

**PROGRAM IN MOLECULAR AND CELLULAR BIOLOGY**  
**UNIVERSITY OF MASSACHUSETTS AMHERST**

**ACADEMIC REQUIREMENTS, POLICIES AND PROCEDURES**



## TABLE OF CONTENTS

|                                                                       |    |
|-----------------------------------------------------------------------|----|
| <b>A. ADMISSIONS</b> .....                                            | 4  |
| I. General .....                                                      | 4  |
| II. Under Special Circumstances .....                                 | 4  |
| a. Admission of Students with Deficiencies in Formal Coursework ..... | 4  |
| b. Exemptions from Core Courses .....                                 | 5  |
| c. Targeted Students .....                                            | 5  |
| <b>B. REQUIREMENTS FOR THE PH.D. DEGREE</b> .....                     | 5  |
| I. Courses .....                                                      | 5  |
| a. Formal Coursework .....                                            | 5  |
| b. Laboratory Rotation .....                                          | 6  |
| c. Journal Clubs .....                                                | 8  |
| d. Seminars .....                                                     | 8  |
| e. Teaching Requirement .....                                         | 8  |
| f. Evaluation of Student Progress in First Year .....                 | 8  |
| II. Comprehensive Examinations .....                                  | 8  |
| a. Written Examination .....                                          | 8  |
| b. Oral Examination .....                                             | 9  |
| 1. General Comments .....                                             | 9  |
| 2. Detailed Guidelines .....                                          | 10 |
| III. Evaluation of Student Progress After the First Year .....        | 12 |
| IV. Dissertation and Final Oral Exam/Dissertation Defense .....       | 12 |
| a. Dissertation Committee .....                                       | 12 |
| b. Dissertation Prospectus/Outline .....                              | 13 |
| c. Seminar .....                                                      | 13 |
| d. Dissertation and Final Oral Exam/Defense .....                     | 13 |
| V. Period of Study .....                                              | 14 |
| VI. Summary of Requirements for the Ph.D. Program .....               | 14 |
| <b>C. REQUIREMENTS FOR FAST-TRACK <u>THESIS</u> M.S. DEGREE</b> ..... | 16 |
| I. Courses .....                                                      | 16 |
| a. Formal Coursework .....                                            | 16 |
| b. Journal Clubs .....                                                | 17 |
| c. Seminars .....                                                     | 17 |
| d. Colloquium .....                                                   | 17 |
| II. Thesis and Final Oral Examination/Thesis Defense .....            | 17 |
| a. Thesis Committee .....                                             | 17 |
| b. Thesis Outline .....                                               | 17 |
| c. Thesis and Final Oral Exam/Thesis Defense .....                    | 17 |
| III. Credits .....                                                    | 18 |
| IV. Summary of Requirements for <u>Thesis</u> M.S. Degree .....       | 18 |

|                                                                                                               |    |
|---------------------------------------------------------------------------------------------------------------|----|
| <b>D. REQUIREMENTS FOR FAST-TRACK <u>NON-THESIS</u> M.S. DEGREE</b> .....                                     | 19 |
| I. Courses .....                                                                                              | 19 |
| a. Formal Coursework .....                                                                                    | 19 |
| b. Journal Clubs .....                                                                                        | 20 |
| c. Seminars .....                                                                                             | 20 |
| d. Colloquium .....                                                                                           | 20 |
| II. Research Report and Final Oral Exam .....                                                                 | 20 |
| a. Research Report .....                                                                                      | 20 |
| b. Committee .....                                                                                            | 20 |
| c. Research Project Outline .....                                                                             | 20 |
| d. Final Oral Exam/Research Report Defense .....                                                              | 20 |
| III. Credits .....                                                                                            | 21 |
| IV. Summary of Requirements for <u>Non-Thesis</u> M.S. Degree.....                                            | 21 |
| <b>E. STUDENT TRANSFERRED FROM PH.D. TO M.S. TRACK</b> .....                                                  | 22 |
| I. Procedure and Requirements (taken Written, not Oral exams) .....                                           | 22 |
| a. <u>Thesis</u> Master's Degree .....                                                                        | 22 |
| b. <u>Non-Thesis</u> Master's Degree .....                                                                    | 23 |
| II. Procedure and Requirements (passed Written/Oral exams) .....                                              | 23 |
| III. Evaluation of Candidate for Readmission to PhD Track .....                                               | 23 |
| IV. Application for Readmission to the Ph.D. Track .....                                                      | 24 |
| <b>F. STUDENT TRANSFERRED FROM FAST-TRACK M.S. TO PH.D. TRACK</b> .25                                         |    |
| I. Procedure and Requirements for transfer before the end of the first year.....                              | 25 |
| II. Procedure and Requirements for transfer during the second year.....                                       | 25 |
| <b>G. APPENDICES</b>                                                                                          |    |
| 1. Deadlines for Oral Comprehensive Examination .....                                                         | 25 |
| 2. The Role of Thesis Advisers in Preparation of the Oral Component<br>of the Comprehensive Examination ..... | 26 |
| 3. Final Report for Oral Comprehensive Examination .....                                                      | 28 |
| 4. Calendar of Deadlines, Ph.D. Candidates .....                                                              | 29 |
| 5. Student Schedule, Ph.D. Candidates .....                                                                   | 31 |
| 6A. Calendar of Deadlines, <u>Thesis</u> M.S. Candidates .....                                                | 33 |
| 6B. Calendar of Deadlines, <u>Non-Thesis</u> M.S. Candidates .....                                            | 34 |
| 7. Student Schedule, <u>Thesis and Non-Thesis</u> M.S. Candidates .....                                       | 35 |
| 8. Progress Checklist for Students Transferred by AAC from<br>Ph.D. Track to M.S. Track .....                 | 36 |
| 9. MCB Membership and Associate Membership.....                                                               | 37 |
| 10. MCB Committees and Committee Responsibilities .....                                                       | 38 |
| 11. Travel Grants .....                                                                                       | 42 |
| 12. Secretary's Report, Dissertation Committee Meeting.....                                                   | 43 |
| 13. Support Agreement for Targeted Students Entering the MCB Program .....                                    | 44 |

## A. ADMISSIONS

### I. General

The Admissions Committee makes the final decision in accepting all applicants to the MCB Program.

Admission requires evidence that the student is capable of doing outstanding graduate work in the areas encompassed by the program. The applicant should have at least a B average in science and mathematics courses, and strong letters of recommendation and satisfactory scores on the Graduate Record Exam. It is expected that entering graduate students will have completed two semesters each of Organic Chemistry and Physics, at least one semester of Physical Chemistry, and Mathematics through Calculus. It is desirable that entering MCB students have completed at least one semester of Genetics, and courses in Cell Biology, Developmental Biology, and Molecular Biology are also advantageous.

With the rare exception of students with minor background deficiencies (see below), it is the policy of the MCB Program and the Admissions Committee to accept only those students who meet the criteria for admission as set by the Admissions Committee. This is especially true in cases where a P.I. is willing to provide support for a particular student in the first year, thus exempting that student from laboratory rotations (see "targeted" students below). The Admissions Committee must be convinced that the "targeted student" is not a marginal admission.

### II. Admission Under Special Circumstances

#### a. Admission of Students with Deficiencies in Formal Coursework

1. A student deficient in one core area but otherwise a very strong candidate, can be admitted to the program with the understanding that (s)he will make up the deficiency. A deficiency in molecular or cellular biology, for example, can be remedied by taking appropriate undergraduate courses as determined by the Academic Affairs Committee and the Admissions Committee. An example of conditions for making up a deficiency in Biochemistry follows:

A student deficient in Biochemistry will take BIOCHEM 523 (as well as MOLCLBIO 641 and 642), but not BIOCHEM 623 in the first year. The student must still take the Biochemistry section of the written examination at the end of the first year with no exceptions. If the student passes that section of the written examination, then (s)he is exempt from BIOCHEM 623. If, however, the student does not pass that section of the written examination, then the student will be required to obtain a grade of B or better in BIOCHEM 623 during the second year. This arrangement will allow students deficient in a single area to make up the deficiency without falling a year behind their classmates, and becoming a liability in terms of MCB support.

2. A student entering with a deficiency in Physical Chemistry must take a course in Physical Chemistry within the first two years in the program.

#### b. Exemptions from Core Courses

The Admissions Committee has the authority to exempt incoming students from core courses. At the end of each spring semester, the Academic Affairs Committee will review the exemptions granted by the Admissions Committee and provide the Admissions Committee with feedback for future admissions decisions. Exemptions approved by the Admissions Committee will be upheld by the Academic Affairs Committee.

c. **Targeted Students**

"Targeted students" are defined as students entering the MCB Program to work specifically with one P.I. Thus, special arrangements are made for financial support, and the student is exempted from the second laboratory rotation. The P.I. must agree to provide financial support for the targeted student. Specifically, the program does not accept financial responsibility.

All "targeted" students must be approved by the Admissions Committee, which must certify that "targeted" student credentials fall within the range that is normally expected for a student accepted by the program. The expectation is that the "targeted" student will remain in the laboratory of the "targeted" faculty member. If for any reason the student leaves the "targeted" lab, financial support will end. Transfer to another laboratory is possible only with the formal approval of the MCB Director.

Both the student and the faculty member involved in a "targeted" arrangement must sign the "Support Agreement" (see Appendix 12).

## B. REQUIREMENTS FOR THE Ph.D. DEGREE

### I. Courses

a. **Formal Coursework**

(See Appendix 4, *Ph.D. Calendar of Deadlines*; Appendix 5, *Ph.D. Student Schedule*)

Normally, all entering students take three core courses in their first year:

BIOCHEM 623 - Advanced General Biochemistry

MOLCLBIO 641 - Advanced Cell Biology

MOLCLBIO 642 - Advanced Molecular Biology

Exemption from core courses can be granted at the time of admission by the Admissions Committee. At other times, exemptions can be granted by the Academic Affairs Committee.

In addition to the three core courses, all students must complete **a minimum of 9 credits in graduate-level elective courses**. To be considered an eligible elective, the course must be taught by MCB Program faculty or the student must receive permission to take the course from his/her thesis adviser. Training at such places as Woods Hole, Cold Spring Harbor, etc, can count towards one course (3 credits). Students must submit a course syllabus and proof of course completion to the MCB Office for your student file.

Students who receive a grade of C in any core course or required elective course will ordinarily be required to re-take the course and earn a grade of B or better. Grades of BC (otherwise B-/C+) will require remedial work, to be specified in individual cases by the Academic Affairs Committee. Students must maintain an average grade of B or better for core courses and required electives (Physical Chemistry and Laboratory Rotation grades are excluded from this average).

## b. Laboratory Rotation

### 1. Purpose

Individual laboratory rotations allow the student to become acquainted with areas of current research within the program, through work on specific laboratory projects and participation in other activities of the research groups. They also provide an important opportunity for the student to gain a working knowledge of techniques commonly used in contemporary research in molecular and cellular biology. In addition, rotations give faculty an opportunity to evaluate the student's performance in a research setting.

### 2. Description

Each first-year student registers for two laboratory rotations, the first extending from September through January, and the second from February through June. The Director of the program must approve all arrangements made between a faculty member and a student on the basis of the student's research interests and his/her need for experience in techniques in one or more area.

To assist students in their laboratory choices, interested faculty will provide a written description of the rotation project(s) available in his/her lab. In addition, an advisory faculty committee (4 or 5 members) will meet with each new student at the beginning of the fall semester of their first year and during intercession. The student is expected to devote a minimum of 10 hours per week to the rotation project during the semester, and full-time effort in January and June.

3. At the end of the first (fall) rotation period, students will participate in a poster session at which each will present a summary of his/her rotation project to the MCB community. The student will also submit an "abstract" of his/her poster, signed by the rotation adviser, to the MCB Program office for circulation to all MCB members.

In early September (the beginning of the students' second year), student presentations will take the form of 10-minute talks to the MCB community. The student will again submit an "abstract" of his/her talk, signed by the rotation adviser, to the MCB Program office for circulation to all MCB members. Students who are exempted from the second rotation (see below) are also expected to make a second presentation.

4. Upon completion of each rotation, the faculty member will write an evaluation of the student's performance and assign a letter grade. A copy of the written evaluation will be given to the student. Rotation grades will be interpreted as follows:

**\*A** Excellent performance in majority of important areas. Shows potential to become a first-rate, independent, highly motivated and highly productive researcher. Likely to overcome any weaknesses.

- A-** Good performance in most areas. Shows potential to perform
- B+** capable, effective, independent research.
  
- B** Adequate, but not much beyond adequate performance in most areas. Potential to become a solid but perhaps not fully independent researcher. Some weaknesses in ability or motivation.
  
- B-** Serious weaknesses in important areas. Adviser has reservations
- C+** about whether candidate has potential to do Ph.D. level work.
  
- C** Serious inadequacies in important areas. Adviser believes candidate lacks potential to do Ph.D. level work.

\*(Please note Graduate School changed grading system 9/04 from A, AB, B, BC, C to A, A-, B+, B, B-, C+, C)

### 5. Exemptions

Students entering the program with an M.S. degree, or substantial research experience, may be excused from one laboratory rotation at the discretion of the Admissions Committee or the Academic Affairs Committee. Requests for exemption, in the form of a petition by the student to the Academic Affairs Committee, should be documented as fully as possible by the inclusion of an M.S. thesis, reprints of published papers, laboratory notebooks and the like. Second semester students who are exempted from a rotation in a second laboratory will be expected to make a presentation covering their work during the preceding semester. This will take place in early September in the form of a 10-minute talk, as outlined above.

### 6. Laboratory Affiliation

Students choose a laboratory for their dissertation research upon completion of the second rotation. This selection should be made only after a thorough discussion of goals and expectations with the intended faculty adviser. Future stipend support for the student will be provided by the dissertation laboratory, except in unusual cases. All choices are subject to approval by the Program Director, who should be informed of each student's intentions at least a week before the end of June.

Work in the dissertation laboratory (and financial support) begins at the end of June. Students who are undecided by the summer may carry out a third rotation during July and August to assist them in the selection of a suitable laboratory. But in that case, financial support during the summer must be provided by the faculty member in whose laboratory the third rotation is taking place.

### c. Journal Clubs

All students are expected to enroll in a Journal Club each semester, with the exception of their **first** semester in the program. Journal Clubs covering various topics in the current

scientific literature are offered by the various participating departments. Students must register for Journal Clubs in at least **two** different scientific areas during their residency.

d. **Seminars**

All students are expected to attend the weekly MCB Colloquia (MOLCLBIO 691A), which feature MCB faculty, as well as Special Topics Workshops held throughout the year. Students are also expected to attend one seminar per week sponsored by the MCB Program (MOLCLBIO 692A) or the participating departments.

e. **Teaching Assistantship Requirement**

Every MCB student is expected to have some teaching experience during his/her residency. This is usually, but not always, accomplished through a teaching assistantship in the first year. Evaluations of the student's performance as a Teaching Assistant will be made in writing to the Director by the TA's faculty supervisor and will become part of the student's file.

f. **Evaluation of Student Progress in First Year**

If performance was unsatisfactory during the first semester in residence, the student will be notified in February in writing that s/he is on probation, and performance standards will be specified which must be met during the second semester in order for the student to remain in the program. Students who fail to perform satisfactorily during both the first and second semesters may be dismissed from the program, with financial support being terminated on the last day of June.

When a student has made satisfactory progress in some areas and shows some promise for graduate work, but has serious deficiencies in other areas, the student may be formally transferred to the M.S. track. This action may result in a terminal M.S. degree, or the student may be invited to re-apply to the Ph.D. Program after completing substantial M.S. work. Students transferred from the Ph.D. track to the M.S. track at the end of the first year have not met the requirements for an M.S. degree (see section E, Appendix 7).

Continuation in the program toward completion of an M.S. will normally require that the student secure the agreement of a faculty adviser willing to provide laboratory space and financial support for work on a laboratory project. Students who are unable to make such an arrangement will be dismissed from the program without completion of the M.S.

## **II. Comprehensive Examinations**

a. **Written Examination**

The written section of the Comprehensive Examination is taken at the end of the first year in early June. Within a week after completion of the examination, the MCB Academic Affairs Committee evaluates the overall first year performance of each student and communicates this information to the student. In addition to the score on the written comprehensive examination, student progress is judged by grades in courses, laboratory rotation evaluations, and recommendations of the Written Comprehensive Examination committee.

**b. Oral Examination****1. General Comments**

The second part of the comprehensive examination consists of an oral defense of an original research proposal. The research proposal must take the form of a formal written document which is approved by the examining committee and kept in the student's official MCB file. The oral defense of this proposal must be passed before the end of the spring semester of the second year in residence unless special permission for an extension is granted by the Academic Affairs Committee.

This examination is intended to test the student's ability to develop a feasible research project, to conceive scientifically valid hypotheses, to work out experimentally sound means for their proof, and to defend these ideas in front of an examining committee. The scientific objective of the proposal may be in the general area of the thesis research, although it should not be identical with the thesis project. The proposal must be based on original ideas and certified as such by the dissertation adviser.

The oral examination is designed to test the competence of the doctoral candidate in skills not evaluated by previous examinations. The skills to be tested include the ability to become expert in a limited area of the current research literature; to conceive an original research project; to apply newly learned tools to the investigation; to envision the possible results of planned experiments; to set criteria by which the data and results will be assessed; to establish reasonable priorities among possible approaches to the problem.

Not all research projects which are reasonable are equally suitable for this examination. For example, it may be reasonable to want to identify all the volatile components of human blood. One could propose to use a combination of gas chromatography and mass spectrometry to do this. However, for an oral exam this topic may not provide evidence of creativity or the other attributes listed above. Borderline proposals may be given the benefit of the doubt, but in such cases the student should expect to be examined in detail on the methods to be used.

In short, the more interesting and original the central concept, the more questioning will focus on that concept. This generally provides the most satisfactory examination and the most valuable experience for the student. However, it is particularly important that the student state a clear-cut hypothesis which can be directly tested.

In starting work on a proposition, a student will usually find it most efficient to read deeply on a few limited topics rather than to read volumes of reviews hoping for an idea to strike. Good ideas usually come more readily when the current work is well understood.

(For definition of the role of the student's faculty adviser and any other faculty in preparation of the oral examination, see Appendix 2).

## 2. Detailed Guidelines

(See Appendix 1, *Deadlines for Oral Comprehensive Examination*)

**Step One:** On the first day of class in the fourth semester of residence, the candidate will submit an abstract of the proposed research project to the MCB Program office. The abstract document should start with a carefully worded title, the student's name, the date due, and the statement: "Abstract of a research proposal submitted to the Program in Molecular and Cellular Biology, University of Massachusetts, Amherst, in partial fulfillment of the requirements for the Oral Comprehensive Examination."

The abstract should begin with an introductory paragraph, which summarizes succinctly the background and relevance of the proposed research. This should be followed by a direct and lucid statement of the problem, the hypotheses to be tested, the objectives, and the experimental approaches to be employed. Not more than two thirds of the text should be devoted to background and introduction; not less than one third should be devoted to the specific experiments proposed. The abstract should be one or two pages in length and should contain about five literature references most pertinent to the problem.

**Step Two:** Within two weeks following receipt of the Abstract (February 15 or September 15) the Chair of the Academic Affairs Committee will appoint a three-member examining committee; one of these three will be Chair. Members of the committee will generally be drawn from the program faculty, although non-MCB examiners may be included. A representative of the Academic Affairs Committee will also be appointed, if the candidate so desires.

The student's thesis advisor will be present at the examination, though (s)he does not vote on the outcome. The MCB Program office will notify committee members and distribute copies of the abstract. Within ten days of receiving the abstract, the Committee Chair will notify the student and the Chair of the Academic Affairs Committee (or the MCB Program office) whether it is approved. If disapproved, the Oral Examination Committee chair will discuss the remedy with the student.

**Step Three:** Prior to April 1, the candidate will arrange with the concerned individuals a satisfactory date for the examination. The date should be scheduled prior to May 15 (or December 15 in the fall semester). The candidate will report this information to the MCB Program office, which will then be distributed by memo to the committee and student's adviser.

**Step Four:** The candidate will prepare the formal research proposal. The Chair of the Academic Affairs Committee may advise the student during its preparation, but the role of the student's thesis adviser (and other faculty) is limited (see Appendix 2). The proposal should be a carefully written document with a maximum length of twelve double-spaced typewritten pages. A file of old proposals may be consulted in the MCB Program office to resolve any questions of form or style. The cover page of the

Proposal should contain the title, the student's name, the date, and the statement: "A research proposal submitted to the Program in Molecular and Cellular Biology, University of Massachusetts, Amherst, in partial fulfillment of the requirements for the Oral Comprehensive Examination."

The first five to six pages should provide:

- (a) a brief review of the background and rationale of the problem with particular concern for recent developments in the field
- (b) a simple, concise statement of the research problem or question that the student is proposing to investigate

The second five to six pages should provide:

- (a) a lucid statement of the hypothesis the student has developed to investigate the problem
- (b) a moderately detailed statement of the rationale and methodology of the experiments to be carried out, an outline of the results anticipated, and a description of how the results will be interpreted

Proposals should be divided into short subsections (roughly 0.5 to 1.5 pages in length) organized into a logical sequence. Each subsection should have an informative title. Titles which state the conclusion or the specific question are more effective than vague and general titles. (Examples: "Protein kinase C increases the avidity of LFA-1 for its ligand ICAM-1" communicates more effectively than "Regulation of LFA-1." "What configurational change is responsible for activation of LFA-1?" is more informative than "Mechanism of activation.")

The bibliography should include titles and inclusive pagination of each cited reference.

Each member of the examining committee will receive from the candidate a copy of the Proposal, not less than 10 calendar days before the date of the examination. Members of the examination committee have until 5 days before the scheduled examination to move for rejection of the Proposal as submitted. To do so, the committee member contacts the chairperson of the examining committee. The chairperson, in consultation with all committee members, will decide what steps are necessary in order to proceed with the examination.

**Step Five:** The candidate will defend his/her research Proposal before the examining committee. In general, the candidate will be expected to open the examination with a talk of approximately 30 minutes—illustrated with slides or transparencies—outlining the salient points of the Proposal. During the defense the student must show that the experimental approach proposed is scientifically valid and the techniques to be employed will yield useful and interpretable information. Furthermore, (s)he must demonstrate a familiarity with the background information in the area of research, and

with the scientific basis of the methodology to be employed in the proposed investigation.

The remainder of the examination will be devoted to the discussion of questions posed by individual committee members. At the conclusion of the examination the student will leave the room. The candidate's adviser will then be asked if (s)he wishes to make any comments. The adviser will then leave the room. However, both the adviser and the student should remain available to the committee as they deliberate and vote. While the Academic Affairs Committee representative will not serve as an examiner, s/he may ask occasional questions during the examination, and may advise the committee on their options and participate in the discussion after the student has left the room. The AAC representative does not, however, vote on the final decision.

**Step Six:** Judgement of the candidate's performance will result in a grade of "Pass," "Conditional Pass," or "Fail." A conditional pass will carry pertinent stipulations for further work.

The Chair will communicate all comments and concerns of the examination committee to the candidate, and transmit the decision and recommendation of the examination committee in writing to the Academic Affairs Committee. A written report is not required from the Chair when the result is an unconditional pass with no specific recommendations. Optionally, the AAC representative may communicate any concerns in writing to the Academic Affairs Committee or may, at the Chair's request, write the report. A Final Report form will be filled out by the Chair and submitted to the MCB Program office (Appendix 3).

The student is to submit a copy of the final proposal to the MCB Program office.

### **III. Evaluation of Student Progress After the First Year**

Brief written evaluations of student progress are prepared each semester by the dissertation adviser and submitted to the Academic Affairs Committee for review. These evaluations normally become part of the student's file, and a copy is sent to the student. Any student who wishes to examine his/her file should make an appointment at the MCB Program office to do so. However, the files may not be removed from the office.

### **IV. Dissertation and Final Oral Examination/Dissertation Defense**

#### a. Dissertation Committee

The Dissertation Committee must be formed before the end of the first month of the fifth semester of study (**September 30**). Names of 4 members (including the dissertation adviser) must be submitted to the MCB Program office and subsequently approved by the MCB Director and the Graduate School. One member may be from outside the University, but in that case a copy of his/her c.v. must be submitted to the Graduate School. One member must be from OUTSIDE the candidate's department. The dissertation adviser will serve as the Chair of the committee.

It will be the responsibility of the Dissertation Committee to monitor the student's research and progress toward the Ph.D. degree. Meetings of the Dissertation Committee

must be held at least ONCE A YEAR. **Two meetings per year are strongly recommended.** The Committee Chair will communicate IN WRITING to the MCB Program office the results of each meeting, including specific requests made of the student (see Appendix 11). A copy of this report will be given to the student. The Dissertation Committee will meet with the student to approve the Dissertation Prospectus (below).

b. Dissertation Prospectus/Outline

Before completion of the third year of study (by **August 31** of the summer after the sixth semester) and at least **seven months** prior to the Final Oral Examination (this last is a requirement of the Graduate School), the student shall submit a Dissertation Prospectus/Outline to the Graduate School (and a copy to the MCB Program office). This is to be approved by his/her Dissertation Committee, as indicated by their signatures on the title page. Please note that the MCB requirement (by **August 31** of the summer after the sixth semester) precedes the deadline set by the Graduate School (seven months prior to submission of the completed dissertation). Normally, the Prospectus is no longer than twenty pages of text.

c. Seminar

All Ph.D. candidates will present a formal, public seminar on their dissertation research. Approximately two months before the public seminar, all students are to schedule a pre-seminar meeting with their committee. Students are encouraged to schedule the seminar on the same day and immediately preceding the oral defense, in order to avoid the necessity of repeating information to the dissertation committee. It is expected the student will arrange for a time when all members of his dissertation committee will be present. The MCB Program office will help facilitate arrangements for the seminar, with at least **one month** advance notice.

d. Dissertation and Final Oral Examination/Dissertation Defense

The format of the Ph.D. dissertation document is set by the Graduate School. It is the student's responsibility to learn about and follow the rules governing the dissertation format. The Final Oral Examination/Dissertation Defense will be administered by the Dissertation Committee after they have read and tentatively approved the dissertation and determined that all other requirements for the doctorate have been met by the candidate. The time and place of the Defense must be publicly announced by the Graduate School (Campus Chronicle), so information about scheduling must be submitted to the MCB Program office at least **one month** in advance. Students are encouraged to schedule the Oral Defense on the same day and immediately following the Seminar (see above).

**GRADUATE SCHOOL:** It is your responsibility to fill out all necessary forms and meet all requirements set by the Graduate School for graduation. See the Graduate School Handbook and Graduate School Bulletin. For more information, contact the Graduate School at 545-0025.

## V. Period of Study

Students in the Ph.D. Program will normally be expected to complete all requirements for their degree within 5 years after admission. Only under exceptional circumstances will financial support through the program or directly from the program be extended beyond 5 years. If such an extension is sought, approval of the Steering Committee is required.

## VI. Summary of Requirements for the Ph.D. Degree

### a. Courses

#### 1. **Core Courses:**

BIOCHEM 623 - Advanced General Biochemistry ..... 4 credits  
 MOLCLBIO 641 - Advanced Cell Biology ..... 4 credits  
 MOLCLBIO 642 - Advanced Molecular Biology ..... 4 credits

#### 2. **Laboratory Rotations:**

MOLCLBIO 696 - Independent Study ..... 8 credits  
 (4 credits each for 2 semesters)

#### 3. **Advanced Courses:**

A minimum of 3 graduate-level elective courses ..... 9+ credits total

#### 4. **Journal Clubs:**

Exempt first semester ..... 1-2 credits per semester

#### 5. **MCB/Departmental Seminars:**

1 per week minimum

#### 6. **MCB Colloquia:**

1 per week

### b. Comprehensive Examination

Part A: Written

Part B: Oral

### c. Dissertation and Final Examination

MOLCLBIO 899 - PhD Dissertation ..... 18 credits  
 (maximum of 9 credits per semester) (minimum)

Total credits, including MCB Seminar and MCB Colloquia - 73 (minimum)

The Graduate School requires no minimum number of credits for a doctoral program, with the exception of dissertation credits. The MCB Program requires 18 credits of MOLCLBIO 899, but there is no maximum number of credits to which a student is limited. However, a student can register for only a maximum of nine (9) credits per semester.

**\*Please note that MCB Ph.D. students must meet the Physical Chemistry requirement by having taken a PCHEM course before entering the Program, or by taking CHEM 471- ELEM PHYS CHEM. in the Fall of student's second year. (Student must contact instructor to get into class as it is an undergrad level. This class fills up early so it is in students' best interest to register early)**

**MAXIMUM NUMBER OF CREDITS A GRADUATE STUDENT CAN SIGN UP FOR PER SEMESTER IS 16**

## C. REQUIREMENTS FOR THE FAST-TRACK THESIS MASTER'S DEGREE

(See Section D for Non-Thesis Master's Degree description)

This program is available to BS graduates from UMass or any other of the Five Colleges. This accelerated program is possible for students who have already begun undergraduate research in the lab of an MCB faculty member, where they will complete their Master's degree.

Please note that students applying for admission under this rubric are exempt from the GRE general exams and are NOT required to take (as undergraduate or graduate students) a course in Physical Chemistry.

### Transfer of Undergraduate Credits to Graduate Transcript

If you are planning to apply graduate-level course credits (up to 6) you took as an undergraduate (credits which you did not need to apply toward your undergraduate degree), you should transfer them to your graduate transcript. The Graduate School's statute of limitations is normally three years for credit transfers. However, the MCB Program can request a waiver of this rule on the student's behalf (e.g. if the course content has not changed substantially). The request must be submitted in writing to the Graduate School. It is recommended that you take steps to make the transfer on entry into the MCB Program.

To do this you must get a letter from the undergraduate Program Director, or your undergraduate advisor of the department in which you got your B.S., stating that those credits were not needed to satisfy the department's degree requirements. This letter should be addressed to the Associate Dean of the Graduate School.

You will also need a letter from the MCB Program Director to Graduate Records confirming that these credits can be applied toward your MCB graduate degree. This should be all that you need to do, but just in case something goes awry here are the next steps that should happen:

- The Associate Dean, on receiving the letter from your department, will confirm that those credits were also not needed to satisfy the University requirements for your undergraduate degree.
- The Associate Dean informs the Graduate Records Office that these credits were not needed for your undergraduate degree and asks that these credits be transferred to your graduate record.

### I. Courses

#### a. Formal Coursework

(See Appendix 6A, *Thesis Calendar of Deadlines*; Appendix 7, *Student Schedule*)

University requirements for the Master's degree include **a minimum of 30 credits**. The MCB Program requires that candidates for the M.S. thesis degree take two of the three core courses required of doctoral students, and receive a grade of B or better. MOLCLBIO 642 must be one of these courses. In consultation with his/her adviser, the student will also take either MOLCLBIO 641 or BIOCHEM 623. Note that a graduate-level course taken as an undergraduate can be used toward the M.S. degree, **if not used toward their B.S.**

b. Journal Clubs

Participation in a Journal Club every semester.

c. Seminars

Attendance at the MCB Seminar Series every semester (MOLCLBIO 692A/BIOCHEM 691A) or at the seminar series sponsored by the department in which the student's research laboratory is located.

d. Colloquium

Attendance at the MCB Colloquium every semester (MOLCLBIO 691A).

**II. Thesis and Final Oral Examination/Thesis Defense**a. Thesis Committee

The student's Thesis Committee will consist of the student's adviser as Chair, and two other MCB faculty members. The deadline for the appointment of the thesis committee is **September 30** of the student's first year, at which time the student is to submit committee membership to the MCB Program office for approval by the Graduate School. It will be the responsibility of this committee to monitor the student's progress toward the thesis M.S. degree.

b. Thesis Outline

A preliminary description (outline) of the thesis must be approved by the committee before **January 31** of the student's first year. The thesis outline must be formally submitted to the Graduate School (and a copy to the MCB Program office), with a title page signed by each member of the thesis committee. The Graduate School requires the thesis outline be submitted **four months** prior to the thesis oral defense. Exemption from this requirement must be formally requested from the Graduate School.

c. Thesis and Final Oral Examination/Thesis Defense

The format of the M.S. thesis document is set by the Graduate School. It is the student's responsibility to learn about and follow the rules governing the thesis format. The Final Oral Examination/Thesis Defense will be administered by the Thesis Committee after they have read and tentatively approved the thesis, and determined that all other requirements for the Thesis M.S. Degree have been met by the candidate.

The Graduate School must receive formal notification from the MCB Director that the student has successfully passed an oral defense of the thesis, but it is **not** required that the defense be announced to the public. Note that a student defending a Master's degree is **not** required to present a public seminar on his/her work. The final written thesis, with a signature page signed by every member of the Thesis Committee and the Graduate Program Director, must be submitted to the Graduate School.

### **III. Credits**

It is a Graduate School requirement for the Master's degree that the student take a minimum of 30 credits of graduate-level courses. **A minimum of one-half of the total required credits must be on a letter-graded basis.** The student does not register for MOLCLBIO 698 (Master's Project), but can count 10 credits of MOLCLBIO 699 (Master's Thesis) toward the degree.

**GRADUATE SCHOOL:** It is your responsibility to fill out all necessary forms and meet all requirements set by the Graduate School for graduation. See the Graduate School Handbook and Graduate School Bulletin. For more information, contact the Graduate School at 545-0025.

### **IV. Summary of Requirements for the Thesis Master's Degree**

a. Courses (must have a total of 30 graduate-level credits)

**1. Core Courses:**

MOLCLBIO 642 – Advanced Molecular Biology .....4 credits

and one of the following:

BIOCHEM 623 - Advanced General Biochemistry - OR -

MOLCLBIO 641 – Advanced Cell Biology .....4 credits

**2. Independent Study:**

MOLCLBIO 696 (Lab Rotation).....6 credits  
(3 credits per semester)

**3. Journal Clubs:** ..... 2-4 credits  
(Journal Clubs carry 1 or 2 credits)

**4. MCB/Departmental Seminars:** .....2 credits  
(1 per week minimum - MOLCLBIO 692A)

**5. MCB Colloquium** .....2 credits  
MOLCLBIO 691A

**6. Master's Thesis (MOLCLBIO 699):** ..... 10 credits

-----  
30-32 Credits\*

\* Note that since only 14 credits in the above program are letter-graded (core courses and MOLCLBIO 696), the student must have at least one other credit in a letter-graded course.

## D. REQUIREMENTS FOR THE FAST-TRACK NON-THESIS MASTER'S DEGREE

This program is available to BS graduates from UMass or any other of the Five Colleges. This accelerated program is possible for students who have already begun undergraduate research in the lab of an MCB faculty member, where they will complete their Master's degree.

Please note that students applying for admission under this rubric are exempt from the GRE general exams and are NOT required to take (as undergraduate or graduate students) a course in Physical Chemistry.

### Transfer of Undergraduate Credits to Graduate Transcript

If you are planning to apply graduate-level course credits (up to 6) you took as an undergraduate (credits which you did not need to apply toward your undergraduate degree), you should transfer them to your graduate transcript. It is recommended that you take steps to make the transfer on entry into the MCB Program.

To do this you must get a letter from the undergraduate Program Director, or your undergraduate advisor of the department in which you got your B.S., stating that those credits were not needed to satisfy the department's degree requirements. This letter should be addressed to the Associate Dean of the Graduate School.

You will also need a letter from the MCB Program Director to Graduate Records confirming that these credits can be applied toward your MCB graduate degree. This should be all that you need to do, but just in case something goes awry here are the next steps that should happen:

- The Associate Dean, on receiving the letter from your department, will confirm that those credits were also not needed to satisfy the University requirements for your undergraduate degree.
- The Associate Dean informs the Graduate Records Office that these credits were not needed for your undergraduate degree and asks that these credits be transferred to your graduate record.

## I. Courses

### a. Formal Coursework

(See Appendix 6B, *Non-Thesis Calendar of Deadlines*; Appendix 7, *Student Schedule*)

University requirements for the Master's degree include **a minimum of 30 credits**. The MCB Program requires that candidates for the M.S. non-thesis degree take two of the three core courses required of doctoral students and receive a grade of B or better. MOLCLBIO 642 must be one of these courses. In consultation with his/her adviser, the student will also take either MOLCLBIO 641 or BIOCHEM 623. Note that a graduate-level course taken as an undergraduate can be used toward the M.S. degree, **if not used toward their B.S. Arrangements must be made through the MCB Office.**

b. Journal Clubs

Participation in a Journal Club every semester.

c. Seminars

Attendance at the MCB Seminar Series every semester (MOLCLBIO 692A/BIOCHEM 691A) or at the seminar series sponsored by the department in which the student's research laboratory is located.

d. Colloquium

Attendance at the MCB Colloquium every semester (MOLCLBIO 691A).

## **II. Research Report and Final Oral Examination**

a. Research Report

All non-thesis M.S. degree students are expected to complete a research project and write a research report. The report is to be approved by a committee of three MCB faculty members and orally defended by the student before the committee. The committee will decide on the form of the Research Report. Credit is earned for this work under the rubric MOLCLBIO 698 (Master's Project). Up to 6 credits may be earned this way.

b. Committee

The student's Committee will consist of the student's adviser as Chair, and two other MCB faculty members. The deadline for the appointment of the committee is **September 30** of the student's first year, at which time the student is to submit committee membership to the MCB Program office. It will be the responsibility of this committee to monitor the student's progress toward the non-thesis M.S. degree.

c. Research Project Outline

A preliminary description (outline) of the research project must be approved by the committee before **January 31** of the student's first year. The outline and the final Research Report become part of the student's file in the MCB Program office (it is **not** submitted to the Graduate School). A copy of the final Research Report is to be submitted to the MCB Program office, with a title page signed by each member of the committee.

d. Final Oral Examination/Research Report Defense

A final oral examination of the student's research project will be administered by the committee after the members have read and tentatively approved the research report, and determined that all other requirements for the Non-Thesis M.S. Degree have been met by the candidate. The results of the final oral examination (research report defense) must be reported to the Graduate School by the MCB Program office, but it is **not** required that the defense be announced to the public. Note that a student defending a Master's degree is **not** required to present a public seminar on his/her work.

**III. Credits**

It is a Graduate School requirement for the Masters degree that the student take a minimum of 30 credits of graduate-level courses. **A minimum of one-half of the total required credits must be on a letter-graded basis.**

**GRADUATE SCHOOL:** It is your responsibility to fill out all necessary forms and meet all requirements set by the Graduate School for graduation. See the Graduate School Handbook and Graduate School Bulletin. For more information, contact the Graduate School at 545-0025.

**IV. Summary of Requirements for the Non-Thesis Master's Degree**

- a. Courses (must have a total of 30 graduate-level credits)
1. **Core Courses:**
    - MOLCLBIO 642 – Advanced Molecular Biology .....4 credits
    - and one of the following:
    - BIOCHEM 623 - Advanced General Biochemistry -OR-
    - MOLCLBIO 641 – Advanced Cell Biology .....4 credits
  2. **Independent Study:**
    - MOLCLBIO 696 – (Lab Rotation)..... 12 credits
    - (6 credits per semester)
  4. **Journal Clubs:** ..... 2 credits minimum  
(Journal Clubs carry 1 or 2 credits)
  5. **MCB/Departmental Seminars:** .....2 credits  
(1 per week minimum - MOLCLBIO 692A)
  5. **MCB Colloquium** .....2 credits  
MOLCLBIO 691A
  5. **Master's Project (MOLCLBIO 698):**..... 6 credits
- 32 credits

## E. STUDENT TRANSFERRED FROM THE PH.D. TRACK TO M.S. TRACK

(Also see Appendix 8, page 36)

In addition to the "Fast-Track Master's Degree" (see Section C, p. 16) there are two other Master's degree options offered through the MCB Program for Ph.D. candidates who wish to switch to a Master's:

- (I) a M.S. option for students who have passed the written exam but not taken the oral exam
- (II) a M.S. option for students who wish to switch to a M.S. after taking the oral exam

### I. Procedure and Requirements for Students who have taken the Written Comprehensive Examination but not the Oral Comprehensive Examination

In the case of transfer to the M.S. track *after the written comprehensive examination at the end of the first year and before the oral comprehensive examination*, action is taken formally through the Graduate School. A Committee is appointed consisting of the student's adviser (Committee Chair), plus two other MCB faculty members subject to the Director's approval. The Adviser is responsible to see that the student's committee is appointed no later than **September 15** of the student's second year. Defense of the M.S. Thesis or Research Report must take place before **May 31** of the following year. It is a Graduate School requirement for the Master's degree that the student take a minimum of 30 credits of graduate-level courses. **A minimum of 15 credits must be on a letter-graded basis.**

#### a. Thesis Master's Degree

The Graduate School requires the student take 6 credits of MOLCLBIO 699 (Master's Thesis). The student may count up to 10 credits of MOLCLBIO 699 toward the degree. The student does not register for MOLCLBIO 698 (Masters Project).

A thesis outline is formally submitted to the Graduate School (and a copy to the MCB Program office), with a title page signed by each member of the committee. The Graduate School must receive the outline **four months** prior to the thesis defense. Exemption from this requirement is possible if requested by the student's adviser. The format of the M.S. Thesis is set by the Graduate School and it is the student's responsibility to learn about and follow the rules governing the thesis format.

The Final Oral Examination/Thesis Defense will be administered by the Thesis Committee after they have read and tentatively approved the thesis, and determined that all other requirements for the Thesis M.S. Degree have been met by the candidate. It is not required that the thesis defense be announced publicly, i.e. in the Campus Chronicle, nor is the student required to present a public seminar.

The Graduate School must receive formal notification from the MCB Director that the student has successfully passed the thesis defense. The final written thesis, with a signature page signed by every member of the Thesis Committee and the Graduate Program Director, must be submitted to the Graduate School.

#### b. Non-Thesis Master's Degree

The student signs up for MOLCLBIO 698 (Masters Project) and can apply up to 6 credits

toward the M.S. degree. The student is required to prepare a Research Report that follows the M.S. Thesis "content" guidelines as set by the Graduate School. It is the student's responsibility to learn about and follow the guidelines governing thesis content. The report need not adhere to the Graduate School format requirements for a thesis.

Once the Research Report is completed it is orally defended before the committee. A copy of the final report, with a title page signed by each member of the Committee and the Graduate Program Director, will be filed in the MCB Program office. The MCB office will report the results of the research report defense to the Graduate School.

## **II. Procedure and Requirements for Students who have passed the Written Comprehensive Examination and the Oral Comprehensive Examination**

In the case of transfer to the M.S. track for students who have **already passed both the written and oral comprehensive exams**, procedures are the same as in Section I except that the student's committee may accept passing the oral exam (i.e. a written proposal and successful defense of the proposal) for the 'project defended before a committee' part of the requirements. The student must also write a report of their research, which must be approved by their adviser and the MCB Director. A copy of the final report, with a title page signed by the student's advisor and Graduate Program Director, will be filed in the MCB Program office. The degree awarded will be a Non-Thesis Masters Degree.

## **III. Evaluation of Candidate for Readmission to the Ph.D. Track**

Evaluation of students in the M.S. track who are seeking readmission to the Ph.D. track should take place no later than the sixth semester in residence (the statute of limitations for M.S. students). The Thesis Committee will evaluate the candidate on the basis of (1) the quality and quantity of research accomplished, and (2) the student's ability and suitability for continuing in the Ph.D. program.

Note: if the evaluation takes places in the fifth semester, students readmitted to the Ph.D. track will be able to complete the oral examination at the end of their sixth semester in the program.

The Thesis Committee will recommend, in writing, to the Academic Affairs Committee that either:

a) The student be terminated in the Program. In this case, the committee must decide whether the thesis document should be modified to a format acceptable to the Graduate School or whether it can be submitted in its present format for the M.S. degree. Any current financial support from the Program for the student will terminate no later than 60 days after this recommendation.

OR

b) The student be invited to apply for readmission to the Ph.D track. In this case a research report is sufficient (see below).

## **IV. Application for Readmission to the Ph.D Track**

*Formal application for admission must be made through the Graduate School.* The student's

entire record will be considered by the MCB Admissions Committee by the end of the student's sixth semester in the MCB Program. If readmitted, the student will submit an abstract of the proposal for the Oral Comprehensive Examination no later than **September 1** of that year. The committee for that examination will be appointed by **September 15**, and the examination will be completed no later than **December 15** (see Appendix 1, *Deadlines for Oral Comprehensive Examination*). Some flexibility in these deadlines may be appropriate if approved by the Academic Affairs Committee.

PLEASE SEE PAGES 18 AND 21 FOR THESIS AND NON-THESIS SUMMARY OF REQUIREMENTS FOR MASTER'S DEGREE

**GRADUATE SCHOOL:** It is your responsibility to fill out all necessary forms and meet all requirements set by the Graduate School for graduation. See the Graduate School Handbook and Graduate School Bulletin. For more information, contact the Graduate School at 545-0025.

**F. STUDENTS TRANSFERRING FROM FAST-TRACK M.S. TO PH.D. TRACK**

All students who wish to switch from the Fast Track M.S. to the Ph.D. track *must formally apply to the MCB Ph.D. program via the Graduate School*. The student's entire record will be considered by the MCB Admissions Committee. If the student is accepted into the Ph.D. Program applicable course-work credits already taken as part of the M.S. requirements will be transferred towards the Ph.D. Typically students will have taken, or be in the process of taking, two of the three MCB core courses (MOLCLBIO 642 plus either MOLCLBIO 641 or BIOCHEM 623) during the first year of the M.S. degree program. They will be required to take the third core course at the first opportunity it is offered after admission to the Ph.D. program. Students transferring from the Fast Track M.S. to the Ph.D. track will be required to satisfy all the requirements for the Ph.D. degree (p. 14), satisfy the teaching requirement, and will be required to take Physical Chemistry (CHEM471) unless they can show that they have previously taken an equivalent class. The Academic Affairs Committee will decide whether a substitute class is acceptable to satisfy the Physical Chemistry requirement.

**I. Procedure and Requirements for a transfer before the end of the first year**

A student who decides to switch from the fast track MS to the PhD in the course of the first year, and who takes all three core courses in the first year, will take the written comprehensive exam in June of the first year. Students who have taken only two of the three core courses may either 1) defer taking the written exam until the end of the second year or, 2) request permission from the Program Director and Advisory Committee to take all or part of the written comprehensive exam at the end of the first year. If they elect to take the written exam at the end of the first year and do not pass all or part of the exam remedial classes may be recommended or they will be required to retake all or part of the exam at the end of the second year.

**II. Procedure and Requirements for transfer during the second year of the M.S.**

Students who are accepted into the Ph.D. Program during their second year as a M.S. candidate will be required to take the third core course at the earliest opportunity. They will take the written comprehensive exam in June of the year they transfer into the Ph.D. Program.

## Appendix 1

### DEADLINES FOR ORAL COMPREHENSIVE EXAMINATION \*

|                                                                                                                                                                     | SPRING TERM | FALL TERM    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------|
| Abstract of proposal submitted to Chair of Academic Affairs Committee.                                                                                              | February 1  | September 1  |
| Examination Committee appointed and Abstract distributed.                                                                                                           | February 15 | September 15 |
| Proposal distributed to Examination Committee. Date of examination scheduled. The Proposal cannot be rejected after the <u>fifth</u> day preceding the examination. | April 1     | November 1   |
| Last possible date to take oral comprehensive examination.                                                                                                          | May 15      | December 15  |

\*Failure to observe these deadlines is a cause for dismissal from the Program. All extensions must be approved in advance of the stated deadline by the Chair of the Academic Affairs Committee.

## Appendix 2

### THE ROLE OF THESIS ADVISERS IN PREPARATION OF THE ORAL COMPONENT OF THE COMPREHENSIVE EXAMINATION

It has become apparent that faculty advisers have had widely differing degrees of involvement with their thesis students during the preparation of research proposals, and especially during the preparation for the defense of the research proposal. Such a situation is completely unfair to the student body and has arisen because some faculty members consider the examination primarily a learning experience while others consider it an important criterion for judging the ability of students to deal with the real world of research.

This problem was discussed at a general faculty meeting in December 1988. A consensus was reached that the faculty member may provide limited assistance to the student in preparing the abstract or the proposal; however, (s)he may not prepare the student for the examination, though (s)he should provide the student with general guidelines. For example, it is desirable that the thesis advisers should tell the student to be prepared to defend the use of any technique proposed and be able to explain both the practical and theoretical basis of the technique and the technique's potential limitations. On the other hand, it is completely unacceptable to tell the student that the proposed technique is not good and to suggest a different one.

It is not acceptable for a faculty member to participate in a practice examination. Instead, students should be encouraged to give presentations of their proposition to groups of other graduate students who can then advise on matters of presentation and provide practice in an oral defense.

Faculty advisers could help the students considerably by discussing the preparation of a research proposal in general terms. It is acceptable to show a student a copy of a grant proposal, for example, and to explain the reasons for the way the different sections are written; it could be very helpful to the student to see referees' comments as well.

Students are encouraged to get information from other faculty members, postdocs, and students concerning any aspect of the proposed research. Examples are leads into the literature, techniques that may or may not be published, new information from "the grapevine," etc. Both students and faculty members should be concerned about the need to ensure that the concept of the proposal and its basic strategy are the work of the student. (This is a difficult area and when questions arise it is important to consult with a member of the Academic Affairs Committee. This consultation will help ensure that similar standards are applied across the Program.) Examples: A student proposes a procedure that the faculty member recognizes as okay in principle, but impractical or terribly out-of-date (inefficient).

Appendix 2 (continued)

It is reasonable to question the method, suggesting further reading which will enable the student to learn why the method is not good one. The key element is that the faculty member, in so far as possible, should help the student find the way to prepare a proposal and not give them such

direct advice as to share in the development of the idea.

Often, a faculty member can help a student avoid a pitfall by asking, "Have you considered other ways to analyze for the phenomenon—ways that might be more direct (less time-consuming, cheaper)?"

Other questions that often need to be asked include, "Isn't this experiment already implied in the previous papers? Won't those authors certainly be doing this work?" Or, "Is this problem anywhere near the mainstream of research? Will the results be worth the time?"

When a student asks his/her adviser questions that might violate the guidelines, it is appropriate for the adviser to refer the student to a member of the Academic Affairs Committee. This will preclude any problems involving conflict of interest.

In contrast to the oral comprehensive examination, the preparation of posters and talks on their rotation projects by first-year students is an area where faculty input is decidedly appropriate. This is a situation in which students can learn a great deal from their advisers.

## Appendix 3

### ORAL COMPREHENSIVE EXAMINATION: FINAL REPORT

CANDIDATE:

Examining Committee:

1.

2.

3.

Adviser:

Observer:

Date:

Time:

Place:

Judgment of the Examining Committee:

PASS

CONDITIONAL PASS

FAILURE

Conditions:

Signatures of the Committee Members:

1.

2.

3.

## Appendix 4

### MCB CALENDAR OF DEADLINES, PH.D. CANDIDATES

#### First Year:

**October 1 - January 31:** First Laboratory Rotation

**Early February:** Presentation of First Rotation Poster

**February 1 - June 30:** Second Laboratory Rotation  
(presentations the following September, as below)

**Beginning of or early June:** Written Comprehensive Examination

**June 15:** Choice of dissertation laboratory reported to MCB Director

**July 1:** Work begins in dissertation laboratory

#### Second Year:

**Early September:** Second Rotation oral presentation

**First Day of Classes:** Abstract of Proposal for Oral Comprehensive Examination  
submitted to Chair of MCB Academic Affairs Committee

**February 15:** Oral examination committee appointed, and student notified within the following 10 days as to whether abstract is approved

**April 1:** - Proposal distributed to examination committee  
- Date of examination scheduled

**May 15:** - Last possible date to take Oral Comprehensive Examination  
- Oral Examination Final Report signed by committee members and submitted to MCB Program office along with one copy of Proposal in final form  
- Results of Comprehensive Examination reported to Graduate School by MCB Program office

**Third Year:**

**September 30:** Dissertation Committee (4 members, including P.I. of dissertation laboratory as Chair and at least one outside member) approved by MCB Director and submitted to Graduate School

**August 31 (end of summer after 3rd year):**

Dissertation Prospectus formally approved by Dissertation Committee. One copy is filed in MCB Program office; copy with original signatures of Committee and Director is submitted to Graduate School. Graduate School requires submission at least 7 months prior to the Final Oral Examination.

**Fourth and Fifth Years:**

**Seminar** on dissertation work presented. Arrangements made through MCB Program office at least one month in advance. Seminar must be presented at a time when all members of the dissertation committee can attend. Students should schedule their seminar just before the oral defense.

**Dissertation Defense:** Scheduled through MCB Program office and Graduate School at least one month in advance.

Observe Graduate School deadlines for final submissions required to complete formal degree. Ph.D. normally completed within **FIVE YEARS** from date of matriculation in MCB Program.

**GRADUATION DEADLINES**

All requirements for any advanced degrees to be awarded at a given degree-granting period must be completed by the appropriate deadline:

February Graduation - Deadline January 15

May Graduation - Deadline last working day of April

September Graduation - Deadline last working day of August

**GRADUATE SCHOOL:** It is your responsibility to fill out all necessary forms and meet all requirements set by the Graduate School for graduation. See the Graduate School Handbook and Graduate School Bulletin. For more information, contact the Graduate School at 545-0025.

## Appendix 5

### **TYPICAL STUDENT SCHEDULE, PH.D. CANDIDATES**

\*Please note that MCB Ph.D. students must meet the Physical Chemistry requirement by having taken a PCHEM course before entering the Program, or by taking CHEM 471- ELEM PHYS CHEM. in the Fall of student's second year. (Student must contact instructor to get into class as it is an undergrad level. This class fills up early so it is in students' best interest to register early)

#### **First Year:**

|               |                                                                |
|---------------|----------------------------------------------------------------|
| <b>FALL</b>   | MOLCLBIO 642 - Advanced Molecular Biology .....4 credits       |
|               | MOLCLBIO 696 - Laboratory Rotation .....4 credits              |
|               | MOLCLBIO 692A - MCB Seminar ..... 1 credit                     |
|               | MOLCLBIO 691A - MCB Colloquium..... 1 credit                   |
|               | Teaching Assistantship (pg 8) .....no credits                  |
|               | No Journal Club (pg 8)                                         |
|               |                                                                |
| <b>SPRING</b> | MOLCLBIO 641 – Advanced Cellular Biology .....4 credits        |
|               | BIOCHEM 623 - Advanced General Biochemistry .....4 credits     |
|               | MOLCLBIO 696 – Independent Study (Lab Rotation) .....4 credits |
|               | MOLCLBIO 691A - MCB Colloquium ..... 1 credit                  |
|               | MOLCLBIO 692A - MCB Seminar..... 1 credit                      |
|               | Teaching Assistantship (pg 8) .....no credits                  |
|               | Journal Club (pg 8) ..... 1-2 credits                          |
|               |                                                                |
| <b>JUNE</b>   | Written Comprehensive Examination (pg 8)                       |
|               | Selection of Dissertation Laboratory - start 7/1 (pg 7)        |

#### **Second Year:**

|               |                                                                 |
|---------------|-----------------------------------------------------------------|
| <b>FALL</b>   | MOLCLBIO 692A - MCB Seminar ..... 1 credit                      |
|               | MOLCLBIO 691A - MCB Colloquium..... 1 credit                    |
|               | Journal Club ..... 1 credit                                     |
|               | *CHEM 471 – Physical Chemistry .....                            |
|               | Elective course (pg 5) ..... 3 credits                          |
|               | Preparation of Abstract for Oral Examination - due 2/1 (pg 10)  |
|               |                                                                 |
| <b>SPRING</b> | MOLCLBIO 692A - MCB Seminar ..... 1 credit                      |
|               | MOLCLBIO 691 - MCB Colloquium..... 1 credit                     |
|               | Journal Club ..... 1-2 credits                                  |
|               | Elective course (pg 5) .....3 credits                           |
|               | Complete Oral Examination - prepare Proposal and defend (pg 11) |

Appendix 5 (continued)

**Third Year and beyond:**

A minimum of 9 credits in graduate-level elective courses. (pg 6)

Dissertation Committee appointed by **September 30**, at beginning of 3rd year.  
Meets at least once every 12 months. (pg 13)

Dissertation Prospectus submitted by **August 31**, at end of 3rd year. (pg 13)

MOLCLBIO 899 - Dissertation Research (1-9 credits per semester); 18 credits required.

MOLCLBIO 692A - MCB Seminar

MOLCLBIO 691A - MCB Colloquium

Journal Club

Students are eligible for PROGRAM FEE (an alternate form of registration), after passing the Oral Examination during any semester when taking NO courses for formal credit. Students should NOT register for this, unless they expect to finish their degree work before the end of the spring semester. To register for Program Fee, fill out Application Card at Graduate School and pay fee.

## Appendix 6A

### MCB CALENDAR OF DEADLINES, THESIS MASTER'S CANDIDATES

#### First Year:

**September 30:** Thesis Committee (3 members, including adviser as Chair) submitted to MCB Program office (pg 18)

**January 31:** Thesis Outline approved by committee and MCB Directory. One copy submitted to MCB Program office; copy with original signatures submitted to Graduate School **four months** prior to oral exam/defense (pg 18)

Final Oral Examination/Thesis Defense - results reported to Graduate School; final written thesis submitted to Graduate School (pg 19)

#### Second Year:

**September 10:** Formal Thesis Outline approved by Thesis Committee and MCB Director. One copy on file in MCB Program office; copy with original signatures of Committee and Director submitted to Graduate School (Graduate School requires submission **4 months** before formal thesis defense).

### GRADUATION DEADLINES

All requirements for any advanced degrees to be awarded at a given degree-granting period must be completed by the appropriate deadline:

February Graduation - Deadline January 15

May Graduation - Deadline last working day of April

September Graduation - Deadline last working day of August

**GRADUATE SCHOOL:** It is your responsibility to fill out all necessary forms and meet all requirements set by the Graduate School for graduation. See the Graduate School Handbook and Graduate School Bulletin. For more information, contact the Graduate School at 545-0025.

## **Appendix 6B**

### **MCB CALENDAR OF DEADLINES, NON-THESIS MASTER'S CANDIDATES**

#### **First Year:**

**September 30:** Committee (3 members, including adviser as Chair) submitted to MCB Program office (pg 16)

**January 31:** Research Project Outline approved by committee and submitted to MCB Program office (pg 17)

Final Oral Examination/Research Report Defense - results reported to Graduate School; copy of report submitted to MCB Program office (pg 17)

#### **GRADUATION DEADLINES**

All requirements for any advanced degrees to be awarded at a given degree-granting period must be completed by the appropriate deadline:

February Graduation - Deadline January 15

May Graduation - Deadline last working day of April

September Graduation - Deadline last working day of August

**GRADUATE SCHOOL:** It is your responsibility to fill out all necessary forms and meet all requirements set by the Graduate School for graduation. See the Graduate School Handbook and Graduate School Bulletin. For more information, contact the Graduate School at 545-0025.

## Appendix 7

### TYPICAL STUDENT SCHEDULE, THESIS MASTER'S CANDIDATES

(University requirements for the Master's degree include a **minimum of 30 credits and at least 1/2 of credits counted towards graduation must be letter graded**)

**FALL**      MOLCLBIO 642 - Advanced Molecular Biology .....4 credits  
               MOLCLBIO 696 – Independent Study (Lab Rotation) .....3 credits  
               MOLCLBIO 692A - MCB Seminar ..... 1 credit  
               MOLCLBIO 691A - MCB Colloquium..... 1 credit  
               Journal Club (pg 8) ..... 1-2 credits  
               MOLCLBIO 699 – Master's Thesis .....5 credits

**SPRING**    One of the following:  
               MOLCLBIO 641 – Advanced Cell Biology - OR -  
               BIOCHEM 623 - Advanced General Biochemistry .....4 credits

              MOLCLBIO 696 – Independent Study (Lab Rotation) ..... .3 credits  
               MOLCLBIO 692A - MCB Seminar ..... 1 credit  
               MOLCLBIO 691A - MCB Colloquium..... 1 credit  
               Journal Club (pg 8) ..... 1-2 credits  
               MOLCLBIO 699 - Master's Thesis.....5 credits

(16 credit maximum per semester for graduate students before needing special permission)

### TYPICAL STUDENT SCHEDULE, NON-THESIS MASTER'S CANDIDATES

(University requirements for the Master's degree include a **minimum of 30 credits**)

**FALL**      MOLCLBIO 642 - Advanced Molecular Biology .....4 credits  
               MOLCLBIO 696 – Independent Study (Lab Rotation) .....6 credits  
               MOLCLBIO 692A - MCB Seminar ..... 1 credit  
               MOLCLBIO 691A - MCB Colloquium..... 1 credit  
               Journal Club (pg 8) ..... 1-2 credits  
               MOLCLBIO 698 – Master's Project ..... 3 credits

**SPRING**    One of the following:  
               MOLCLBIO 641 – Advanced Cell Biology - OR -  
               BIOCHEM 623 - Advanced General Biochemistry .....4 credits

              MOLCLBIO 696 – Independent Study (Lab Rotation) .....6 credits  
               MOLCLBIO 692A - MCB Seminar ..... 1 credit  
               MOLCLBIO 691A - MCB Colloquium..... 1 credit  
               Journal Club (pg 8) ..... 1-2 credits  
               MOLCLBIO 698 - Master's Project.....3 credits

(16 credit maximum per semester for graduate students before needing special permission)

## Appendix 8

### PROGRESS CHECKLIST FOR STUDENTS TRANSFERRED BY THE ACADEMIC AFFAIRS COMMITTEE FROM THE PH.D. TRACK TO THE M.S. TRACK

Student Name:

Date Transferred:

Thesis Adviser:

Requirements for readmission to Ph.D track:

1. Graduate Level Course(s):

| Course and Instructor | AAC Approval | Grade |
|-----------------------|--------------|-------|
|-----------------------|--------------|-------|

2. M.S. Thesis:

A. Committee Appointed (date):

B. Committee Membership and Department Affiliations:

C. Thesis Committee Recommendation:

\_\_\_\_\_ Terminate student with M.S.

\_\_\_\_\_ Student should apply for readmission to Ph.D. Program

3. Other Requirements

4. Decision of Admission Committee

## **Appendix 9**

### **MCB MEMBERSHIP AND ASSOCIATE MEMBERSHIP**

There are two categories of MCB faculty membership as follows:

Members may teach graduate courses for MCB students, serve on MCB thesis/dissertation committees, and chair MCB thesis/dissertation committees. (Corresponds to Graduate Faculty Status "G".) In addition, Members will elect the Steering Committee from among their own ranks according to the distribution specified in the Academic Requirements, Policies and Procedures of the MCB Program (Red Book).

Associate Members may teach graduate courses appropriate for MCB students and serve on MCB thesis/ dissertation committees, but cannot chair MCB thesis/dissertation committees. (Corresponds to Graduate Faculty Status "M".)

### **Rights and Responsibilities**

Members and Associate Members alike are invited to participate in all MCB-sponsored functions such as the colloquia, workshops, seminars and the MCB Retreat.

Members will in general direct an independent research laboratory with adequate financial support, have a record of graduate training in areas pertinent to the mission of the MCB Program, and provide evidence of appropriate publications in their specialty field. They also assume the responsibility to contribute to the training mission of the MCB Program through (1) substantial teaching efforts in a course or courses intended primarily for MCB graduate students, (2) service on MCB committees such as Steering, Academic Affairs, Curriculum, Advisory, Recruiting or Admissions, or (3) direction of MCB Master's or doctoral research. To remain in good standing, Members must serve in one of these capacities at least once every three years.

Members are also expected to take part in written and oral examinations, serve on thesis and dissertation committees, and participate in the MCB Colloquia and the MCB Retreat. Associate Members may share in these responsibilities if they so wish.

New faculty will be evaluated for Membership/Associate Membership on the basis of the appropriateness of their research field, their postdoctoral productivity as, their promise for obtaining extramural grant support, and their commitment to participation in the activities of the MCB Program

### **Selection and Appointment**

Members and Associate Members will be appointed to five-year terms by the Director in consultation with the Steering Committee and may request reappointment at the end of each term. The MCB Steering Committee will review all such requests and recommend appropriate action to the Director.

## **Appendix 10**

## **MCB COMMITTEES**

The following descriptions are provided so that MCB faculty and students will be able to direct questions and requests appropriately.

|                                       |                                      |
|---------------------------------------|--------------------------------------|
| <b>Academic Affairs Committee:</b>    | Requested to serve by MCB Director   |
| <b>Admissions Committee:</b>          | Requested to serve by MCB Director   |
| <b>Curriculum Committee:</b>          | Core Course instructors              |
| <b>First-Year Advisory Committee:</b> | Requested to serve by MCB Director   |
| <b>Program Committee:</b>             | Requested to serve by MCB Director   |
| <b>Recruiting Committee:</b>          | Requested to serve by MCB Director   |
| <b>Steering Committee:</b>            | Elected by MCB Faculty, 3-year terms |

### **Procedures:**

MCB Director sends questionnaire in spring requesting that faculty indicate preference of committee service for the coming year

Attempts are made to compose and rotate membership so that every committee is composed of both old and new members. Ordinarily, the committee Chair is appointed by the Director and will have previously served as a member of the committee.

## **ACADEMIC AFFAIRS COMMITTEE**

1. A minimum of four faculty members requested to serve by Director.
2. Responsibilities:
  - a. Oversee day-to-day academic issues concerning MCB students.
  - b. Make decisions about special requests concerning exemptions from Program academic requirements.
  - c. Oversee arrangements for written comprehensive examinations.
  - d. Prepare written evaluation to be sent to individual students at end of first year. Meet with examination committee and report results of written examination to students in the context of their overall performance.
  - e. Oversee arrangements for oral comprehensive examinations.
  - f. Evaluate, in the context of the overall record, the progress of any student who fails the oral comprehensive examination; make decision about the student's future in the MCB Program.
  - g. Nominate selected students for Graduate School Fellowships.

Appendix 10 (continued)

- h. Nominate students for fellowships from sources outside the University.
- i. Works with MCB office staff to ensure deadlines are met and records kept current.

**ADMISSIONS COMMITTEE**

- 1. Five faculty members, requested to serve by Director.
- 2. Responsibilities:
  - a. Evaluation of student applications for admission.
  - b. Interviews and correspondence with applicants.
  - c. Nominate selected entering students for Graduate School Fellowships in consultation with the Academic Affairs Committee.
  - d. Determine exemptions and special requirements for students entering with unusual backgrounds.
  - e. Work with MCB office staff to ensure prospective student correspondence and records are kept current.

**CURRICULUM COMMITTEE**

- 1. Four or more faculty members who teach the core courses; two student representatives as determined by the Director.
- 2. Responsibilities:
  - a. Evaluate MCB core courses for content and effectiveness.
  - b. Initiate discussion about new MCB course offerings or advanced electives that would be appropriate for MCB students.
  - c. Coordinate logistics of the comprehensive examination.

**FIRST-YEAR ADVISORY COMMITTEE**

- 1. Three faculty members requested to serve by the Program Director.
- 2. Responsibilities:
  - a. Meet with students on the first day of entry into the program to advise on rotation projects.
  - b. Meet with students on a regular basis in their first year to evaluate their progress (October, January, June).

Appendix 10 (continued)

- c. Work with the MCB office staff to ensure deadlines are met and student advising records are kept current.
- d. Provide guidance to the MCB office staff for implementing recommendations of the committee.

**PROGRAM COMMITTEE**

1. Two faculty members requested to serve by Director; one student representative as determined by MCB Student Organization.
2. Responsibilities:
  - a. Plan seminars and Distinguished Lecturer Series.
  - b. Provide guidance to the MCB office staff for implementing seminar arrangements.

**RECRUITING COMMITTEE**

1. Three or more faculty members representing the broad research interests within the MCB Program; two student representatives as determined by the Director.
2. Responsibilities:
  - a. Oversee production of information and publicity materials for the MCB Program (posters, brochures).
  - b. Oversee design and updates of the MCB web site.
  - c. Oversee content of entries in Peterson's Guide.
  - d. Plan spring recruiting events and student contacts.
  - e. Provide input to the MCB Director for other ways to enhance recruitment to the MCB Program.

**STEERING COMMITTEE**

1. Eight faculty members elected by MCB faculty for 3-year terms; one student representative as determined by the Director. MCB Director is Chair, ex officio. Area representation observed in makeup of Committee as follows:

Appendix 10 (continued)

- 2 members from Biochemistry & Molecular Biology
- 2 members from Biology
- 1 member from Chemistry
- 1 member from Veterinary & Animal Sciences
- 1 member from the Five Colleges (i.e. Amherst, Mt. Holyoke or Smith)
- 1 member from either:  
at large (any department or institution)  
University departments not named above
- 1 student member as determined by MCB graduate student organization

2. Responsibilities:

- a. Policy decisions.
- b. Budgeting decisions.
- c. Election of new MCB faculty.
- d. Liaison with other MCB committees.
- e. Level of graduate student stipends.
- f. Future direction of MCB Program.

## Appendix 11

### MCB TRAVEL GRANTS

#### General Regulations:

- The MCB Travel Grant is limited to \$500 per trip.
- Each student may receive up to **three** travel grants during residency. MS students will receive **one** travel grant.
- Applicants must be presenters of papers (or posters). "Presenter" means that the student's name must be first on the Abstract.
- The meeting attended must attract a national (as opposed to regional) audience. Small specialty meetings with such an audience are quite suitable.
- Application for the MCB travel grant must be made at least 2 weeks IN ADVANCE of the meeting if a cash advance is needed. An advance is available from the Bursar (up to the limit of \$500), but all paperwork must be processed before the advance is available.

#### Procedures:

- A travel request is made by filling out the Travel Grant Application and Travel Reimbursement forms obtained through the MCB Program office.
- The Travel Grant Application is returned to the MCB Program office, **with an abstract of the presentation attached.**
- After the MCB Director has approved the request, a Travel Authorization form is filled out and submitted to the Travel Office for approval. (This form authorizes a cash advance.)
- The Travel Authorization form is sent to the Bursar's office for disbursement of the cash advance.
- After the trip, receipts must be submitted to the MCB Program office. A claim for airfare must be accompanied by the ticket stub left at the end of the trip. All other procedures are outlined on the Travel Reimbursement form.
- IN THE CASE OF FUNDING FROM BOTH MCB AND ANOTHER SOURCE, the student must be sure both sources know the travel will be split-funded. In this case, two Travel Authorizations must be signed by the traveler. Receipts should be submitted to one of the sources, with the understanding that official copies will be sent by that source to the second source.

## **Appendix 12**

### **COMMITTEE CHAIR'S REPORT, DISSERTATION COMMITTEE**

Name of student writing dissertation:

---

Date meeting held: \_\_\_\_\_

Name of committee member making this report:

Name of Adviser (Committee Chair):

---

Names of other committee members present:

Please indicate whether progress is generally on schedule or behind schedule:

Estimated date for completion of writing of dissertation:

Dissertation committees are required to meet once per year and are strongly urged to meet twice per year. Month and year agreed upon for next meeting:

Did the candidate show good command of the presentation and the project, or did the candidate too often allow the adviser to answer questions and lead the discussion?

Benchmarks requested for next meeting, problems the committee asked the candidate to deal with, concerns of the committee. List items which remain to be completed in order for the dissertation as a whole to be completed; if this is premature, so indicate. (Use continuation page if necessary.)

**Please return this form to the MCB Program office**

## **Appendix 13**

### **MCB TARGETED STUDENT SUPPORT AGREEMENT**

A "Targeted Student" is defined as a student entering the Program to work in the laboratory of the specific MCB faculty member. Such a student does not occupy a Teaching Assistant slot, but instead will be supported by a specific laboratory. The normal expectation is that the "targeted" student will remain in the lab of the "targeted" faculty member. The purpose of this agreement is to make the risks, advantages, and obligations of this arrangement clear to all concerned and to clarify that the MCB Program does not bear any financial responsibility for a student entering under the "targeted" arrangement, either at the time of matriculation or later.

The expectation is that the "targeted" student will remain in the "targeted" laboratory until completion of his/her degree. The P.I. of this lab will provide financial support for the student at the standard MCB rate, as is the case for every P.I. who has made the commitment to an MCB student as a dissertation adviser. The targeted student must fulfill the requirements of the Program in a timely manner, remaining "in good standing" in the MCB Program, as is required of every student. If the student and/or the adviser decide that the student should leave the "targeted" lab, the student may be obliged to leave the MCB Program. If (s)he wishes to continue, the student must find another MCB lab willing to accept him/her as a degree candidate and also able to provide financial support. In addition, this new arrangement must be formally approved by the Director of the Program. If the student cannot make such an arrangement, his/her status as an MCB student will terminate. Specifically, the MCB Program is not committed to providing financial support for a student entering the Program under the "targeted" arrangement.

We, the undersigned MCB student and faculty member, agree to these terms.

\_\_\_\_\_

\_\_\_\_\_