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

Office: C327, Physicum

Email: kenneth.osterberg (at) helsinki.fi

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 (if not already on-going, autumn 2023)
- **Make a MSc thesis disposition** (autumn 2023)
- **Prepare & give oral presentation** related to MSc thesis subject (spring 2024, first oral presentations already in period II?)
- **Give feedback** to your fellow students on MSc thesis disposition & oral presentation (autumn 2023 & spring 2024)
- **Career related lectures/webinars & task(s)** (spring 2024)

Course plan

Gatherings:

✓ Period I-IV: Tuesday 12-14 in lecture room D112
Get-to-gethers only occassionally, 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

Course requirements & grading

Course requirements:
- Make MSc thesis supervision agreement (if not yet done, autumn)
- Complete thesis disposition exercise and review others (autumn)
- Make career development related tasks (spring)
- One page abstract of seminar topic (spring)
- Giving of a 25 minute seminar (spring)
- Act as opponent to seminar at least twice (spring)
- Minimum 80 % attendance of seminars & career lectures (spring)

Course assessment (based on seminar, grading 0-5, same as PHYS4006):
- ✓ 25 % timing (providing abstract 1 week in advance & slides 4 h before presentation and keeping the 25 min presentation time)
- ✓ 25 % abstract (title, clarity & readability, language and correspondence to presentation)
- ✓ 25 % presentation material (general impression, basic information, amount of slides, text & bullets and figures, formulas & tables)
- ✓ 25 % presentation itself (look & talk towards audience, audiable voice, suitable pace and answer to questions)
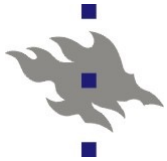
MSc thesis

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.
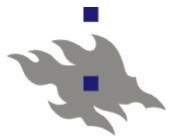
Master thesis: 30 ECTS credits
suggested length ~ 40-50 pages (however field & topic dependent)

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

How find a thesis subject and a supervisor ?

If you don't have a clear idea about your thesis topic and supervisor, discuss with your academic mentor or course lecturers as soon as possible. They can guide you to a research group that matches your interests.

For **MSc thesis topics in astronomy**, please visit
https://moodle.helsinki.fi/course/view.php?id=15592

Webpages of research groups (except astronomy):

- **Experimental particle physics** (CERN & Large Hadron Collider):
https://www.hip.fi/research/cms-programme/ (contact: M. Voutilainen or K. Österberg)

- **Detector laboratory for particle physics instrumentation** (radiation detectors):
https://www.hip.fi/detector-laboratory/ (contact E. Brücken or M. Kalliokoski)

- **Theoretical particle physics**: (contact: O. Lebedev & A. Tureanu)

- **Observational & theoretical cosmology:** (contact H. Kurki-Suonio, E. Keihänen or S. Räsänen)

- **Space physics research:** https://blogs.helsinki.fi/spacephysics/ (contact: E. Kilpua or M. Palmroth)

- **Computational field theory:** https://blogs.helsinki.fi/computational-field-theory/ (contact K. Rummukainen, M. Hindmarsh or D. Weir)

- **Quantum field theory & dense strongly interacting matter:** (contact: A. Vuorinen & N. Jokela)

- **Quantum technology:** https://www.helsinki.fi/en/news/human-centric-technology/quantum-technology (contact: S. Maniscalco or E. Keski-Vakkuri)

MSc thesis supervision agreement

- Agreement between student & supervisor(s) on defining how to work together

- Made when starting work on the MSc thesis

- At the same time a first MSc thesis planning

- Signed by the supervisor(s) and the student

- Copies distributed to the director of the MSc programme (ParAs: Anca Tureanu, TCM: Kimmo. Tuominen) and to the study office (Elina Palmgren/kumpula-student@helsinki.fi).

- **Drafting of the agreement is important and it is the student's responsibility.**

NB! People external to University of Helsinki (UH) can be supervisor but there needs to be at least one UH permanent staff as supervisor.
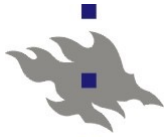
Next: When topic & supervisor known, fill MSc thesis supervision agreement

UNIVERSITY OF HELSINKI
MASTER'S PROGRAMME IN PARTICLE PHYSICS AND ASTROPHYSICAL SCIENCES

UNIVERSITY OF HELSINKI
FACULTY OF SCIENCE

MSc thesis supervision agreement
☐ **New agreement**
☐ **Updated agreement**

Name of the student:	
Student number:	
E-mail and telephone:	
Study track:	

Supervision:

Supervisor(s): O.O. (UH PARAS) and N. N. (organization)	

Please outline below the supervision process taking into account at least the following aspects:
- distribution of responsibilities between student and supervisor(s)
- planned frequency of supervision meetings
- timeframe submitting materials before supervision meetings (if applicable)
- timeframe for receiving comments from the supervisor(s) after submitting material
- ways of contacting the supervisor between agreed meetings

Topic of the thesis (preliminary title):

Research question of the thesis:

If the research question is not specified yet, please outline the process how to define the research question and set the date by when the research question will be set.

Study area, materials and methods:

Schedule:[1]

Start time (mm/yy):	
Review of literature (months)	
Experiments / computations (months)	

Analysis of results and writing the thesis (months)	
Finish time (mm/yy)	

Good scientific practice and the ethical principles followed in the field of research:

If applicable:
Research resources: (partners in cooperation, datasets, infrastructure), space arrangements, funding)

If applicable:
Safety introduction and safety measures for experimental work.

If applicable:
Use of and publication of research data: (if specific data is used/produced)

The thesis will be published at the e-thesis platform (HELDA).

Validity of the agreement, problem solving

End date of the validity of the agreement (mm/yy)	
The contact person in case of problems in the supervision and thesis process[2]	

This agreement can be updated anytime during the thesis process by preparing a new agreement. The agreement must be updated after the end date, if the thesis is not finished.

Date and signatures:

Supervisor   Student

Distribution: Student, supervisor(s), responsible professor (of the study track), programme director and study office.

[1]   One of the expected learning outcomes of master's thesis is to learn to conduct project work, which includes keeping the schedule. This is reflected also in the evaluation matrix.

[2]   The primary contact person is the director or vice director of the master's programme. The contact person can not be a supervisor of the thesis.

Deadline: Sun 8.10.2023

Link to template on course homepage:

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

8

Discussion: MSc thesis

15 minutes discussion: Have a discussion regarding the following topics in groups of 3-4 students

- What are your thoughts about the MSc thesis ?
- What subjects are your interested of ?
- How to find a thesis topic & thesis supervisor ?
- How to get started ?
- Any tips that would be good to know for the others ?

After the small group discussions, short reports by each group to the whole room

(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

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**

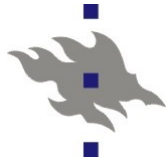https://guide.student.helsinki.fi/sites/default/files/inline-files/Pro%20gradu%20thesis%20evaluation%20matrix_3.pdf

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.

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

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.

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

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.

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

Next

What is the status of your MSc thesis ?

Do you have a supervisor ?

Is the thesis subject fixed ?

If not discuss with your academic mentor/supervisor !

Make thesis supervision agreement with your thesis supervisor & return it to programme director, study office + Paras seminar Moodle page:
https://moodle.helsinki.fi/course/view.php?id=28327

(deadline: **Sunday 8.10.2023**)

Next get-together: Tuesday 10.10.2023