
How to prepare for your candidacy examination (specific to the CME Department)

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The purpose

Students in doctoral programs are required to pass a candidacy examination in subjects relevant to their general field of research. Students must demonstrate to the satisfaction of the examining committee that they possess:

- ✓ an adequate knowledge of the discipline and of the subject matter relevant to the thesis.
- ✓ the ability to pursue and complete original research at an advanced level.

During the candidacy examination, only minor attention should be given to work done on the thesis.

Note: Document listing complete examination procedures is available at <https://cloudfront.ualberta.ca/-/media/engineering/departments/departments-of-chemical-and-materials-engineering/faculty-and-staff/resources/forms-cabinet/col-1/examprocedures2016nov.pdf>

Possible outcomes

- **Adjourned** (majority of examiners must agree; extraordinary circumstances, code of conduct violations)
- **Pass** (all/all but one examiners must agree)
- **Conditional pass** (majority; specific conditions to be met in a reasonable time frame – usually within 6 months)
- **Fail and repeat the candidacy** (majority; exam performance inadequate but performance/work to date indicate potential to perform at the doctoral level)
- If the student fails the second candidacy, fail with a recommendation to terminate the doctoral program (all/all but one; performance and work completed to date both inadequate) or for a change of category to a master's program (all/all but one; performance inadequate but potential indicated for masters program).
- **Fail with termination** at first attempt possible, but rare.



What are examiners looking for?

- Internal consistency in hypotheses/objectives, methods, and work to date
- Critical evaluation of the literature and one's own work
- Reasonable/feasible scope, realistic timelines
- The ability to offer reasoned speculation when one doesn't know the answer

Purpose:

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How can students prepare?

- Preparation starts as soon as your research topic has been chosen
- Stay on top of the literature
- Critically evaluate your work at regular intervals, be aware of its strengths and weaknesses
- Discuss with your supervisor/supervisory committee regularly
- Practice presentation multiple times, have a mock candidacy
- Be aware of departmental requirements and expectations/culture
- Think like an examiner

The research proposal (report)

- Submit within 13 months (six copies)
- Develop in consultation with your supervisor (give her/him enough time to provide feedback)
- Guidelines: ≥ 12 point font, ≤ 20 pages (excluding references, table of contents)
- Cannot be modified after submission

Research proposal: good practice

- Format is flexible, but generally includes introduction/motivation, literature survey, objectives/hypotheses, work done to date and proposed work (with methods).
- Maintain clear distinction between literature survey, hypotheses, preliminary work and proposed work for clarity.
- You will likely not know the composition of your examining committee when you write the report. Prepare the report for a technical audience that is likely to be a mixture of experts and non-experts.
- Your proposed work must be original and meaningful – that is the case you have to make based on your introduction, literature review and methods.

Research proposal: key elements

- Establishes that there is a research problem (‘what’)
- Establishes that addressing this problem will contribute to knowledge (‘why’)
- States the key research questions (hypotheses) involved in addressing the problem (‘what’, but very specific)
- Outlines a plan for answering the question(s) using sound principles of academic inquiry (‘how’)
- Presents any preliminary indications (i.e. work) that suggest the plan will be successful in answering the question(s) posed (i.e. justifies the ‘how’)

What does a research proposal make you do?

- Justify your research
- Provide context for your research and its importance
- Outline steps in your proposed research
- Think through your experiments/simulations
- Be creative
- Anticipate potential problems
- Formulate a realistic timetable

Essential ingredients of a research proposal

- **The issue:** what problem does the research address?
- **Research design:** how will the research achieve its stated objectives?
- **Benefit:** what will the research contribute to existing knowledge?

Dr. Marilee Ogren-Balkema, Scientific Communications, MIT Open Courseware

What part to write first?

The hypotheses/objectives

Then check each element of the proposal to align with them.

Change hypotheses as needed (e.g., if the question has already been answered by someone else)

Elements of the proposal: Title

- Acts as a mini-abstract
- Provides a quick picture of the key ideas/components
- Should reflect the focus of your proposal
- Must be clear and unambiguous
- Put the most important words first
- Write the title last

Elements of the proposal: Introduction

- Establishes that there is a research problem
- Establishes that addressing this problem will contribute to knowledge
- Enunciates the benefit of the proposed research

Usually a first attempt to inform readers and motivate them, may not have a very high level of detail.

Elements of the proposal: Literature review

- Is an account of what is known (has been published) about a topic
- Is not an annotated bibliography
- Includes
 - ✓ Information seeking
 - ✓ Critical appraisal

(note that your proposal should inform and persuade)
- Reflection about literature review:
 - ✓ What is the specific research question this will help define?
 - ✓ What type of information am I seeking? What is the scope of the review?
 - ✓ Is it thorough enough and yet narrow enough to exclude irrelevancies?
 - ✓ Critical analysis: all relevant viewpoints, assessed accuracy of sources, synthesized specific themes?
- Will readers find this relevant and useful?

Elements of the proposal: Literature review (contd)

While assessing each source, ask:

- Does it possess/contain a clear focus/problem definition/hypothesis?
- Are the methods used appropriate to answer the questions asked?
- Would additional or alternative approaches provide more information?
- Where does this source fit in the context of the research topic/question I am reviewing?

Elements of the proposal: Literature review, transition to hypotheses/objectives

- Summarize what is known so far
- State what we need to know next
- Explain why we don't know it yet
- Describe how you intend to find the answer

Elements of the proposal: Methods

- Link each method/experiment/simulation you propose to a specific hypothesis. It may make sense to arrange your methods section according to the list of objectives.
- Specifically mention innovative aspects of your ideas
- This section is not just a list of protocols, though that is required in more detailed proposals or in reports/manuscripts

Elements of the proposal: Results and discussion

- Include if relevant (and that is often true)

Overall quality of the proposal: Ask

- Is it a meaningful research question?
- Is the research design appropriate?
- Are your methods rigorous and feasible?
- Is the title informative?
- Are the specific aims clear?
- Is the background and significance meaningful and rigorous?
- Are the methods appropriate for the aims?
- Is the timetable realistic?
- Is the proposal clear and unambiguous?

Overall quality of the proposal: presentation

- Are the headings clear and obvious?
- Are the figures/tables appropriate?
- Is the document free of errors (typographical or otherwise)?

Write it so you avoid the common criticisms:

- Idea(s) not original
- Rationale is weak
- Writing is vague
- Outcomes are uncertain
- Problem is not important
- Proposal is unfocused
- Project is too large

Before the exam

- Practice presentation multiple times, have a mock candidacy (to get the feel of answering questions, but don't expect it to be exactly like the real thing)
- The chair of your examining committee is supposed to discuss procedures with you approximately a week before the examination – request a meeting yourself if that does not happen
- Refresh your knowledge of the general field
- Try to figure out if you speak faster or slower when you are nervous, test your presentation with your computer in the room where the exam will be held
- Your supervisor may ask you for a short CV

At the exam

- Arrive early and set up your computer and presentation
- Bring a copy of your research proposal with you, also dry erase markers and water/a beverage if you think you might need it
- You will have a maximum of 25 minutes for your presentation (20 is ideal)
- Two rounds of questioning, 10-20 minutes per examiner per round, 5 examiners (3 in supervisory committee, 2 at arm's length). The chair oversees conduct of the exam and moderates proceedings, but does not ask questions.
- Can take a short break between rounds

At the exam, contd.

- You will be asked to leave twice:
 - The first time is after the purpose of the exam has been stated. This is to discuss your background, courses, etc.
 - The second time is after both rounds of questioning are completed. At this point, the committee deliberates on the outcome of the exam and recommends one of these outcomes: pass, conditional pass, fail, adjourned

After the exam

- If the outcome is a pass, the real work begins
- If it is a conditional pass, you will be informed of the specific conditions and the timeline to meet them
- If it is a fail, it is likely you will be given another chance at the exam. Take all feedback you get into account in preparing for it.
- If the outcome is a pass and you have a Masters degree, discuss the possibility of obtaining exemptions for some course requirements with your supervisory committee

Other general guidelines

- Do not approach your examining committee before the exam to inquire about their possible line of questioning at the exam
- Do not be needlessly argumentative with examiners, i.e., don't pick a fight. State your answers, provide your reasoning and respectfully disagree if needed.
- Keep in mind that the outcome of the examination is not a reflection on you, but on your potential to complete a PhD successfully.
- Informed speculation is encouraged when you aren't sure of the answer, wild guessing is not. Be prepared to back up your speculation with cogent reasoning. 'I don't know' is also a valid response (if not used too often).

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