

Guideline for lab reports

Supervisor and team:

Due date for the report:

We recommend sticking to the IMRaD (Introduction, Material and Methods and Discussion) structure as seen below.

Introduction

Idea: I summarized the theoretical background and clarified my expectations.

- What is the essential question behind the experiment?
- Which kind of theoretical background do I need in order to make my results understandable?
- What do I want to focus on in the discussion of my report?
- Do I have a certain expectation concerning the results (and why)?
- Methods
 - o Should only be mentioned briefly in most reports.
 - o But: If your report is of methodological nature, give more details, such as:
 - Equations.
 - Concept of the method employed.
 - Theoretical background with focus on relevance in the scientific context.
- Status of the current scientific research.
- If your report is longer, introduce its structure (e.g. "In section 1.1, X will be introduced. We will come back to that in section 1.2 where we do Y.").

Material and Methods:

Idea: I mentioned and explained all the information that is crucial in order to exactly reproduce the experiment.

- Describe all materials used in detail.
- Mention your methods (e.g. spectroscopy, microscopy...).
 - o A short note on how you proceeded and why can be included e.g. if the employed method was modified from the standard method.
- Refer to the research status described in the introduction (see above) if needed.
- Statistics:
 - o Statistical methods can be assumed as known to the reader.
 - o But describe them in a way that determines them to full extent (e.g. if you perform a t-test, clarify which one (parametric vs. non-parametric, paired vs. unpaired, were results corrected in regard to sample size? ...).



- Explain the required error calculation.
- In case of complex experimental set-ups, include an image e.g. a scheme or a picture (don't forget to cite properly if needed; details on how to employ figures can be found in the results section below).
- If equations are needed in the results section below, they should be introduced and explained here.

Results

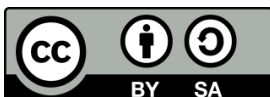
Idea: I have summarized the most striking data I found in the experiment objectively.

- Subsections should begin with an introductory sentence:
 - Why and with which kind of methodology was this experiment performed?
- Results should be presented with a sensible structure and order, e.g. individual steps of the experimental parts need to be sorted thematically or, in case of larger experiments, be put into individual subsections.
- Results should be described objectively.
 - No discussion of the results in this part of your paper!
 - Emphasize the results that you will refer to in the discussion.
- Figures:
 - Choose a fitting representation of your data. Depending on the employed calibration or scaling (e.g. linear vs. logarithmical) the same data can look entirely different.
 - The description of the figure in the text should appear before the figure itself.
 - Figures always need a caption.
 - This text needs to include a sufficient description of the methods.
 - It should include enough information for the caption and figure to be fully comprehensible without referring to the text of your paper.
 - If necessary, details from the caption can be included in the normal text of your report.
 - Please use units, error bars and sensible axis labels!
- Tables:
 - Need a meaningful heading (e.g. displayed measurement, duplicates...)
 - Have a proper format (avoid word wrappings, they should not be broader than the text; are labeled correctly – please take a second to consider, which information should go into the rows and which in the columns.)
- Large datasets: Only show relevant data with reference to attachments or a digital medium.

Discussion

Idea: I evaluated the results, questioned them critically and contextualized them with regard to other information (e.g. my expectation or results in literature)

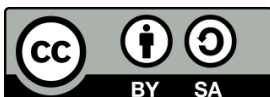
- Be careful in your choice of words: Your paper presents hypotheses, not facts, as far as the underlying theory is concerned!
- Summarize relevant results:
 - Relevance is defined by the essential question underlying your experiment or by possible sources of error.
- You should refer to the expectations previously stated in the introduction.



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- Discuss possible errors and the reasons for them.
- If needed, limitations of the experimental methods should be discussed.
 - If you conclude that the experiment was indeed limited due to the method applied, you may suggest an alternative or modified experimental design that could provide better results.
- The results should be discussed in their scientific context.
 - A comparative discussion with findings from other scientific works should happen if possible.
- End with an overall conclusion: What can be concluded from the experiment?

Don't forget a bibliography and if needed an appendix!



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