How do I hold a seminar presentation?

A seminar presentation has two tasks. On the one hand, the lecturer should learn something, more precisely: acquire and work on a specific, more or less clearly defined mathematical topic. On the other hand, the other seminar participants should learn something from the lecturer passing on his acquired knowledge in a kind of pre-chewed form.
Convincing the lecturer that you have earned a certificate is not one of the goals of a lecture. The appearance is at best a side effect. Please take this to heart, especially if acquiring a certificate is actually your main motivation for taking part in the seminar at all.

An oral presentation has means of expression that all written sources lack. A good seminar presentation, like a good lecture, is aware of these possibilities and makes use of them. A bad lecture is an organized waste of time and grossly impolite to the listeners.

Below I have written down a few things that should help you with the preparation and implementation of a seminar presentation. Not everything I have gathered here will meet with undivided approval. Others will have different priorities. After all, some things will seem obvious or banal to you. Still, think about it for a moment. Take the preparation seriously and the presentation relaxed!

If you prepare for a seminar presentation, this must be done in two ways: in terms of content and technique. It goes without saying that you can only give a good lecture if you understand what you are talking about. Good content preparation is therefore an indispensable prerequisite for every presentation. Start preparing in good time. Two weeks before the lecture date is not in time!

For content preparation

What is the purpose of the lecture?
In the discussion with the lecturer or the supervising assistant, make sure that you understand the task correctly and that you are not preparing for the wrong topic or with the wrong focus. Sometimes, however, you can only ask meaningful questions once you have at least familiarized yourself with the subject matter to some extent. The question of how the lecture is embedded in the overall context of the seminar is also important. This can help, for example, when selecting examples.

What literature is there for the lecture?
An entire seminar or an individual lecture is often based on specific books and texts or sections from them. Still, try to find and read other literature on the subject once you have an idea of what it is about.

How do you read math texts?

If you are ready to give a seminar lecture during your studies, you have already studied one or the other semester and read one or the other book and know what is important: When you read mathematical texts, there are two modes in which You can proceed: From a bird's eye view: what are the rough lines? What is the

Subject of this text? What are the key terms and definitions, what are the key statements and sentences? What are the rough proof structures? What are you doing all this for? From a frog's perspective: How is it done in detail? How does a proof work? Why do you need the prerequisites in the sentence? What happens if you leave them out? You often have to switch back and forth between these modes.
You first have to get an overview of where you really want to go, otherwise you get stuck in the first technical lemma and get stuck. On the first reading you can skip all the proofs and concentrate on the statements of the theorems.
At some point, however, there comes a point where you no longer understand the sentences because you have not developed a feeling for the terms introduced. Then it's time to take a closer look at the evidence. Once you have understood more technical details, you should step back a little and ask yourself again what the overall context is, etc.
In an adapted form, this also applies to the way in which individual sentences or examples are approached. If you are confronted with a new theorem, you can ask yourself questions of the following kind before, after or even during the study of its proof: What are simple examples for the theorem (e.g. special cases)? What are simple counterexamples where certain conditions are not met? Does the theorem, or the term used, or the proof, relate to things already known? Is there a characteristic example from which one can observe all the essential phenomena?

Familiarize yourself with the literature on your presentation (and its position in the seminar) in circles.

For the written elaboration

When you think you've got the general idea, write it down. All things related to the lecture should be there.
Work out all (!) details in writing. This applies in particular to all questions of the oh-so-yes-is-really-trivial! type. If you stumble upon certain points, there is a very good chance that the same question will pop up again in the seminar.

This written elaboration does not have to have very much to do with the later lecture. Sometimes proof steps or rather boring calculations will be left out in the lecture. Nevertheless, you should have prepared the things you are leaving out all the more carefully. If you are supposed to give a lecture on a very specific text, it is not yet an achievement if you understand this text and then write it verbatim on the blackboard, possibly keeping the numbering of the lemmas. Read the text from the following points of view: - The author is not right at all. First of all, do not believe a single argument from him. First of all, there are always mistakes in mathematical texts, even in texts about things you think are completely washed out. On the other hand, this is a simple psychological trick to force yourself to work precisely. - The train of thought can be shortened. Sometimes proofs can be simplified or drastically reduced. Try that. If you succeed, ask yourself why the author didn't think of it. Sometimes that's because your new abbreviation is just plain wrong. But when you discover the mistake, you will have learned a lot.

A lecture is a lecture and a book is a book. A text has completely different possibilities than a lecture and vice versa. A structure of proof designed for a text that allows, for example, leafing through, may be totally unsuitable for a lecture whose framework is defined by the listener's capacity and short-term memory. Invent a new one. Never talk about things you don't understand.

The temptation is great. But there will always be someone in the audience who, without malicious intent, asks a question exactly where the ice is thin. And when that happens, admit that you don't understand the point; there might then be an opportunity to discuss the issue in plenary. (Of course, if this happens a lot, it's probably because you didn't prepare properly.)

During this preparation period, you should take advantage of the support offered by the lecturers and assistants. Of course, you cannot expect that every epsilon will be calculated for you, because the preparation is an essential part of the seminar performance to be provided. On the other hand, it doesn't make sense to spend weeks brooding over a problem that may be based on a simple misunderstanding.
In particular, you should discuss the choice of topic and the role in the seminar context with your supervisors.

To the actual lecture

When you feel at home in your topic, the work on the topic gradually turns into the actual preparation of the presentation. To do this, you must condense what you now know extensively into a lecture. You will only be able to explain a small part of what you have understood or learned on the blackboard. Nevertheless, you still need to know a little more, be able to provide details in the event of queries, or have an example at hand, etc.

There are common stereotypes: --- The
introverted lecture. The lecturer is unaware that he is not alone in the room. He speaks more to himself and to the blackboard than to the audience, and if possible does not let the audience participate in the lecture.
--- The I-know-what lecture. The lecturer is primarily interested in demonstrating to the audience that he has learned something. He strings together the terms, sentences and proofs like pearls, if possible at a breathtaking speed, but prevents the audience from gaining insight into the connections, because that would mean losing his knowledge monopoly.

--- The zero-buck lecture. The lecturer did not understand the topic and did not prepare himself. He buys time so that he doesn't get to the complicated things in the end. Poor wording and illegible writing prevent any possible approach to interposed questions.

A good lecture is characterized from the start by the fact that it sees itself as conveying the topic to the audience and that the audience is the focus. All other principles can be derived from this principle. When selecting the performer, the available time and the capacity of the audience must be taken into account.
In principle, all speakers always seem to have too little time. Overdoing is a mortal sin. If in doubt, you have to shorten. Shorten wisely! Which parts of a proof are important because they contain the joke or practice typical procedures for the area, which parts are unimportant because they were already there in a similar form or can be left out without loss of understanding? Writing faster or changing slides quickly only helps the presenter, but not the audience.
Always remember: It's all about the audience, not the presenter! The presenter is judged on how his presentation is received by the audience. When giving a presentation, bear in mind that things that seem trivial to you after you have been dealing with them for a few weeks are far from trivial for the audience, even then

if you call them trivial. Never call things trivial that are not, or you will offend the audience.

Speak to the audience. The board will always give you the cold shoulder.
Address each listener individually, making eye contact. And don't talk to the seminar leader! Your main addressee are your fellow students. Speak loudly without shouting. Speak clearly. You cannot cover up insecurities by mumbling or speaking softly and quickly. On the contrary. Think about your chalkboard painting! Before the lecture, find out which and how many boards are available to you. Think about how you want to use these boards. Plan exactly which things you want to write down and which things you only want to explain verbally. Complete German sentences do not always have to appear on the blackboard. This can be very tedious and cumbersome. (The phrase "We define a ... as" within a definition is completely superfluous). Symbolic notation used sensibly can be perceived much more quickly. Too many symbols, on the other hand, make it difficult to understand. (I personally detest logical connectors, like and/or/not and clusters of quantifiers).

In your manuscript, clearly mark what you want to write about and how.

Use pictures and sketches where it makes sense. With a good (!) sketch you can pass on more information to the audience than with long cumbersome sentences. When you make a drawing, make an effort: every picture should be considered. How to choose the perspective? Where do you start on the board and how much space do you need to complete the drawing? And draw cleanly and precisely. Of course, the obligation to be mathematically exact sets limits to overly free imagination. However, it is usually worth exploring these limits. So dare to take a picture!

Work on your typeface. While handwriting may be difficult, there is no excuse for sloppily written formulas. An "alpha" must be distinguishable from an "a", a "zeta" from an "xi", and an "l" from an "e". A "Sigma" is not a zigzag line. The blackboard also has a baseline, and it is horizontal, not sloping up or down. Letters have descenders or ascenders. Fractions are at the same level as equals signs or linking signs, etc. Written handwriting is certainly nicer than childish block letters. However, if you have trouble with formulas, it can be helpful if you kind of print formulas. Remember our rationale again: it doesn't matter if you can read your own handwriting, it's not a yardstick: it's the audience that counts.

Incidentally, from what I have said so far, it is clear that a mathematical lecture has to take place at the blackboard. In my opinion, slides are only allowed in a few exceptional cases, mainly for quick illustration. This means that slides are very well suited for presenting summarized results, providing interim results for later use, and presenting complex images or graphics quickly. Transparencies have the decisive disadvantage that they condemn the listener to passivity to a much greater extent than the blackboard: - Those who use transparencies usually also darken the room, because otherwise one cannot read the transparencies. This almost automatically induces sleepiness in most listeners.

- Taking notes from slides is much more difficult than from the blackboard. First of all, this is due to the conversion difficulties of the eye. And secondly because the slides are almost always too full. One often observes as the first reaction of the audience that the pencils are put down as soon as transparencies are put on. Slogan: You can with foils

inform, but not argue. The following rules of conduct apply to a slide presentation: - Only use a few slides and leave each slide as long as possible.

- Each slide should contain only a small amount of text, and this text must be discussed in turn.

- The writing on a slide has to be even more careful than on the blackboard. If you use printed text, pay attention to the fonts used. Sans Serifs fonts are easier to read than Times fonts or similar. The sensible use of colors increases readability enormously.

- You must never cover parts of the foil and then uncover them in the course of the presentation. The papers you use to cover them are never quite right on the foil, mostly at an angle, they tend to fall off. In any case, they create unrest.
- Each slide may only contain the text that is also used in the presentation.
- Recreate the slides as you need them for each presentation.
- Slides are to be written in the language of the presentation. The use of English slides in a German lecture is unfortunately an increasing bad habit.
- It is grossly impolite to reuse slides that have served a completely different purpose and which show that because they contain information that is not needed at all, or because they are from the last conference and are written in English, but now in German be read aloud. The series could be continued.

[Addition: The preceding paragraph shows that this text is already a few years old: slide presentations have become very rare overall, but unfortunately Power Point presentations are becoming more and more common. Of course, beamer presentations all have the same problems as slide presentations plus others: For example, the presenter is completely tied to the medium, can no longer correct errors, which is still possible with slides, and cannot react flexibly to intermediate questions from the audience.
Basic rule: Beamer presentations are strictly forbidden. Unless there are very, very good reasons. I can't imagine almost any. ML June 2009]

If you have never given a lecture before, you should definitely make the effort to rehearse your lecture in front of an empty hall or, if possible, in front of friends. On the one hand, you will get a feeling for how much time you need.
On the other hand, it is important to hear your own voice and to formulate sentences out loud at all. Perhaps you have experienced that an apparently very plausible argument breaks down as soon as you say it aloud, regardless of whether someone objects, or that, conversely, a problem solves itself as soon as you speak it aloud to someone else when the other person just listens or asks simple questions. A sample lecture also gives you confidence in your appearance and takes the stage fright away. Such a test presentation should always be followed by a critical revision of the manuscript, and if necessary a new test presentation.

Speak freely! This is a big challenge and a difficult hurdle. Many lecturers never take this hurdle either. Of course, that doesn't happen from the start. But make the free lecture your goal. The basic prerequisite is, of course, that you are well prepared in terms of content. (There may be places where you are unsure. The important thing is that
You can limit this uncertainty and also admit it to the outside world without getting upset.) If you have repeatedly rewritten your manuscript in the course of the preparation in its various phases (after all, you are trying to find the optimal presentation) , you will eventually memorize half of the lecture anyway. Mind you, it doesn't matter to memorize the lecture

to learn! It is much more important to keep an overview, to be able to say at any point in the presentation where you are at the moment and where you want to go. (You must keep reminding the audience of this, by the way.) Think about the following question: How is the completely unprepared audience supposed to understand a lecture when even the lecturer needs a manuscript after a long and thorough study of the subject? There is nothing wrong with checking long calculations by looking at the manuscript to see whether the table calculation is correct. Even carefully formulated sentences and propositions can be copied. But try to reason freely in the evidence. Use your manuscript more as a reminder of the outline. A first step is to occasionally put the manuscript down. Nothing is more absurd than mindlessly writing a proof on the blackboard and then standing in front of it and reconstructing why the argument is an argument at all. All beginnings are difficult. If you also feel more secure when you can hold on to a piece of paper, occasionally, and more often, just put it down. You'll find out: that's liberating!

For follow-up After
the lecture, there should actually be an opportunity to discuss both the content and the implementation. Often there is no time to talk about the lecture itself because of all the mathematics. Sometimes the lecturer will refrain from publicly speaking about mistakes in the lecture. In any case, try to get feedback on the style of presentation, blackboard painting, etc. and talk to fellow students, lecturers and assistants about it. This is the only way you can improve future presentations.

When you have given your presentation, the seminar is not over yet. Pay close attention to the lectures of your fellow students and try to learn something from them. If you don't understand something, don't be afraid to ask. Remember our main rule. Only now the roles have been reversed and you are part of the audience: the lecture is given just for you. Don't suppress a question out of misunderstood solidarity with the speaker. The focus is always on mathematics, not on acquiring a license. Only then are seminar lectures not events whose end one waits bored and impatiently for. It remains to be noted that you should not limit yourself to the minimum number of seminar presentations prescribed by the examination regulations. On the contrary, I hope you enjoyed your presentation so much that you continue to face the challenge of new topics. Good luck and have fun!

Manfred Lehn.