

# Molecular and Cellular Biology Graduate Program General Examination Format

## MCB General Examination Timeline

TASK	DEADLINE
Schedule General Exam Date with Supervisory Committee	Last day of Summer Quarter of Year 2
Select General Exam Chair -A committee member other than the PI or the GSR must chair the exam	At least 3 weeks before exam
Schedule General Exam online -List the PI, not the Exam Chair, as the Chair of Supervisory Committee	At least 3 weeks before exam
Submit Written Proposal and General Exam Format Document to Supervisory Committee	At least 2 weeks before exam
Complete General Exam	Last day of Autumn Quarter of Year 3

## MCB General Examination Sections

1. **Written Proposal**
2. **Oral Examination**

### Written Proposal

The proposal is written by the student. The format is similar to NRSA application. The PI may provide feedback on the Specific Aims and on a preliminary draft of the Approach. However, it is expected that the final version reflects the student's ideas.

**Font size:** Times size 12 or Arial size 11, 1/2-inch margins, single spaced.

**Recommended Document Length:** 7 pages including figures, not including references. The Committee may not want to read more than this and may appreciate a shorter proposal. No supplemental material should be included.

**Submission to Committee:** The Written Proposal and this General Examination Format document must be submitted to the Supervisory Committee at least two weeks before the General Examination. After submitting the Written Proposal to the Committee, students are encouraged to contact committee members to inquire about possible areas of questioning.

**Experiment Design:** Design experiments that generally correspond to the amount of work one person can accomplish in a 3 year time span. Most proposals will have 2-3 Aims.

### Written Proposal Format

The proposal format is similar an NIH NRSA Fellowship grant. Here is a link with sample F31 applications:  
<https://www.nigms.nih.gov/training/indivpredoc/pages/predoctoral-f31-sample-applications.aspx>

#### 1. ABSTRACT

Length: 300 words or less

The Abstract uses broad, general language to summarize the primary goal(s) and motivation of the research, the significance of the research, and the choice of experimental approach. The Abstract should be accessible to any molecular-cellular biologist and should avoid technical jargon and acronyms.

#### 2. SPECIFIC AIMS

Length: 1 page maximum

Concisely state the goals of the proposed research program and summarize the expected outcome(s), including the impact that the results of the proposed research will exert on the research field(s) involved. Succinctly list the specific objectives of the proposed research. Provide a 2-3 sentence summary for each Aim.

### 3. RESEARCH STRATEGY

Length: 6 page maximum not including references.

The research strategy has three sections: Significance, Innovation and Approach. Describe the significance of the research proposed including how the proposed research will advance the field. The innovation section should highlight methodological and/or conceptual novelty in the proposal. The approach section will be the longest. For each Specific Aim, address the following 4 topics:

1. RATIONALE BEHIND AIM
2. ANY RELEVANT PRELIMINARY DATA
  - Performed by student or the lab
3. EXPERIMENTAL DESIGN AND METHODS
4. EXPECTED OUTCOMES, POTENTIAL PROBLEMS AND ALTERNATIVE APPROACHES

The approach section should also include a timeline for accomplishing the aims and sub-aims.

#### Oral Examination

The first part of the Oral Examination is reserved for presentation and discussion of the student's research area - concepts, background, significance, questions, and the current state of knowledge. It also covers related, basic principles of molecular and cellular biology. The second part of the Oral Examination is a presentation and discussion of the research project's experimental approaches.

**Total Length:** Two and one-half hours

**General Examination Chair:** A committee member other than the Thesis Committee Chair (PI) or the GSR must chair the Exam.

**Thesis Committee Chair (PI):** The PI may not comment on the student's activities and performance in the lab. The PI cannot ask or answer questions during the exam.

#### **Oral Examination Format**

##### 1. Student Introduction

The student's introduction should include:

- a. Academic and Research Background
  - Years and location of undergraduate training
  - Degree(s) obtained
  - Years and location of research experience
- b. Coursework
  - List classes and number of credit hours taken to date
  - Grades
  - Number of credit hours remaining
- c. TA assignments completed
- d. Number of presentation slides and anticipated delivery time for both sections of presentation

##### 2. Introduction and Summary of Area of Investigation (20 minutes or less)

This section corresponds to Section 1 and 2 of the Written Proposal: Abstract and Specific Aims. A detailed discussion of experimental strategies and presentation of unpublished data will occur later. However, summaries of previously published experiments that are key to a general understanding of the research field, and general questions about such strategies, are allowed.

**Note:** Interruptions are not allowed during this 20 minute introduction. Questions may be asked only for general clarification.

3. Question and Answer Session: General (~30 minutes)

This session focuses on general principles and concepts in molecular and cellular biology, related to the area of biological study presented in the proposal. Questions about details of experimental methods should be avoided at this time. This portion is an opportunity to examine the quality of the student's knowledge and understanding of their general area of study. The Committee is encouraged to prepare questions that test the breadth of the student's knowledge in the broader areas of molecular and cellular biology that surround their thesis work.

4. Break (5 minutes)

5. Presentation of Research Strategy (20 minutes or less)

The Research Strategy presentation should include:

- a. A statement of the specific aims of the project, including a definition of the extent to which the work is discovery based vs. hypothesis based.
  - If the project is primarily discovery based (ie, a genetic screen or a structure determination), some explanation of if and how the data generated by the project will lead to novel, revised or expanded understanding of the field and the problem is expected and appropriate.
- b. Proposed experiments, with a logical sequence and timeline.
- c. Justification and defense of the chosen experimental strategy relative to possible alternative methods.
- d. Description of any unusual, novel, or innovative experimental strategies or methodologies.
- e. Published and/or unpublished preliminary experiments that indicate feasibility, with interpretation of the resulting data as desired.
  - Preliminary data generated by the student is not a requirement for taking the general exam, nor for evaluation of a student's performance. However, the student is expected to describe a well-designed flow chart of experiments that progress from initial characterization and trouble-shooting of the experimental system to well-controlled tests of experimental hypotheses and/or collection of data for long-term analyses. The student is free to describe any recent experiments by themselves or others that indicate feasibility.

**Note:** Interruptions are not allowed during this 20 minute introduction. Questions may be asked only for general clarification.

6. Question and Answer Session: Research Project (~60 minutes)

This session focuses on the student's understanding of experimental methodologies, and their ability to defend and rationalize the choice of experimental system, techniques and strategies. The questions should cover both published precedents and examples of similar studies, and interpretation of any available experimental results. Questions on general areas of biological understanding are still permitted at this time and for the remainder of the exam.

6. Supervisory Committee Discussion, Part 1

With the student and PI absent from the room, this discussion focuses evenly and comprehensively on strengths and deficiencies in understanding and knowledge of the research area and on the student's defense and rationalization of experimental strategies and goals.

7. Supervisory Committee Discussion, Part 2

The PI joins the Committee to continue discussion.

8. Supervisory Committee's Decision

The Supervisory Committee provides the student with an oral summary of the Committee's decision.

**The committee can, at their discretion, require the student to be reexamined in the next quarter for any of the following reasons:**

1. Deficiencies in understanding and/or presentation of basic principles, core knowledge and/or biological context of the project within the boundaries of historical molecular and cellular biology.
2. Deficiencies in rationale and/or defense of experimental strategies, including the ability to engage in a detailed critique of strengths and weaknesses of published and unpublished methods, including proposed thesis experiments.

Reexamination can include all elements of the exam, or just the part deemed deficient by the committee. The committee may also request resubmission of a revised written proposal if the proposal is deficient in quality - including clarity, logic, grammar, organization, or presentation. The Dean of the Graduate School will approve at most two reexaminations except under extraordinary circumstances.