Study guide External Internship

Master Applied Physics

Eindhoven University of Technology

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| Course code & credits: | 3MA15 (15 credits) / 3MA30 (30 credits) / 3APNF15 (15 credits) |
| Level: | Master |
| Program: | Applied Physics and Science Education |
| Responsible lecturer: | Prof. dr. ir. Henk Swagten, h.j.m.swagten@tue.nl |
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| Responsible Applied Physics supervisor: | Examiner appointed for the external internship by the Examination Committee Applied Physics |

**Content**

# 1. Introduction

The 15 or 30 credits external internship project offers you the opportunity to develop your academic skills in a different working environment. The type and content of this internship will depend on your background and ambitions. The subject and location of the internship needs be chosen in close cooperation with a TU/e internship supervisor, who should be an examiner appointed by the Examination Committee Applied Physics.

The procedure for finding a suitable external internship can differ per research group or research institute. General information about the research groups and the corresponding projects, can be acquired via the Applied Physics Marketplace Canvas page. Some groups have a notice board presenting all available projects. Other sections advise their students to contact a responsible Applied Physics supervisor of their interest to get an overview of possible projects. In all cases, the initiative lies with you; well before the intended start of the project activities to identify a project should be started. For more information, click here.

# 2. Learning outcomes of the external internship

After finalizing the external internship, you are able to:

- Work independently or as a member of a team on a problem in the domain of Applied Physics.
- Work in a professional environment, under supervision and in a structured manner. You demonstrably have obtained the required skills and attitude.
- Plan and organize the execution of the external internship project aligned with supervisor(s).
- Execute the project following a scientific research methodology, i.e. formulate a research question, set-up and perform research, interpret and formulate the outcomes and conclusions.
- Clearly communicate about the process, progress, and results both orally (presentation) and in written form (report) on a specialist level
- Contribute to scientific discussion related to the internship.

# 3. Assessment of the external internship

You will finalize the internship with an internship report and a presentation at TU/e. Your responsible Applied Physics supervisor, also first TU/e examiner , in consultation with the external supervisor and a second TU/e examiner, will assess your internship on each of the grading criteria according to the rules mentioned in the External Internship assessment protocol.

# 4. Location external internship

Generally speaking, you must carry out the external internship outside the TU/e campus and therefore also outside the physical location of the Department Applied Physics, including the location of other TU/e departments or institutes at the TU/e campus. If possible, the external internship is carried out abroad, i.e. outside the Netherlands. When you decide to take the internship abroad, you are allowed to carry out the internship at a research institute, a university or a company. Within the Netherlands the internship is carried out at a company or at a research institute (not a Dutch University).

For a more precise description of the regulations for the location of the external internship, please consult the Program and Examination Regulations (OER) AP.

For more information on going abroad, please check the International experience AP page on the education guide

# 5. Planning a 15/30 credits external internship

You can either carry out an external internship of 15 credits or 30 credits, depending on how you have designed your own study program for the Master Applied Physics. The internship needs to be finished within a predetermined and fixed time period. By choosing a 15 or 30 credits external internship, you determine the timeline and the end date of your internship, according to the following rules:

- For a 15 credits (short) external internship, an effort of 420 hours is expected (an equivalent of 10.5 weeks of full-time, 40 hours work per week).
- For a 30 credits (long) external internship, an effort 840 hours is expected (an equivalent of 21 weeks of full-time, 40 hours work per week).
- When needed you are allowed to use a limited amount of extra time to finalize the External Internship project. For both the 15 and 30 ECTS external internship, you receive 160 hours (or 4 weeks of full-time work) allowed extra time.

When planning your external internship, you should keep (public) holidays and part-time work into account, also for the allowed extra time. When needed, you can also distribute the workload over a longer period (part-time work), but keep in mind that this can cause study delay. Before filling in the registration form and starting your external internship, you should discuss your final planning with your responsible Applied Physics supervisor, and also with the external supervisor, and together come to an agreement on the final start and end date and the end date incl. allowed extra time of the project, based on the regulations above. The end date of the external internship includes the submission of the external internship report and delivering the presentation.

**By filling in the start and end date and the end date incl. additional time on the registration form of the External Internship, you agree together with your supervisor that there is the commitment that the project is completed by these dates.**

# 6. Monitoring process of the external internship

Near the initial end date of the project as indicated on the registration form, it is expected you finalize your Bachelor's Final Project. If this seems not feasible anymore, you automatically use your allowed extra time (see chapter 4) after confirmation from your Applied Physics supervisor.

## 6.1 Retake

In case the responsible Applied Physics supervisor has graded the project with a final grade <6.0, and/or one of the criteria, 'Report', 'Presentation', or 'Implementation of the work itself' are graded <6.0, if the level of the project is substandard or if the report cannot be handed in 5 working days before the end date including allowed extra time the External Internship Project will be graded with an insufficient grade.

In that case a retake is offered. Together with your responsible Applied Physics supervisor you will agree on what actions need to be taken in order to improve the project, e.g., rewrite the report and/or deliver the presentation again. For the 15 credits External Internship the time allocated for the retake is at most 160 hours (an equivalent of 4 weeks of full-time, 40 hours work per week), for the 30 credits External Internship the time allocated for the retake is at most 240 hours (an equivalent of 6 weeks of full-time, 40 hours work per week). The end date of the retake is determined by the student in consultation with the responsible Applied Physics supervisor. The start and end date of the retake is communicated to CSA-AP by the responsible Applied Physics supervisor.

An extension of the retake is not possible. If by the end date of the retake the report is not handed in, the External Internship will be graded with a definite insufficient grade. In general, a new project should be started.

### 6.2. Personal circumstances

If personal circumstances will cause a delay, you and your responsible Applied Physics supervisor should get in contact with the MSc. academic advisor. You can discuss whether continuation of the current project would be a feasible option. When there is a possibility for continuation of the project, new agreements regarding the throughput time of the project need to be made and communicated to the education coordinator.

Permission for longer extension can be asked to the Examination Committee in certain conditions comparable to those mentioned in Appendix 2 to Article 1.3.3, paragraph e, of the Regulations of the Examination Committee. In any case the following personal circumstances must be recognized: illness, exceptional family circumstances, pregnancy and childbirth, dual career (top talent), or other situations involving circumstances beyond the student's control.

## 7. Guidelines external internship report

The outcomes of the external internship have to be described in a compact, written report in English, preferably not exceeding 20-30 pages or 10,000 words, without supplementary material. The format of the report needs to be agreed by your responsible Applied Physics supervisor. A checklist can be found in the appendix, to guide students and supervisors on the essential elements of the external internship report.

Before you start your internship, you should agree with the company and your TU/e internship supervisor if your report should be confidential or not. If your report is confidential, it will be stored by CSA AP in a separate folder with a restricted access to the staff and your TU/e internship supervisor will check the plagiarism manually.

During the external internship, you prepare for the (final) presentation. A checklist can be found in the appendix, to guide you on the essential elements.

## 8. Organization of the external internship

Properly organizing your internship will take some time. Following the steps below can help you with this. It's very important that you follow these steps proactively. It is your responsibility to make sure that you arrange things in time and follow procedures accurately.

### 8.1 Preparing the external internship

| When? | Who? | What? |
|---|---|---|
| A few months before start internship | Student | Make sure your study program has been accepted by the study program committee (apse.spc.ap@tue.nl).<br>Check the prerequisites for starting the external internship.<br>Find a suitable TU/e internship supervisor matching your interests and wishes & start applying for an internship position.<br>There are different ways to find a position:<br>• Contact a professor or other staff member of the research group / research institute of your interest to ask for options for an external internship. Staff members have contacts with companies, and institutions. |

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| | | • Find an external internship via your own contacts. Keep in mind that you have to find a TU/e internship supervisor with a research field matching the area of research at the organization/company.<br>It is undesirable that students do both their external internship as well as their graduation project at the same external location. Exceptions can be requested to the Examination Committee AP |
| Approx. 4 weeks before the start of the external internship | Student & responsible Applied Physics supervisor | 1st meeting between the responsible Applied Physics supervisor and the student. Discuss:<br>• The details of the location where the external internship will take place<br>• The external supervisor from the institute/company and his/her contact details<br>• The subject, scope and planning of the project, taking the size of the external internship into account (15/30 credits) |
| Before the start of the external internship | Student & responsible Applied Physics supervisor | Student & responsible Applied Physics supervisor write a final proposal of the project about subject and content, scope and planning and organization, in close collaboration with the external supervisor. |
| | Student | Enroll yourself for the correct course code in Osiris. |
| | Student | Fill in the registration form external internship Master Applied Physics with the information as agreed upon by you and your responsible Applied Physics supervisor.<br>When you start your (external) internship project, it is a potential requirement for the student and the research institute, company or university (and in some cases the TU/e as well) to enter into an agreement concerning the internship project. This agreement lays down conditions/arrangements regarding such things as working hours, an internship allowance, intellectual property rights and (if necessary) a duty of confidentiality.<br>The research institute, company or university might have its own contract; but it is preferred to use the TU/e's model work place contract. The contract can be a tripartite contract (you, the research institute, company or university and TU/e sign it) or a bipartite contract (only you and the research institute, company or university sign it).<br>You fill in the registration form internship contract prior to the start of the Internship. Do not sign your contract until it has been checked. A copy of the registration form will be sent to CSA AP.<br>- If you use a standard TU/e agreement (e.g. the work place agreement), CSA AP will have your contract signed by the managing director. (So, your responsible Applied Physics supervisor should not sign contracts)<br>- If you use a non-standard TU/e agreement (e.g. company contract) or if modifications have been made to the standard agreement, CSA AP will forward your contract to the education lawyers for a legal check. Then, the education lawyer will make sure you receive the final version of your contract that you can sign.<br>Please be aware that the process of reviewing, changing and signing a contract can easily take one month. Therefore, send your contract to CSA AP as soon as possible. |
| | Student | Read the assessment protocol for the external internship Master Applied Physics. |

## 8.2 During the external internship

| When? | Who? | What? |
|---|---|---|
| Within 3 weeks after the start of the external internship | Student & responsible Applied Physics supervisor | Send a (modified) abstract, the objectives of the internship and the global planning which you prepared with your external supervisor, to your responsible Applied Physics supervisor. |
| During the external internship | Student & responsible Applied Physics supervisor | You maintain regular contact with your responsible Applied Physics supervisor about your progress and development. At the project start, discuss together how you will maintain contact (i.e. face-to-face, e-mail/Teams) and with what frequency. During the project, adapt the communication when necessary.<br><br>In the assessment protocol, you can find more information about the assessment criteria.<br>When you are facing a problem(s) during the internship, more regular contact is needed. You are in the lead to discuss the faced problems with the responsible Applied Physics supervisor. |
| During the external internship | Student | You work on your project and report during the internship, aiming to finalize the report at the scheduled end date. Discuss the feasibility with your TU/e and external supervisor. See the checklist for report on page 7. |
| At the end of the external internship | Student & external supervisor | Prepare and deliver a presentation about your internship at the location where the internship takes place. See the checklist for presentation on page 10. |

## 8.3 Finalizing the external internship and the report

| When? | Who? | What? |
|---|---|---|
| Before the end date of the external internship | Student and responsible Applied Physics supervisor | Determine who will be the TU/e second examiner that will access the project. |
| At least 5 days before the end date of the external internship | Student | Hand in your internship report at the external location, your responsible Applied Physics supervisor and TU/e second examiner. |
| After handing in the report | Student & responsible Applied Physics supervisor | Your responsible Applied Physics supervisor will assess the report and the implementation of the work before the presentation takes place. The external supervisor needs to send the feedback on these assessment criteria to your responsible Applied Physics supervisor before the presentation takes place.<br><br>If you carried out a 30 credits internship, the second examiner will also assess your report. |
| End date of the external internship | Student & responsible Applied Physics supervisor | Prepare and deliver a presentation about your internship within the research group of your responsible Applied Physics supervisor.<br><br>The presentation should take about 20 minutes, with 10 minutes for discussion afterwards. |

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| | | Your responsible Applied Physics supervisor and a second TU/e examiner will assess the presentation. |
| After the presentation | Responsible Applied Physics supervisor | Your responsible Applied Physics supervisor (also first TU/e examiner) in consultation with the external supervisor and a second TU/e examiner, will grade your external internship on each of the grading criteria according to the rules mentioned in the assessment protocol.<br>The final feedback and (sub)grades will be filled in on the assessment form and communicated to you by the responsible Applied Physics supervisor.<br>**The first TU/e examiner sends the assessment form and your report to CSA-AP.** When the assessment form is handed in at CSA-AP, your grade will be processed, and the report will be stored. |

Appendix EXTERNAL INTERNSHIP MSC AP – Checklist for Report

# CHECKLIST for REPORT

## Assessment, length limit, scientific level, general recommendations

- ☐ The report will be **graded by the first TU/e examiner (this is the responsible Applied Physics supervisor), in consultation with the external supervisor(s)**. The first TU/e examiner (i.e. responsible Applied Physics supervisor) informs the external supervisor about the assessment procedures and rubrics before the start of the internship. In case of a 30 EC external internship project, the report will be also **assessed by a second TU/e examiner**.
- ☐ The **key assessment criteria** of your report can be consulted in the Assessment Protocol External Internship MSc Applied Physics. This includes all assessment elements listed under items: 1a. Introduction of research question and methods, 1b. Results & conclusion(s), 1c. Structure, style.
- ☐ The report is sufficiently compact. Without references and appendices, you should typically not exceed **20-30 pages or 10,000 words**. The length of individual sections/chapters should be carefully balanced considering their relevance and importance within the full report.
- ☐ The **scientific level of your report** should be such that typically other MSc-AP students in the research group, working on similar subjects, can basically follow the content. It can be assumed that topics and theory within BSc-AP courses, including related courses within your track, are familiar, and do not need to be repeated (see later in Main chapters / sections).
- ☐ To be able to judge the required level and other key elements of your report (as will be discussed below)**, ask your responsible supervisor for exemplary reports**, which were delivered by other MSc-AP students. These examples may guide you in the writing process of the project.
- ☐ Before starting up the actual writing process, **discuss with your supervisors the general outline and structure of your report**. This may guide you in carefully planning timely delivery of sections or chapters, including the required feedback from your supervisors and its implementation. For details on structure and chapters, see the next sections.
- ☐ Based on the outline of your report, it is strongly advised to **startup up the writing process at an early stage** of your project, to warrant sufficient progress and to prevent a too high workload at the end. Involve your supervisors in discussing the progress in your report, e.g. by identifying what sections can be written at an early stage, and how to deal with feedback and corrections.

## Structure

- ☐ When you are able to identify the **main conclusions based on the core results**, the whole report should revolve around explaining and supporting this. This requires an introduction and motivation of the project, and concise background theory and experimental or theoretical tools. Then you will report on results including discussion and conclusions. This is the core of your work, and the rest of the report should support this in a direct and compact way.
- ☐ In the chosen **structure of the report**, the reader is optimally guided through all chapters of the full report. All individual chapters and sections are carefully tied together and always placed within the larger framework of the report.
- ☐ Apart from the main sections or chapters (see below: Introductory part & Main chapters / sections), the report has **four compulsory parts**. The report starts with (1) **Title page**, (2) **Summary or Abstract**, and (3) **Table of Contents**, and is completed at the end by (4) **References or Bibliography**.

- ☐ **Appendices / Supplementary material** are usually added to give additional details in data and analysis, not suitable (in extent and/or detail) for the main chapters in your report. In the main chapters, properly refer to this additional material.
- ☐ The full report, main chapters including supplementary sections, should warrant the **replication of your research** (data, analysis, etc.). Others should be able to repeat and confirm the basic findings of your study, using the information given in your report.
- ☐ **Lists of Abbreviations, Symbols, Tables and/or Figures** can be optionally added to the report, usually before the start of the Introductory part. Keep the use of acronyms to a minimum.

## Title page, title of the report

- ☐ The title page containing at least:

  **(1) Title, optional subtitle (2) Student initials, surname, ID (3) Study load of external internship, 15/30 EC (4) Name of Master's program(s) + master track (5) Month and year of finalized report (6) Name of the responsible Applied Physics supervisor, also first TU/e examiner (7) responsible AP supervisor's research group, department, (8) Name of the 2nd examiner, (9) 2nd examiner's research group, department, (10) Name of external supervisor(s), including full affiliation**

- ☐ The **title of the report is compact and contains key words** of the research, methods or techniques. It optionally hints towards the overall result or conclusion of the thesis work.
- ☐ A **subtitle is optionally added** when more detailed key words are required to frame the research, methods or conclusions.

## Summary / Abstract

- ☐ The summary/abstract at least contains:

  **(1) Background of the work (2) Research objectives or hypothesis (3) Research methodology, and (4) Obtained main results and factual conclusions**.

- ☐ The **abstract is sufficiently concise**, for the reader to have fast access to the impact of the work. Typically, it fits to half a page, and never exceeds a full page.

## Introductory part

- ☐ To clarify the motivation and objectives of your work, the introduction usually starts with an adequate **scientific, technological and/or societal background** to the work, including a representative selection of references to relevant scholarly literature.
- ☐ After identifying the open issue or quest in the research field, the introductory part should clearly state **your motivation and actual research objectives** of the present study.
- ☐ In connection to motivation and objectives, the introductory part optionally includes a **short written outline of the remaining chapters/sections** of the thesis, to optimally guide the reader. It may also optionally include a preview of the main conclusions of your thesis work.

## Main chapters / sections

- ☐ Following the Title page, Summary/Abstract and Table of Contents, (and preceding the references) the report contains a selection of logically structured main chapters/sections; typical examples:

  **Introduction (see earlier), Background, Technology Assessment, Methods, Research Tools, Theory, Results, Interpretation, Discussion, Recommendations, Outlook.**

Please note that these chapter/section titles are just examples, these are not mandatory!

A customized selection and ordering of these typical chapters/sections is used such that the actual results and discussion are well positioned within the entire report. Alternative titles for your chapters, that are specific for your project and your storyline, can be considered. As mentioned earlier, discuss this with your supervisor at an early stage!

☐ In view of the length-limit indication (20-30 pages or 10,000 words), **chapters on theory, methods and tools are carefully configured preferably without extensive reproduction of textbook-like elements**. Use appropriate references (ideally including hyperlinks) to other sources when writing these chapters, and keep in mind that these parts should be written in a way to optimally introduce the actual research results and discussion.

### References/Bibliography and Appendices/Supplementary

☐ The **list of references/bibliography**, positioned at the end of the report, is logically structured and sufficiently clear, using a consistent format. In the main text, references to this list are systematic and precise. A reference management tool is recommended.
☐ A standard **reference/bibliography style** has been chosen that is commonly accepted, such as used in physics papers by American Physical Society (APS), Institute of Physics (IOP), or Nature/Science.
☐ **Appendices / Supplementary material** can be included to avoid a too lengthy or detailed report and/or to facilitate reproduction of the actual research.

### Technical requirements: figures, tables, equations, symbols, concepts

☐ For style/conventions/typefacing of **figures, tables, equations, symbols** etc., the guidelines in *Experimental Physics* courses of the *BSc program Applied Physics* at TU/e can be consulted.
☐ For style/conventions/typefacing, also **typical (applied) physics papers can be consulted**, see e.g. guidelines at the American Physical Society (APS), Institute of Physics (IOP), or Nature/Science journals.
☐ Relevant **physical/technological concepts, parameters and symbols** are introduced at their first occurrence. When using **equations and physical arguments** that are not derived or introduced in thesis, and which cannot be considered as basic physics knowledge, they should be properly cited.
☐ All **figures and tables carry a caption** containing all the information necessary to understand what is actually shown. The full interpretation/explanation of the figure/table should be in the main text, it does not belong to the caption.
☐ All **figures and tables are referred to in the main text**. Numbering is dictated by appearance in the text. All **equations carry a number**, unless they are integrated as part of the main text, and all **equations are part of a running sentence**. Automatic numbering of figures, tables and equations is recommended.

# Appendix EXTERNAL INTERNSHIP MSC AP – Checklist for Presentation

## CHECKLIST for PRESENTATION

### Assessment, audience, duration, general recommendations

- ☐ The presentation will be **graded by the first and second TU/e examiner.** The first TU/e examiner is the responsible Applied Physics supervisor**, in consultation with the external supervisor(s) if possible**. The responsible TU/e examiner informs the external supervisor about the assessment procedures and rubrics before the start of the internship.
- ☐ The **key assessment criteria** for your presentation can be consulted in the Assessment Protocol External Internship MSc Applied Physics. This includes all elements listed at item 2a. Content and structure, and item 2b. Performance.
- ☐ The **presentation should last approx. 20 minutes**, thereafter follows a **discussion of typically 10 minutes**. Generally speaking, presenters in physics often spend 1-2 minutes per slide, which means that presentations are typically supported by **10-20 slides** (excluding a series of slides belonging to an animated sequence).
- ☐ The **scientific level of the presentation** should optimally match the audience. Ensure that the presentation is at a level such that all other BSc-AP and MSc-AP students in your research group are able to grasp the essentials of your talk. It can be assumed that topics and theory within BSc-AP courses, including related courses within your track, are familiar. Still, those not directly involved in your project usually need more introduction and explanation than you might think.
- ☐ Unlike your report, your **presentation is not meant to show all you have done** in the project**.** In most cases, this means you have to boil down your work its essence and make it understandable even for the non-experts. Not all subjects covered in the report need to be contained in the presentation, also the order of subjects can be completely different.
- ☐ You are strongly advised to **carefully prepare and practice your presentation** well in advance, preferably with your supervisor(s) or other students working on similar subjects. This will help you optimize the timing (20 minutes), design and physics content, including your actual performance. A presentation earlier held at the host institute may help to prepare for the presentation at TU/e.
- ☐ Before designing and detailing your slides, **discuss with your supervisor(s) the outline of your talk**, which is related to the main message and subjects to be discussed. See the following section.

### Message and motivation, subjects, structure

- ☐ To make a strong outline, it is very important to **identify the main take-home message of the presentation**. Try to capture the message of your presentation in a single sentence. Identify which topics need to be explained and what results need to be shown in order to convey the main message. All you present is there to explain or support the take-home message!
- ☐ At the start of your talk, **try to immediately catch the attention** by clear opening sentences or statements. Consider showing a compact, catchy version of the project title or to immediately highlight the main take-home message. Carefully practice these first sentences, these are key in getting and keeping the attention of the audience. A catchy image on the opening slide may also help to attract attention.
- ☐ In the first part of the talk, you should carefully **introduce the motivation behind the project**. This requires giving sufficient background information about physics or technology in this particular field, within the research (sub)group.

- ☐ In the introductory part, clearly mention the **actual research question of your work**. This is typically followed after the motivation and narrows down to your actual contribution or quest. You may anticipate on the conclusions to better guide the audience through your presentation.
- ☐ Keep the attention of the audience by a **coherent and recognizable structure** of the presentation and consider implementing intermediate conclusions. As mentioned, be critical in selecting what is needed to support the message, in terms of background, theory, results, figures, etc. Be aware that the words you speak when moving from one slide to the other are very important in creating a clear storyline – prepare those links with care.
- ☐ Unlike your report, **a table of contents or outline is not required** to guide the audience, it may even weaken the narrative; a well-prepared message, storyline and supporting slides are much more essential
- ☐ For each figure, scheme or diagram you are showing, **take time to explicitly highlight and explain all details of graphs**, such as what is plotted along axes and what the different curves or data sets mean. You know what is in the graphs, but an audience needs enough time to consume this new information and recognize what is shown.
- ☐ You should finish the presentation in a natural way, which most likely puts the **main conclusions, take-home message, or outlook**, at the end of your talk. Keep the concluding part compact to regain full attention by the audience. Try to close the circle by answering the research question you posed at the start of the presentation.

## Stage performance

- ☐ By preparing yourself optimally, you should be able to demonstrate **engagement, confidence, enthusiasm, and liveliness**. Since this is one of the key elements for a successful presentation, specifically ask for feedback on these aspects during practicing the presentation with others.
- ☐ It is **natural to be nervous for your presentation**. You have to learn to recognize the symptoms and to appreciate them for optimizing your performance. By systematically practicing and analyzing your presentations, you gain experience and nervosity may actually help your performances. You may consider using video recordings of your presentation in the preparation phase.
- ☐ When **speaking to the audience**, your voice should be loud enough with a clear articulation and lively intonation. Use a conversational pace but try to make variations when appropriate. Use body language or even supporting tools and try to continuously keep eye contact with your audience.
- ☐ As a **junior scientific presenter**, the sentences you are using should be compact and at a proper scientific level, and your explanations and reasoning should be correct and clear, and structured in a logical way. Only use physics terms and English that you feel comfortable with. Make sure that all your statements are supported by either data or references.
- ☐ A good way to test your presentation is to record yourself on camera and then **critically review your own performance** given all the feedback you already received. Compare it with your own experience of what you liked and disliked at other presentations or lectures. Obviously, you may consider sharing your recordings with fellow students/friends for asking additional feedback.

## Technical requirements

- ☐ When designing your slides, **use current TU/e templates** online available.
- ☐ Mention **your name, supervisors at the host institute and at TU/e** (usually but not necessarily all on the title slide). Acknowledge others that contributed to your work; number your slides. Give correct reference when using pictures and other material, from literature or other sources.

- ☐ To ensure the audience is mostly concentrating on you and your narrative, **use a limited number of compact phrases or words on your slides**. The format/layout of these text elements on your slides should be coherent and well-readable during the full presentation. In many cases, a slide is carrying a dedicated title of your slide with a limited number of words, and the main conclusion of that slide is displayed as well – make this coherent for the full presentation.
- ☐ Put great effort in **carefully designing your figures, schemes and diagrams**, preferably eye-catching and as simple as possible, containing limited elements that are very well visible in size and color. Consider breaking up figures or diagrams into parts and introduce them sequentially. As a rule of thumb: figures/graphs from the report should be fully redesigned for using it in your talk. Often figures from literature need to be remade or simplified. Properly align different graphical elements and text to assure a structured layout.
- ☐ Using **tables with numbers** is in most cases not recommendable, as well as **mathematical derivations**. In case of showing **formulas or equations**, usually try to show these in a compact, understandable and attractive way.
- ☐ Use **animations in your slides** when it will benefit your narrative and performance, e.g. when explaining a complicated concept, or when elements in figures are added sequentially. Make sure to carefully prepare and practice animated sequences when you do add them. Avoid too many control/mouse clicks – in particular assure that information stays projected enough time.

## Questions and discussion

- ☐ After **finishing the presentation**, usually an applause will be given, and the audience (including examiners) are allowed to ask questions. As a rule of thumb: do not end with a question, in particular “Are there any questions?”, but you may thank the audience for their attention, and you could add “I will be happy to answer any of your questions”. Discuss with your supervisor in advance who is initiating/regulating the questions, which is usually the chair of the meeting.
- ☐ For all **questions after the talk**, repeat the question in your own words and direct your answer to the entire audience. When needed, immediately go back to the slide in question for supporting the discussion (in PowerPoint: type slide number, press enter)
- ☐ In **answering questions**, explain your thoughts natural and open-minded, similar to scientific discussions. Show respect for all types of questions and try to judge whether your answers are well received. When you do not fully understand the question, ask for further clarification.
- ☐ Be prepared for unexpected **questions or interruptions during your presentation**. Discuss with your supervisor in advance how to handle these situations.
- ☐ Consider having **back-up slides** when you anticipate additional discussion on specific results or subjects. Make sure you are able to quickly navigate to this supporting material.