

PRBB Intervals Course Proposal

Course Title

Sharpen your reasoning skills: logic and critical thinking for scientists

Proposed date(s)

9th and 10th of July 2025

Course Language

English (questions can be answered in Spanish, if required)

Course Leader(s) and very brief summary of relevant qualifications and experience (no more than 2 lines for each trainer)

Kai Hübemeyer studied philosophy and physics. He has several years of teaching experience with courses on critical reasoning.

Rationale for course (why is this course of interest for the PRBB staff?)

In science, thinking clearly and seeing the logical relationships between ideas is as important as are experiments and data. Nevertheless, the logical basics of correct reasoning are not part of the curricula for most university degrees. In this course we introduce basic concepts of logic such as validity and soundness and the distinction between inductive and deductive reasoning. The idea of the course is to use these concepts as a toolbox for various aspects of scientific work. Participants get to know techniques that help them identify strengths and weaknesses in arguments, structure texts optimally, and to state arguments clearly and precisely.

Course aim - general

In addition to learning how to give more convincing arguments in their publications and in debates, the course will also help participants to identify gaps or weaknesses in scientific reasoning and to judge more accurately whether their own positions are well justified. The exercises in the course are designed to apply the acquired skills directly to the individual participant's scientific work. Participants can bring their own texts and practice argumentation in contexts which are most relevant to them individually, for example grant applications, research papers, or debates at conferences.

Specific learning outcomes (what new skills, knowledge &/or attitudes will participants take away from the course?)

Your learning development

This course, along with a few other courses in the Intervals programme, offers participants the added benefit of taking an active part in assessing their progress towards their learning goals in a structured way. To this aim we have incorporated a pre- and post-course assessment into the course:

How it works: before the course, we will ask you to complete a short questionnaire identifying your perceived learning needs in line with the course objectives. You will also be asked to do a written exercise so that the trainer can also make an assessment of where you are now. After the course you will be asked to

complete a similar exercise and to reflect on the next steps you wish to take to further your learning in this area. This exercise will take up to 30 minutes, both before and after the course.

Registration on this course implies that you are happy to participate in this initiative and you will ensure that you have set aside time to complete both the pre and post-course exercises.

Course Objectives:

Participants will...

- get to know basic concepts of logic (validity, soundness, standard form, fallacies etc.)
- structure scientific texts and presentations optimally
- learn to quickly identify the strengths and weaknesses of arguments in scientific contexts
- learn how to break down arguments into their logical structure
- train analytical-thinking skills

Course contents (outline of topics to be covered)

Session 1 (July 9):

What is an argument?

Deductive arguments: validity and soundness

Background assumptions in arguments

Patterns for deductive arguments

Inductive arguments

How to structure texts and talks

Session 2 (July 10):

How to structure texts and talks (continuation)

Tips for written argumentation

Typical fallacies and unfair communication

Arguing in oral discussions

Training methods

The methods are interactive throughout. The course provides extensive exercises that aim at the application of the acquired skills to the participants' individual fields of work. The exercises alternate between individual work and group work.

Target group in PRBB (Senior scientists, postdocs, predocs, management/admin staff, all residents)

All residents

Number of participants (maximum)

12

Total course hours (Please specify: a) direct training with instructor present b) required self-study.

- a) 16 (including breaks)

Distribution of course (hours/days)

Day 1: 8 hours

Day 2: 8 hours

Material participants need to bring (laptops, etc...)

Participants (ideally) need a laptop or tablet with internet access, because the exercises are hosted on an online platform (moodle). If this is not possible in a few individual cases, the trainer can bring a few copies of the exercises in print. (Please notify in advance if this is the case.)

Relevant background reading/ audiovisual/websites or other materials

A course script will be uploaded to a moodle-page before the start of the course. Reading it is optional and knowledge of its contents is not a prerequisite for the course.