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***STEP (Strategic Translation and Extension of Project) and LEAP (Lateral Exploration of Alternate Project) COMPREHENSIVE EXAMINATION for Ph.D. CANDIDATES***

**Department of Pathology and Laboratory Medicine, University of British Columbia**

The Faculty of Graduate and Postdoctoral Studies requires that each Ph.D. student pass a comprehensive examination in their discipline. To fulfill this requirement in the Department of Pathology and Laboratory Medicine, the student must prepare and defend a Research Proposal in the style of a grant application within 30 months of initial registration in the program. The goals are to advance intellectual independence, experimental design as it relates to scientific creativity and organizational skills, to broaden knowledge, and to provide an introduction to grant writing.

**Choosing a Stream:** Students must choose from 2 streams for their Research Proposal topic; either STEP (Strategic Translation and Extension of Project), or LEAP (Lateral Exploration of Alternate Project). For the **STEP stream** the student will determine a comprehensive exam topic that is either a future-cast project, (i.e. a follow-up project stemming from findings/anticipated or expected outcomes of the existing project), or a side-line project, (i.e. a project that may expand on a component or single aim of the student's current proposal project), that addresses an original hypothesis that builds on the student's current proposal.

For the **LEAP stream** the student will select a comprehensive exam topic outside their immediate thesis topic that addresses an original hypothesis distinct from the student's thesis topic. This option is similar to the comprehensive exam format in place prior to 2024.

**Choosing a Topic:** Most students find that selecting a Research Proposal topic is the most difficult aspect of the Comprehensive Exam. It should be chosen based on a novel and innovative line of research based on a careful literature review, keeping in mind that a grant application proposal must have a solid rationale and justification. A Comprehensive Exam research proposal in the same general area as the thesis may be chosen, however the research question must be original and cannot reiterate the research aims or methods from the current project. In addition, the topic cannot be based on a



project proposed or funded/reviewed recently in a Supervisor's or collaborator's grant application. Preparation of the Comprehensive Exam research proposal is intended to be an academic rather than a practical exercise. Therefore, conducting preliminary experiments is not permitted, although it should be understood that key proof-of-concept data are an essential element of composing an actual grant application.

**Topic Approval:** After informal discussion of the Comprehensive Exam research proposal topic with the Supervisor, it is required that a summary be circulated by the student to the Thesis Supervisory Committee (including the Chair) on the fully completed [Approval of Comprehensive Exam Topic and Examining Committee Form](#) which includes: Thesis project summary (250 words), Comprehensive Exam research proposal summary (600 words) and several bullets describing how the topic differs and may overlap the thesis project (75 words each). Following good grant-writing practices, these should be written in scientific language suitable for an audience lacking background in the specific field or proposed technologies. The form should also list suggestions for Examination Committee members who must be informally contacted by the Supervisor and agree to participate in approximately 2 months.

After the unanimous email approval of the topic by the Supervisory Committee, the form should be signed by the student and Supervisor. The student should submit it to the [Graduate Program Coordinator](#). Final approval of the topic will be made by the Departmental Associate Director of Examinations, who will inform the student.

**Role of Supervisor:** The student must be encouraged to select a topic, specific goals and methodologies on their own. However, the Supervisor may provide informal guidance on the rationale, feasibility, impact and appropriate timeframe, which are important factors a grant review panel would consider. The student may ask the Supervisor to review the content of the proposal for scientific accuracy, feasibility and grantsmanship. However, the student is also encouraged to seek feedback from others who may be experts in the field and from other experienced grant-writers. If requested, the Supervisor



may provide an example of a successful grant application to the student. The supervisor should not edit the writing style or grammar of the research proposal, but may comment on how these could be improved. The Supervisor may suggest how the proposal could be organized for added clarity, which is another important aspect of grantsmanship.

The student will likely hold a rehearsal talk in preparation for the exam. The Supervisor may participate, offering suggestions for clarity, especially to help the student emphasize the strengths of the proposal. Along with others in the audience, the Supervisor will undoubtedly ask questions that could be raised during the exam.

The Supervisor will attend the exam as a silent observer. After the student's presentation and oral exam, they will be asked to leave the room to allow confidential discussion on their performance. The Supervisor will remain present for the first part of this discussion and may answer questions or if asked, offer an opinion and later be excused for the second part where the Examination Committee will finalize their decision.

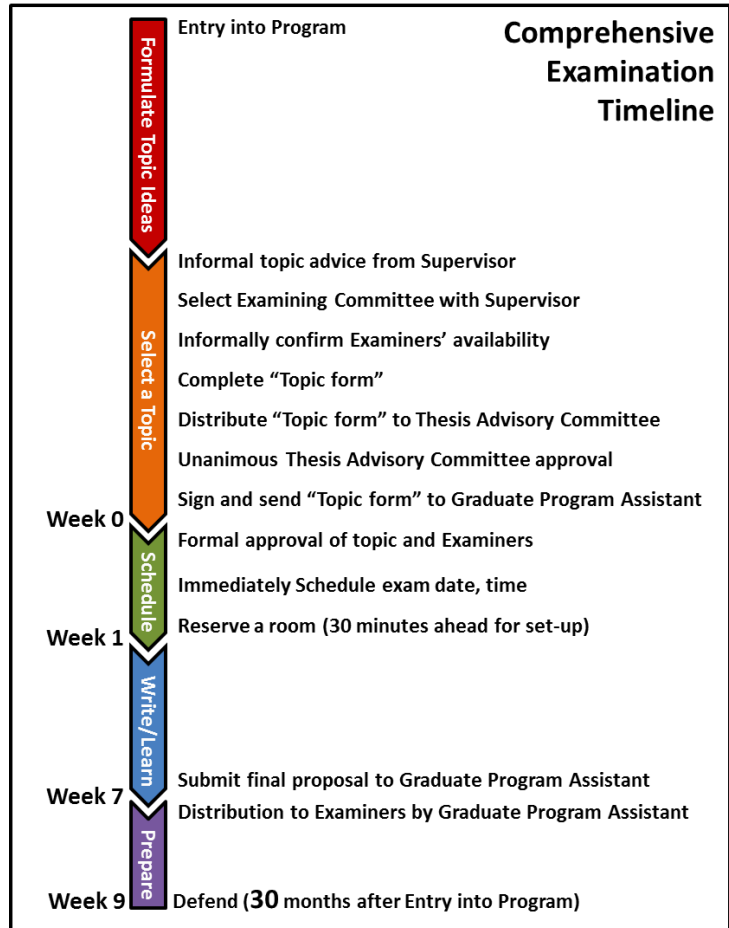
If, in the future, the Supervisor utilizes the student's topic to apply for a grant, the Supervisor is asked to acknowledge the student as the co-applicant.

**Selecting an Examination Committee:** In consultation with the Supervisor, the student will compile and present a list of nominees for the Examination Committee first to the Supervisory Committee as part of the [Approval of Comprehensive Exam Topic and Examining Committee Form](#). After the topic has been approved by all members of the Supervisory Committee, the entire form should be signed, scanned and sent to the [Graduate Program Coordinator for approval by the Departmental Associate Director of Examinations](#). The Examination Committee consists of the student's research Supervisor, a member of the student's Supervisory Committee, two other examiners who are not members of the supervisory committee (at least one of whom is a member of the Department) and a Chair. Members are normally selected based on overlapping expertise with the Comprehensive Exam topic. The Chair is



typically the Chair of the Supervisory Committee.

**Timeline:** For optimal benefit and scheduling, the Comprehensive Exam Research Proposal topic should be selected and defended 24 to 30 months from initial entry into the Graduate Program. This would normally follow the completion of all required course-work with the exception of PATH 635. **All PALM Examinations are strongly recommended to not be scheduled during the months of July and August.**





After formal approval of the topic by the Departmental Associate Director of Examinations, the final written Research Proposal must be submitted to the [Graduate Program Coordinator](#) within 7 weeks of topic approval, and at least 9-10 weeks from the planned examination date. As soon as possible after the topic is approved, an exam date and room booking should be scheduled by the student - normally to take place by week 9 (or 10) to provide sufficient time for the examiners to evaluate the Research Proposal. The student must ensure the room is booked 30 minutes in advance of the exam to allow for setup and troubleshooting of equipment, and the student should anticipate the exam will take 2.5-3 hours. The Graduate Program Coordinator will circulate the written proposal to the Examination Committee 2 weeks before the examination date.

**Written Proposal Format:** To provide the student with an initiation into grant-writing, the research proposal must be prepared according to CIHR grant guidelines and in CIHR format assuming a **three year duration**. The Operating Grant format requires a Lay Abstract (200 words), Scientific Summary (300 words), Detailed Research Proposal, (10 pages total, 12 pt. font, 2cm (¾") margins, including figures and legends, not including references, single-spaced), and Budget (1 page in table format) with justification (max 2 pages). A Common CV is not required. Appendices containing additional information **will not be accepted**.

Targeting a non-expert, but highly skilled scientific audience, the Detailed Research Proposal is generally organized to:

- provide a background literature review rationalizing the proposal and identifying knowledge gaps that the proposal will address
- justify and clearly state an overall hypothesis or objective,
- clearly list specific aims addressing the hypothesis,
- describe experimental design addressing each specific aim. Since this is an academic exercise, anticipated results must be discussed to rationalize the next experimental steps.



Where appropriate, more than one possible experimental outcome should also be considered. For guidance on grantsmanship please see available publications, such as but not limited to: [The-Art-of-Grantsmanship.pdf](#). Once complete, the student must collate and distribute the complete written proposal, including the [Comprehensive Exam Overview](#) to the [Graduate Program Coordinator](#) by the deadline date; 7 weeks after the topic approval date. Upon receipt, the Program Coordinator will issue the Examination Committee an examination reminder that will include these documents along with examination instructions.

**Examiner Responsibilities:** The Examiner must familiarize themselves with the Pathology and Laboratory Medicine Comprehensive Exam guidelines and read the student's Research Proposal as though it was submitted to a peer review panel for consideration for funding. At the exam, Examiners question the student on any aspect of the research proposal, typically focusing on the student's knowledge in the general Research Proposal area, and the ability to think critically and logically, and less on their capacity to memorize minute details. Questions may cover topics directly or indirectly related to the Research Proposal area. Further details on the rationale emphasizing literature discrepancy or how the proposal could be strengthened for actual submission to a grant review panel are often requested. Neither a formal evaluation is required, nor advance discussion with the student of strengths and weaknesses.

**Please Consider the following when evaluating:**

**A) Literature review and introduction.**

Long and short term objectives

Hypothesis

Literature review/rationale

**B) Experimental Design/Methods**

Is hypothesis tested by proposed experiments?

Interpretation of possible results



Experimental methods/controls

Feasibility/Timeline?

Alternative approaches

**C) Grantsmanship**

Targeting the audience

Good use of graphics

Project justification

Impact conveyed

Contingency plan

**Exam Format:** To begin the exam, the student will present a 20 minute summary of the Research Proposal to the Examination Committee. If needed, the Chair will warn the student at 20 minutes, and stop the presentation at 22 minutes. The student is expected to have the AV equipment set up ahead of time (room unlocked, projector, pointer, etc.). Therefore the room booking should be made 30 minutes earlier than the exam time. The Committee will then question the student on the written and presented material. **The Supervisor is a silent observer.** The oral exam is usually ~2 hours. Each Examination Committee member will be allowed a 20 minute period of questioning, with a second round of 15-20 minutes each. During the question period the student may not use supplementary slides to illustrate answers. If needed, students will be encouraged to explain their answers using a white board or other media.

The examiners should keep in mind whether this was a LEAP or STEP proposal in their expectation around the student's depth of knowledge on the topic.

**Outcomes:** Following the exam the Examining Committee will either pass the student, recommend that all or part of the examination be repeated (a conditional pass), or fail the student. The decision of the Committee will require the agreement of three of the members. The Supervisor will be excused from the final Committee discussion, may not take part and does not have a vote. *Students who receive a*



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*conditional pass will be required to meet the conditions of the pass within three months, and students who fail will be allowed to repeat the exam once within three months, which must take into consideration the deadline for candidacy to transfer into the Ph.D. program. If needed, the second examining committee may have new external examiners.*

To help make a decision, the relative weights of the various components of the Comprehensive Examination are as follows: Written Proposal: 40%, Oral Presentation: 20%, Oral Exam: 40%. The final outcome will be pass, fail or conditional pass. The latter will involve remedial work to address the weaknesses in the student's performance. The student may be asked to repeat the exam after additional preparation.

The Examining Committee may choose to use the following points in their evaluation of the written proposal. Regardless, the student should consider these (and more!) when planning and writing the Research Proposal.

### **Committee Assessment of Pathology Comprehensive Exam Written Proposal**

#### **The Literature Review**

- a) Is it clear and concise?
- b) Does it flow logically from one section to the next?
- c) Is it thorough and current, equally covering contradictory literature?
- d) Is the literature review unbiased?

#### **The Objectives**

- a) Are they clearly stated?
- b) Are they reasonable?
- c) Are they a logical extension of the literature review?





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**d) Would they significantly advance the field? Do they address a knowledge gap?**

**The Proposed Experiments**

- a) Are they technically feasible?**
- b) Are the methods appropriate and are the experiments logical?**
- c) Do they contain the proper controls?**
- d) Are the proposed statistical analyses appropriate?**
- e) Do they address the objectives?**
- f) Are potential problems discussed?**
- g) Can the research be completed within three years?**