

Suggestions for the Preparation of Oral Exams with Prof. Lengauer

This compendium serves to give you suggestions of how to effectively prepare for an exam with Prof. Lengauer. We expect that these suggestions are also helpful for preparing exams with other examiners. Furthermore, we give special advice on how to carry out oral exams.

1. Content of the exam

In general, the exam covers a substantial area of knowledge which can only be conquered by *understanding* and not by *learning by heart*. In the literature and lectures on which the exam is based, the field has been presented to you as a coherent whole and not as a collection of independent results. You have to have grasped this structure of the field and need to express your understanding of it in the exam. This is the general objective of the examination. All questions asked in the exam have to be taken in the context of the general framework of the field.

If you have grasped the material of the field then it does not have to “lie on your lips” in its entirety during the exam. Rather, during the exam you can recover knowledge that is not immediately present by re-deriving it from the context of the field. If you cannot do so on your own, I will help you. The overall maxim is: *Stored knowledge (learnt by heart) is not sufficient for a successful exam. You will have to think during the exam.* If you have a mental block or come in with not much more than photographic memory of the material then you have to expect difficulties. Examples are part of the material to be learnt as well as general issues such as the precise definition of central concepts and formal structures, the description of algorithms, and the derivation of proofs or proof sketches (if applicable), and the systematics of validations. I also expect you to be able to prioritize the material into central elements of the field and more peripheral material.

Special suggestions for exams with much interdisciplinary content: In general, interdisciplinary material is more complex and harder to assimilate than monodisciplinary material. The available literature is voluminous and not always coherent. Well prepared tutorials specially targeted to a student audience are rare. The prioritization of the contents into central and peripheral is especially important for structuring the field. Therefore I go into great detail during the lecture with respect to exhibiting this structure. *As a rule, you get this structure only in my lectures. Therefore it is a good idea to attend the lectures.* During the exam, we will not only ask you on the content of the lectures but also ask questions that test your scientific common sense. Such questions are answered quickly, and there are quite a few of them. Can you estimate important parameters of bioinformatics? E.g., do you know about how many human genes there are? Are there more protein sequences or more protein structures in the databases? What is the estimated age of the first multicellular organism? What is the amount of ATP produced by the human body in a day? Such questions you can only answer if you have reflected on the field rather than just inflexibly working through the manuscripts.

Special suggestions for exams with much formal content: During the exam, we do not only query content but also check your ability to handle formal material precisely and adequately. This includes that formal definitions are recalled correctly, that you can distinguish definitions from theorems, proofs, and algorithms and that you can write down things precisely. Especially in these respects I tend to experience unpleasant misunderstandings, if the student thinks that he/she has understood something intuitively but presents the material in such an incoherent fashion that actual understanding of the main elements cannot be recognized. (A nice example from the area of algorithms is the notion of NP-completeness which many people think to have understood intuitively but which is quite involved if you write it down exactly.) Such problems happen especially with students who have largely restricted the theoretical content of their curriculum.

2. Psychology of oral exams

During the exam concentrate on the content. Do not get distracted by trying to keep a log on where you are performance-wise and estimating your final grade. Otherwise you will become insecure and apprehensive. Especially, do not worry if you cannot answer some question. A central element of the exam is to test the boundaries of your knowledge. In the best case these boundaries lie “far way”, such that the exam is passed with flying colors. Even such students will probably encounter questions during the exam that they cannot answer. Thus you should not get discouraged when you happen to not know something. Conversely, a feeling by the students to have known everything need not coincide with a good grade. The answers can have been imprecise, for one thing. (In this case I will ask for more precision several times.) Sometimes (though seldom) it also happens that a student spends much time explaining trivial material and, in this way, prohibits the examiners from covering enough territory during the exams. Thus the general suggestion is: Answer questions precisely and concisely. Frequently, a well-placed diagram saves much time and helps to focus the discussion. If you do not know something, do not spend much of the precious exam time trying to cover up the situation. In contrast, it is usually advisable to ask a question back in order to get additional input on what is asked for.

The final grade is composed of the overall judgment of your knowledge and – in exams with formal content – your ability to handle formal material.

If the exam is not in your native language prepare yourself for the language part, as well. Your capability of dialog must be sufficient to ascertain your level of knowledge. It is important to answer in complete sentences.

3. Suggestions for exam preparation

Grade: Aim at a good grade. Do not be content with just passing the exam. Also in areas with good job prospects, such as informatics and bioinformatics, employers look at the grades and select for the abilities that are witnessed by good grades. Aiming for a good grade will give your preparation the appropriate direction right from the start.

Team work: If at all possible, prepare together with others. In each exam team there should be at least one person who has a deeper understanding of the subject and one that can ask the notorious “dumb” questions. (Often both qualities are combined in the same people.) “Dumb” questions advance the understanding most effectively. Test each other and practice technical dialogs as preparation for the exam dialog.

Exam stress: Each exam is a stress situation. I would like to take as much stress from you as possible – among other things by providing these suggestions. But it would be unrealistic to assume that anybody can relieve you of all of the stress. And this is not even desirable. This exam is not the last stress situation in your life, and your employer wants to know how you deal with such situations. The judgment: “Overall he is a great student and knows everything. But in exams he cannot perform.” is misleading. Really effective are only those people that perform well also when the environment is not optimally adjusted – which, incidentally, is the case in most real-life situations. It is important that you recognize this fact, since this will have a profound impact on the way you prepare for your exam.

Whatever you have not learned until the day before the exam you will not learn during this last day, either. Remember: Learning by heart is not the key for exam preparation and understanding can hardly be reached on the day before the exam if it has not been reached before. Thus take this day aside and prepare for the exam stress which – as we have seen – cannot be neglected. You can relax or do sports, sleep or have a good meal. Everybody has to know for himself/herself what is the best method to get into shape. It is not the object to come into the exam well prepared scientifically and rundown in every other respect but to appear in a great condition overall. Only then you can think and react, remember and sometimes, maybe, even take the initiative in the dialog. On the last day, the scientific preparation should be confined to a relaxed recapitulation of the field that focuses on the overall picture and leaves out details.

4. Graded Master seminar talks

This add-on from the previous version of these guidelines is specifically targeted to the new exam version required by the current Bioinformatics Master curriculum. About a third of the time into your thesis project you have to give a talk that presents the background of the project, its goals, the way by which you want to get to the goal, your time plan, and possible first results. This seminar is worth 12 credits and is graded. Please consider the following advice on the seminar:

- a) The grade is based on (1) the impression you make with respect to the competence that you display for completing the project and (2) your presentation skills. The presentation of the introductory Master Seminar determines half of the grade for that seminar, and it is of great importance that you prepare this presentation carefully. In grading your competence – the other half of the grade – your performance on that project up to the seminar will also be taken into account.
- b) The concluding Master Seminar, which you give at the end of your project, influences the final grade of your thesis, but does so only partly. There are many other factors that enter the grade of your thesis. In contrast, the presentation of your in-

troductory Masters Seminar determines half of the grade for that seminar. Thus, it is of great importance that you prepare this presentation carefully.

5. Choice of the seminar language

Many students want to give the seminar in English even though they are Germans. Please be advised that you should hold the seminar in a language which enables you to give a coherent and understandable presentation and discussion. You can also choose to present in English and discuss in German. Substantial language problems can influence your grade negatively, and they do so, if the advisors cannot understand what you want to say. This applies to English and German, and it has happened in the past. In general, the language of conversation in the institute is English, but here you are in an exam situation. Thus your choice of language should be dominated by the goal of maximizing the communication bandwidth between you and the people who judge you.

Analogous arguments hold for oral exams and written theses. I acknowledge the ambition of German students that want to write in English, and I am not fine-tuning my judgment on English style when grading Bachelor or Master theses, but if the language quality is bad enough to curtail understanding or hamper the appropriate use of technical terms or exposition of topical context this will reduce the grade of the thesis.

And now I wish you all the best for an effective preparation of the exam, and good luck in the exam itself.

Thomas Lengauer, in the spring term of 2006