

MSc Program in Biology, Specialization in Genetics

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Instructions to BIO 503 "Master Thesis"

The written Master thesis has to comply formally with the usual standards applied to scientific publications. The student has to hand in **one hard copy** of the final version of his Master thesis to the **Studienkoordination** on the date fixed in the Learning Agreement.

Additional copies will be given to the **Master thesis supervisor** and to the **MSc coordinator** for evaluation. The supervisor should communicate his suggestion for an appropriate grade to the MSc coordinator. The coordinator has the right to ask for revisions of Master theses that do not fulfil formal standards, as well as modify the suggested grade. In general the following seven criteria (A.1-4, B.1-3) are the most important for grading BIO503:

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

A.1 Title page:

- The title page should contain following information:
- Title
- Master thesis
- Master of Science in Biology / Genetics
- name of candidate
- name or names of supervisor(s)
- name of responsible member of Faculty of Science (MNF)
- University of Zurich
- Month, Year

A.2 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.3 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.4 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

Note that the supervisor should base his grade recommendation on a version of the Master thesis that has not yet been corrected by the supervisor and that is considered to be the final version by the student. However, subsequent revision in response to comments by the supervisor or experienced scientists is permitted and encouraged as this 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

Instructions to the module BIO 520

"Integrated Knowledge in Biology / Themenübergreifende Fachkompetenz"

Description

This module, designed as a self-study period of the Master degree course and comprising 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. The Master coordinator in collaboration with the supervisor of the Master thesis discusses and designs the scope and content of the module with each individual student. In general, it is expected that the student uses the opportunity to acquire a broad and solid overview in Genetics and related fields (i.e. Molecular, Cellular and Developmental biology). At the end of the self-study period, the final exams take place in the form of a three-hour written exam and a 30 minute public thesis defense followed by an oral examination.

For suggested readings to prepare for the exam, see below.

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 - summarize and critically review scientific literature efficiently and effectively

Format of the exams

The three-hour written test and thesis defense/oral examination should take place within the same week. The precise dates are arranged on an individual basis between the MSc coordinator, the thesis supervisor and the student. In general, it will be scheduled about 8 weeks (but no longer than 2 months) 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. Unless otherwise agreed, the exam takes place at the Institute of Molecular Life Sciences (IMLS) in a room organized by the MSc supervisor and at a time and date agreed on by the MSc supervisor and candidate. The thesis supervisor formulates the exam questions and transmits them ahead of time to the MSc coordinator (alex.hajnal@imls.uzh.ch). Supervision of the candidate during the exam is done by the MSc supervisor. The written exam consists of two parts; an essay and an analysis of the primary literature. The candidate is allowed to bring copies of the three

papers mentioned below **(1.2).** **Not permitted are:** 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 two to three general topics in the field of Genetics. She/he selects one topic and writes a short essay (usually 2-3 pages) to demonstrate her/his general knowledge in the field.

Examples of previous essay topics:

- The genetics of cancer
- Advantages and problems of RNA interference screens
- Post-transcriptional regulation of gene expression
- Molecular mechanisms of DNA mismatch repair in bacteria and eukaryotes

1.2 Analysis of the primary literature

The candidate will be given three primary literature papers selected by the thesis supervisor one week before the date of the written exam, usually in electronic form (pdf) via email (please with cc to alex.hajnal@imls.uzh.ch). The candidate needs to read and understand the key points of the papers. At the exam, she/he will be asked a series of “journal club style” questions about one, two, or all three of these papers. These questions should to be answered completely and succinctly. Examples of previously asked primary literature questions are below. Obviously, the questions make no sense without the paper, but you get a general idea...

- What is the key message of this paper?
- If you were the author of this paper, what would be your next experiment(s)? Explain briefly why and how you would perform these experiments.
- How did the authors confirm the specificity of their siRNAs?
- Explain the principle of 35S-Met the pulse-chase shown in figure xx. What do these assays measure?

Part 2: Oral examination

After the presentation of the Master thesis in a public research seminar followed by a public discussion, a closed examination session will follow at which both the thesis supervisor and the coordinator of the MSc program are present. The supervisor or the MSc coordinator can also invite additional group leaders to attend the closed session.

2.1 Presentation of the Master thesis

The public research seminar (about 30 minutes) is not an official part of the oral examination of BIO 520. However, the quality of the performance will be considered (among many additional factors) when deciding on a grade for the Master thesis (BIO 503). The public research seminar is as a good opportunity for the student to present and discuss his/her thesis work with colleagues and the examiners.

2.2 Oral examination:

Immediately after the presentation of the Master thesis and the short public question/answer period, the actual oral presentation takes place in the form of a closed 30- max. 60-minute question/ answer session with the candidate, the thesis supervisor, Master coordinator and other invited group leaders. The examiners ask the student questions related to the Master thesis, to the general field of specialization (i.e. Genetics) and to fundamental biological concepts.

Suggested readings

Molecular, Cellular & Developmental Biology:

Molecular genetics: Molecular Biology of the Cell, 5th edition, Bruce Alberts et al.,

Genetics (to complement the lecture notes and handouts)

Modern Genetic Analysis 2nd edition, Griffiths, A. et al.

iGenetics 3rd edition, Russell, P

Additional instructions to Master thesis supervisors

Part 1: Written examination

1. Who selects the publications?

In general the publications will be selected by the Master thesis supervisor but selection by the MSc coordinator is not excluded. The Master thesis supervisor presents three papers as suggestions to the coordinator (pdfs by e-mail) who either accepts them or replaces one or all of them.

2. How close to the topic of the Master thesis should the selected papers be?

The papers should address matters of the chosen MSc specialization (therefore: no papers on rain forest ecology for an NMR structural biologist). They should not be too close to the area of the Master thesis research, but they can come from the wider area of the Master thesis research.

3. Who hands out the pdfs of the selected publications to the candidate? When are they handed out?

The Master thesis supervisor. Exactly one week before the date of the written exam by e-mail to the candidate with a cc to the MSc coordinator.

4. Who formulates the specific questions and essay topics for the written exam?

Specific questions are formulated concerning one, two or all three of the selected publications by the Master thesis advisor, but it is not excluded that questions are contributed by the MSc coordinator. The Master thesis supervisor presents his/her suggestions for these specific questions to the MSc coordinator ahead of the exam. Note that the essay topics have to be rather general and not be closely related to the Master thesis research project.

6. Who is responsible that a definitive selection of questions and essay topics is available at the date of the written exam?

The Master thesis supervisor

7. Who organizes the room for the written exam and the supervision of the candidate during the written exam?

The Master thesis supervisor

8. Who corrects and grades the written exam?

The Master thesis supervisor. She/he is expected to communicate the corrected exam as well as a suggestion for the grade to the MSc coordinator within two weeks after the exam. The MSc coordinator has the right to modify the suggested grade.

Part 2: Oral examination

9. Who participates in the oral examination?

Besides the candidate, the Master thesis supervisor and the MSc coordinator, additional group leaders may participate at the oral exam.

10. Who determines date and place of the thesis presentation and oral examination?

It is the responsibility of candidate and Master thesis supervisor to arrange a date with the other examiners. In addition, the Master thesis supervisor reserves a seminar room, organizes the seminar and informs the other examiners where the seminar will take place. In special cases, the oral exam can be organized by the MSc coordinator.