

SUPPLEMENTARY COURSE OUTLINE: preparation of the research proposal and information regarding the oral examination

Preparation for MBB 806

Students must request permission from his or her supervisory committee to enroll in MBB 806. This request should be made at least one month before the end of the semester prior to planned enrolment in MBB 806, typically during one of the regularly scheduled Annual Progress meetings. After permission to enroll is granted based on performance and suitability for the PhD program, MBB 806 must be completed within the following two semesters (and within the deadlines defined above).

Assistance with student preparation for MBB 806 will involve at least two separate preparatory meetings. At the discretion of the student or supervisory committee, the first preparatory meeting (see below) may be held during the Annual Progress meeting where the initial request for MBB 806 enrolment is made (see above).

The first preparatory meeting will involve the supervisory committee and will normally be held in the semester prior to the examination. At this meeting the student will present a rough draft or outline of the research proposal whose content will be discussed. The committee will advise on the topics that will represent the broader context (the “peripheral area” of knowledge) of the field of research to be examined.

After the first preparatory meeting, the MBB 806 Application Form will be completed by the student and supervisory committee, outlining the tentative proposal topic and the peripheral area of knowledge to be examined. The Application Form should be submitted to the MBB 806 course instructor(s) no later than the last day of examinations in the semester prior to enrolment. The instructor(s) may, after consulting the student and supervisory committee, recommend a broadening, narrowing, or clarification of the proposed peripheral area of knowledge to better match customary norms of the MBB Department.

The second preparatory meeting will be held within the first two weeks of the semester in which the student is enrolled in MBB 806. At this meeting, the course instructor(s) will confirm approval of the peripheral area of knowledge, discuss course expectations and offer guidance to assist with preparation for the written proposal and oral examination. Additional meetings or rehearsal opportunities for feedback may be scheduled prior to the final oral examination.

Detailed guidelines for the research proposal

You (the student) will be examined on your grasp of knowledge relevant to the proposed thesis research and broader context, as well as your capacity to complete your thesis project. You should therefore prepare a written proposal of no more than 10 double-spaced pages (12 pt Arial or Times New Roman font with 2.5 cm margins); this page limit does not include references, figures and tables. The research proposal should present your PhD research project and include selected results that you may have obtained. The proposal should be written in the style of a typical grant application. You are encouraged to use a format similar to that described below:

Introduction/Background: Provide background information for your proposed research, citing appropriate references as required. The introduction should present the current state of knowledge relevant to the proposed research, and identify the importance and need for the proposed studies. This section should also clearly explain how the proposed research fits into the broader context of the field of study. It is suggested that a separate sub-section be used to explain this broader context. You are encouraged to include one or more figure(s) that clarify essential background material.

Statement of the specific Aims and hypothesis: Indicate the working hypothesis or hypotheses, and/or questions to be addressed. Based on these, what are the specific goals (aims) of the research project? Briefly outline approaches that will be used to achieve the research goals and state how achieving those goals may impact current knowledge.

Previous (preliminary) Results: Summarize the results you have obtained to date that are most relevant to the proposed project and you would like to include in your proposal. Selected key data should be presented in tables and/or figures. Provide interpretations and conclusions from the Results obtained.

Note that it is not essential for you to have produced preliminary results relevant to the research plan. With or without preliminary results, your research plan should include arguments and evidence that the proposed work is feasible.

Research Plan: Describe the planned research, including specific experiments to be conducted, as well as anticipated results and their interpretation. Short-term and longer-term goals should be distinguished. Give some thought to alternative results that may arise and your consequent course of action. For some experiments, providing alternate approach(es) may be beneficial in giving additional experimental support for your conclusions, or allowing the study to be conducted successfully if a particular approach does not work.

Methods: Summarize the methods that have been or will be used to carry out the project. These can be integrated into the research plan (see above) or presented in separate sections. For standard methods, citations of published research papers or manuals is sufficient (but you may be asked to explain the methods in some detail during your oral examination). Provide sufficient details for novel procedures, including assessment of feasibility. Consider technical problems that may arise and how these will be addressed.

Discussion: Discuss how your results (obtained and anticipated) relate to the current state of knowledge. Do not merely provide a summary of what has, or will, be done. What problems may arise and how will they be resolved? How do you anticipate the project will be concluded and what might be its impact? Note that this "Discussion" can also be considered (and named) a "Conclusions and future prospects" section.

References: Cite the most relevant references you have read and understood, focusing on primary literature rather than review articles. Use a consistent format which includes titles, for example:

Dot D, Kit KT and Kat KT (2014) Superresolution microscopy for dummies. *Nature* 10, 100-110.

Outside assistance for preparing the proposal

It is anticipated that the content of the research proposal will largely be the work of the student, but will be influenced by course work and discussions held with his or her Senior Supervisor(s), members of the Supervisory Committee, or students and other personnel in the department. Actual participation on the preparation of the paper by others should be largely limited to general feedback on content, formatting, and correction of grammatical/typographical errors.

Submission of the MBB 806 proposal

The written proposal must be distributed by the student to the course instructor(s) and supervisory committee at least 1 week prior to the scheduled date of the oral presentation. The student is responsible for scheduling the oral examination (using Doodle), as well as booking the room and necessary A/V equipment.

Oral presentation for MBB 806

The student will give an oral presentation between 30-40 minutes in length. The presentation should include appropriate background information, relevant results if available, a description of the proposed research and its significance.

Question period following oral presentation

The oral presentation will be followed by a series of questions from the course instructor(s), members of the supervisory committee, and possibly other MBB 806 participants. The senior supervisor is encouraged to attend the MBB 806 examination, but cannot participate during the question period. The questions will focus on the feasibility of the research proposal and the student's grasp of the subject matter relevant to the topic of the research proposal, including the current state of knowledge and methodology. The questions will also cover topics related to the broader context of the field of research. The supervisory committee, in consultation with the student, will have previously identified such topics prior to the MBB 806 oral exam. Topics directly related to the research proposal, and breadth areas will include the following:

1. ***Knowledge directly related to research area.*** Questions that pertain directly to the student's research topic are fair game for examination. This can for example include questions relating to a specific cellular component(s) under investigation (*e.g.*, proteins), particular cellular pathway(s) or mechanism(s) the cellular component(s) are implicated in, and methods directly relevant to the proposed research.
2. ***Knowledge peripherally related to research area.*** Knowledge regarding a family of genes/proteins related to that (those) under investigation, and related/connected cellular pathways or mechanisms, would be testable. Questions about related methodologies potentially useful for the project could be asked.
3. ***Basic understanding of molecular biology and biochemistry.*** Fundamental concepts of molecular biology and biochemistry relevant to the given project are fair game for questioning. For example, questions probing the student's basic understanding of gene expression, protein structure and function, cellular function, genetics, genomics, bioinformatics, *etc.*, could be asked.