

Department of Electronics

Ph.D. Comprehensive Exams

The comprehensive exams for the Ph.D. degree in the department of Electronics are a required component of the program. Comprehensive 1&11 (Major and Minor written exams) and must be completed within 6 terms of the initial registration for full-time students, and within 8 terms of the initial registration for part-time students. The exam is designed to test a candidate's preparedness for study in the chosen field of specialization and to assess the scope and content of the candidate's proposed research area. The exam consists of two parts, which are described below.

Comprehensive 111 (Ph.D. Proposal, Written and Oral) must be completed within 9 terms for full-time students and within 12 terms for part-time students of the initial registration.

Written component

The written component will consist of two exams of three hours duration each. 3 to 4 faculty members related to the candidate's area of specialization will contribute to the questions each to form the exam papers. Although the scope of the exam is at the discretion of the examiners, it is expected that the supervisory committee (or the supervisor and one other faculty member if the supervisory committee has not yet been set) will identify "major" and "minor" areas for the written questions, with more in-depth coverage of material in the "major" area.

The faculty members contributing questions to the exam will make available, at least one month in advance of the exam, a list of suggested references from which the exam material will be drawn, indicate whether their question(s) are closed or open book, and, in the case of open book questions, identify the material which may be brought into the exam. The identity of the examiners, coverage of the questions and authorized material for each question will be communicated at least one month in advance of the date of the written exam.

On or before the date of the written exam, the candidate will also submit a written Ph.D. thesis proposal to each member of a thesis proposal committee. This document will normally not exceed 25 pages of single spaced 12 point text with figures. The purpose of the thesis proposal is to give an overview of the scope, methods and goals of the work which will form the bulk of the Ph.D. thesis. Emphasis should be on the novel components of the proposed work and their advancement of the state of the art. The document should also address the requirements for specialized equipment and or services, and, where appropriate, contingency plans in the event of major problems.

Oral component

Within a short period of time after the written component (typically in the same academic term), the oral component of the exam will be held. The candidate will give a 20 minute overview of the Ph.D. research outlined in the proposal. A question period similar in nature to the final oral exam will follow, which will cover details of the Ph.D. proposal and presentation, and may also include follow-up questions regarding the written exam questions.

Department of Electronics

Ph.D. Comprehensive Exam Procedure

Introduction

All candidates for the Ph.D. degree in the OCIECE must pass a Ph.D. comprehensive examination as a required part of the program. The three departments (DOE, SCE at Carleton and SITE at University of Ottawa) each have a different examination format but the purpose is the same. The exam is designed to test a candidate's preparedness for study in the chosen field of specialization and to assess the scope and suitability of the candidate's proposed research topic. The exam should be completed within 18 months of initial registration for full time students, and within 3 calendar years of first registration for part time students. In this period, the candidate should have finished the required courses (either 3 or 5 courses as determined upon admission), identified a research topic, performed an extensive literature search, and completed some preliminary analysis/design/testing in the research area. The latter tasks should not be so extensive as to delay the comprehensive examination beyond the 18-month time period from initial registration.

Advisory Committee

Before the comprehensive examination can take place, an Advisory Committee for the candidate must be established. The committee will consist of the supervisor and normally two other members of the department but any member of the OCIECE can serve on this committee if appropriate. The members of the Advisory Committee will take an active part in the candidate's Ph.D. comprehensive examination and also serve to provide additional guidance to the student throughout the Ph.D. program. The supervisor is responsible for striking the Advisory Committee and will inform the Department Associate Chair (Graduate Studies) and the candidate about the committee membership prior to setting the Ph.D. comprehensive examination.

Examination Format

In the Department of Electronics, the Ph.D. comprehensive examination consists of a written component and an oral component. Both components will normally be completed within a 2-week period -that is there must not be an unreasonable delay between the written component and the oral component.

Written Examination Component

The written examination component will consist of two exams of three hours duration each -one in a "major" area and the other in a "minor" area. The "major" area must be chosen from one of the major research areas of the department as accredited by OCGS:

- digital and optical communications
- computer-aided design of electronic circuits
- microwaves and electromagnetics
- solid-state devices and integrated circuits
- photonics (soon to be accredited)
- VLSI

The "minor" exam will be in the specialized area of the candidate's research. The candidate and supervisor must both be in agreement with the chosen areas for written examination.

The exams can be "open book" or "closed book", in whole or in part and will be 3 hours in duration. An "open book" exam would normally only allow the student to bring certain specified textbooks. A "closed book" exam could also permit the student to bring specified memoranda. The Advisory Committee will inform the Department Associate Chair (Graduate Studies) about the format of the exams in the "major" and "minor" area and also a list of reference books for each area, clearly indicating the textbooks which will be allowed in an "open book" exam. A list of authorized memoranda will also be given for each "closed book" exam. The Associate Chair (Graduate Studies) will send the candidate a letter clearly indicating the "major" and "minor" exam topics, format of the exams, allowed memoranda and the examination dates at least one month in advance of the exam. The written exams will normally be held on two consecutive days, but in no case will they be held more than a week apart.

The members of the Advisory Committee will contribute 1 or 2 questions each to form the exam papers. Although the scope of the exam is at the discretion of the examiners, the degree of difficulty will be at the senior undergraduate level with the expectation that in order to pass the exam, the candidate answer with the "comprehensive" understanding and insight required by a Ph.D. candidate. Some of the exam questions should require essay-type answers to help ascertain comprehension of the subject.

Written Proposal Component

On or before the date of the first written exam, the candidate will also submit 5 copies of a written Ph.D. thesis proposal to the Department Associate Chair (Graduate Studies). This document will normally not exceed 50 pages of double spaced 12-point text with figures. The purpose of the thesis proposal is to give an overview of the scope, methods and goals of the research which will form the bulk of the Ph.D. thesis. Emphasis should be on the novel components (through literature search) of the proposed research and the candidate's proposed advancement of the state of the art. At the time of preparing the document it is not expected that the candidate has done more than some preliminary research. The document should also address the requirements for specialized equipment, internal and/or external services, and, where appropriate, contingency plans in the event of major problems.

Oral Component

Within a short period of time after the written component (normally two weeks), the oral component of the exam will be held. In the "closed session" at the beginning of the exam, the Advisory Committee will report on the results of the candidate's written examinations. The Advisory Committee will indicate to the Examination Chair if the oral exam should proceed based on satisfactory written examination; if there are minor problems in the written examination that need to be addressed later in the oral exam; or whether the exam should not proceed because of unsatisfactory written examinations. If the exam proceeds to the "open session", the candidate will give a 20-minute overview of

the Ph.D. research outlined in the proposal. A question period similar in nature to the final oral exam will follow, which will cover details of the Ph.D. proposal and presentation, and may also include follow-up questions regarding the written exam questions.

Ph.D. Comprehensive Examination Committee

The examining board for the Ph.D. Comprehensive examination will consist of:

- the 3 members of the candidate's Advisory Committee (thesis supervisor plus two other members of OCIECE)
- one member from SITE if not already on the Advisory Committee
- one additional member of the department who will act as Chair -- normally the Department Associate Chair (Graduate Studies) or his designate
- Dean of Engineering (ex-officio)
- Dean of Faculty of Graduate Studies and Research (ex officio).

The Department Associate Chair (Graduate Studies) will distribute the 5 copies of the Ph.D. proposal to the examining board at least two weeks prior to the examination date.

The Chair of the examining board is responsible for the following:

- 1) To ensure that the procedure outlined in the section "Oral Component" is followed.
- 2) To ensure that the Comprehensive Examination Report is prepared, signed and submitted to the Dean of the Faculty of Graduate Studies and Research.
- 3) To ensure that the candidate receives a copy of the completed Comprehensive Examination Report
- 4) To ensure that the written examination papers and the graded written examinations of the candidate are inserted in the candidate's departmental file.
- 5) To ensure that his copy of the Ph.D. proposal is inserted in the candidate's departmental file.