# Appendix 1: Lab Journal

1. Title
2. Student name and student number
3. Aim of the practicum and learning objective

|  |  |  |  |
| --- | --- | --- | --- |
| Aim and learning objective from the practicum | Expected learning objective from the student before the experiment | Expected learning objective from the student after the experiment | Learning objective fulfilled? |
| *complete before the practicum* | *complete before the practicum* | *complete after the practicum* | *to what extent and please explain* |

*\*The completion of this table is compulsory.*

1. Short introduction

The introduction should be constructed using the learning objectives (point 1) as a guideline. It contains the theory behind the learning objectives. You can use your theoretical handouts, books, or search engines to construct your story.

1. Risk assessment of the chemicals used in the lab

*Risk assessment of all chemicals employed in the experiment before entering the laboratory is compulsory.* Your risk assessment should explain: (1) the type of chemical, (2) chemical properties, (3) it is the chemical harmful to humans and the environment? If yes, look at the chemical data safety sheet and describe the potential risks you expect to face during experimentation. (4) Describe how you will mitigate the risk. (5) Describe the disposal category.

1. Graphical representation of the conceptual model and the narratives

This is the initial conceptual model CM0. It should include all the elements of a good conceptual model, as described in the handouts on conceptual modeling.

In CM0 include the following table containing:

|  |  |  |
| --- | --- | --- |
| Part of the experiment | Observation | Questions based on observation |
| *1. Describe the part of the experiment you are referring to…* | *1. Describe your observation* | *1. Include your question based on your observation* |
| *2. Describe the part of the experiment you are referring to…* | *2. Describe your observation* | *2. Include your question based on your observation* |
| *etc* | *etc* | *etc* |

*\*The completion of this table is compulsory.*

1. From the point before (i.e., vi), the student should formulate the research questions (what the student wonder, what the student wishes to inquiry about). **Please note**: if the research question is connected to the table from point vi. Keep the same order and number.

|  |  |
| --- | --- |
| Connection to table vi. | Research questions |
| *e.g., this point is connected to observations 1 and 2.* | *1. formulate your question…* |
| *e.g., this point is connected to observations 3 and 4.* | *2. formulate your hypothesis…* |

*\*The completion of this table is compulsory.*

1. **After the practicum and during the meeting with the learning assistant**.

The meeting is designed as a reflection/explanation meeting. In this case, make use of tables from points *vi* and *vii*. You are allowed to ask the learning assistant about the table in point *vi* and the formulated research question in table point *vii*. **At the end of the meeting, the student should discriminate between (i) bare observations and scientific observation and (ii) a question based on observation and a research question**. Narrow down your thoughts and complete the table below.

|  |  |  |  |
| --- | --- | --- | --- |
| Part of the experiment | Observation | Questions based on observation | Overarching question |
| *1.* | *1.* | *1.* | *1.* |
| *2.* | *2.* | *2.* | *2.* |
| *3.* | *3.* | *3.* | *3.* |
|  |  |  |  |

*\*The completion of this table is compulsory.*

Note that this is the transition between the first conceptual model CM0 and the new CM1. The new CM1, should include all the elements of a good conceptual model, as described in the handouts on conceptual modeling. Remember that CM1 is a more evolved version of CM0.

1. **After the meeting with the learning assistant**

Provide the final part-results and discussions (based on observations and the measurements). This is an intermediate version of the conceptual model, now called CM1. In this case, you should make a comparison between CM0 and CM1. Include a reflection in the form of bullet points for the transition between CM0 and CM1 using the table below:

|  |  |
| --- | --- |
| CM0 (before the practicum). *For CM0 indicate in red the points generated during the preparation meeting with the learning assistant.* | CM1 (after the practicum and meeting with the learning assistant) |
| *e.g., this point is connected to observations 1 and 2.* | *1. formulate your research question…* |
| *e.g., this point is connected to observations 3 and 4.* | *2. formulate your research question…* |

*\*The completion of this table is compulsory.*

After completing the table, could you describe the rationale behind the changes between CM0 and CM1?

1. **A new CM called CM2**

*This is the final conceptual model derived from CM1. This is part of the final reflection on the making of the model (that is,* reflection in the form of bullet points for the transition between CM1 and CM2*).* **Describe the CM2 as a narrative or a short story, make use of calculation, equations, or if you dare make use of a graph from your experimental data**.