BBS PRELIMINARY QUALIFYING EXAMINATION GUIDELINES  
(Academic Year 2014 –2015)

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 a set of original, testable hypotheses
- Prepare a compelling research plan to test these hypotheses
- 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 BBS330: Critical Thinking and Research Proposal Writing course. In small groups, students will develop an on-topic proposal that overlaps with their thesis work, first an outline followed by successive drafts. The PQE will follow in late March or early April (of G2) for all students who passed BBS330. The PQE will generally be based upon the two aim proposal developed during the course, but must include at least one new aim that was not part of the course proposal and was conceived/developed independently.

Deadlines for submitting necessary forms are listed below:

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<th>Deadline for submission of PQE request form to the BBS office</th>
<th>Proposals due to the BBS office</th>
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<td>5:00PM, October 20, 2014</td>
<td>5:00PM, February 20, 2015</td>
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PQE Request Form (Due October 20, 2014)
1) Describe the topic (one concise paragraph)
2) Briefly outline the major questions that will be pursued
3) Briefly describe the experimental system and approaches (with a few sentences and by choosing keywords)
4) Identify possible Exam Chairs from the Steering committee list (See below)

Final selection of examiners will be at the discretion of the BBS Program Office, but every effort will be made to identify examiners with expertise that fits closely with the topic. For example, if the project involves studying the cell cycle in Drosophila, the office will try to identify at least one examiner with expertise in the organism, and another with expertise in the cell cycle. The program office may consult the chair for advice in assigning examiners. It may not be possible to find examiners with closely related expertise for every proposal. 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. The student should therefore strive to make the proposal accessible to anyone in the general area of the project.

Once the BBS Program Office receives the PQE Request Form, an exam chair from the PQE Committee (below) will be assigned. The BBS office will take care of scheduling the oral exam. Before the committee is formed, inform the BBS office if there are faculty that you know or believe should be excluded because of a conflict of interest; for example, avoided should be current collaborators of the PI who have been closely involved in the project, recent trainees of the PI (within the last 5 years), and your program advisor.

**Role of the PQE Committee Chair**
The Chair of the PQE Steering Committee, Alex Toker (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  Víctor 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**

**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 must be hypothesis-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. 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 BBS30 aims for the PQE proposal (e.g., to encompass new preliminary data, or newly-published studies), but if you do so please highlight changes made using a line in the margin. The aim(s) are expected to be creative and thought-provoking yet must be balanced.
with feasibility. This, as well as the additional aim(s), do not necessarily have to be the exact aims of your dissertation research proposal.

While it is anticipated that some of the proposal will be based on the ideas of your thesis advisor, the Aim developed 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 receive input or feedback from any faculty. This does not mean that you cannot continue to have normal discussions with your PI about your data; but rather that you should not be consulting your PI or other faculty about the details of your proposal (e.g. going over your aims, giving them drafts, etc). 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. You should also designate on the cover page which aim(s) you specifically derived.

The proposal should conform to the following requirements:

1) **The proposal should consist of no more than 4,000 words, including figure legends but not the title page or references.** The word count should be indicated on the title page. Proposals that exceed this limit will 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 third 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 asked to introduce the two aims that were developed during the BBS330 course and indicate which aim 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 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.

- It is important to emphasize that the PQE is not just an exam, but 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.

- **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.