

# **BBS PRELIMINARY QUALIFYING EXAMINATION GUIDELINES**

(Academic Year 2015 –2016)

## **THE GOAL**

The primary goal of the Preliminary Qualifying Examination (PQE) is to ensure that you have achieved a high standard of scientific scholarship and skills that are critical for successful completion of your Ph.D. thesis and beyond. In addition to assessing your foundation in genetics, molecular biology, cell biology and biochemistry, the PQE will test your ability to:

- Develop hypothesis- or technology-driven research plans likely to advance a field
- Prepare a compelling research plan to test these hypotheses or technologies, including describing the overall strategy, methodology and analyses to be used to accomplish the aims as well as discussing potential problems and alternative strategies
- Orally explain and defend these hypotheses and your research plan
- Critically analyze and interpret data

## **PROCEDURAL ISSUES**

During the fall of the G2 year, all students must take the *BBS330: Critical Thinking and Research Proposal Writing* course. In small groups, students will develop an on-topic proposal, consisting of 2 aims, that overlaps with their thesis work, first an outline followed by successive drafts. The PQE will follow after BBS330, from January to May (of G2) for all students who passed BBS330.

- The PQE will be based on the two aims developed during BBS330 plus
- a third aim, derived outside of BBS330, and which is specific to the PQE proposal
- Changes made to Aims 1 and 2 for the PQE version of the proposal are allowed, for example if new data are obtained, new paper(s) are published that affect the rationales or approaches – if major, non-cosmetic changes are made, students must include an introductory cover page that summarizes the changes from the BBS330 proposal to the PQE proposal. This cover page is not included in the final page count.

## **PQE Request Form**

*Due to the BBS Office before 12:00 PM, October 20, 2015*

Students are required to attend a PQE Informational Meeting before submitting the PQE Request Form.

PQE Informational Meeting: Friday, September 18 from 1:00PM – 3:00PM, TMEC 227

1. Describe the topic (one concise paragraph)
2. Briefly outline the major question(s) that will be pursued
3. Briefly describe the experimental system and approaches (with a few sentences and by choosing keywords)
4. Identify potential exam chairs and examiners
5. PI must sign the form so plan accordingly

**Students are responsible for contacting faculty and scheduling their own PQE committee, date and time.** Try to pick faculty whose expertise fits closely with your topic. For example, if the project involves studying the cell cycle in *Drosophila*, pick at least one examiner with expertise in the organism and another with expertise in the cell cycle. It may not always be possible to find examiners with closely related expertise. However, and it must be emphasized, this is not a necessary condition for a fair exam. As is common in the NIH grant review

system, some committees might include faculty with expertise in the broad area of the student's project but not exactly the same system or topic. You should therefore strive to make the proposal accessible to anyone in the general area of the project.

Once the BBS Program Office receives your PQE Request Form, the office will review the list of chairs and examiners you proposed and determine who should be excluded due to a conflict of interest; for example, current collaborators of the PI who have been closely involved in the project, recent trainees of the PI (within the last 5 years), your program advisor, BBS330 section leaders, and non-BBS faculty. The office will also ensure that the same faculty are not repeatedly tapped as examiners. Typically, an examiner will only serve on 1-3 exams per year. The list of approved faculty will be submitted back to you within one week of submitting your PQE Request Form. **You may only contact the faculty approved by the BBS office. If additional names are needed, contact the BBS office.**

You should begin scheduling your exam at least one month before you would like to take your PQE; for example, if you are planning on taking your exam in late March you should begin contacting faculty in early February. It is also strongly recommended that you secure a chair first and then use his/her availability as a starting point for scheduling your PQE. Once you've obtained your chair's availability, contact the two examiners you wish to serve on your committee and provide them with the dates and times. The website [www.doodle.com](http://www.doodle.com) is a fantastic tool for aiding in the scheduling process. Please note, the exams are usually two hours and typically take place at the HMS campus. Parking will be provided for faculty outside the Longwood Medical Area (please contact the BBS Office to schedule parking for faculty). You can book a room for the exam through the eCommons portal under "Services" and fill out the "Room Request Form." We recommend booking either a tutorial or conference room at TMEC. You may also book a conference room in your department if preferred.

Once you've confirmed your exam, please email Danny Gonzalez ([danny@hms.harvard.edu](mailto:danny@hms.harvard.edu)) the following: chair & examiner names, and exam date, time, and location.

### **Role of the PQE Committee Chair**

The Chair of the PQE Steering Committee, Alex Toker ([atoker@bidmc.harvard.edu](mailto:atoker@bidmc.harvard.edu)), is available to answer questions, clarify expectations, and provide guidance at any point during the exam preparation process.

### **Role of Examination Committee Chair**

PQE chairs are experienced examiners and are responsible for keeping the exam on course and ensuring that examiners pursue an appropriate line of questions.

Martha Bulyk	Ann Hochschild	Carl Novina
Alan Cantor	Hanno Hock	Tom Rapoport
Dipanjan Chowdhury	Victor Hsu	Adrian Salic
Pat D'Amore	Laurie Jackson-Grusby	Ralph Scully
Dan Finley	Josh Kaplan	Jagesh Shah
Lee Gehrke	Andrius Kazlauskas	Ramesh Shivdasani
Emanuela Gussoni	Carla Kim	Michael Wolfe
Steve Gygi	Galit Lahav	Bruce Zetter
Kevin Haigis	Andi McClatchey	
Marcia Haigis	Raul Mostoslavsky	
Xi He	Anders Naar	

## **THE PROPOSAL**

You must submit your proposal to your committee (please CC Danny as well) one week before your exam. The BBS Program Office will send your student file and course grades to your committee once your proposal is received.

### **Topic**

As described above, the PQE proposal will follow logically from the on-topic proposal developed in BBS330. The expectation is that 2 aims will be developed as part of BBS330, and will be focused on your thesis topic or related to your thesis project, and a substantial proportion of the work should be hypothesis- or technology-driven. For the PQE proposal, one additional specific aim should be developed that is driven by your own ideas. Even if any of the aims involve screening or other open-ended efforts, at least one aim must test a hypothesis. Technology-driven or screen-based proposals are allowed and encouraged; however for such approaches it is essential to emphasize rationales, as well as efforts directed at validation of data sets and expected outcomes. You should submit your PQE proposal comprising the 2 aims developed in BBS330, plus a new third aim. You are allowed to update the two BBS330 aims for the PQE proposal (e.g., to encompass new preliminary data, or newly-published studies), but if you do so please include a summary paragraph, not more than one half page, as a cover page where you describe the major changes made to the BBS330 proposal to the PQE proposal. The aim(s) are expected to be creative and thought-provoking yet must be balanced with feasibility. They do not necessarily have to be the exact aims of your dissertation research.

While it is anticipated that some of the proposal will be based on the ideas of your thesis advisor, the third aim developed specifically for the PQE proposal must be solely written by you. Students are expected to propose work that will advance understanding within the relevant field, and proposals that restrict themselves entirely to obvious extensions of existing work will not be given a clear pass. For aims that have been inspired by the ideas of others, we expect students to cite the sources of ideas and/or information derived from personal communication. **The proposal should be designed so that you can realistically complete the work in approximately four years.**

### **Input/Advice**

You are strongly encouraged to seek advice and help from post-docs and graduate students as you work to develop and craft the proposal and prepare for the oral exam. **Students are not allowed to simply abstract or copy aims from their PI's proposals.** Students are expected to continue to have normal discussions with their PI about data, proposal goals and approaches. However, PI and other faculty should **NOT** read proposal drafts or give specific feedback about proposals. You may **NOT** use work that you have submitted for other courses here or at another institution, with the exception of BBS330. Examples of successful proposals **CAN** and should be reviewed in the BBS Program Office. We also encourage you to get feedback on your written proposal and the proposal presentation from post-docs and students.

## **Guidelines for Organization and Writing of the Proposal**

### **Contents**

Your PQE proposal should contain the following elements:

- Succinct summary of the current state of knowledge in the field
- Discussion of how the proposed studies will address key questions in the field
- Clearly stated and testable hypotheses
- Individual aims (an aim should NOT be based on the outcome of one specific experiment, or fully dependent upon results obtained in a previous aim).

- A well-reasoned and feasible set of experiments to test the key hypotheses
- A thorough understanding of the tools and techniques necessary to carry out the experimental plan
- A discussion of potential pitfalls that may arise and possible solutions/alternative approaches
- A guide to quantitative analysis and interpretation of anticipated results.
- A discussion of how the results obtained will contribute to the state of knowledge and conceptual understanding in the field.

### **Format**

*Cover page of the PQE exam must include student's name, email address, date and location of exam, and committee members; if applicable, it should also include your summary of any substantive changes from the BBS330 proposal to the PQE proposal. You should also designate on the cover page which aim(s) you specifically derived (it may not always fall chronologically as Aim 3).*

### **The proposal should conform to the following requirements:**

1. The proposal should consist of no more than 4,000 words for the BBS330 proposal, and 5,000 words for the PQE proposal that will include the additional aim and associated background. These limits include figure legends but not the title page or references. The word count should be indicated on the title page. Proposals that exceed this limit can be returned.
2. Use 11 point Helvetica or Arial font
3. Document is double-spaced
4. Margins, in all directions must be at least 1/2 inch

### **The following sections need to be included with suggested lengths in parentheses:**

- Abstract (~1/2 page)
- Specific Aims, (Hypotheses to be tested should be clearly stated) (~1/2 page)
- Background and Significance, Preliminary Data (~6-8 pages for these two sections)
- Experimental Design, Expected Outcomes & Interpretation, Pitfalls and Alternative approaches (7-10 pages)
- Literature Cited (Full References with titles -- number of words will not count toward total)

Figures with legends are expected to be included, and are highly encouraged because they generally add clarity to the proposal. It is expected that these figures will be embedded within the document (i.e., they should not all be placed together at the end of the proposal but should be embedded just as they would be in a published paper).

### **ORAL EXAM**

The oral exam will last approximately 2 hours. You should prepare a presentation of your entire proposal (that is, the aims developed in BBS330 plus your new aim) including an abbreviated Background and with a focus on the Experimental Design and Expected Outcomes and Interpretation. 10-15 slides will likely be sufficient. During the exam, you will defend and explain your hypotheses, methodology, and expected outcomes. At the beginning of the exam, you will be expected to present and discuss all three Aims including those that were developed during BBS330, and also indicate and present the additional third aim that was developed independently.

You are expected to have a strong command of the primary literature related to your field. You are also responsible for the materials covered in the core courses, including fundamental principles and experimental

approaches in the fields of genetics, molecular biology, biochemistry and cell biology. Questions testing your knowledge in these areas may be framed within or outside the context of your proposal. You are strongly encouraged to give practice presentations to students and post-docs to help you prepare for the oral exam. No input from faculty is allowed.

## **THE OUTCOMES**

You will be informed of the outcome (pass, conditional pass, or fail) at the end of the exam (see below). Within 1 week and in rare cases 2 weeks, a written evaluation will be provided.

- **Pass.** No further work on the PQE will be required
- **Conditional.** A student will receive a conditional pass if the committee feels that he/she would benefit from additional preparation or work. This may be due to issues that arise in the written proposal, oral exam, or both. ***The conditions for changing the grade to “pass” will be determined by the exam committee. If possible these recommendations will be given to the student at the end of the exam, but may be provided at a later date. The plan will be noted in the evaluation form, along with the expected time frame for when the condition will be due.*** It may be helpful for the student and the chair to communicate by email shortly after the exam in order to make sure that it is clear what the student will be expected to do. The work required to fulfill any conditions should be performed in parallel with your thesis project. A written condition is typically 30 days.
- It is important to emphasize that the PQE is not just an exam, but it also is an academic exercise in which the student learns how to write and defend a research proposal. Students come to the exam with different backgrounds, and for most the PQE will be an experience and test like no other they have encountered before. Accordingly, receiving a conditional or even a fail should not be considered necessarily to be a judgment on a student’s innate or ultimate abilities. It is extremely important that students begin to master the skills involved in the PQE, a process that will continue even after they graduate. Students should consider a grade of “conditional” simply to mean that they need to acquire additional expertise before they can be considered to have developed these skills to the level expected for passing the PQE. ***The student will receive a “pass” once this conditional work is completed to the satisfaction of the exam committee. If it is not completed satisfactorily, the student will receive a fail and be asked to repeat the entire exam.***
- **Fail.** A student will receive a fail if there are serious concerns based on the written proposal and the oral exam. In this case, a follow-up meeting with the exam chair, PQE committee chair, program head, program advisor, and thesis advisor will be scheduled. After this meeting, a set of recommendations will be made to address the identified issues. The student will be given the opportunity to rewrite the proposal and retake the oral exam following completion of the recommended work. Students are typically given 1 year to retake their exam.
- **Feedback.** In addition to determining the outcome of the exam, examiners will be asked to provide students with short comments on their strengths and weaknesses in the following areas. These criteria will be important for determination of the overall outcome:
  - Experimental approach and written proposal
  - Predicted impact of the proposed work
  - Innovation and creativity
  - Oral exam

- Knowledge base (proposal-related and general)

### **THE NEXT STEP**

After passing the PQE, you will assemble a Dissertation Advisory Committee (DAC). This meeting should happen within 3-4 months after passing the PQE. In order to encourage students to apply the constructive critique that they receive during the PQE and address key weaknesses in the original proposal, all BBS students are required to submit a revised version of the PQE proposal to their DAC in preparation for the first DAC meeting. If your aims have changed, you should prepare and submit a new thesis proposal to your DAC. Please see the DAC Guidelines for more information.