Year One

Summer/Fall Semester Year 1

Arrival
In general, students seeking a Ph.D. in Molecular Biology & Microbiology will enter graduate school through the Biomedical Sciences Training Program (BSTP), which takes charge of admissions and first year oversight for a dozen graduate programs at CWRU. Incoming students are expected to arrive July 1 to begin lab rotations. Stipend support will begin upon arrival; health insurance and tuition are also covered.

Coursework – Core Curriculum
During the fall semester, students will enroll in the 8-credit core curriculum in Cell and Molecular Biology “CMB” (CBIO 453/455). In addition, students will sign up for 1 credit hour of Research (BSTP 400) for lab rotations, which will extend through the fall semester.

Research Rotations
Students will carry out three research rotations of 4 to 6 weeks duration between July 1 and the middle of December prior to selection of a Ph.D. thesis lab. A list of faculty affiliated with the Program in Molecular Biology & Microbiology can be found at http://www.cwru.edu/med/microbio/faculty.htm. For advice on selecting rotation laboratories, please consult the Graduate Advisor, Dr. Lloyd Culp (x3407; e-mail lac7).

Rotation Reports and Evaluations
Following each of their three rotations, students must submit a 2 to 3 page rotation report to the BSTP Office and an evaluation form signed by the student and the rotation mentor. The form is generally filled out during an exit interview with the rotation mentor. First year students are encouraged to present their findings to each laboratory in which they rotate in an oral format such as a group meeting.

Spring Semester Year 1

Overview of coursework
In the course of their studies, students must complete 36 credit hours of graduate coursework, including required courses, advanced courses and 601 research. At least 24 credits must be graded coursework (not research). The required core curriculum taken during fall semester of the first year is 8 credit hours; therefore, students will need to take an additional 16 hours of graded coursework. Up to 3 credit hours can be allocated to the Molecular Biology Graduate Seminar (one credit per semester).

Students are expected to register for the following courses during the spring semester:

1. Two advanced graduate courses in the biomedical sciences (4-6 credit hours). Students will select these in consultation with their Ph.D. mentor. Typically these are chosen based on research interests and to obtain a broad background in cell and molecular biology.
2. Molecular Biology Graduate Student Seminar course: 1 credit hour (MBIO 435). Students will participate in both the graduate student research seminar series (Tuesdays at 1:00 PM) and outside speaker series (Thursdays at 1:00 PM).
3. Bioethics Course: Students are required to take the one week bioethics course “On Being a Professional Scientist” (IBMS 500) at the end of the spring semester of their first year.

Year Two

Summer Term Year 2

Full time research in the Ph.D. thesis lab.

Coursework
Students will continue graduate coursework during their second year. It is suggested that students take at least one 2-3 credit graduate course during the fall semester of year 2.

Fall Semester Year 2

Seminar
Students will participate in all departmental seminars, for which they will receive 1 hour of credit by registering for MBIO 435.

Research
Students will continue to spend the remainder of their time conducting thesis research, for which credit is given as MBIO 601. Students should register for a variable number of hours of research credit to make up a total of 9 credit hours per semester in combination with their coursework.

Thesis Advisory Committee
By the end of the fall semester of the second year, students will convene a thesis advisory committee. The committee should consist of four faculty members, including the mentor, at least one other faculty member affiliated with the Molecular Biology & Microbiology Program, and at least one outside faculty member. The fourth member of the committee can be selected from within or outside the department; faculty members with secondary appointments may be counted in either category. A member from within the department (other than the mentor) will chair the committee. All thesis committees must be approved by the departmental Graduate Academic Advisory Committee (GAAC), currently chaired by Dr. Jo Ann Wise (Phone: 1876; e-mail: jaw17).

Spring Semester Year 2

Coursework
At least one 2-3 credit advanced graduate course is recommended.

Seminar
Students will register for 1 credit hour of seminar (MBIO 435), reflecting participation in all departmental seminars (student research and outside speakers). During the spring semester, students will give a half hour seminar on their research project in the graduate student research seminar series. It will consist mainly of background/significance and presentation of the proposed specific aims for the project. Any preliminary results the student has acquired to this point can also be presented.

Thesis Advisory Committee Meeting
Students must meet with their thesis advisory committee within 2 weeks of the first seminar. They should discuss the plan of study for the individual student, research progress and coursework. Students should prepare a document in the form of a pre-thesis proposal at this time and provide it to the committee at least one week in advance of the seminar. Committee members will provide feedback on the content and aims of the document and decide upon a date for the advancement to candidacy (qualifying) exam.

Year Three

Advancement to Candidacy
Students are required to pass the qualifying examination no later than December 15 of their third year in the program. Thus, they are encouraged to schedule the exam as early as possible, preferably during the summer after year 2 or early fall of year 3. Advancement to candidacy is based on intellectual preparation, not preliminary results; thus, there is no penalty for taking the examination early.
The exam consists of two parts:

1. **Written proposal** in NIH grant format describing the student’s research project. This document must be the student’s own work without input from their faculty mentor. This document must be turned in to the committee members at least two weeks in advance of the scheduled oral exam. If the written document is not acceptable, the student will be asked to re-write it and re-schedule the oral defense.

2. **Oral defense** of the proposal, with questioning to be conducted by committee members other than the mentor.

Three outcomes are possible for the exam: Pass, Provisional Pass, or Fail. To remain in good standing, students must pass their exam by December of their third year.

### Advanced Program Requirements

**Coursework**

Students will continue to take classes as necessary to complete 24 hours of graded coursework.

**Seminars**

Students will continue to participate in departmental seminar programs even though the student is not taking the seminar course for credit.

**Graduate Research Seminar/Thesis Advisory Committee Meetings**

Advanced students are required to present one seminar per year on their research. Typically this will consist of an ~50 minute power-point presentation and ~10 minutes for questions. This seminar should be coupled with a meeting of the thesis advisory committee, which must meet at least once per year to review student progress. Students must prepare a written document for the committee describing current research and immediate and long-term goals. This must be submitted to the committee at least one week in advance of the seminar and meeting.

**Research**

The major focus for advanced students is dissertation research. After advancement to candidacy, students will sign up for research credit under MBIO 701 (18 credits total are needed for graduation).

**Other Activities**

By this time in the student’s graduate career, s/he should be functioning as a professional researcher by participating in the following additional activities:

1. **Seminars and Journal Clubs sponsored by affiliated programs or other departments:** Choices include: Biochemistry, Cell Biology, Developmental Biology, Genetics, Molecular Virology, Neurosciences, RNA Center, Cell Adhesion Molecule.

2. **Research Presentations:** Attend/present talks or posters at conferences (ideally at least one per year); present at graduate student symposia and departmental/program retreats.

3. **Write/coauthor research papers and review articles.**

**Graduation/Thesis Defense:**

The thesis should describe an original body of research and be written according to University guidelines. At least one published or submitted paper is expected prior to defense of the thesis. The thesis defense will consist of an oral presentation open to all members of the university community, followed by a private oral exam administered by the thesis committee.

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**Typical Program of Study**

<table>
<thead>
<tr>
<th>Year</th>
<th>Term</th>
<th>Course</th>
<th>Credit Hours</th>
<th>Total Credits (Graded/Research)</th>
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<tbody>
<tr>
<td>Year 1</td>
<td>Fall</td>
<td>Cell and Molecular Biology Core Course</td>
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<td>8/1</td>
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<tr>
<td></td>
<td></td>
<td>Research Credit/Rotation (BSTP 400)</td>
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<tr>
<td></td>
<td>Spring</td>
<td>Two advanced graduate courses</td>
<td>4-6</td>
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<tr>
<td></td>
<td></td>
<td>MBIO Seminar (MBIO 435)</td>
<td>1</td>
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<td></td>
<td></td>
<td>Research (MBIO 601)</td>
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<td></td>
<td></td>
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<td>13-15/3-6</td>
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<tr>
<td>Year 2</td>
<td>Fall</td>
<td>One advanced graduate course</td>
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<td>16-19/8-11</td>
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<td>Research (MBIO 601)</td>
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<td>Spring</td>
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<td>2-3</td>
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<td>24-26/17-21</td>
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<td>24-26/26-31</td>
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<td>Year 4 &amp; Beyond</td>
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<td>Research (MBIO 701)</td>
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<td>24-26/35-40</td>
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<td>Spring</td>
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<td>24-26/36-40</td>
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</tbody>
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*a After advancement to candidacy, students must complete at least 18 credit hours of MBIO 701. Thereafter, they need only register for 1 credit hour of MBIO 701 per semester to remain an active student.

*b If for any reason a student needs “full-time status”, s/he may elect to register for 8 credit hours of MBIO 703 (Dissertation Fellowship) in addition to MBIO 701.

Revised 10/15/04