CHM 7000: Predoctoral exams at the chemistry department at the Université de Montréal

Brief description of the examination process and regulatory background:

The objective of the predoctoral exam is to verify that the doctoral candidate has a good knowledge of his field of study and a deep knowledge of the topics in which he(she) specializes (see section 132 of the pedagogical regulations of graduate and postdoctoral studies).

The predoctoral exam comprises a written test and an oral test (section 132a). At the chemistry department, these two tests are based on a research summary document written by the student in which he(she) describes the research project on which he(she) anticipates working on.

French or English may be used to write the research summary document, as well as for the written and oral tests. The language used for the predoctoral exam will be the same as that used to write the thesis. According to section 135 of the regulations, a student who wishes to write his(her) thesis in English must submit such a request to the faculty responsible for graduate studies in our department.

According to section 132a of the regulations, the exam must be completed before the end of the sixth trimester of study at the latest. At the chemistry department, however, the procedure for the predoctoral exam normally starts at the second trimester of study and continues over two trimesters. When the situation justifies it, the predoctoral exam of a particular student may however be postponed by one or two trimesters.

The exam occurs in front of a jury constituted by the three members of the thesis committee of the student (section 132c), as well as the faculty in charge of predoctoral exams in the department who supervises the written test and presides the oral test. The three members of the thesis committee are the president, the regular member, and the research director. In cases of co-direction, only one of the research co-directors is allowed to ask questions and vote, the other one may only act as an observer.

The jury may, with a majority of votes, state that the student succeeded, or failed the entire exam, or adjourn only once the exam to repeat one or the other of the written and oral tests (section 132d). The jury may also, with unanimous votes, decide that the student failed the exam after being submitted to either the written test or the oral test. In case of equality, the vote of the faculty in charge of predoctoral exams is preponderant. The extension given in case of adjournment normally corresponds to one trimester.

A doctoral candidate is excluded from the doctoral program when he(she) fails the predoctoral exam or if it is still not completed at the end of the sixth trimester of studies.

Time frame of the predoctoral exam:

At the chemistry department, the predoctoral exam normally starts at the second trimester of doctoral study and continues over two trimesters.

The candidate and his(her) research director are contacted toward the end of the first trimester or the beginning of the second to verify is the student is ready to begin the examination process. If so, the

student is invited at the next information session which is given at the beginning of each trimester. At the request of the research director, when the situation justifies it, the start of the examination can be postponed for one or two trimesters to allow the student to better prepare for it. A typical example is a student who did his(her) previous studies in another university and has not yet completed a graduate course in our university.

A new round of predoctoral exams begins each trimester. It starts with the information session that occurs during the second or third week of the trimester. After this meeting, the student will dedicate his(her) first semester of examination to the writing of the research summary document on which both the written and oral tests are based. The content of this document will be discussed in detail later in this text. The student must send his(her) research summary document to the members of the jury and the faculty in charge of predoctoral exams on the last business day of the semester e.g., the end of final exams.

Members of the jury have three weeks to read the research summary document of the student, write their questions for the written test and give them to the faculty in charge of predoctoral exams who will use them to compile the individual written test questionnaire. The written test occurs on the last week of the first month of the second trimester of examination. Students have 4 hours to answers the questions of the written test.

Students who succeed at the written test are invited to the oral test. In case of failure at the written test, the examination is usually adjourned, and the student is invited to join the next round of predoctoral exams the following trimester.

Oral tests begin one month after the written tests, around the middle of the second trimester of examination. Exact dates vary since all members of the jury, the student, and the faculty in charge of the exam must all be available.

Students who succeed at the oral test complete their predoctoral exam successfully, which terminate the process for them. Students who fail the oral test and who never used their right to an adjournment will see their predoctoral exam adjourned and will be invited to take the oral test again the following trimester. Students who fail the oral test and who already used their right to an adjournment will be attributed a failure at the predoctoral exam.

The research summary document:

The student dedicates the first trimester of examination to the writing of his(her) research summary document. This document constitutes an important element of the examination since the questions of both the written and oral tests are directly or indirectly inspired from topics mentioned in it.

It is acceptable, actually recommended, that the student conceives an outline plan and submit it for approval to his research director before going forward with the writing of the research summary document.

This document is similar, both by its content and its structure, to what the introduction of the student's thesis would be if the research project was completed. This document is also like a research proposal.

In the first section, the student describes the state of the science in his(her) field of research. This bibliographic section summarizes what is known in the literature regarding the objectives of the research project, as well as the main methodologies and techniques that will be used.

It is strongly suggested to the students that they read the original papers and cite them in their own original text instead of translating a review article or finding inspiration in the thesis of a colleague. Like any other academic work, the research summary document is subjected to the regulations on plagiarism. Any case of suspected plagiarism will be reported to the proper authority and may lead to sanctions.

Once the literature review is completed, the student is invited to put his(her) research project in context. What are the problems that remain unsolved in the literature? What kind of advances are desirable and why? What will be the usefulness of the anticipated research work?

In light of this, the student will then describe the research work that he(she) plan to carry out. The envisioned approach will be described in this section, as well as the experiments, the methodology and the techniques that will be used. What are the expected results and why?

Finally, the student may conclude by speculating over where the completion of this research project will lead to. What other discoveries could be made during the completion of the project? What other research project may be inspired by it? In other words, what is the future outlook?

Note that the research summary document is not the place where the student is expected to present experimental results. The document is used as inspiration for the questions of the written and oral tests and not to relate the progress achieved in the laboratory nor to prove the feasibility of the project. These elements are brought up instead during the meetings with the thesis committee, the departmental seminar, and the thesis defense.

Regarding the format of the document, it is recommended to follow the model suggested by the library for doctoral and master theses at the Université de Montréal (Modèle de document Word pour thèses et mémoires de l'UdeM). The document should be between 25 and 40 pages and may comprise the following sections:

- Cover page with title and the names of the jury members.
- Abstract
- Table of content
- Introduction
- Bibliography (the state of the science)
- Contextual background of the project
- Description of the project; methodology and techniques
- Conclusion and outlook
- References

While the research summary document is not formally evaluated, it is required that it be well conceived and well written. If the submitted document does not meet the expectations of the members of the jury, they may require that the student rewrite it.

The written test:

Members of the jury receive the research summary document toward the end of the first trimester of the examination and have three weeks to read it, write their questions for the written test and send them to the faculty in charge of the predoctoral exams who will use them to compile the individual written test questionnaire.

The written test occurs during the last week of the first month of the second trimester of examination. Students have 4 hours to answer to the written test and they are authorized to bring with them and consult the following documentation in paper or electronic format:

- Research summary document
- Publications cited in the document
- A few textbooks (1 or 2)

Any other type of documentation is forbidden during the written test, for instance online research and communications with third party.

After the written test, answer-books are sent to the members of the jury for grading. Each member grades his(her) questions independently and communicate the results in percentage to the faculty in charge of predoctoral exams who compile them. Students must meet two criteria to succeed at the written test, e.g.:

1. To obtain a score equal to or superior to 60% to most of the questions (2 of 3).
2. To obtain an average equal to or superior to 60% for all the questions.

In case of success, the student is invited to the oral test a little bit later in the same trimester. The examination may be adjourned when a student does not successfully pass the written test and never used his(her) right for an adjournment. In that case, the student will resume the written test the following trimester. Finally, a student who fails at the written test and previously used his(her) right to an adjournment will fail the predoctoral exam and will be excluded from the doctoral program.

It is suggested that the students contact the members of their jury after the written test to obtain some feedback and better prepare themselves for the oral test. Indeed, members of the jury frequently ask questions at the oral test on topics where weaknesses were identified at the written test

The oral test:

The oral test comprises an oral presentation by the candidate on the research described in the document, followed by a question period by members of the jury to evaluate the dept of the basic knowledge in chemistry of the candidate and his(her) and his(her) understanding of the topics specific to the project.

The test begins by the oral presentation by the candidate, supported with slides (PowerPoint). The length of the oral presentation is about 20 minutes. The faculty in charge of predoctoral exams, who presides the test, may to stop the presentation after the allotted time. The oral presentation must cover the

important topics described in the research summary document. It is useful to send a copy of the slides to the member of the jury prior to the presentation.

The question period begins after the oral presentation. During the first round, each member of the jury is allocated 30-40 minutes of questions. When the first round is over, a 5-minute break is suggested to the candidate and the members of the jury, followed by a second round of questions. The faculty in charge of predoctoral exam may also ask some questions if he feels that it is useful or necessary.

Members of the jury often ask their first questions on topics that were not mastered well at the written test. It is important to know that questions may not necessarily be limited to subjects directly addressed in the document and that some questions will aim at evaluating the basic knowledge of chemistry. The dept of the answers is a key element in the outcome of the predoctoral exam and, consequently, you must be well prepared and take the time required to answer well. If a question is not clear, it is important to ask the member of the jury to rephrase the question instead of providing a bad answer. Failures at the oral test occur when candidates are unable to answer questions on basic chemical concepts or do not answer adequately to questions failed at the written test. To succeed, candidates must show a good knowledge of the basic concepts in their discipline, as well as understanding the topics that are more specific to their project.

At the end of the oral test, the candidate will be asked to briefly leave the room to allow the jury to deliberate. The candidate will be immediately informed of the decision of the jury. From the beginning to the end, the oral test generally last between 2 and 3 hours.

Students who succeed at the oral test successfully complete their predoctoral exam, which ends the examination process. Students who fail the oral test and have never used their right of an adjournment may see their predoctoral exam adjourned and be invited to resume their oral test the following trimester. Students who fail the oral test and have already used their right to an adjournment will fail their predoctoral exam.

Formative aspects of the predoctoral examination:

The predoctoral examination, like all exams, is part of an academic progression and is very formative. Indeed, a student who passed successfully the predoctoral exam of the chemistry department had the opportunity to understand well his(her) research objectives. He(she) completed a literature review in his(her) field of expertise and learned to write a text like a research proposal or the introduction of a thesis. He(she) also created and presented an oral presentation with visual support, such as those presented at meetings and conferences. Finally, he(she) demonstrated to the members of his(her) thesis committee that he(she) has a good general knowledge of his(her) discipline and a deeper knowledge of his(her) domain of expertise and that he(she) possesses the competences required to carry out his(her) research project.