



Final Exams - Instructions-

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BIO 520 "Integrated Knowledge in Biology / Themenübergreifende Fachkompetenz"

Description

This module, designed as a self-study period of the Master degree course and consisting of a total of 300 study hours (corresponding to about 2 months), allows students to demonstrate a comprehensive understanding of primarily the area of their chosen MSc specialization but also general fundamental biological concepts. In general, it is expected that the student uses this opportunity to acquire a broad and solid overview in Molecular and Cellular Biology (for instance by working through a textbook such as the Alberts et al., *Molecular Biology of the Cell*). At the end of the self-study period, an examination takes place in the form of a written (3 hours) and an oral exam (30-60 minutes).

Learning Outcomes

By the end of this module students should be able to

- demonstrate their understanding and command of relevant biological facts, methods and concepts
- identify and explain interrelationships between the various facts, methods and concepts
- summarise and critically review scientific literature efficiently and effectively

Format of the exams

The written and oral examinations should take place within the same week. While an approximate date is already determined in the Learning Agreement at the start of the MSc Program, the precise dates of the exams have to be arranged on an individual basis between the MSc coordinator, the thesis supervisor and the student. In general, these exams should be scheduled about 8 weeks after completion of the Master thesis. Alternative scheduling is not excluded. The final grade will be the arithmetic mean (rounded to half grades) of the grades obtained in the two parts.

Part 1: Written examination

The written examination lasts 3 hours. It can take place in a room organized by the MSc coordinator or MSc supervisor. It is the MSc thesis supervisor's responsibility to formulate the exam questions that need to be shared with the MSc coordinator sufficiently ahead of time. Supervision of the exam is handled by the MSc coordinator or supervisor. The candidate brings "blank" copies of the three papers mentioned below (i.e., no written notes on the papers, no underlining or memo stickers on the pages). Not permitted: other documents, devices such as laptop, calculator, cell phone or other communication forms, unannounced/unaccompanied visits to the bathroom

1.1 Essay

The candidate will be offered three general topics in the field of Molecular and Cellular Biology. She/he selects one of these, and writes an essay of a few pages to demonstrate her/his general knowledge in the field.

Examples of previous essay titles:

- The molecular hallmarks of cancer

- Compare the various methods that exist to detect protein interactions: describe their relative merits and drawbacks.
- Mechanisms of protein degradation in eukaryotes
- Give an overview of currently used conditional gene expression systems. Compare their respective advantages and limitations.
- Methods to determine protein structure: advantages and limitations

1.2 *Analysis of primary literature*

The MSc supervisor will provide three primary literature papers one week before the written exam, usually in electronic format (pdf). It is the candidate's responsibility to read and understand these papers until the exam. During the exam, the student will be asked three "journal club style" questions per paper. The student should provide complete and concise answers to these questions.

Examples of previously asked primary literature questions. (In the absence of the related paper, these questions have no meaning, but they provide a general overview).

- How did the authors confirm the specificity of their siRNAs?
- If you were the author of this paper, what would be the next experiment(s) that you would perform? Explain briefly why, and how you would perform these experiments.
- Explain the principle of ³⁵S-Met pulse-chase assays. What do these assays measure?
- Do p53 and SUSP4 compete for binding to the same domain of Mdm2?
- What is the mechanism of action of actinomycin D?

Part 2: Oral examination

Typically, the oral exam follows a public research seminar presentation of the Master's thesis. The public presentation can be in the form of an institute or lab seminar.

A closed session follows, at which both the thesis supervisor and the coordinator of the MCB MSc program are present. Additional group leaders can also be invited to the closed session by the supervisor or MSc coordinator.

2.1 *Public research seminar of the Master's thesis*

The public research seminar (about 25-35 minutes + 5 minutes of public discussion) is not an official part of the oral examination of BIO 520. However, the quality of the performance will be considered (among other additional points) when deciding on a grade for the Master thesis (BIO 501). The public research seminar is used as a convenient mechanism for the student to present their thesis work to the examiners. After the research seminar and the short public question/answer period, all guests are asked to leave the room.

2.2 *Questions related to the Master thesis and to the field of specialization*

The research seminar is followed by a 30- to max. 60-minute question/answer session, in which the student's supervisor and the MSc coordinator ask the student questions related to the Master thesis, to the field of specialization (i.e. Molecular and Cellular Biology) and to fundamental general biological concepts.

BIO 501 "Master Thesis"

The written thesis must meet the usual standards for scientific publications. On the date specified in the Learning Agreement, the student must submit the final version of the Master thesis to the Studienkoordination. Additional copies will be given to the Master thesis supervisor and to the MSc coordinator for evaluation. The coordinator can ask for revisions of Master theses that do not fulfil formal standards.

In general the following six criteria (A.1-3, B.1-3) are most important for grading BIO 501:

A. Thesis: Overall style, presentation, logic, language, completeness

A.1 Introduction:

- Concise overview of the research field relevant to the Master thesis focussed towards an explanation of the significance of the Master thesis research within this field
- Clear description of the problem addressed in the thesis, and clear statement of the project goals

A.2 Results and Methods:

- Clear description of the logic and hypotheses underlying the choice of performed experiments
- Clear presentation and correct interpretation of the experimental results
- Clear description of the methods used such that all experiments can be reproduced by others

A.3 Discussion and Conclusions:

- Concise discussion of the obtained results with respect to the original goals
- Discussion of the results into a more general context within the research field
- Formulation of new hypotheses, outlook for future work

The MSc coordinator and supervisor will base their grade recommendations on a version of the Master thesis that has not yet been corrected by the supervisor (or other experienced scientists) and that is considered to be the final version by the student. Upon request, the MSc coordinator is entitled to inspect the version generated without input and corrections from the supervisor (or other experienced scientists). However, subsequent revision in response to comments by the supervisor (or experienced scientists) is permitted and encouraged, as it is an important element of learning and teaching of the MSc program.

B. Practical work in the laboratory: Overall attitude, motivation, input, independence

B.1 Lab work:

- High quality and conclusiveness of experimental work
- Independent organization of experimental procedures
- Solid understanding of the theory behind experimental techniques
- Detailed and traceable documentation of the experimental work in the lab note book

B.2 Experimental design:

- Independent interpretation and design of experiments
- Understanding of the purpose, possibilities and limitations of the applied experimental techniques

B.3 Communication:

- Communicative attitude in the laboratory
- Ability to ask for and make constructive use of advice
- Initiation of and contribution to scientific discussions
- Clear presentation of the project and the results in group meetings and during a contingent Master thesis defence