

Qualifying Review Proposal Guidelines

Prepared by NEP QR-subcommittee (version 8/24/10)

Summary

This document contains the guidelines for the Qualifying Review Proposal (also called the Written Exam component), and its Oral Defense (also called the Oral Exam component). Students are expected to produce a written proposal for a three (3) year project addressing a topic within the scope of the solicitations (or request-for-proposals) provided by the QR-Committee. Students are then expected to summarize and defend their proposal in an oral presentation to the QR-Committee. While no official budget is requested, students are expected to keep in mind that the proposed work should be within the scale and scope of a single-investigator grant within the academic environment.

Qualifying Review Committee

3-4 faculty from NEP. Contact Dr. Michael Escuti (mjescuti@ncsu.edu) for current members.

Important Dates

Week ~2 QR Launch Meeting, Dissemination of Guidelines / Examples / Resources, Q&A
Tutorial on Effective Proposal Writing
Week ~5 Submit Draft of 1-Page Abstract Submission (implies final selection of topic)
Week ~6 Peer-Review Process and Practice, Q&A
Week ~10 Submit Draft Proposals for Student/Committee Group-Review
Last Week Final Proposal Submission
(finals week) Oral Review Examination

Proposal Topics

The proposal must be an original document produced entirely by the student, and its topic does not need to be identical to a student's research topic. The following subject areas are suitable, and representative of the NEP area (select one):

- Ultimate CMOS: More Moore's Law
- Novel Optical Sources and Detectors
- Sensors for the 21st Century
- High Frequency Devices
- Novel Devices to Reduce the Consumption of Energy
- Future Devices: Molecules, Spins, and the Unknown
- Enabling Materials for Optoelectronic Devices

The intended focus of all proposals is on devices, components, and research developments that will have the ability to enable systems (i.e. not the systems themselves). The proposals may be experimental or theoretical. Important Note: For proposal ideas, examine the following solicitations published online to get ideas of what is currently attractive in the NEP area.

- National Science Foundation (NSF) solicitation for the [Electronics, Photonics & Device Technologies \(EPDT\) program](#)
- Past/current Semiconductor Research Corporation (SRC) solicitations
- Past/current Defense Advanced Research Projects Agency (DARPA) solicitations
- Very good searchable database of solicitations is [Community of Science](#) (free sign-up)

Importance of Written Proposal vs Oral Exam

The Qualifying Review process includes both a written document (the QR-Proposal) and an oral presentation (the QR-Oral Exam). While there is no rigorous official scoring rubric established for these two components, it should be clear that they are both nearly equal in importance, and poor performance in either can prevent passing the Qualifying Review.

Instructions

In the following, we specify the evaluation criteria that will be used by the Committee, the requirements of the Oral Exam, and the formatting and structure of the Written Proposal.

Evaluation Criteria

The following categories will be used for evaluation of the QR-Exam. Students are encouraged to consider these as a useful guide to the approximate relative importance of each section. Note that categories 3-5 apply to both the Written and Oral components.

1. *Written Document Overall Appearance and Formatting (~5% of score)*

Are the given guidelines are followed in every detail?

2. *Oral Exam Effectiveness (~5% of score)*

Does the oral presentation follow the overall structure of the written proposal? Can the student communicate technical content clearly, with adequate English, and within the allotted time? Are presentation slides (and other visual aids) used effectively? Can the student confidently answer reasonable questions in a professional and knowledgeable way?

3. *Quality of Literature Review and Quantitative Assessment (~45% of score)*

How well is the background for the proposed activity and state-of-the-art explained? Does the literature review adequately introduce the core scientific principles and current limitations of the proposed activity? How clear is the context, importance, and impact of the proposed activity? Can it be understood by a qualified technical person (i.e. a competent EE researcher who is not an expert in the proposal's topic)?

4. *Problem Statement and Description of Proposed Research (~30% of score)*

Is the problem statement (or hypothesis) clear and well defined with respect to previous work in the area? How well are the objectives clearly defined in terms of research focus? How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? To what extent does the proposed activity suggest and explore creative and original concepts? Does the proposal clearly identify what is 'success' with regard to the stated objectives?

5. *Research Methods (~15% of score)*

How well conceived and organized is the proposed activity? Are the proposed methods (i.e. both technical and project management) adequate to address the topic of the project? This section should include elements such as research tasks, experiment/fabrication methods, project time frame, and resource requirements and availability.

Oral Exam Requirements

The Oral Exam will take place after submission of the Written Proposal (usually during finals week), and will be conducted by the Committee in a closed session with each student. The review will consist of two parts, a defense of the Written Proposal, and an oral review on fundamentals of ECE courses the student has taken. A strict time limit of one hour will be allowed for the entire Oral Exam. Both sections of this oral exam must be passed to the satisfaction of the Committee in order to pass the QR.

- (1) *Defense of the Written Proposal*: The student should prepare a 20 min presentation based on the Written Proposal, following its general organization, and highlighting its key aspects with a view toward the Evaluation Criteria above. The committee will question the student regarding the presentation and written document, which usually expands this proposal defense to approximately 45 min.
- (2) *Oral Review of Analytical Skills*: The Committee will question the student on foundational NEP concepts in the remaining time (usually ~15 min). Questions will be selected from the undergraduate and graduate courses previously taken by the student as indicated on his/her transcript. The focus will be on basic topics reasonably expected of researchers in the Nano-Electronics and Photonics field.

Written Proposal Formatting

The following formatting guidelines must be followed:

- Margins: at least 1 inch, in all directions
- Recommended Font: “Times New Roman” or “Arial”, 12 pt size
- Line Spacing: at least 6 lines per inch, usually equivalent to “single-spacing”
- Figures and Tables: all illustrations, figures, and tables must be numbered sequentially and include a brief caption
- File Type: all submissions must be in PDF format (Portable-Document-Format, Adobe)
- Submission Method: all submissions must be done as email attachments, directed to the QR-Committee Chairman

Written Proposal Structure

The following sections within the proposal must be included:

- 1. Project Summary Statement (also called an Abstract)**
 - a. 1-page (roughly 500 words)
 - b. Include the proposal title, principle investigator name and institution.
 - c. This summary should include the motivation, objectives, and anticipated value/impact of the proposed work.
 - d. This summary should answer the following questions concisely:
 - i. What do you intend to do?
 - ii. Why is the work important?
 - iii. What has already been done?
 - iv. How are you going to do the work?

2. Project Proposal (submitted in combination with 1-Page Summary)

- a. 15-pages or less
- b. The following Sections must be identified by headings in the proposal (additional sub-headings are certainly permitted):
 - i. Objective and Motivation
What problem(s) are you solving, or what do you aim to discover, or what is your hypothesis? If you are completely successful, what will the likely impact be? How is this research beneficial to others? Put bluntly: Is this a good idea, and who cares?
 - ii. Background
What is the scientific foundation needed to understand the proposed research? What work has been done by others that is most relevant to the proposed research? Why has this work not yet been done by others? Put bluntly: Do you know your stuff?
 - iii. Proposed Research
What are the details of the proposed research? What is the work to be done? What are the challenges and how do you aim to overcome them? What resources are needed? Put bluntly: What will you do?
 - iv. Research Plan, Timeline, and Evaluation
How will you perform the research? How will you employ your resources? How will you evaluate your results and progress? Put bluntly: How will you do it, and how will you know if you succeeded?

3. References

- a. No page limit
- b. Reference numbers should correspond to the citation numbers in the proposal.
- c. Each reference must include the names of all authors, the article and journal title, book title, volume number, page numbers, and year of publication.

4. Biographical Sketch

- a. 2-pages or less
- b. About the principle investigator
- c. Recommended that it includes the following (at least)
 - i. Contact Information
 - ii. Professional Preparation (Institutions, dates, degree)
 - iii. Publications (5 or less)
 - iv. Collaborators and Graduate Advisors
 - v. Honors and Awards

5. Supplementary Information

- a. Required: the top five (5) most-important references, as judged by the student, must be provided as PDF files for consideration by the QR-Committee.
- b. Optional electronic resources may be additionally provided, if the student feels that these include important information or support the proposal. Note that these resources will only be optionally considered by the QR-Committee.