



HELSINGIN YLIOPISTO
HELSINGFORS UNIVERSITET
UNIVERSITY OF HELSINKI

PAP301 Seminars in Particle Physics and Astrophysical Sciences

5 ECTS course 2023-2024

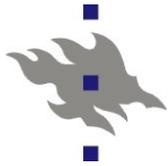
https://www.mv.helsinki.fi/home/osterber/Paras_seminars/

Prof. Kenneth Österberg

Department of Physics

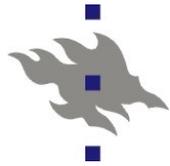
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Goals & outcomes of the course

- Develop your **oral & writing skills** in scientific contexts of your own specialisation (“presentation skills”) in English
 - Develop your **peer-reviewing skills** (“feedback”)
 - Develop your ability to **promote your expertise and market yourself** (“career development”)
-
- **Plan your MSc thesis** & start writing it (autumn 2023)
 - **Make a MSc thesis disposition** (autumn 2023)
 - **Prepare & give oral presentation** related to MSc thesis subject (spring 2024, first oral presentations in November-December 2023)
 - **Give feedback** to your fellow students on their oral presentation (spring 2024)
 - **Career related lectures & task(s)** (spring 2024)



Course plan

Gatherings:

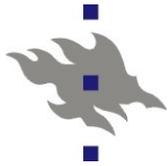
- ✓ Period I-IV: Tuesday 12-14 in lecture room D112
Get-to-gether only occasionally, email sent in advance.
Preliminary dates for autumn: Tue 10.10, Tue 14.11 and Tue 12.12.
- ✓ Career related lectures/webinars (spring, date & time to be fixed)

Course homepage:

https://www.mv.helsinki.fi/home/osterber/Paras_seminars/

Autumn 2023: focus on starting and planning of MSc thesis

Spring 2024: focus on the preparation & giving of oral presentation (+ giving of feedback) as well as career related lectures & tasks



MSc thesis

More details & useful links: ParAs programme moodle page
<https://moodle.helsinki.fi/course/view.php?id=45534>

Academic trained person should be able to find facts in reference works and to express his/her thoughts in writing logically and clearly. The MSc thesis will train these skills.

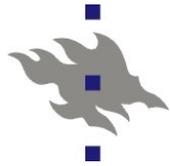
Master thesis: 30 ECTS credits

suggested length ~ 40-50 pages (however field & topic dependent)

MSc thesis work phases:

- ✓ familiarization with reference works
- ✓ independent research work
- ✓ making of a disposition for the thesis
- ✓ thesis writing

} Under the guidance
of the supervisor



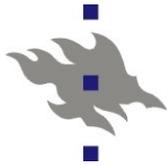
Structure and argumentation

See e.g. <https://sokogskriv.no/en/writing>

The structure of your text is the “skeleton” that holds the various elements together – in the right order. To ensure that your text is properly structured and flows well, it is important to understand the function of the different chapters. **In a thesis, everything you write fills a purpose.**

In a good thesis:

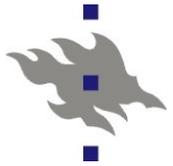
- All questions raised by the author are answered or clarified
- The author’s intention is clear to the reader at all times
- Everything that is presented, fills a purpose
- The theory presented is put to work
- The methods section is concrete
- The discussion brings together empirical data, theory and method
- The findings are duly presented
- The conclusion follows logically from the argumentation



(Typical) structure of MSc thesis

See e.g. <https://sokogskriv.no/en/writing>

- ✓ Abstract/summary
- ✓ Foreword (optional)
- ✓ Introduction
- ✓ Theory (optional, theory can be included in introduction)
- ✓ Methods
- ✓ Results/analysis
- ✓ Discussion and Conclusion (separate or together)
- ✓ List of references: **apply reference convention of physics field**
 - + either in alphabetic order with year e.g. [Donald2010] ...
 - or numbered in the order the references occur e.g. [1] ...
- ✓ Possible appendices



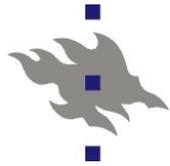
Abstract/Summary and Foreword

See <https://sokogskriv.no/en/writing>

Most readers will turn first to the summary (or abstract). Use it as an opportunity to raise the reader's interest. **The summary should highlight the main points from your work, especially the thesis statement, methods (if applicable), findings and conclusion.** However, the summary does not need to cover every aspect of your work. The main objective is to give the reader a good idea of what the thesis is about.

The summary should be completed towards the end; when you are able to overview your project as a whole. Nevertheless a good idea to work on a draft continuously. Writing a good summary can be difficult, since it should only include the most important points of your work. But this is also why working on your summary can be so useful – it forces you to identify the key elements of your writing project.

There are usually no formal requirements for forewords, but it is common practice to thank your supervisors, colleagues, and others who have helped and supported you. If you have received grants or research support, you should also acknowledge these.



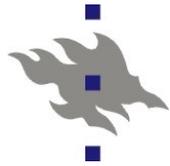
Writing one thing at the time

See <https://sokogskriv.no/en/writing>

In order to write effectively, it is important to understand the different functions that your writing needs to perform. For example, you need to distinguish between **presentation, interpretation, analysis, discussion** and so on. A well organised text tackles one function at a time. It will not, for example, combine presentation with discussion.

One way of distinguishing between different functions is to put all your introductory material into dedicated chapters (a theory chapter, a chapter to present your findings etc.) and then put everything that can be classified as discussion into a separate discussion chapter. You may also choose to discuss as you go along. Whatever strategy you adopt, **it is important to indicate clearly which parts of your text are descriptive in nature and which parts represent your interpretation, your or other scholars' arguments** etc... This will help the reader to follow your reasoning, and help you to fulfil the research ideals of reflexivity and objectivity.

Tip: Personal views and beliefs have no place in academic writing.



Writing one thing at the time

See <https://sokogskriv.no/en/writing>

Presentation

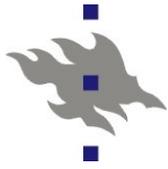
Descriptions and presentations should be as neutral and straightforward as possible. When presenting a theory, for example, the test is whether the originator of the theory would approve of what you have written. On this basis, your criticism will carry much more weight than if your presentation were skewed from the start. Your text will be better organised if you begin a new section before starting a discussion – but this is a matter of style and no absolute rule. **Tip!** Present the material with your own words, then consult the source to check the facts.

Analysis

Data collected for an empirical dissertation will have to be analysed, i.e. interpreted, coded and/or categorised. There are many ways of doing this and you should refer to methodological literature in your field. The analysis can either be integrated or follow your presentations. For examples other theses are probably the best sources.

Discussion

In a dissertation, argumentation and discussion are central. You can either discuss your ideas and concepts as you go along or in a separate chapter. Whichever strategy you adopt, make sure that you are not presenting and discussing at the same time.



Introduction

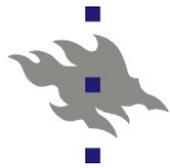
See <https://sokogskriv.no/en/writing>

Your introduction has two main purposes: 1) to give an overview of the main points of your thesis, and 2) raise the reader's interest. It is recommended to rewrite the introduction one last time when the writing is done, to ensure that it connects well with your conclusion.

Tip: For a nice, stylistic twist you can reuse a theme from the introduction in your conclusion. For example, you might present a particular scenario *one* way in your introduction, and then return to it in your conclusion from a different – richer or contrasting – perspective.

The introduction should include:

- The background for your choice of theme
- A discussion of your research question or thesis statement
- A schematic outline of the remainder of your thesis



Defining the scope of the thesis

See <https://sokogskriv.no/en/writing>

One of the first tasks of a researcher is defining the scope of a study, i.e., its area (theme, field) and the amount of information to be included. Narrowing the scope of your thesis can be time-consuming. Paradoxically, the more you limit the scope, the more interesting it becomes.

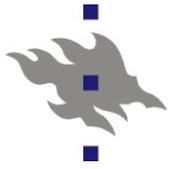
The research question can be formulated as one main question with (a few) more specific sub-questions or in the form of a hypothesis that will be tested. Your research question will be your guide as your writing proceeds. If you work independently, you are also free to modify it as you go along.

How do you know that you have drafted a research question?

Most importantly, a research question is something that *can be answered*.

Some tips:

- Use interrogative words: how, why, which (factors/situations) etc.
- Try to condense your research question into one general question – and perhaps a few more specific sub-questions (2-3 will usually suffice).



Theory/Model

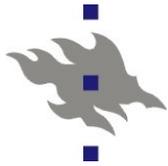
See <https://sokogskriv.no/en/writing>

Theory (model) in an empirical study is meant to shed light on the data in a scientific manner. It should give insights not achievable by ordinary, everyday reflections. The main purpose to use theory is to analyse and interpret your data. Therefore, you should *not* present theory that are not being put to use.

Not all theses have a separate theory section. The theory can be included in the introduction, and the second chapter covers the methods used.

What kind of theory should you choose? Since the theory is the foundation for your data analysis it can be useful to select a theory that lets you distinguish between, and categorise different phenomena. Other theories let you develop the various nuances of a phenomenon. In other words, you have a choice of either reducing the complexity of your data or expanding upon something that initially looks simple.

How much time and space should you devote to the theory chapter? The nature of your research should decide: Some studies do not require much theory, but put more emphasis on the method, while other studies need a rich theory section to enable an interesting discussion.



Methods

See <https://sokogskriv.no/en/writing>

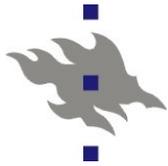
Method

Use your method chapter to show that you arrived at your results by applying valid and reliable methods. Explain what you did; your research, treatment or professional intervention, and how you did it.

- Account for ...
- Document ...
- ... what you did and did *not* do

What you **must** do is to show how your choice of research method is suited to answering your research question(s). Demonstrate that you have given due consideration to the validity and reliability of your chosen method. By “showing” instead of “telling”, you demonstrate that you have understood the practical meaning of these concepts.

Your method chapter shows how you arrived at your results !



Results/analysis

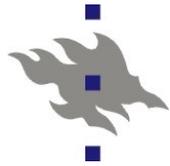
See <https://sokogskriv.no/en/writing>

Results

A relatively large part of your thesis should be devoted to your results/analysis (findings, data, empirical evidence). In this section you should:

- Present the findings
Organise, classify, analyse and (if relevant) categorise
- Explain and interpret (e.g. differences between various studies)
- Assess and evaluate

Your results = the essence of your thesis. The Introduction and Methods chapter should build up to your results by showing how you arrived at your results (Methods) and their significance (Introduction).



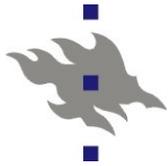
Discussion

See <https://sokogskriv.no/en/writing>

In many thesis, the discussion is the most important part. Make sure that you allocate enough time and space for a good discussion. This is your opportunity to show that you have understood the significance of your findings and that you are capable of applying theory in an independent manner.

The discussion will consist of argumentation. In other words, you investigate a phenomenon from several different perspectives. To discuss means to question your findings, and to consider different interpretations. Here are a few examples of formulations that signal argumentation:

- On the one hand ... and on the other ...
- However ...
- ... it could also be argued that ...
- ... another possible explanation may be ...

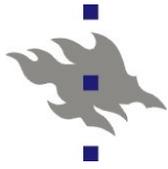


Conclusion

See <https://sokogskriv.no/en/writing>

The final section of your thesis may take one of several different forms. Some theses need a conclusion, while for others a summing up will be appropriate. The decisive factor will be the nature of your thesis statement and/or research question. Open research questions cannot always be answered, but if a definite answer is possible, you *must* provide a conclusion. The conclusion should answer your research question(s). Remember that a negative conclusion is also valid.

A summing up should repeat the most important issues raised in your thesis (particularly in the discussion), although preferably stated in a (slightly) different way. For example, you could frame the issues within a wider context.



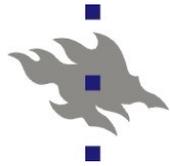
Placing your thesis in perspective

See <https://sokogskriv.no/en/writing>

In the final section you should place your work in a wider, academic perspective and determine any unresolved questions. During the work, you may have encountered new research questions and interesting literature which could have been followed up. At this point, you may point out these possible developments, while making it clear for the reader that they were beyond the framework of your current project.

- Briefly discuss your results through a different perspective. This will allow you to see aspects that were not apparent to you at the project preparation stage
- Highlight alternative research questions that you have found in the source materials used in the project
- Show how others have placed the subject area in a wider context
- If others have drawn different conclusions from yours, this will provide you with ideas of new ways to view the research question
- Describe any unanswered aspects of your project
- Specify potential follow up and new projects

A good thesis should “bite itself in the tail”

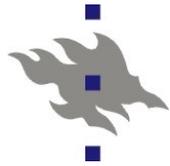


MSc thesis disposition task

1. **Write your research question and open it up in detail (Toulmin's model)**
 - What is your (preliminary) **conclusion/claim to your research question?**
 - Which is **your argumentation** for your (preliminary) conclusion/claim and how are you going **show (proceed to) it ?**
 - What kind of **research methods** are you going using?
 - Which **counterarguments** do you have against your methods/conclusion/claim?
 - From where can you find **backing/support** to use this methods?
 - **To which degree** is your (preliminary) conclusion/claim to your research question **certain, probable or possible?** How will **you qualify it?**
2. Make **outline and/or chapter composition** of your MSc thesis
3. Write a **short description of the content of each chapter** (as well as possible according to your current knowledge)

Deadline: Sunday 12.11.2023 23:55, return on Moodle only:

<https://moodle.helsinki.fi/course/view.php?id=28327>

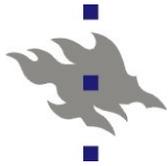


Evaluation criteria MSc thesis

(new degree structure)

- ✓ **Assignment and content of the thesis**
 - How the topic of the thesis is presented and how the research goals are justified.
 - How the research question is formulated and focused.
 - Choice of reference material, its suitability and depth.
 - Presentation of results and how they address the goals of the research.
 - Quality of research methodology and results.
 - Evaluation of the validity and significance of the results.
- ✓ **Structure of the thesis and quality of presentation**
- ✓ **Work processes**

https://guide.student.helsinki.fi/sites/default/files/inline-files/Pro%20gradu%20thesis%20evaluation%20matrix_3.pdf

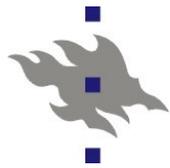


Evaluation criteria MSc thesis

(new degree structure)

- ✓ **Assignment and content of the thesis**
- ✓ **Structure of the thesis and quality of presentation**
 - The coherence and focus in the structure of the thesis
 - Scientific style of presentation, correctness of the language and overall readability of the text.
 - Use of references.
 - Use of equations, tables and figures and their quality.
- ✓ **Work processes**
 - Independent and creative thinking during the thesis work.
 - Ability to collaborate with the supervisor and (if relevant) with other members of the research team
 - How well the planned schedule is implemented.

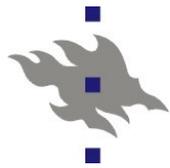
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MSc thesis evaluation matrix (new degree structure)

	0	1	2	3	4	5
i) Assignment and content	Essential elements are missing (e.g. introduction or conclusions). The reference material is absent or it has not been used in an appropriate way. Research topic is vague or severely misunderstood.	Research topic is narrowly described and the linking of the research goals with the wider background is insufficient. The references used are limited and the overall dependence of the text on the references is obvious. The work shows limited or incorrect understanding of the thesis topic.		The topic of the thesis and the research goals are presented robustly. Research methods and materials are sufficient and correctly used. Presentation of results is acceptable. Conclusions and outlook show that the student is familiar with the research topic.		The topic of the thesis, research goals and questions and research methods are well presented. Research methods are valid. The reference material is sufficient and well chosen. Presentation of results is excellent. The validity and significance of the results is evaluated. Conclusions and outlook show insight and coherent view on the topic of the thesis.

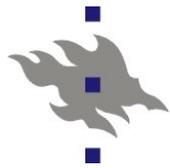
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MSc thesis evaluation matrix (new degree structure)

	0	1	2	3	4	5
ii) Structure and quality of presentation	Thesis lacks structure. The text has not been written according to the standards of scientific writing. Citations to references are lacking. The overall style does not conform at all to standard of scientific writing. The figures and equations are irrelevant or poorly connected to the text.	Significant structural deficiencies. The use of the standards of scientific writing and citation technique are deficient. The thesis is not of appropriate length or the requirements on the overall style are not met. The figures and tables in the thesis are of poor quality, lacking or do not support the text. The equations are unclear, unnecessary or wrong, or the symbols are not explained. The thesis contains lots of grammatical errors, lack of preciseness or scientific mistakes.		The structure of the thesis is good. The thesis conforms largely to the standards of scientific writing. The length is acceptable and the requirements on the overall style are mostly met. The figures and tables in the thesis are informative and support the written text. The equations are mostly in balance with the written text. The text is mostly clear and grammatically precise.		The structure of the thesis is excellent. The thesis conforms to the standards of scientific writing. The length is suitable and the overall style is excellent. The figures and tables in the thesis are prepared well, are informative and support the written text. The equations are sufficient and well balanced with the written text, and all used symbols and acronyms are explained. Language and appearance are exemplary.

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MSc thesis evaluation matrix (new degree structure)

	0	1	2	3	4	5
iii) Work process	Independence and capabilities to collaborate with the supervisor are difficult to assess or nonexistent. The thesis takes exceptionally long time to finish	Independence is largely missing and the thesis proceeds mainly by the decisions and advices of the supervisor. The student lacks understanding of the methodology applied in the thesis. The thesis falls significantly behind the planned schedule.		Some independent thinking during the thesis work. Student interacts with the supervisor, but requires often external input for making minor decisions. Work proceeds mostly according to the planned schedule.		Creativity and independence in analysis and inspection of the results. Skilled collaboration and/or interaction with the supervisor and other team members (if relevant) during the thesis work. Planned schedule is met.

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