disposition, anknytning till rapport och presentation, etc.

³ Endast om nödvändiga för att realisera projektet.

⁴ Bedöms av respondentens examinator.



UMEÅ UNIVERSITET

C Ruling syllabus at Umeå University

Kursplan

Examensarbete för civilingenjörsexamen i teknisk fysik, 30.0 hp

Master's Thesis in Engineering Physics, 30.0 Credits

Högskolepoäng: 30.0 hp

Kurskod: 5FY123

Ansvarig institution: Institutionen för fysik

Datum för fastställande: 2011-06-28

Beslutad av: teknisk-naturvetenskapliga fakultetsnämnden

Giltig från: 2011-06-27

Giltig till: Tillsvidare

Nivå: Avancerad nivå

Huvudområden och successiv fördjupning:

Fysik: Avancerad nivå, innehåller examensarbete för masterexamen

Betygsgrader:

För denna kurs ges endast betyget G Godkänd eller U Underkänd

Innehåll

Kursen innebär att studenten får tillfälle att visa sin förmåga att tillämpa och utveckla kunskaper och färdigheter som förvärvats under studietiden. Detta innebär konkret att studenten ska kunna leda och genomföra ett behovsbaserat projekt med anknytning till utbildningen och i ett sammanhang som liknar en möjlig framtida arbetssituation för en civilingenjör i näringslivet eller akademien. Det innebär även att studenten efter kursens slut ska ha förstått vilka villkor som måste vara uppfyllda för att arbetsprocessen ska vara effektiv, säker och leda till ett tillfredsställande resultat.

Examensarbetet kan göras inom ett av de områden som ingår i civilingenjörsprogrammet teknisk fysik eller inom en kombination av dessa. Under examensarbetet bör arbetet delrapporteras via en projektplattform för att möjliggöra för handledare, examinator och student att effektivt kunna följa arbetsprocessen. Vid arbetets slut presenterar studenten resultatet av arbetet i en slutrapport som redovisas och granskas vid ett seminarium. I kursen ingår också att fungera som opponenter på redovisningen av ett annat examensarbete inom teknisk fysik.

Förväntade studieresultat

Efter genomgången kurs ska den studerande kunna:

- genomföra ett större projekt på ett både ingenjörsmässigt och vetenskapligt sätt inom givna ramar,
- med helhetssyn, kritiskt, självständigt och kreativt identifiera och formulera komplexa frågeställningar,
- hantera frågeställningar inom projektet genom att skapa, analysera och kritiskt utvärdera olika ingenjörsmässiga eller vetenskapliga lösningar,
- visa förmåga att delta i forsknings- eller utvecklingsarbete och därigenom bidra till kunskapsutvecklingen,
- kritiskt och systematiskt integrera kunskap förvärvad under utbildningen med för projektet relevant information hämtad ur annan facklitteratur,
- självständigt identifiera relevanta



UMEÅ UNIVERSITET

informationskällor, utföra informationssökningar, värdera informationens relevans samt använda sig av korrekt referenshantering, • muntligt och skriftligt kommunicera resultat och den kunskap och de argument som ligger till grund för dessa, • kritiskt och konstruktivt bedöma sitt eget och andras examensarbeten med hänsyn till relevanta vetenskapliga, samhällseliga och etiska aspekter.

Behörighetskrav

Examensarbetet skall normalt utföras under det femte utbildningsåret. För tillträde till kursen krävs att studenten har minst 270 hp totalt samt uppfyller samtliga krav under rubrik ”4.3 Övriga krav” i examensbeskrivningen. I undantagsfall kan dispens ges av programansvarig för civilingenjörsprogrammet i Teknisk fysik. Beroende på examensarbetets inriktning kan krav på särskilda förkunskaper krävas. Engelska A och svenska för grundläggande behörighet för högskolestudier.

Undervisningens upplägg

Arbetet genomförs i samverkan med en handledare i nära anslutning till pågående forsknings- eller utvecklingsprojekt och kan utföras såväl inom högskolan som i privat eller offentlig verksamhet utanför högskolan. Arbetet ska omfatta tjugo veckors heltidsarbete och studenten ska ges förutsättningar att planera, leda och slutföra arbetsuppgiften inom denna tidsram.

Under arbetet ska studenten hålla regelbunden kontakt med handledaren och examinatorn. Studenten ansvarar även för att kommunikationen mellan parterna fungerar. Handledaren ska finnas tillgänglig för arbetets dagliga fortskridande under större delen av projektet. Examinatorn ska, som underlag till sitt bedömningsarbete, likaledes kontinuerligt informeras om hur arbetet utvecklas. Examinatorn ska i inledningen av projektet försäkra sig om att alla parter har samma uppfattning om projektets mål och tillvägagångssätt.

Vid projektarbetets slut ges studenten, handledaren och examinatorn tillfälle att utvärdera kursens mål samt värdera och bedöma hur kursen administrerats, om arbetsprocessen varit effektiv, hur formerna för kunskapsredovisningen fungerat och hur samarbetet mellan projektets intressenter fungerat. Vid denna utvärdering ska dessutom studenten värdera sin arbetsinsats.

Examination

De i examensarbetet ingående momenten betygsätts med betygen Godkänd (G) eller Underkänd (U). För att bli godkänd på kursen krävs att studenten:

framlagt ett eget projektarbete i en rapport med betyget G och genomfört en godkänd muntlig presentation, • kritiskt och konstruktivt granskat metoder och resultat från ett annat examensarbete och presenterat i samband med den muntliga presentationen.

Projektarbetet ska redovisas både i en rapport och vid ett seminarium. Rapporten ska beskriva problem, tillvägagångssätt och resultat samt innehålla en utvärdering av resultatet. Den ska vara genomarbetad, väl strukturerad och språkligt korrekt. Studenten kan välja att skriva på svenska eller engelska. Om rapporten skrivs på svenska ska ett



UMEÅ UNIVERSITET

särskilt blad bifogas med titel och sammanfattning översatt till engelska. Vid seminariet presenteras arbetet muntligt. Studenten har möjlighet att välja mellan ett antal olika seminarietillfällen varje läsår. Presentationen görs i samband med minst en annan students presentation, där de studenter som redovisar sina examensarbeten samtidigt fungerar som granskare av varandras presentationer. Det är examinatorns ansvar att inhämta information om hur dennes student klarat opponeringen av en annan student från dennes handledare. Under presentationen ges studenten tillfälle att redovisa erfarenheter och lärdomar av det egna och andras examensarbeten. Granskarens uppgift är att kritiskt och konstruktivt granska metoder och resultat och meddela sina iakttagelser skriftligt till examinator och rapportförfattaren. Vid redovisningstillfället är granskarens uppgift att diskutera det presenterade arbetets förtjänster och brister. Granskningen bör omfatta följande huvudpunkter: uppläggningsen av det muntliga framförandet, arbetets principiella uppläggning, formella och stilistiska synpunkter på rapporten, källbehandling, detaljgranskning av den valda lösningen och sammanfattande slutomdöme.

En student som är utan godkänt resultat efter att handläggarens åtaganden är slutförda har rätt att få en annan examinator utsedd, om inte särskilda skäl talar emot det (HF 6 kap. 22 §). Begäran om ny examinator ställs till prefekten för Institutionen för fysik.

TILLGODORÄKNANDE Tillgodoräknande prövas individuellt.

Övriga föreskrifter

Litteratur

Giltig från: 2011 vecka 27

Litteratur som är nödvändig för kursens genomförande bestäms i samråd mellan studerande, handledare och examinator.