

(These guidelines constitute a program-specific interpretation and expansion of the general qualifying exam guidelines of the Cell and Molecular Biology Programs and should be read carefully by both students and members of all examining committees.)

1. **PURPOSE:** The qualifying exam has several purposes. One is to assess the depth and integration of the student's knowledge of developmental biology and to determine whether or not it is adequate to provide a sound basis for doing thesis research in developmental biology. Another is to assess the student's ability to formulate a novel research question and design a plan to investigate that question. Two final goals are to give the student experience in proposal writing and in the oral presentation of a research plan.

2. **TIMING:** PhD and MSTP students must pass the exam by January 28 following the second year of graduate-student education, (January 28 of the first year for MSTP students). A letter will be generated in the Division Office and sent about September 15 each year to remind students of the upcoming deadlines. Please see the attached Qualifying Examination timeline. Forms for planning and reporting the qualifying exam are available in the Division Office.

3. **FORM OF THE EXAM:** The exam consists of two parts: a written research proposal and an oral presentation, followed by questions from the examiners. At least one member of each examining committee will be a member of the Developmental Biology Steering Committee, who will chair the exam. The Chair will inform both the student and the committee at the time that the exam is set up which areas of developmental biology appear to be most germane to the student's proposal, and in which s/he should be prepared to entertain questions. The entire oral examination, including both presentation and examiners' questions, usually takes about 2 hours.

a. **Nature of the research proposal.** The proposal should describe an original research project focused on a significant question in developmental biology. The topic of the proposal should not be the same as that of the student's thesis research, but may be related in some way. For example, the proposed project might address the same central question as the thesis research, but in a different model system. Alternatively it might address a very different question, but in the same model system as the thesis research. The proposed project should require use of some techniques that are not expected to be used in the thesis research (although it may also require techniques that the student does plan to employ). The written proposal should take the form of an NIH postdoctoral fellowship proposal and should describe a project that might realistically be done by one person in three years. It should be no longer than 10 pages of single-spaced typing. The student is encouraged to read actual postdoctoral proposals and/or previous qualifying exam proposals and use them as structural models.

Each proposal should include a literature review providing the background and context of the question being addressed by the project. In the experimental section of the proposal, the student should fully describe the overall rationale, experimental strategy, expected outcomes and interpretations, possible technical difficulties and back-up strategies. In describing the proposed experiments, the student should be sure to indicate the rationale for choosing these particular experiments and indicate how they relate to the overall experimental strategy, but nitty-gritty experimental details (such as buffer formulations, centrifugation times, etc.) do not need to be included for relatively standard techniques.

b. Pre-exam feedback on the written proposal. In order both to aid the student in developing his/her proposal-writing skills, and to assure that questioning during the oral exam can focus on critical analysis (rather than clarification) of the proposal, members of the examining committee are encouraged, whenever possible, to provide the student with advance feedback on the clarity and structure of the proposal. To that end, the student should provide a draft of the proposal to committee members at least three weeks prior to the exam date, and arrange individual meetings with those examiners who are willing and able to provide such feedback. (Students are also free to request critical evaluation of the proposal from other colleagues during this time period.) It is appropriate for committee members to indicate, for example, that the proposal is too ambitious and should be more narrowly focused, and/or to indicate where the proposal lacks clarity, logic, adequate detail, adequate consideration of alternative approaches, adequate controls, etc. But it is considered inappropriate for committee members to provide detailed, specific suggestions for rewriting. The final version of the proposal should be given to committee members at least 3-4 days before the examination date.

c. Oral presentation: The student should prepare an oral presentation of the research proposal that parallels the written proposal. This presentation should take about 30, and no longer than 40, minutes (the student should practice the presentation to make sure that it falls within this guideline). Visual aids may be used to illustrate the main points. The first 5-10 minutes of the presentation should be devoted to a discussion of the background and facts that lead up to the proposed question and place that question in context. The presentation should next outline the experiments proposed and indicate their relative priorities. Expected results, possible alternative results, and their interpretations should be discussed. Finally, possible technical problems and back-up strategies should be presented. The presentation should conclude with a very brief summary of the main experiments, the possible significance of the expected results, and the contribution that this project would make to the field.

d. Examiners' questions: During the student's presentation, the examiners should ask only questions needed for clarification. After the presentation, the examiners may ask specific questions about the background of the proposal and about the proposed experiments. Although the questioning will begin by focusing primarily on the proposal, it will also move to broader areas of developmental biology related to the proposal. This might, for example, include asking the student to compare the system he or she proposes to use to other systems that might have been used, or to discuss the ways the question might be addressed differently in the same or in a different system. The examiners will expect the student to have a broad basic knowledge of the concepts and techniques of developmental biology, cell biology and molecular genetics, derived from core courses, advanced electives, journal clubs, and reading. Students should expect to be asked questions that test the limits of their knowledge. Although the student will be expected to have a firm grasp of the fundamentals of modern developmental biology, it is not anticipated that he or she will know the answer to every question asked.

e. Evaluation: At the conclusion of the oral exam, the examining committee is charged to address only the narrow question of whether the student has or has not met at least the minimum standard for passing the qualifying exam and being allowed to proceed to dissertation research. In the event that the answer to this question is "no", it will be the responsibility of the Developmental Steering Committee, and not the examining committee, to determine what should

happen next regarding a second attempt. Each member of the examining committee will be asked to write a brief note to the Program Director, indicating what s/he felt the major deficiencies were. The Steering Committee will then decide whether the student should or should not be permitted to retake the exam on the same or different proposal, with the same or a different committee, etc. This decision will be made in a timely manner. In the event of a second failure, the student will be given the opportunity to appeal the decision to the Steering Committee. Should this appeal be denied, the student will not be in satisfactory academic standing and will be asked to withdraw from the program or be dismissed. Should the student feel there existed a procedural flaw in his/her examination process, the student may appeal the decision to the Programs and Student Affairs Committee, as outlined in the Student Guide to Division Policies.

Development Biology Qualifying Examination Schedule

(Effective 10/1/03)

<u>Date</u>	<u>Comments</u>	<u>Committee</u>
Oct 15, 2004	General Topics released	Written Proposal Cmte.
Oct 29, 2004	Specific Exam Topics approved	Exam Topics Cmte.

By this date, you should have chosen your specific topic and had this topic approved by the Exam Topics Committee. Within a few days of having your topic approved, the Exam Committee will assemble the individual examination committee, and you will be notified about the composition and the chair of your oral committee. As part of your preparation, you are encouraged to speak with members of your committee, as well as any other faculty, students, postdocs, etc. as you think appropriate.

Jan 7, 2005	Proposal Submission Deadline	Exam Topics Cmte.
Jan 14, 2005	Committee Review	Exam Topics Cmte.
Jan 28, 2005	Oral Exams should be completed	Oral QE Exam Cmte.

The Written Proposal Committee will evaluate each of the written proposals. The written exam must be submitted by the date indicated above, with no exceptions. The final assessment of the student will include (i) the Written Proposal Committee's assessment of the written proposal, (ii) each Oral Qualifying Exam Committee member's assessment of the written proposal, and (iii) the Oral Qualifying Exam Committee member's assessment of the oral presentation.

Any changes due to an emergency that prevent a student from meeting these deadlines must be approved beforehand by the Written Proposal Committee.