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UNIVERSITY OF CALIFORNIA

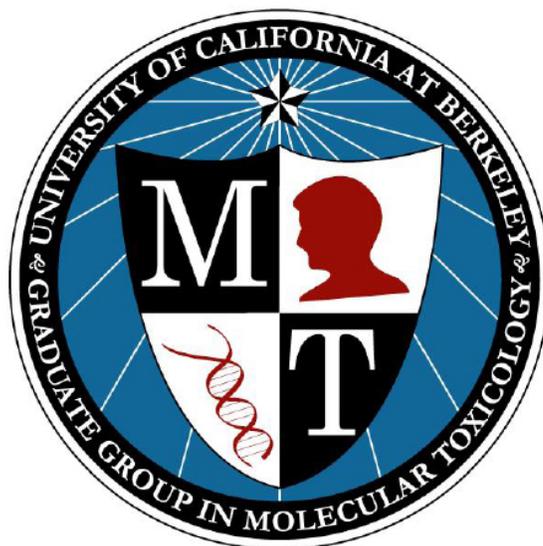
## Graduate Student Handbook

2016-2017

The Graduate Group in Molecular Toxicology (MT)

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# Introduction

The Interdepartmental Graduate Group in Molecular Toxicology administers the Ph.D. degree for students interested in a biochemical and molecular approach to study the adverse effects of chemicals on organisms. Opportunities for research exist with faculty from diverse departments and research units on the Berkeley campus including Molecular and Cell Biology, Nutritional Sciences and Toxicology, Plant and Microbial Biology, Chemistry, Public Health, Environmental Science and Policy Management, Integrative Biology, the Lawrence Berkeley National Laboratory and the Lawrence Livermore National Laboratory.

## Program of Study

The academic program is designed to provide students with rigorous training in Molecular Toxicology. The multidisciplinary nature of the program encourages students to pursue their unique research interests and work with faculty from a variety of fields. Graduates of the program will receive the Ph.D. degree in Molecular Toxicology. Additional academic requirements of the Graduate Division are found in the Berkeley General Catalogue. The MT Group operates under Ph.D. Plan B as described in the UC Berkeley General Catalog. The M.S. degree in Molecular Toxicology is available only under exceptional circumstances.

## Prerequisites

Students admitted with prerequisite deficiencies must remedy these deficiencies during the first year in residence. The following is a list of undergraduate course requirements, with courses at UC Berkeley that fulfill these requirements indicated in parentheses.

Statistics	Introduction to Statistics (Stat 2, 20)	1 Semester
Mathematics	Differential and Integral Calculus (Math 1A)	1 Semester
Chemistry	General Chemistry (Chem 1A, 1B or 4A, 4B)	2 Semesters
Organic Chemistry	Lecture and Lab (Chem 3A, 3B; 112A, 112B)	2 Semesters
Biology	General Biology (Bio 1A, 1B or introductory courses in Genetics, Microbiology, Nutrition, Plant Biology or Zoology)	2 Semesters
Physiology	Cellular or Organismal (Int. Biol. 132, 132L)	1 semester
Biochemistry/ Molecular Biology	General Biochemistry, Lecture and Lab (MCB 100, 102, 110, 100L)	2 Semesters
Toxicology	Introduction to Toxicology (NST 110)	1 semester

## Course Requirements

All graduate students on the Berkeley campus are required to maintain a 3.0 cumulative GPA or above. Failure to maintain a 3.0 cumulative GPA will lead to probation and possible dismissal. The Graduate Group in Molecular Toxicology requires its graduate students to maintain a 3.0 cumulative GPA in the core courses. Research units (NST 299) are not calculated into this GPA requirement. To receive financial support, students must maintain a 3.1 cumulative GPA.

Although the Ph.D. has no minimum unit requirement, it is expected that students will enroll in a core curriculum totaling 30 units. This includes the core courses and at least 6 units of elective courses. Graduate students in Molecular Toxicology must enroll in at least 12 units per semester, in courses of the 200 series or higher, or 15 units of 100/200 series courses to qualify as full-time students. These courses must be taken for a letter grade (not S/U), if the letter

grading option exists. The unit requirement may be met by enrollment in courses, seminars, and/or research units (NST299).

#### First Year

Semester	Course/Activity		Credits
Fall	NST 110	Toxicology (Students who have not taken an upper division toxicology course are required to take NST 110 during the fall semester of their first year)	4
	MCB 110	Molecular Biology	4
	NST 292	Graduate Research Colloquium	1
	NST 293	Faculty Research Presentations	1
	NST 299	Dissertation Research	1-12
	NST 301	Teaching in NST	1-2
Spring	NST 250	Advanced Topics in Metabolic Biology	3
	NST 292	Graduate Research Colloquium	1
	NST 299	Dissertation Research	1-12
	NST 302	Supervised Teaching	2

#### Second Year

Semester	Course/Activity		Credits
Fall	MCB 236	Advanced Mammalian Physiology	5
	XXX 290	Graduate Seminar (Advanced Special Topics in any department)	1
	NST 292	Graduate Research Colloquium	1
	NST 299	Dissertation Research	1-12
	Elective	According to Research Area	3
Spring	NST 292	Graduate Research Colloquium	1
	NST 299	Dissertation Research	1-12
	Elective	According to Research Area	3

#### Third Year - Completion of Degree

Semester	Course/Activity		Credits
Every Semester	NST 299	Dissertation Research	3-12
Every Semester	NST 292	Graduate Research Colloquium	1
Once a Year	XXX 290	Graduate Seminar (Advanced Special Topics to be taken at least once per year)	1

# Requirement Notes

In the first year of the program, the required core courses will introduce students to the fundamental concepts and methods of toxicology and examples of their current applications. Through participation in the first year laboratory research course, students will begin to acquire in-depth knowledge of specific problems of toxicology, as well as a familiarity with specialized research methods and techniques. The student's in-depth expertise in a specialized area will be further developed through dissertation research. Knowledge of the broader field of which the dissertation research is a part will be acquired through the selection of 2-3 elective courses. This breadth of knowledge will be fostered further by participation in the required seminar courses (XXX 290). Students are required to take at least four Graduate Seminars (290 courses). Typically students will take one per year, following the first year. Students must enroll in NST 292 each semester.

**Area of Emphasis:** Students are not required to declare a specific field of emphasis, but possibilities exist to focus in any of the following areas of toxicology:

Developmental toxicology	Genetic toxicology
Environmental toxicology	Immunological toxicology
Food/Nutritional toxicology	Neurological toxicology
Reproductive toxicology	

**Electives (6 units):** In consultation with the Mentor, a student must select a minimum of 6 units from the approved list of elective courses (see below), to comprise an area of emphasis consistent with the student's research interests. Alternative courses require approval of the Head Graduate Advisor.

## Elective Examples:

(Course names and numbers are subject to change. Please see the online catalog for the most up-to-date information on courses. <http://schedule.berkeley.edu/>)

CEE 108 Air Pollutant Em. & Control	MCB 204 Molecular biology of cell reproduction
NST C114 Pesticide Chem. & Tox.	MCB C214 Protein Chemistry, Enzymology, and Bio-organic Chemistry
NST 115 Principals of Drug Reaction	MCB 230 Advanced Cell Biology
HMS 202 Anatomy of Human Development	MCB 231 Advanced Developmental Biology
HMS 209 Principles of Human Pathology	MCB C232 Advanced Topics in Endocrinology
HMS 219 Human Histology	MCB 244 Developmental Genetics
HMS 220 Human Physiology	MCB 250 Advanced Immunology
IB 106 Biological Oceanography	PMB C102 Diversity of Plants and Fungi
IB 132 Survey of Human Physiology	PMB C102L Lab in the Diversity of Plants and Fungi
IB 152 Marine pollution	PMB C103 Bacterial Pathogenesis
IB 176 Ichthyology	PMB 110 Biology of Fungi
MCB 135A Molecular Endocrinology	PMB 110L Lab for Biology of Fungi
MCB 135E Physiology of Human Development	PMB 180 Environmental Plant Biology
MCB 135G Biology of Human Cancer	PH 250 Epidemiologic Methods
MCB 135K Physiology of Aging Process	PH 270A Exposure Assessment & Control
MCB 150 Molecular Immunology	PH 270B Toxicology I
MCB 160 Intro to Neurobiology	PH 270C Advanced Pharm. & Tox.
MCB 165 Molecular Neurobiology	PH 271B Reprod. Hazards of Industrial Chemicals

**Departmental Seminar:** All MT graduate students mentored by NST faculty are required to attend the regular

Departmental Seminar in as an integral part of graduate training, unless they have a valid reason for not attending. Valid reasons include: illness, death in the family, being out of town, conflicts with GSI responsibilities, or a petition from their research Mentor for individual seminars. Any anticipated absence should be communicated to the Graduate Affairs Officer in writing (email is fine). The informal refreshments before seminars offer a good opportunity for students and faculty to interact and exchange ideas.

**NST 292 Graduate Research Colloquium (1 unit):** A seminar that includes presentations by graduate students of research proposals and results of research for discussion and evaluation by the group. This class is to be taken every semester. Students are not required to present until their second year (and each year following). **Attendance is mandatory for all graduate students.** Any anticipated absence should be communicated to the Graduate Affairs Officer in writing (email is fine). Valid excuses for absences include: illness, death of a relative, or attending an important scientific meeting. More than two unexcused absences will result in a failure, which will affect the GPA and therefore funding, and will need to be made up by taking an extra 292 before graduating. Students are encouraged to participate in the discussions and must hand in an evaluation form. One presentation per year is required of all students. The presentation should serve as the prelude to dissertation committee meetings, which should be held as closely after the 292 as is practical. First-year students may opt to present a short-report of one rotation.

**NST 293 Faculty Research Presentations:** Intended to educate first-year graduate students on topics and techniques of faculty research to broaden their education, and as an aid in choosing committee members.

## Teaching

All graduate students in the Group are required to obtain teaching experience as a Graduate Student Instructor (GSI) before taking their Oral Qualifying Examination (OQE). This assignment may involve lecturing, leading discussions, lab preparation, examination writing, and grading. Each student must serve as a GSI for at least one semester. For more information on being a GSI and to find teaching resources, please look at the Graduate Student Instructor (GSI) Teaching & Resource Center website at <http://gsi.berkeley.edu/>.

## Oral Qualifying Examination

During the second year of study, a student will take an oral qualifying exam (OQE). This examination will be administered by a four-member committee. The student's Mentor may not sit on this committee.

### OQE Committee Members

The OQE Committee consists of four faculty members selected by the Head Graduate Advisor and the GAC. Students are invited to propose membership of their OQE committees to the Head Graduate Advisor for approval. Students must submit their proposed qualifying exam committee by a designated date. The Head Graduate Advisor and/or MB Graduate Affairs Committee may elect to approve the proposed committee or may elect to change some or all of the committee members. The four member committee composition must follow the Qualifying Exam Committee guidelines outlined by the Graduate Division (available at [grad.berkeley.edu/policy](http://grad.berkeley.edu/policy)).

### Proposals

The student will prepare two proposals for the OQE: a formal proposal to describe their dissertation research, and a proposal on a topic not directly related to the dissertation research or to the research of their major professor, but in an area of toxicology. The topic of the outside research proposal is subject to the approval of the Chair of the OQE Committee and he/she will assist the student in preparing the proposal. Each proposal should be on a hypothesis-testing

research project. The proposal should be 10-15 pages, double-spaced with background information, aims, methods, discussion and rationale. The student should distribute copies of both proposals to the members of the Committee at least two weeks before the exam.

A student must pass the OQE before being advanced to candidacy for the Ph.D. degree. Before taking the exam, the student must have: a) removed deficiencies in training; b) satisfactorily completed (or be in the process of completing) all course work and seminar requirements and resolved any incomplete grades; c) maintained at least a 3.1 GPA in all course work undertaken in graduate standing; and d) completed (or be in the process of completing) the GSI requirement for the Group.

### Examination Format

The OQE committee will examine the student on:

- general scientific knowledge;
- background knowledge in the area of his/her dissertation research;
- ability to formulate and defend a hypothesis;
- ability to formulate and defend experiments and techniques to test the hypothesis;
- ability to postulate expected and alternative results; and
- interpretation of expected and alternative results.

General topics of the exam will be in three areas selected by the student from those listed below.

### Areas for Examination

The expectation of breadth will include all of the course work taken during the student's first and second year in the graduate program (including prerequisite material).

In addition, the student must choose three areas from List A or two from List A and one from List B.

List A: Areas of Toxicology	List B: Fields Related to Toxicology (i.e., Minor Field)
Mechanistic Toxicology Metabolism Molecular Epidemiology Environmental Toxicology Computational Toxicology	Chemistry Biochemistry Molecular Biology Biostatistics Immunology Endocrinology Nutrition

The OQE committee may recommend: 1) an unqualified pass; 2) a partial failure requiring additional course work and/or written reports and/or revision of research plans, which usually will involve retaking the exam after additional study and/or preparation of a different proposal; 3) re-direction to an M.S.; 4) separation from the program. Upon successful completion of the OQE, the student enters into candidacy and responsibility for his/her further development passes to the Mentor and the Dissertation Committee.

## Advancement to Candidacy

Once the Oral Qualifying Examination has been passed, the student must file an application, properly approved by the Graduate Advisor, for Advancement to Candidacy for the Degree of Doctor of Philosophy. It should be filed with the Dean of the Graduate Division by the end of the semester following the one in which the Qualifying

Examination is taken. Completion of the Ph.D. degree in Molecular Toxicology requires a minimum of two semesters of residency after Advancement to Candidacy for the degree.

## Dissertation

Upon passing the OQE a three-member dissertation committee will be formed to guide the student's dissertation research. The chair will be the student's Mentor. At least one member of the committee must be outside the Group. The student must meet with this committee at least once a year, generally immediately following the students NST 292 presentation.

To satisfactorily complete the dissertation, the student must take the following steps:

- Develop a hypothesis. The topic may encompass a question of basic science in toxicology or an applied toxicology problem.
- Design experiments to test the hypothesis.
- Develop and/or apply analytical techniques to obtain data.
- Interpret the data, discuss the data in relation to reports of other workers, and evaluate the significance of the findings.
- Publish the results. A major activity of research scientists is communication of their results through timely reports in research literature.

## Normative Time

Normative time is defined as the elapsed time in years that under normal circumstances would be needed to complete all requirements for the Ph.D. degree assuming that the student engaged in full-time, uninterrupted study and is making desirable progress toward the degree. Normative time for Molecular Toxicology is five years.

## Financial Support and Leave

Ph.D. students who remain in good academic standing may receive an award package of financial assistance. Students are funded by their Mentors, who may use a combination of Graduate Student Researcher (GSR) and Graduate Student Instructor (GSI) appointments, grants and fellowships. If a student declines a teaching position for any reason, he or she may no longer receive financial support. If the student's GPA falls below 3.1, he or she may not be eligible for support. Students are urged to discuss terms of their support with potential mentors before joining a lab.

Students who receive financial support are expected to devote their full-time efforts to their graduate work. Arrangements for vacation or other leaves must be discussed with the Mentor or Head Graduate Advisor. Graduate students are eligible for no more than four weeks of leave per year, including school breaks. Financial support will be suspended for students who are absent longer

## Student Appeals Procedure

The following procedures have been established in accordance with the Graduate Division for students who encounter difficulties while enrolled in our graduate program:

## **Purpose and Scope**

The purpose of this procedure is to afford students in the Graduate Group in MT an opportunity of resolving complaints about dismissal from graduate standing, placement on probationary status, denial of readmission, and other administrative or academic decisions that terminate or otherwise impede progress toward academic or professional goals.

The scope of this procedure is limited to the matters listed above, and excludes complaints regarding denial of admission, student records, grades in courses of instruction, student employment, student discipline, and auxiliary student services (such as housing, child care, etc.). This procedure may not be used for complaints regarding actions based solely on faculty evaluation of the academic quality of a student's performance, or decanal evaluation of a student's appropriate academic progress, unless the complaint alleges that the actions may have been influenced by non-academic criteria.

## **Informal Resolution Procedures**

A student may pursue informal resolution of a complaint by scheduling a meeting with his/her Major Professor to discuss the complaint and explore possible avenues of resolution. If no solution is found, the student should then schedule a meeting of his/her Guidance Committee. If informal resolution is pursued, it must be initiated, and should be completed, within 30 days. At any point in this process, if a satisfactory solution cannot be reached, the student may initiate formal resolution by putting the complaint in writing.

## **Formal Resolution Procedures**

A written complaint must include information regarding the action being complained of and the date it occurred, the grounds upon which the appeal is based, and the relief requested. The complaint must be based on one or more of the following grounds:

1. Procedural error or violation of official policy by academic or administrative personnel
2. Judgments improperly based upon non-academic criteria including, but not limited to, discrimination or harassment on the basis of sex, race, national origin, color, age, religion, sexual orientation, or disability
3. Specific mitigating circumstances beyond the student's control not properly taken into account in a decision affecting the student's academic progress

The written complaint must be received by the Head Graduate Advisor within thirty days from the time the student knew, or could reasonably be expected to have known, of the action that is the subject of the complaint. The complaint will be presented to the Graduate Affairs Committee ("GAC"), which should complete its investigation and notify the student of the outcome of the complaint within sixty days of the date it was received.

The time frame for filing a written complaint may be extended by the Group if the student has been involved in continuing efforts toward informal resolution, and the informal resolution process was initiated within thirty days of the time the student knew, or could reasonably be expected to have known, of the action that is the subject of the complaint. All time frames referred to in this procedure refer to calendar days. Summer and inter-semester recesses are not included within these time frames.

Upon receipt of a written complaint, the Head Graduate Advisor will assign a member of the GAC to investigate the complaint and make a recommendation to the Head Graduate Advisor regarding the outcome of the complaint. Generally, the investigation will include an interview with the complainant, a review of any relevant written materials, and an effort to obtain information from available witnesses (i.e. interviews or written statements or documents). The

Head Graduate Advisor will notify the student, in writing, of the outcome of the complaint. A written complaint under this procedure satisfies the requirement of a unit level resolution process pursuant to the Graduate Appeals Procedure.

### **Appeal To The Graduate Division**

If the student is not satisfied with the outcome of the complaint under the Group's procedure, he or she may bring the complaint to the Formal Appeal stage of the Graduate Appeals Procedure. The formal appeal must be received in the Office of the Dean of the Graduate Division, 424 Sproul Hall, within fifteen days of the date of the written notification of the result of the unit level procedure. Copies of the Graduate Appeals Procedure (updated February 12, 1996) may be obtained from the Office of the Dean of the Graduate Division.

### **Complaints Involving Discrimination**

If the complaint involves allegations of discrimination or harassment on the basis of sex, race, national origin, color, age, religion, sexual orientation, or disability; the Group should consult the appropriate campus compliance officers prior to commencing informal or formal resolution. The names, phone numbers, and campus addresses of these individuals are listed in various campus publications and may be obtained from the Office of the Dean of the Graduate Division or the Academic Compliance Office.

## **Administration & Safety**

### **Accidents**

All accidents must be reported to the Main Office, 119 Morgan Hall, and an accident form must be completed. Students should also be seen by their personal physicians or a physician at Student Health Services.

### **Laboratory Animals**

All students who will be working with animals are required to have a current tetanus shot. These are obtainable from Student Health Services at no charge to the student. Students must also pass the OLAC exam concerning the care of animals and should discuss with their Mentor the procedures for ordering animals and use of the facilities.

### **Radioactive Chemicals**

All students working with radioactive chemicals must be certified for such work by passing an Environmental Health and Safety (EH&S) examination and must discuss with their Mentor the procedures for ordering and use of such chemicals.

### **Copy Machines**

Only materials that will be used for distribution in class or preparation for a lecture to be given to a class may be charged to NST. The student's Mentor may allow some research material to be charged to his/her account. Check with your mentor regarding his/her policy.

### **Graduate Student Lounge**

Desks/couches for new graduate students are available in the Graduate Student Lounge in 209 Morgan Hall. Graduate students generally have a desk in the laboratory in which they work once they have been assigned to a laboratory.

### **Keys**

Please see [http://nature.berkeley.edu/site/safety\\_facilities.php](http://nature.berkeley.edu/site/safety_facilities.php) for the Key Access Form. Each graduate student is routinely issued keys for the outside doors of Morgan Hall, the Reference Room, the room in which his/her desk is located, and the laboratory in which he/she is working. The student is asked to agree to use all keys only for authorized purposes, not to loan or duplicate any key, and to return the keys to the department when he/she no longer needs them or leaves the Department.

## **Libraries**

The student's current id card serves as a library card for all campus libraries. The libraries most frequently used by students in this Group are:

Biosciences	2101 Valley Life Sciences Building
Biochemistry	430 Barker Hall
Public Health	42 Warren Hall

## **Campus Safety**

Emergency phones are located throughout the campus and are easily identified by a blue light on top of the phone box. You can call the police, fire department, or an ambulance by dialing 911 or 9-911. The University Police are available 24 hours a day (1 Sproul Hall). The emergency phone number from a campus phone is 2-3333. Additional information about Night Escort Service is included in the Resource Guide. Always keep the doors locked to offices, laboratories, and to the outside building entrances in the evenings and on weekends. Always carry your keys with you. Do not share your door codes/keys with anyone else.