

## **MASTERS OF SCIENCE IN MOLECULAR BIOLOGY** **UNIVERSITY OF WYOMING**

Students wishing to pursue a Masters of Science (MS) in Molecular Biology should visit the Department of Molecular Biology web site:

<http://uwacadweb.uwyo.edu/UWMOLECBIO/>

The Doctor of Philosophy (PhD) graduate program for the Department of Molecular Biology is administered through the Molecular and Cellular Life Sciences Graduate Program:

<http://www.uwyo.edu/MCLS/>

### **Intent of the MS in Molecular Biology Program**

This program is designed to serve students who have, usually, one of the following goals:

- (a) Further experiencing and exploring molecular biology as a potential career.
- (b) Enhancement of their curriculum vitae in order to increase probability for admittance to PhD or Professional School programs.
- (c) A terminal degree in molecular biology to facilitate a career as a laboratory technician in an industry or academic laboratory setting.

Students who pursue a MS degree in Molecular Biology are not guaranteed admittance to the MCLS PhD program, nor will their research effort in the MS program be credited as effort towards a PhD in a program that they might subsequently enter.

### **Funding of students pursuing a MS in Molecular Biology**

No departmental funds will be used to support students in the MS program. Students are expected to be self-funded unless specific arrangements for funding have been made with the faculty member acting as mentor and thesis director. Prospective foreign students must satisfy the financial standards of the graduate school prior to being granted admittance to the program.

### **Application and Assignment of Thesis Directors**

Admission to the MS in Molecular Biology Program will be dependant, in all circumstances, upon filing a competitive application. Assignment of thesis directors can occur concomitant with admission, meaning that the admitted student will begin thesis work immediately under the direction of a specific thesis director. Alternatively, self-funded students can elect to undertake several laboratory rotations of approximately 7 weeks in duration. In this case, final choice of a thesis director is the result of a mutual decision by both parties.

## **MASTERS DEGREE (M.S. PLAN A)**

Students pursuing the M.S. Plan A degree in Molecular Biology are expected to complete their program in 2 to 3 years, on average. However, masters students have a maximum of six calendar years to complete their degrees from the beginning of the first course taken and listed on the Program of Study according to University regulations (see the Graduate Bulletin).

### ***1. Laboratory Rotations and Choice of Thesis Project Adviser***

If the M.S. student is self-funded, the student will consult with the Graduate Program Chairperson to devise a first year program. Laboratory rotations of approximately 7 weeks in duration will be arranged between the student and interested faculty. These laboratory rotations should include a minimum level of effort of 20 hours per week. To reflect this commitment, the student should register for 3 credit hours of MOLB 5520-02. As soon as possible, a mutually agreeable thesis advisor will be decided upon and the Graduate Program Chairperson notified in writing. A student who has arranged to enter the program under the guidance of a specific faculty member (e.g. – no rotations), will work with the sponsoring faculty mentor to devise an appropriate program of study.

If, during the course of a M.S. program, there will be a change of adviser with whom the student will be working, the student and professor must so notify the Graduate Program Chairperson in writing before the actual change takes place.

### ***2. Program of Study***

A Program of Study for a student must be on file in the graduate school before the end of the fall semester of the First Year. The Program of Study must include a minimum of 30 semester hours of credit at the 4000-level or above from UW or equivalent levels from another approved university (see transfer credit below). 17 of the 30 hours must be completed as specified below:

#### **Requirements for fulfilling the 17 specified hours of the 30-hour requirement:**

- 6 CH total of General Biochemistry MOLB 5600 and MOLB 5610 with grades of B or better. If a student has already taken the MOLB 4600/4610 sequence as an undergraduate or MOLB 5600/5610 as a graduate student and received grades of B or better in each course, the General Biochemistry requirement will have been fulfilled and thus only 11 of the 30 hour-requirement will be specified. Also, if a student passes out of the Biochemistry requirement by taking an exam at the beginning of the first semester, only 11 hours of the 30 hour-requirement will be specified. 2 CH of seminar presentation courses MOLB 5050 (1 CH of MOLB 5050 must be taken the first semester a student enrolls).
- 3 hours of lab rotation credits (MOLB 5520-02) if appropriate.

- 6 CH in the 4 advanced molecular biology core courses, including MOLB 5620, MOLB 5650, MOLB 5660, and MOLB 5670.
- Four CH of thesis research (MOLB 5960) can be applied to the 30-CH requirement.
- MOLB 5051 and MOLB 5052 credits: students are also required to register and attend the departmental seminar each semester and in the summer.

**Recommendations for fulfilling the 13 remaining CHs of the 30-hour requirement:**

- Other advanced molecular biology courses and lab pods.
- Please note that credits earned in ENGL 5910 *cannot* be included in the Program of Study even if a student is required to take this course.
- MOLB 5900 *can* be included in the Program of Study.

### ***3. Transfer Credit***

No more than 9 semester hours that have been transferred from another accredited institution may be used for meeting the 30 credit hour requirements of a Masters student's program. Transferred hours must carry a B or better grade. Transferred credit will be subject to the approval of the appropriate major professor and the Dean of the Graduate School and must be completed prior to approval of a masters degree program for which the credit is to apply. No S/U or P/F courses are allowed to be transferred.

### ***4. M.S. Committee***

The student's major adviser will serve as chairperson of the student's committee unless the major adviser is not a member of the Graduate Faculty. In this event, a chairperson shall be chosen from among the Graduate Faculty by the major adviser and student and the major adviser may serve as a co-chairperson of the committee. The remaining committee members (at least two) will be recommended jointly by the major adviser and the student involved. At least one committee member must be a member of the graduate faculty from another department at U.W. An additional member (making a total of four) may be added to the committee (see Graduate School Bulletin). An additional member does not necessarily have to be a faculty member from this university.

### ***5. Continuing enrollment***

Once a student has completed 90% of their course work and has a program of study filed, and is working fulltime on the thesis, the student may register for only 1 CH to qualify as a full time student. These students also need to submit the Optional Fee Package to retain their full-time status which allows them access to fulltime benefits such as library services, access to campus facilities, and deferment of student loans. Since registration in MOLB 5051 (or MOLB 5052 in the summer) Departmental Seminar is required for each graduate student every semester, the student must register for this

course and this satisfies the 1 credit hour requirement. A student may wish also to enroll in 1 CH of MOLB 5960 in order to have a record of enrolling in research credits, however this is a personal preference and not a requirement.

In the case of part-time student status, the student should arrange to receive the optional fee package by filing a "Petition for the optional student fee package," a form which can be obtained from grad school or from the main department office. To complete this form, a student will need the date on which the Program of Study was filed. The optional fee package will enable the student to have the same benefits as a full-time student (access to student health, etc.). If the optional fee package is to be purchased, it must be done by the last day to add a course each semester (see the Graduate Catalog and the Class schedule). Registration for only 1 CH plus the optional fee package will allow a substantial savings in tuition and fees' cost for the adviser.

If a student has a loan such as a Stafford federal loan, they may be required to enroll for at least 4.5 CH in order to retain eligibility for the loan. A student should discuss the option of enrolling as a part-time student with his or her adviser before registering each semester.

## ***6. Research Proposal***

The first year M.S. student must submit to the members of their committee, one month following completion of their second semester in the program, a brief Research Proposal not to exceed 4000 words. The proposal, based on a literature review and the proposed M.S. thesis research, should consist of at least the following sections:

1. Background and Significance
2. Specific Aims
3. Preliminary Results
4. Overview of Experimental Design
5. Expected Results

The M.S. candidate is required to make an oral defense of the Research Proposal to the thesis committee not more than 30 days following submission of the written proposal. If the proposal and/or defense are not satisfactory, the student has one month to repeat the process. Failure on the second attempt will result in dismissal from the Plan A masters degree program. Once the student has successfully completed the oral defense of the proposal, a "Completion of Research Proposal" form must be filed with the Graduate Program Chairperson within one week after the oral defense. This is a Molecular Biology Department form that is available in the main department office.

## ***7. Evaluation of Satisfactory Degree Progress***

The Graduate Program Chairperson in consultation with the student's rotation supervisors will evaluate satisfactory progress during a student's first semester in course work and laboratory rotations. Progress in the second semester will be evaluated by the

thesis committee on the basis of the Research Proposal and oral examination. If the student has not yet completed a thesis, at the end of the second year, evaluation will be based on a student presentation to the thesis committee. The thesis committee will do any subsequent evaluations on a semester basis. Unsatisfactory progress may lead to dismissal from the Graduate Program.

### ***8. Termination of Support***

A full-time masters degree candidate is expected to complete his or her degree requirements in two calendar years. Any of the following conditions may result in termination of financial support (if provided) at the end of the original contract period: cumulative GPA below 3.0, unsatisfactory progress, or termination of candidacy for the M.S. degree.

### ***9. Final Thesis Preparation and Defense***

Before the final thesis defense, the student is required to review the proposed content of the thesis with the student's thesis committee prior to commencing the writing or at least 3 months prior to the anticipated date of the defense. This meeting provides the student with the advantage of an early review. The thesis should then be presented in typed draft form to the student's committee at least five weeks prior to the scheduled defense. Faculty members will have 10 days from the date of receipt of the manuscript to suggest major changes in content and register any other significant objections. The student must present the completed thesis to the committee no later than two weeks prior to the scheduled defense date.

Plan A masters candidates must have completed course requirements as specified earlier. The student's thesis defense will include a public seminar to be followed by an oral examination by the student's thesis committee. Any interested member of the Graduate Faculty may also participate in the oral examination. However, only members of the thesis committee will be allowed to vote.

### ***10. Plan A M.S. Recommended Degree Schedule –***

#### **Summer before Classes Start –.**

- (International Students only) English Proficiency Testing.
- (All students involved in teaching) Teaching seminar.

#### **Semester 1: -**

- Arrange meeting with Graduate Program Chairperson to devise course plan for first semester.
- Arrange first two lab rotations of 7 weeks each if appropriate.
- Complete course work, including MOLB 5600, MOLB 5050, MOLB 5051 and one of the advanced MOLB core courses (MOLB 5620, 5650, 5660, 5670) if you have already taken biochemistry and molecular biology courses in the past .

- Arrange thesis project, advisor and M.S. committee near the end of the semester.
- Submit Program of Study to Graduate Program Chairperson before the end of the semester. Submit these to the Graduate school.

**Semester 2:**

- Complete course work, including MOLB 5610, MOLB 5050, MOLB 5051 and one of the advanced MOLB core courses (MOLB 5620, 5650, 5660, 5670).
- Submit Research Proposal one month following completion of second semester.
- Schedule oral defense of Research Proposal, not more than 30 days after submission of proposal.

**Semester 3 and Beyond:**

Continue research, course work and teaching in subsequent semesters.

**Final Semester:**

- Arrange thesis committee meeting prior to commencing writing or at least 3 months prior to the anticipated thesis defense date.
- Submit Graduation/Title form to grad school by due date in final semester (check schedule) and do a program check with grad school.
- Present draft of thesis to committee no later than 5 weeks prior to scheduled defense date.
- Submit completed thesis to committee members no later than 2 weeks prior to scheduled defense date.
- Present public seminar and final defense of thesis.
- Publication(s) should be accepted, in press or published.
- Submit official "Completion of Requirements" form to grad school by due date for that semester. (Forms can be found online at the Graduate School website).
- Submit copy of thesis to Department of Molecular Biology collection.
- Fulfill other grad school requirements for thesis submission.

**MASTERS DEGREE (M.S. PLAN B)**

Potential Plan B masters students are considered for admission only after they establish an agreement with a specific adviser that he or she agrees to advise that student if the student is admitted to the program. The Graduate Chairperson should be notified in writing by the student's prospective adviser of their willingness to advise the student's Plan B masters project. Masters students have a maximum of six calendar years to complete their degrees from the beginning of the first course taken and listed on the Program of Study according to University regulations (see the Graduate Bulletin). A student may be able to obtain financial support from the graduate school by applying for a Graduate School Scholarship or Minority Scholarship or other award from the Office of Educational Opportunities. The deadline for application for the Minority Awards is usually in the middle of the spring semester. Alternatively, some research advisers are in

the position of being able to offer financial support to a student in the Plan B masters program if the student's performance in the Graduate Program is excellent.

### ***1. Program Of Study***

After consultation with the student's adviser and the Graduate Program Chairperson, and with consideration of academic background and research interests, students will devise a Program of Study before the end of their first semester in the program. Students are expected to complete a Plan B masters program in one full year. A student must successfully complete a minimum of 30 hours of credit, 14 of which must be in the student's major field.

#### **Requirements for fulfilling 14 specified hours of the 30-hour requirement:**

- 6 CH total of General Biochemistry MOLB 5600 and MOLB 5610 with grades of B or better. If a student has already taken the MOLB 4600/4610 sequence as an undergraduate or MOLB 5600/5610 as a graduate student and received grades of B or better in each course, the General Biochemistry requirement will have been fulfilled and thus only 11 of the 30 hour-requirement will be specified. Also, if a student passes out of the Biochemistry requirement by taking an exam at the beginning of the first semester, only 11 hours of the 30 hour-requirement will be specified.
- 2 CH of seminar presentation courses MOLB 5050 (1 cr of MOLB 5050 must be taken the first semester a student enrolls).
- 3 CH of Advanced Problems in Molecular Biology (MOLB 5520-01).
- 3 CH of the 4 advanced molecular biology core courses, including MOLB 5620, MOLB 5650, MOLB 5660, and MOLB 5670.
- MOLB 5051 and MOLB 5052 credits: students are required to register and attend the departmental seminar (MOLB 5051 or MOLB 5052 in the summer) each semester.

#### **Recommendations for fulfilling the 16 remaining CH of the 30-hour requirement:**

- Other advanced molecular biology courses and lab pods.
- MOLB 5010 (total univ. max. 6 CH per degree program); 5520-01 CH (total univ. max. 10 credits per degree program).
- Please note that ENGL 5910 CH *cannot* be included in the Program of Study even if a student is required to take this course. MOLB 5900 CH *can* be included in the Program of Study.

### ***2. Transfer Credit***

No more than 9 semester hours that have been transferred from another accredited institution may be used for meeting the credit hour requirements of a Masters student's program. Transferred hours must carry a B or better grade. Transferred credit will be subject to the approval of the appropriate major professor and the Dean of the Graduate School and must be completed prior to approval of a masters degree program for which the credit is to apply.

### ***3. M.S. Plan B Committee***

The student's major professor will serve as chairperson of the student's committee unless the major professor is not a member of the Graduate Faculty. In this event, a chairperson shall be chosen from among the Graduate Faculty by the major professor and the student involved and the major professor may serve as a co-chairperson of the committee. The remaining committee members (at least two) will be recommended jointly by the major professor and the student involved. At least one committee member must be a member of the Graduate Faculty from another department at U.W. An additional member (making a total of four) may be added to the committee (see Graduate School Bulletin). An additional member does not necessarily have to be a faculty member from this university.

### ***4. Continuing enrollment***

Once a student has completed 90% of their course work and has a program of study filed, the student may register for only 1 credit hour per semester instead of being a full-time student. Since registration in MOLB 5051 (or MOLB 5052 in the summer) Departmental Seminar is required for each graduate student every semester, the student must register for this course. A student may wish also to enroll in 1 credit of MOLB 5010 or MOLB 5520 in order to have a record of enrolling in research problems credits, however this is a personal preference and not a requirement. In the case of part-time student status, the student should arrange to receive the optional fee package by filing a "Petition for the optional student fee package," a form which can be obtained from grad school or from the main department office. To complete this form, a student will need the date on which the Program of Study was filed. The optional fee package will enable the student to have the same benefits as a full-time student (access to student health, etc.). If the optional fee package is to be purchased, it must be done by the last day to add a course each semester (see the Graduate Catalog and the Class schedule). Registration for only 1 credit hour plus the optional fee package will allow a substantial savings in tuition and fees' cost for the adviser.

A student who elects to enroll as a part-time graduate student is still eligible for the full graduate stipend. If a student has a loan such as a Stafford federal loan, they may be required to enroll for at least 4.5 credit hours in order to retain eligibility for the loan. A student should discuss the option of enrolling as a part-time student with his or her adviser before registering each semester.

### ***5. Evaluation of Satisfactory Degree Progress***

The Graduate Program Chairperson in consultation with the student's adviser will evaluate satisfactory progress during a student's first semester in course work. The adviser and Plan B masters Committee will do additional evaluations. Unsatisfactory progress may lead to dismissal from the Graduate Program.

## **6. Research Paper(s)**

Each Plan B masters student must present a paper or, if the committee requests, two papers which may or may not, at the discretion of the student's Plan B masters committee, be based on a laboratory experience. The paper(s) should present the results of a study of a problem representative of the quality, but not the range, of a thesis submitted under Plan A. The student and adviser design the format of the Plan B paper(s). A Plan B masters thesis is not filed in Coe library and is not submitted to the Graduate School; instead, it is filed in the Department of Molecular Biology.

## **7. Examination**

Before the Final Examination, the student is required to review the proposed content of the thesis or papers with the student's thesis committee prior to commencing the writing or at least 3 months prior to the anticipated date of the defense. This meeting provides the student with the advantage of an early review. The Plan B paper(s) should be presented to the student's committee at least 5 weeks prior to the scheduled defense. Faculty members will have 10 days from the date of receipt of the manuscript to suggest major changes in content and register any other significant objections. The student must present the completed thesis to the committee at least 2 weeks prior to the scheduled defense date.

The student's final comprehensive exam will include a public seminar to be followed by an oral examination by the student's thesis committee. The oral exam, in addition to examining the student's thesis material, will test the candidate's general competence in the fields in which he or she is working and may cover both his or her undergraduate and graduate courses in these fields.

## **8. M.S. Plan B Degree Recommended Schedule**

### **Semester 1:**

- Arrange meeting with Graduate Program Chairperson to review course plan.
- Complete course work including MOLB 5600, MOLB 5050, MOLB 5051, and one of the advanced MOLB core courses (MOLB 5620, 5650, 5660, 5670) if you have already taken biochemistry and molecular biology courses in the past.
- Research project work (enroll in MOLB 5520-01 for 3 CH).
- Arrange M.S. committee.
- File Program of Study with Graduate School.

### **Semester 2**

- Complete course work including MOLB 5610, MOLB 5050, MOLB 5051 and other courses.
- Work on research project or paper(s).

### **Final Semester:**

- Arrange thesis committee meeting prior to commencing writing or at least 3 months prior to anticipated date of defense of thesis.

- Submit Graduation/Title form to grad school by due date in final semester (check schedule) and do a program check with grad school.
- Present draft of research paper(s) to committee 5 weeks prior to scheduled defense date.
- Submit completed research paper(s) to committee members 2 weeks prior to scheduled defense.
- Present public seminar followed by final defense.
- Submit official “Completion of Requirements” form to grad school by due date. (Forms are in main office).
- Submit a copy of the final thesis or research papers to the Dept. of Molecular Biology collection.