

Part 1: Assessment Form Double Bachelor Physics & Mathematics (NS-320B)

Use of this form, including assessment score form (Part 2), is mandatory for all double bachelor thesis research projects. It must be filled out and signed by both project supervisors, before handed in at the administration office JI (BBg 7.72).

Student	
First and last name	
Student number	
Telephone	
Email address	
Research Project	
Project title	
Number of EC (22.5 for regular project)	
Honours project (yes, no)	
Project Supervisor Physics	
Name and title (must be a staff member of the Physics Department holding or in training for BKO)	
Email address	
Project Supervisor Mathematics	
Name and title (must be a staff member of the Mathematics Department holding or in training for BKO)	
Email address	

Assessment in Words

Describe the project and assess the performance of the student using the protocol as set up in Part 3 of this form. Determine the strong and weak points of the student's work. Please address the three main aspects of the project, i.e., Research skills and results, Thesis knowledge/content, and Oral presentation. The final grade should be determined on the basis of the assessment criteria listed in Part 3 and along the rules described in Part 2 to ensure an equalized assessment of the research projects and to offer clarity to the students and board of examiners about the assessment.

Additional points that affect the assessment but do not become apparent in the assessment of Part 3 should be thoroughly motivated by both reviewers. The final grade may deviate from the 'target final grade' (see Part 2) by a maximum of $\pm 0,5$ points (e.g., positively if there was excellent connection between the Physics and Mathematics, on top of an excellent performance in either discipline).

Category grades and final grade					
Research skills: A		Thesis: B		Oral presentation: C	
Final grade:		(this grade will be recorded in OSIRIS and included in the student's grade list)			
Signatures					
Project supervisor Physics Herewith the reviewer confirms that this assessment has been discussed with the Mathematics supervisor, the second referee, and the student.		Date: Name: Signature:			
Project supervisor Mathematics Herewith the reviewer confirms that this assessment has been discussed with the Physics supervisor, the reading committee, and the student.		Date: Name: Signature:			

Part 2: Use of the Rubric for the double bachelor P&M

Guidelines for obtaining the final grade

1. The final grade is a combination of the subgrades (A,B, and C):

A: Research skills	weight 50%
B: Thesis	weight 35%
C: Oral presentation	weight 15%

2. The above subgrades can be determined using the rubrics in Part 3, which should be considered a guideline for the supervisors to structure their "Assessment in words" section of Part 1. It is important to identify how well the student did within the context of the individual disciplines, as well as how well (s)he managed to merge these two together.

3. It is recommended that both supervisors propose subgrades and discuss possible difference between each other, in order to reach a common conclusion.

4. The minimum grade necessary to pass is 5.5 for all subsections.

5. A target final grade is calculated according to:

$$\text{target final grade} = 0.50 * \text{Grade}_{\text{Research skills}} + 0.35 * \text{Grade}_{\text{Thesis}} + 0.15 * \text{Grade}_{\text{Oral presentation}}$$

6. The final grade may deviate from the target final grade by a maximum of 0.5 points, if explained in the written motivation for the final grade (Part 1). It is recommended to use (up to) +0.5 points to reward excellent interdisciplinary research.

7. Before the mark is finalized and the document submitted, the marking is evaluated by the "Reading Committee" of the Mathematics department and a secondary referee within the Physics department. Any changes in the grade that arise from this evaluation procedure must be addressed in "Assessment in words" section in Part 1. The head of the Mathematics Reading Committee and the second Physics referee co-sign the document.

8. In the case of a retake or repair (herkansing), the maximum grade for the failed components of the thesis (A, B, or C) can be no higher than 6.5.

Part 3: Category Grades Rubric

Grade A: Research skills and results (50%)

Grade:

Comment/subgrade

A1: Background knowledge

Insufficient (<6)	Satisfactory (7-8)	Excellent (>8)
<ul style="list-style-type: none"> Missing or unrelated to the project. 	<ul style="list-style-type: none"> An appropriate overview of prior knowledge. 	<ul style="list-style-type: none"> Excellent overview of prior knowledge. New concepts and techniques are understood; broader context is seen.

A2: Research question(s)

Insufficient (<6)	Satisfactory (7-8)	Excellent (>8)
<ul style="list-style-type: none"> Missing or is not related to the research field and/or approach. 	<ul style="list-style-type: none"> Appropriate formulation of research question(s) 	<ul style="list-style-type: none"> Excellent and clear. Follow logically from given state of the art knowledge.

A3: Design and execute research plan

Insufficient (<6)	Satisfactory (7-8)	Excellent (>8)
<ul style="list-style-type: none"> Executes only plans devised by the supervisor. Has problems comprehending and executing plans devised by the supervisor. 	<ul style="list-style-type: none"> Proposes new, valid calculations or measurements based on previous results. Has creative ideas. 	<ul style="list-style-type: none"> "Owns" the project. Proposes many new, relevant calculations or measurements Student has original, creative ideas.

A4: Experimental/numerical/theoretical/mathematical approach

Insufficient (<6)	Satisfactory (7-8)	Excellent (>8)
<ul style="list-style-type: none"> There are significant shortcomings. The approach is inappropriate/illogical. Fails to produce meaningful results. 	<ul style="list-style-type: none"> Appropriate implementation of the approach. It is clear that the research questions can be addressed. 	<ul style="list-style-type: none"> Excellent implementation of the approach. Alternative approaches are considered and the chosen approach is the most appropriate to address the research questions. Potential difficulties/problems are seen and avoided/solved in a smart/ingenious way.

A5: Data analysis and interpretation

Insufficient (<6)	Satisfactory (7-8)	Excellent (>8)
<ul style="list-style-type: none"> Depends on supervisor for correct interpretation of results. Invalid statistical analysis. 	<ul style="list-style-type: none"> Provides correct analysis and interpretation of results. 	<ul style="list-style-type: none"> Provides correct analysis and interpretation of results from the start of the project. Recognizes implications of his results in a broader scientific and societal context.

¹ The examiner is strongly encouraged to supply a written comment (one word is sufficient; or encircling the relevant description) or a subgrade for each item, as feedback to the student and to supplement the 'assessment in words' in Part 1. If subgrades are specified, the grade is not necessarily equal to the arithmetic mean of the subgrades.

A6: Professional attitude

Insufficient (<6)	Satisfactory (7-8)	Excellent (>8)
<ul style="list-style-type: none"> • Fails to work independently (e.g. cannot perform simple tasks or calculations without constant input). 	<ul style="list-style-type: none"> • Works independently to solve well defined problems. 	<ul style="list-style-type: none"> • Works independently. • Solves most problems him/her-self.

A7: Social skills

Insufficient (<6)	Satisfactory (7-8)	Excellent (>8)
<ul style="list-style-type: none"> • Does not act as a member of a research group. Not responsive to advice. 	<ul style="list-style-type: none"> • Works well together and takes initiative, becomes easily part of a group. Asks others for advice and helps others when necessary. 	<ul style="list-style-type: none"> • Exceptional social skills

A8: Integrity

Insufficient (<6)	Satisfactory (7-8)	Excellent (>8)
<ul style="list-style-type: none"> • Data manipulated or left out.² 	<ul style="list-style-type: none"> • Accurate, reliable and trustworthy. • Shows awareness of confidentiality of information. 	<ul style="list-style-type: none"> • Exceptionally accurate, reliable and trustworthy.

A9: Critical attitude

Insufficient (<6)	Satisfactory (7-8)	Excellent (>8)
<ul style="list-style-type: none"> • Critical attitude is absent. 	<ul style="list-style-type: none"> • Has critical attitude towards (published) research. 	<ul style="list-style-type: none"> • Critical attitude is based on intellectual depth and profundity.

Grade B: Thesis (35%)

Grade:

Comment/subgrade¹

B1: Background information

Insufficient (<6)	Satisfactory (7-8)	Excellent (>8)
<ul style="list-style-type: none"> • Missing or unrelated to the project. 	<ul style="list-style-type: none"> • An appropriate overview of prior knowledge is given. 	<ul style="list-style-type: none"> • Excellent overview of prior knowledge. • New concepts and techniques are explained and put in a broader context.

B2: Research question(s)

Insufficient (<6)	Satisfactory (7-8)	Excellent (>8)
<ul style="list-style-type: none"> • Missing or is not related to background information and approach. 	<ul style="list-style-type: none"> • Appropriate formulation of research question(s). 	<ul style="list-style-type: none"> • Excellent and clear . • Follow logically from given background information.

² In case of fraud or plagiarism, the reviewer will inform the Board of Examiners.

B3: Experimental/theoretical approach

Insufficient (<6)	Satisfactory (7-8)	Excellent (>8)
<ul style="list-style-type: none"> • There are significant omissions. • The approach is inappropriate/illogical. • Fails to reveal how results were obtained. 	<ul style="list-style-type: none"> • Appropriate description of the approach • It is clear that the research questions can be addressed 	<ul style="list-style-type: none"> • Excellent description of the approach. • It is clear why the chosen approach is the most appropriate to address the research questions. • Crucial steps are identified and highlighted. • Context is provided with respect to. alternative approaches.

B4: Presentation of the results

Insufficient (<6)	Satisfactory (7-8)	Excellent (>8)
<ul style="list-style-type: none"> • Unclear whether results are useful to address research question. • Missing or inadequate treatment of errors and uncertainties. 	<ul style="list-style-type: none"> • Clearly visible that the results relate to the research question. • Appropriate treatment of uncertainties and errors (if applicable), and/or limitations of the methods used. 	<ul style="list-style-type: none"> • Excellent presentation of results. • Results are appropriate to gain deeper conceptual understanding of some aspects related to the research question. • Excellent treatment of uncertainties and errors (if applicable) , and/or limitations of the methods used.

B5: Discussion and conclusions

Insufficient (<6)	Satisfactory (7-8)	Excellent (>8)
<ul style="list-style-type: none"> • Basic knowledge of physics and/or mathematics is insufficient. • Inappropriate and wrong conclusions. • Data inadequately discussed, sticking rigidly to existing concepts or using invalid arguments. • Conclusions weak or not supported by evidence. 	<ul style="list-style-type: none"> • Demonstrates sufficient knowledge and understanding. • Demonstrates sufficient understanding of techniques and concepts. • Relation data and research question discussed adequately, using valid arguments. • Conclusions in line with presented evidence. 	<ul style="list-style-type: none"> • Excellent in depth discussion of data/results in relation to research question. • Critical discussion in the light of the specified errors and uncertainties (if applicable), and/or limitations of the methods used. • Excellent discussion of how the data relate to current knowledge of the subject, and suggestions for future research.

B6: Quality of the references

Insufficient (<6)	Satisfactory (7-8)	Excellent (>8)
<ul style="list-style-type: none"> • Missing or unrelated to the content.² 	<ul style="list-style-type: none"> • Appropriate to make the point. 	<ul style="list-style-type: none"> • Excellent/varied choice of literature.

B7: Structure

Insufficient (<6)	Satisfactory (7-8)	Excellent (>8)
<ul style="list-style-type: none"> • Clear structure is absent or the content of the sections is often inappropriate (e.g. details of the method explained in the result section, etc.). • The thesis is two theses, one Mathematics and one Physics pasted together. 	<ul style="list-style-type: none"> • Clear structure visible with following mandatory sections: Abstract, Introduction, Method, and Result/Discussion section(s). • Content in the sections is generally appropriate. • References are provided in a consistent style. 	<p>Additionally:</p> <ul style="list-style-type: none"> • Content in the sections is always appropriate and is presented in an exceptionally well-considered way. • The connection between the two disciplines (Mathematics and Physics) is logically woven into the narrative.

B8: Tables and Figures

Insufficient (<6)	Satisfactory (7-8)	Excellent (>8)
<ul style="list-style-type: none"> Figures and tables missing, irrelevant, or ill-presented. 	<ul style="list-style-type: none"> Figures and tables can be understood without additional information. 	<ul style="list-style-type: none"> Figures and tables are clearly presented and self-explaining. The layout of figures and tables is of high quality (publishable).

B9: Writing Style

Insufficient (<6)	Satisfactory (7-8)	Excellent (>8)
<ul style="list-style-type: none"> Style too wordy or too concise. Severe and numerous spelling or grammar mistakes. 	<ul style="list-style-type: none"> Use of language, grammar and spelling sufficient. 	<ul style="list-style-type: none"> Grammar and style support legibility of the document. Writing flows smoothly.

Grade C: Oral presentations (15%)

Grade:

Comment/subgrade

C1: Content and structure

Insufficient (<6)	Satisfactory (7-8)	Excellent (>8)
<ul style="list-style-type: none"> The presentations are not easy to follow and conclusions do not always follow from data. No or weak discussion of the results. 	<ul style="list-style-type: none"> Provides a reasonable view of the research, but the presentation can be clearer. Line of reasoning and how the conclusions were reached are not always clear. Fitting the research into a broader framework is not adequate at all points. 	<ul style="list-style-type: none"> Excellent structure, relevant introduction which connects with the aims of the study, fascinating results, good graphics, excellent discussion, clear implications with perspectives on future research.

C2: Presentation skills

Insufficient (<6)	Satisfactory (7-8)	Excellent (>8)
<ul style="list-style-type: none"> Poor slides, no contact with audience, cannot answer questions. 	<ul style="list-style-type: none"> Knows how to retain the interest of listeners. Slides provide the audience with necessary information 	<ul style="list-style-type: none"> Professional presentation in all aspects.

C3: Interdisciplinary Style

Insufficient (<6)	Satisfactory (7-8)	Excellent (>8)
<ul style="list-style-type: none"> The two presentations are “the same”, no consideration for the respective target audience is shown in this regard. 	<ul style="list-style-type: none"> The student gives the minimally requisite background to the field with which the target audience is assumed not to be familiar. 	<ul style="list-style-type: none"> The student has carefully considered the audience in crafting both presentations and makes use of, e.g., analogies and aids to convey those aspects that the audience will not be familiar with.