1. Protocol implementation graduation project MSc Applied Physics

Prior to the start of graduation.

Before the beginning of the final project a discussion will take place between the graduation supervisor/teacher and the student. The objective of this meeting is to discuss the subject, the planning, the phases, and the end date of the graduation project. The subject of the graduation project should fall within (applied) physics research topics that matches the framework of the study program track of the Applied Physics TU/e chosen by the student. The project must meet the end qualifications of the program.

In case the student conduct the graduation project abroad within an external research institution or university, the external supervisor (host) will be involved (via mail, Skype) in defining the planning and the phases. In this regard, the protocol that can be followed, in principle, is the one established for the ‘Assessment protocol Internship MSc Applied Physics’. The ‘Assessment protocol Internship MSc Applied Physics’ states that, prior to departure to the external graduation location, the subject of the graduation project must be known and an abstract should be written with a description of the research.

During the last meeting the Registration form for graduates is filled in. This Registration form for graduates can be obtained at the education administration office at the Applied Physics department.

After the start and during the graduation:

In the first month after the start of the graduation the TU/e supervisor receives from the student a short proposal (two pages) where the topic (abstract), the objectives of the graduation project, the planning and the phases are indicated. Needless to mention that this document can be also developed with the support of the supervisor(s).

During the graduation period both the student and the TU/e supervisor maintain weekly contact (regarding students who carry out the graduation project at the TU/e). With regards to the students who carry out the graduation project elsewhere, this task is taken over by the host. In this case, the student maintains regular contact with the TU/e supervisor (via email, Skype) so that the supervisor can monitor this process. If necessary, the TU/e supervisor and the external supervisor maintain contact, especially in unforeseen circumstances which may cause delays. Planning and good communication with each other are recommended.
After conclusion of the research project:

As soon as possible after the research is completed, the student will submit her/his report and give a presentation at the TU/e. Thereafter, the grade is determined in accordance with the assessment protocol which is described below. The assessment criteria are described on page two of the assessment form.

Differences between a 60 ECTS and 45 ECTS graduation project.

The choice of a 45 ECTS and 60 ECTS graduation project is done by the students at the moment students make a planning for the selection of the study program in the first year of the master. This choice determines the timeline and the end date. In this regard:

For a 45 ECTS (short) graduation project, a period of maximum 9 months is considered. For a 60 ECTS (long) graduation project, a period of maximum of 12 months is considered. Thereby both the mandatory leave (Christmas Easter, and the 12 days/year national days) and the optional leave (holidays, and the 15 days/year national days) are taken into consideration which counts for 28 hours per ECTS and a working day of eight hours.

In addition, it is expected from the students a more depth research and more independence in a 60 ECTS graduation project than the students who carry out a 45 ECTS graduation project. This is currently not (yet) regulated. However, the criteria are listed in the components e), f) and g) of the assessment form.
2. Assessment protocol graduation project Physics MSc Applied Physics

The graduation supervisor/teacher forms a graduation project committee to assess the graduation project. This committee consists of at least four examiners, namely:

- the graduation teacher/supervisor, also chair, and
- at least three authorized examiners members of the academic staff of the university, of whom at least two should be from the Applied Physics department.
- at least one member of the graduation committee must belong to a different research group than the one of the graduation teacher/supervisor, who does not belong to the same main area of interest either.
- experts, who are not authorized examiners, may act as advisors.

- In the assessment of the graduation project the following components weigh up: 1) the report (25%), 2) the presentation (25%), 3) the discussion (25%), and 4) the implementation of the work itself (25%).

- Separate marks for these four components as well as the final grade should be registered on the 'Assessment form graduate project MSc Applied Physics'. This form and the criteria for assessing the four components are enclosed as appendices. The completed assessment form (in which a short written report of the deliberations of the committee is also included) is sent to the Examination Committee. In case the grades are 6 or 10, an oral explanation should be given on how the grade was decided. In case the grade is a 10, at least two members of the graduation committee will be present.

- The graduation supervisor/teacher, determines his/her assessment of the implementation of the work itself (part 4), before the graduation committee sitting takes place. The graduation supervisors/teacher can be also advised by a direct supervisor. The grade is established based on the assessment criteria and must be registered on the assessment form.

- The members of the graduation committee receive a copy of the graduation report at least ten working days before the graduation sitting takes place.

- Prior to the deliberations of the graduation committee, the student gives a presentation of a maximum of 30 minutes (including discussion), whereafter a discussion with the student takes place by the graduation committee.

- After the discussion has taken place, the deliberations of the graduation committee follow by discussing first the graduation report, the presentation and the discussion with the student in this order. After a deliberation of each of these components the committee assesses the components separately on a scale of 1-10 in full or half marks. Only after discussing these three components, the graduation supervisor informs the graduation committee about the marks regarding the implementation of the work itself. It is preferable that the committee members write down their preliminary assessment of the three components before the deliberations begin. The committee members may change their ratings based on the deliberations, in order to avoid that a first very positive or very negative impression can influence the other committee members in advance.
• The final grade is determined in full or half marks based on the rounded average of the four marks. The decision to round up or down the grade (in case the unrounded average is "N, 25" or "N, 75" where N is the number between 1 and 10) is determined by the individual mark of the component ‘the implementation of the work itself’.

• The student has passed the graduation project if the final grade is 6 or higher and also if the marks for the report (part 1) and for the implementation of the work itself (part 4) are assessed with at least a 6. Furthermore, at least one of the components of the parts 2 and 3 (the presentation and the discussion) can be insufficiently graded. In case the final grade is 6 or higher, but the above mentioned conditions are not met (i.e. the report (part 1) and the implementation of the work itself (part 4) are scored with a minimum mark of a 6), the result will be "insufficient" and the student has not passed the graduation project MSc Applied Physics.

• If the student fails, the grade is reported to the education administration office. In this case, the student will get a maximum period of three months to revise the report and to submit it to the graduation committee, whereafter a complete graduation sitting will take place. If the result is again insufficient, the student will have to carry out again a whole new graduation project.

• The student has the right to inspect the assessment form. In case the student has objections regarding the assessment and s/he wishes to appeal against a decision of the Examination Committee, the student can make use of the right to appeal as it is noted in Article 8.1 of the OER.
Assessment form graduation project MSc Applied Physics

IDNR student _________________________________________________________
Name student _________________________________________________________
Start date/Scope _________________________45 EC □  60 EC □ _________________________
Date of assessment _________________________________________________________
Responsible graduation supervisor ____________________________________________
Group _________________________________________________________
Title report _________________________________________________________

Plagiarism check on report has been conducted: □

<table>
<thead>
<tr>
<th>Assessment internship MSc AP</th>
<th>1) Report</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2) Presentation</td>
</tr>
<tr>
<td></td>
<td>3) Discussion</td>
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<tr>
<td></td>
<td>4) Implementation of the work itself</td>
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</tbody>
</table>

Final grade _________________________

Composition graduation committee: ____________________________________________
Department/group ____________________________________________
Chair ____________________________________________

Advisors of the committee: Company c.q. institution:

__________________________________________
__________________________________________
__________________________________________
__________________________________________
__________________________________________

Result (pass/fail): ____________________________________________

Time schedule internship and handing report: (delete as appropriate)
Report: was/is not finalized in time              (delete as appropriate)
Internship: was/is not completed within the scheduled time                            (delete as appropriate)
Any remarks: Report deliberations committee: (including timeline motivated in a different paper)

Signature of the graduation committee chair
**Specification of grades:**

General remark: the assessment should be based on the performance of the student in the research group at the TU/e Applied Physics department (with internal graduation) in the company, or in the research institution abroad where the graduation project took place.

- **10:** Excellent; unique performance which seldom occurs
- **9:** Very good; outstanding performance which seldom occurs
- **8:** Good; performance of high quality, appropriate for a student who independently can conduct a research assignment
- **7:** More than enough; performance at the level of above satisfactory work
- **6:** Sufficient; performance that meets the minimum requirements
- **5 or less:** Insufficient

**CRITERIA TO TAKE INTO CONSIDERATION IN THE ASSESSMENT OF THE DIFFERENT COMPONENTS**

1. **Report**
   a. Clarity / readability
   b. Quality overview progress of research topic (incl. Bibliography/literature review) with a depth that may be expected for a 45/60 ECTS project
   c. Quality of scientific arguments
   d. Time management/time needed
   e. Structure/organization (formulation of research question-approach-analysis-conclusions)
   f. Independence/needed supervision
   g. Scope of the report according to what may be expected of a 45/60 ECTS project

2. **Presentation**
   a. Able to convey the essence of the research
   b. Structure / organization
   c. Presentation skills
   d. Quality material presented
   e. Independence/needed supervision

3. **Discussion**
   a. Theoretical knowledge of the topic
   b. Expressing understanding of the methods of the graduation topic
   c. Clarity in providing answers, ‘to the point’ come
   d. Depth
   e. Effort/dedication

4. **Implementation of the work itself**
   a. Scientific level of achieved results
   b. Scope of scientific work as expected of a 45/60 ECTS project
   c. The work can be published
   d. Quality of execution of research project
   e. Time management (work finished as planned)/time required/effort and dedication
   f. Creativity / originality / analytical skills
   g. Independence/ needed supervision
   h. 60 ECTS: Capacity to adjust the project based on achieved results