Information about Bachelor and Master Theses in the Atmospheric Chemistry Group

1 Preparation

In the period of preparation the scientific idea for the bachelor or master project is designed and shaped in planning meetings. From that a project plan is developed, that…

- contains a working title of the thesis (short and meaningful),
- introduces the topics background (literature overview),
- names specific working hypothesis (justified expectations),
- defines the project goals (SMART),
- summarizes the measurement methods (as precise as possible),
- describes the expected time table (including all steps as detailed as possible).

According to the study program this project plan can be either a project sketch or a research proposal. All projects will be presented and discussed at the beginning of the thesis within the Seminar (15 to 20 minutes talk).

This preparative work is the foundation for carrying out, analysing and writing the bachelor or master theses.

2 Start

The theses will be officially registered in accordance with the supervisor.

The theses can be written in English or German.

Possible co-reviewer should be discussed and agreed on together with the supervisor during an early stage of the thesis.

Depending on the available office space, a work place will be setup. Keys for the laboratory and work place can be handed out in consultation with the group leader.

3 During the thesis

During the preparation and realization of the theses it is expected that the Seminar of the Micrometeorology and Atmospheric Chemistry groups is attended regularly. Additionally, the Friday-Groupmeetings should be visited.

For each bachelor and master project a laboratory-book is used for protocols and notes. The lab-book will be archived in the lab after finishing the theses.

Besides the scientific results of the thesis each project should contribute to the “Third Mission” of Uni Bayreuth. Everybody should, according to his/her talents, prepare a small contribution about his/her topic (e.g. poster presentation in easy language, text for webpage, presentation at science events, video, ect.).

Master theses are presented at the end of the project in the Seminar within a 20-minute talk.

4 After handing in

After handing in the thesis all raw data, intermediates, results and collected literature (pdf) plus the seminar talk and the written thesis need to be burned on two CD/DVD.

Experiments and methods need to be documented. If not existing yet, then small manuals should be written. Self-written programs and software-codes need to be documented and commented.

At the end, please clean up your work and lab space, the computer and folders, give back borrowed instruments, literature and the keys. Provide a contact address.

5 From the study guides of Geoecology and Environmental Chemistry

Gemäß dem Modulhandbuch für **Bachelor Geoökologie** sind zwei Module zu erfüllen:

> T1: wissenschaftliche Projektarbeit (Ziel – Projektskizze entwerfen und vorstellen)
>
> T2: Bachelorarbeit (Ziel – erworbenes Fachwissen anwenden, eine erste wissenschaftliche Arbeit durchführen und in schriftlicher Thesis präsentieren)

http://www.geooek.uni-bayreuth.de/geooek/bsc/de/lehre/gru/html.php?id_obj=52137

Für den **Master Geoökologie** sind gemäß Modulhandbuch ein Modul zu erfüllen:

> MA: Masterarbeit (Ziel – eigenständig eine wissenschaftliche Arbeit planen und durchführen, die in einer schriftlichen Thesis mündet)

http://www.geooek.uni-bayreuth.de/geooek/msc/de/lehre/gru/html.php?id_obj=58568

According to the Study Guide of the **Master program Environmental Chemistry** two modules need to be fulfilled:

> M3: Paper seminar / Research Plan (Aim - write and present Research Proposal)
>
> T: Master Thesis (Aim – plan and perform a hypothesis-driven independent research task)

http://www.bayceer.uni-bayreuth.de/environchem/en/program/5001/1/13021/MSc_EnvironmentalChemistry_StudyGuide_EN_2019-11-20.pdf

6 Possible structure of the thesis

Classic scientific literature is following the structure lined up below. If you read other theses you will find that most written works are structured in that way. However, in some cases it might make sense to change or adopt it to a more suited structure, e.g. in case that manuscripts were published during the theses that need to be included, or in case that results cannot be separated clearly from a discussion, or in case that the motivation needs to be highlighted, or in case that the thesis is part of a larger project, or…

In general, even a scientific story is a story. Tell it from the beginning to the end, describe the necessary details, focus on a redline and highlight the key-findings.

- **Title**: The title page includes a short, but meaningful title of the theses, information about the type of theses, where it was conducted (Atmospheric Chemistry) and handed in (University of Bayreuth), the authors name and matricle-number.
- **Contents/List of figures/List of tables/List of abbreviations**
- **Erklärung zur selbstständigen Anfertigung der Arbeit**
- **Summary in German and English**: The abstract should summarize on one page the motivation of the thesis, the overall goal, briefly the methodology applied, the major results and the key-findings.
- **Introduction**: The introduction highlights why the topic is relevant. Current gaps in the understanding can be pointed out and open questions posed. It should be referred to past and

current literature that is important to understand the topic and the motivation of the study. The project goals as well as hypotheses should be formulated here.

- **Methodology**: Describe in detail the methods and set-up. This includes e.g. the location, sampling site, instruments, experimental set-ups, self-made equipment, routines, programs or models, data analysis strategies, calibration procedures, ect. It should become clear how you obtained the results and of what quality they are.
- **Results**: Here the results are presented in figures and/or tables and explained within the text. Each figure carries a caption with a short, descriptive text and is numbered. Each table carries a caption and is numbered as well. These numbers need to be referred to in the text to point out the data presented in the figures or tables. Explain each abbreviation when you use it the first time. Take care to always use the correct units.
- **Discussion**: The discussion should place the results into the context of the initially formulated study goal and hypotheses. Pros and cons of the methodology can be discussed here. Uncertainties and possible errors should be highlighted in order to judge the significance of the data. Explain and interpret the results, in particular but also in context of previous studies. The discussion can be a stand-alone block following the presentation of the results. Or it can be included into the results section (label: Results and Discussion).
- **Conclusions and Outlook**: From the results and discussion, implications and final syntheses can be concluded. Here new questions and possibilities for future research can be mentioned.
- **References**: All citations or concepts taken from the literature must be referenced. The style of citation can be adopted from https://www.atmospheric-chemistry-and-physics.net/for_authors/manuscript_preparation.html.
- **Appendices**: If needed, e.g. for large tables, software codes, method descriptions, ect.
- **Thanks**

7 Further Reading

https://www.schreibzentrum.uni-bayreuth.de/de/index.html

https://www.icp.uni-bayreuth.de/pool/dokumente/LaTeX-fuer-wissenschaftliche-Arbeiten.pdf

http://www.utb-studi-e-book.de/9783838546018