

*Cell and Molecular Biology
Graduate Program Handbook*

*John A Burns School of Medicine
University of Hawaii at Manoa*

Revised January 2023

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1. Organization of Graduate Program

Overview

The Cell and Molecular Biology (CMB) Graduate Program is an integrated program of study for students seeking a PhD or MS degree in health-related research that emphasizes the techniques and approaches of cell and molecular biology. The program currently has ~62 graduate faculty members dedicated to helping qualified students pursue original research degrees at the PhD and MS level. Areas of strength include molecular medicine, neurobiology, immunology, molecular and population genetics, biochemistry, virology, clinical and translational research, reproductive biology, cancer biology, and cardiovascular research. A listing of graduate faculty, their areas of interest and the program degree requirements can be found at <https://cmbdept.jabsom.hawaii.edu/graduate-program/>.

The program admitted its first cohort of students in August 2000. The CMB graduate program replaced former graduate degree programs based in academic departments (Biomedical Sciences PhD program administered jointly through Genetics, and Anatomy and Reproductive Biology), and the Cell, Molecular, and Neurosciences Interdisciplinary Specialization. CMB has formal degree-granting program status at the John A. Burns School of Medicine from the University of Hawaii at Manoa.

The CMB program established in 2010 a Neuroscience Specialization. This is a graduate specialization rather than a free-standing graduate program and requires that all students entering the program are first accepted by a participating graduate program. These students fulfill the requirements for CMB and take additional coursework as determined by the Neuroscience Specialization. They are eligible for graduate degrees in CMB (Neuroscience). The Neuroscience Specialization admitted its first seven transfer students from CMB in 2010, and as of Fall 2014, has admitted 12 new applicants and graduated 3 PhD students and 2 MS students. The website and requirements for the specialization can be found at <http://manoa.hawaii.edu/neurosciences>.

Faculty

Participating faculty members are drawn from across the campus: they come from the Basic and Clinical Sciences Departments of the John A. Burns School of Medical, the University of Hawaii Cancer Center, the College of Natural Sciences, the College of Tropical Agriculture and Human Resources, and the School of Ocean and Earth Science and Technology. Many of our faculty members have split appointments within the university, including affiliations with both traditional academic departments and with organized research institutes or centers. The latter include the University of Hawaii Cancer Center (UHCC, <http://www.uhcancercenter.org>), the Institute for Biogenesis Research (IBR, <http://www.ibr.hawaii.edu>), and the Pacific Biosciences Research Center (PBRC, <http://www.pbrc.hawaii.edu>). Links to faculty contact information, brief biographies and summaries of their research can be found at <https://cmbdept.jabsom.hawaii.edu/graduate-program/faculty-directory/>. Additional information about research and educational interests of some of the faculty can be found in the *Hawaii Journal of Medicine and Public Health* articles: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4407459/> and <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4238125/>.

Students

Combined enrollment in the CMB PhD and MS programs typically averages between 30 and 35 full-time students, primarily from Hawaii and the mainland U.S. Training in CMB is intended to prepare students for careers in teaching and/or research in academia, research institutes, and biotechnology. Students in the graduate program present their research findings in oral and poster presentations at local, regional, national and

international conferences and publish their research results in peer-reviewed journals. Over the past five years, Cell and Molecular Biology graduate students have published an average of over 20 manuscripts per year.

Graduate faculty committees

The CMB program is administered by a chair, Dr. Michelle Tallquist who represent the program to the University Graduate Council and Graduate Division. They are assisted in their duties by an Executive Committee consisting of the Department Chair and the chairs of two other committees: Admissions and Curriculum. The Executive Committee is charged with the overall governance of the graduate program.

Executive Committee			
Faculty member	Office	Phone	Email
Michelle Tallquist (Chair)	BSB 311E	808-692- 1579	michelle.tallquist@hawaii.edu
Ben Fogelgren	BSB 222H	808-692- 1420	fogelgre@hawaii.edu
Olivier LeSaux	BSB 222G	808-692- 1504	lesaux@hawaii.edu

The Graduate Admissions Committee evaluates applicants for the CMB Graduate Program, determines who to admit, and prioritizes accepted applicants for fellowships. It also considers applications for transfer from other programs into the CMB program.

Admissions Committee			
Faculty member	Office	Phone	Email
Michelle Tallquist (Chair)	BSB311E	808-692- 1579	michelle.tallquist@hawaii.edu
Ralph Shohet	BSB 311H	808-692- 1469	shohet@hawaii.edu
Matthew Pitts	BSB 222	808-692- 1970	mwpitts@hawaii.edu
Noemi Polgar	BSB 110	808-692- 1422	polgar@hawaii.edu

The Graduate Curriculum Committee oversees the required courses, their contents as well as the administration of a qualifying exam (written and oral) given to all students at the start of their second year in the program. It supervises the content and organization of the required courses, CMB 621-622 and CMB 626. It also deals with specialized elective courses focusing on specific topical areas that might only be covered in survey fashion in the core course. These include courses focused on cancer biology, immunology and inflammation, endocrinology, the neurosciences and others.

Graduate Curriculum Committee			
Faculty member	Office	Phone	Email
Ben Fogelgren (Chair)	BSB 222H	808-692- 1420	fogelgre@hawaii.edu

Michelle Tallquist	BSB 311E	808-692-1579	michelle.tallquist@hawaii.edu
Jun Panee	BSB 222	808-692-1521	junchen@hawaii.edu
Nick James	Biomed T-708	808-956-8332	njames4@hawaii.edu
Peter Hoffmann	BSB 222L	808-692-1510	peterrh@hawaii.edu

University of Hawaii's Graduate Division

The CMB Program is part of the University of Hawaii's Graduate Division, headed by Interim Dean, Dr. Julienne Maeda (<https://manoa.hawaii.edu/graduate/graduate-division/>) Dr. Maeda is assisted by Jarren Miki; Director of Graduate Student Services, Reid Takamatsu; Director of Graduate Admissions, Jason Fujii; Director of Graduate Records. The Graduate Division offices are on the 3rd floor of Spalding Hall, on the UH Manoa Mall (<https://manoa.hawaii.edu/graduate/contact-us/>). Graduate students are responsible for reviewing and knowing the information in the <https://manoa.hawaii.edu/graduate/> web site.

2. Program Activities

Seminars

Students are expected to attend seminars in the CMB graduate program seminar series. In addition, they are encouraged to attend seminars hosted by other programs that will introduce them to areas they have not had the opportunity to explore. Seminars are good ways of finding out what new areas of research are opening up, because of new advances in technology or theory. They will direct you to sources of further information in journals or on-line, and help you put real faces to the names you have read about in your textbooks.

CMB Graduate Program Seminar Series

Faculty with appointments in academic departments participate in a formal seminar series that includes UH Manoa faculty as well as invited speakers from other institutions, governmental organizations and private companies. Students participate in nominating and voting for invited speakers from outside Hawaii, as well as hosting the speakers during their visit. These seminars are generally listed in the university's online publication at www.hawaii.edu and are always open to the public. This site may also contain information about seminars at off-campus research institutes and hospitals.

The Cell and Molecular Biology Graduate Program holds weekly seminars, CMB 611 during the academic year, and CMB students are required to attend. The University of Hawaii Cancer Center and the Graduate Programs in Tropical Medicine, Medical Microbiology and Pharmacology, and Developmental and Reproductive Biology hold seminars at various times during the week. These seminars are forums for research presentations including dissertation defenses from CMB students, reports on recent advances from UH faculty, and talks from guests outside the university.

CMB Graduate Research-in-Progress Seminar Series

Students have the opportunity to present their research to other students, postdocs and faculty in the program in a one-hour research-in-progress series that meets every other week throughout the academic year. This allows each student from the second year on the opportunity to present their work in a longer format than afforded by the retreats and other venues.

CMB Graduate Program Retreats

Graduate student retreats are held each year to provide opportunities for the graduate students to give short oral presentations of their work, for new students to meet current students and faculty, and for all students and faculty to get better acquainted.

Biomedical Sciences and Health Disparities Symposium

The John A. Burns School of Medicine hosts an annual symposium to highlight projects that feature the research of undergraduates, graduate students, medical students, postdoctoral fellows, medical residents, and faculty. Students submit short abstracts and present their projects in poster format. Awards are given for the best posters in each category of participants. The deadline for submission of abstracts for the symposium is usually in March, and the symposium is held in April. To go along with these events, a prominent scientist is chosen by the organizing committee to come to Honolulu and give an invited research seminar. Students are encouraged to interact informally with the speaker, who also participates in judging poster presentations.

Tester Symposium

The Department of Biology sponsors the annual Tester Research Symposium named after a former faculty member, Albert L. Tester, who was a world expert in shark morphology, behavior, and evolution. Graduate

students from all departments on campus with research interests in the natural sciences are encouraged to participate, and this event usually takes place over two days in late March or early April. A distinguished scientist chosen by a committee of students and faculty participates in the symposium and serves as one of the judges. Students submit abstracts, give oral presentations, and answer questions from the audience. Prizes are also given for best presentations, and the symposium concludes with an awards banquet, often at the Honolulu Aquarium or Lyon Arboretum. The winners from one year become part of the panel of judges for the next year. This venue provides an excellent opportunity for CMB graduate students to meet and mix with their peers in Biology, Microbiology, Marine Biology, Oceanography, Botany, and Zoology.

3. Program Requirements

This handbook is a summary but not a complete description of all requirements, rules, and procedures. More detailed and complete information can be found at the University of Hawaii Graduate Division website, at <http://www.manoa.hawaii.edu/graduate/> or by consulting the CMB Graduate Program Chair or Office of Graduate Education staff.

Entrance Requirements

1. Minimum qualifications for admittance as a regular student are an undergraduate degree from an accredited U.S. college or university or equivalent degree from a recognized foreign institution of higher learning and a GPA of at least 3.0 on a scale of 4.0.
2. All prospective students must submit scores for the GRE General Subjects tests. A minimum score of 50th percentile is required for Verbal and Quantitative Reasoning. A minimum score of 3.5 is expected for Analytical Writing. Foreign students must also submit TOEFL scores (see Graduate Bulletin for exceptions). A minimum TOEFL score of 250 in the computer-based test (or 100 in the internet-based test) is required.
3. All applicants are expected to have completed courses or equivalents in general biology, chemistry, physics, organic chemistry, cell biology, genetics, calculus or statistics, and at least one additional upper division course in cell or molecular biology, e.g. developmental biology. While not a requirement, biochemistry and physical chemistry are highly recommended.

Financial Assistance

Some graduate students are supported by graduate assistantships (GA) to teach or conduct research. Tuition is waived for all GAs. It is recommended that students interested in research assistantships contact faculty working in their area of interest regarding availability. Additional fellowship support information is available at the UH Manoa Graduate Division website.

Entering students

Students should arrange to arrive on campus approximately a week before the start of the fall semester so that they can sign necessary appointment papers, complete course registration, obtain ID cards that will allow them access to various facilities, meet other students, and identify a research laboratory.

TIMETABLE, COURSE CREDITS AND KEY DEADLINES FOR CMB DEGREES

Requirements	MS Plan A	MS Plan B	Ph.D.
Course credits and required courses	30 credits in 500-700 level courses. Up to 9 of 699 can be counted towards this requirement. 18 credits in 600 level or greater excluding CMB 631, 699, 700. CMB 611, 621, 622, 626, 654X, and 700 are required. One journal club ((654X or 705)/year is required, and CMB611 is required every semester until enrolled in CMB 700.	30 credits in 500-700 level courses. Up to 9 of 699 can be counted towards this requirement. 18 credits in 600 level or greater excluding CMB 631, 699, 700. CMB 611, 621, 622, 626 and 654X are required. One journal club (654X or 705)/year is required. CMB611 is required every semester.	CMB 621, CMB 622, CMB 626, CMB 631, CMB669, and QHS601 are required. Additionally, one journal club (654X or 705)/year is required. CMB611 is required every semester until enrolled in CMB800.
Rotations			Three research rotations (CMB 631), each of 11-13 weeks duration.
Research/thesis Credits	6 credits CMB 699 6 credits CMB 700	6 credits CMB 699	12 credits CMB 699 and 1 credit CMB 800
Individualized Development Plan (IDP)	Every year starting summer after year 1	Every year starting summer after year 1	Every year starting summer after year 1
Qualifying exam	Third semester	Third semester	Third semester
Form Thesis /Dissertation Committee	Second or third semester	Not required	End of second year
Thesis/Dissertation Proposal	Semester before enrolling in CMB700	Not required	By 5 th semester
Comprehensive exam			By end of 7 th semester and required before enrolling in CMB800
Thesis/Dissertation Defense	Estimated end of 2 nd year	Culminating experience required	Estimated end of fourth - fifth year depending on progress
Neuroscience Specialization	CMB 606 (1 Time), CMB 705 (every semester)	CMB 606 (1 Time), CMB 705 (every semester)	CMB 606 (1 Time), CMB 705 (every semester)
Additional Ph.D. Requirements			One Peer reviewed publication One 15 minute oral presentation at a CMB retreat or other meeting One 25 minute oral presentation in CMB 611 or other meeting One poster presentation at a symposium or conference

New students are encouraged to make an appointment early with the program chair. They should come into the program with a general idea of a set of topics they are most interested in and use the required first year

survey course (CMB 621-622) as a way to explore those topics professionally by learning how to critically read original scientific literature.

Undergraduate deficiencies may be revealed during the first year of coursework and research rotations, and students will be encouraged to make up any deficiencies in the first year. Since research goals may change upon exposure to new ideas, students should not be surprised if they discover their undergraduate course work was not an adequate preparation for a certain topic.

First-year requirements

PhD students on CMB graduate program assistantships are required to perform 3 research rotations (CMB 631) consisting of 11-13 weeks each during their first year in the program. Upon completion of each rotation, students are required to prepare either a written report or an oral summarizing their research experience, with one copy to the faculty advisor and one copy in the student's academic file. At the beginning of the rotation, they are to turn in a completed rotation agreement form and at the end a rotation evaluation form should be completed by the rotation mentor.

Second-year requirements

After completing the first year of course work and laboratory rotations, all students must turn in an individualized development plan that is cosigned by the mentor. In the fall semester of the second year all students are expected to take a qualifying exam (Form 1) administered by the chair of the curriculum committee. Passing the qualifying exam is required for program continuation. The qualifying exam consists of two parts: written and oral. The written part consists of 50 multiple-choice questions. The Curriculum Committee generates textbook-type questions to reflect the various cell and molecular biology. A minimum of 70% is required to pass the written exam. The oral exam is based on a formal and critical presentation (without notes) of a research article to a committee of 5 CMB faculty. This committee then votes on a "pass" or "no pass" decision. Students may repeat either written or oral or both portions of the qualifying exam at any time within one year. Failure on a second attempt will result in dismissal from the CMB program.

Upon passing the qualifying exam and in consultation with their advisor, PhD students should schedule a pre-proposal meeting to give their committee members an overview of their research direction. For the PhD degree, the committee is comprised of at least four faculty within the CMB program and a University Representative (<https://manoa.hawaii.edu/graduate/committee-composition-potential-members/>). Master's plan A students should schedule their proposal meeting as soon as a research topic is identified. Committees for the MS plan A (thesis) are comprised of 3 CMB faculty members or 2 CMB faculty and 1 approved member from other UH programs. In the spring of their second year, PhD candidates should complete their proposal meeting where they outline the aims of their dissertation. This can be 1-2 pages with background, significance and specific aims. The advisor, the student, and the committee members meet to consider the research proposal formulated by the student, and make recommendations to implement or strengthen this proposal.

Third-year requirements

In the 3rd year PhD candidates should prepare an NIH style pre-doctoral proposal. This proposal is the basis of the comprehensive exam (Form 2) where the thesis committee determines if the student progresses towards candidacy. The student will turn in the proposal to the committee two weeks before the scheduled comprehensive exam. At the exam the student presents their proposal and relevant experimental data demonstrating progress. The PhD candidate should be prepared to answer a wide range of questions posed by the committee. These questions can be any question related to the proposal or related work. The committee also determines if any additional coursework is required to complete the dissertation. Research involving human subjects, dangerous physical conditions, laboratory animals, radioactivity, bio-hazardous materials, or certain

chemicals is strongly regulated and requires the approval of university regulatory committees before this research can be legally conducted. You may be required to attend special training classes to conduct your research. This requirement is intended for your own protection, as well as the protection of those working around you in the lab.

Annual Requirements for all students

All CMB graduate students are required to maintain a B grade = 3.0 GPA and in all required courses. Failure to do so may result in a student being placed on academic probation (<https://manoa.hawaii.edu/graduate/disciplinary-actions/>) by Graduate Division. If a student has to repeat a required course and does not pass with a B grade, the student will be dismissed from the CMB graduate program.

All CMB graduate students (except those in their first year) are required to prepare a yearly progress report to their committee. This report should describe research accomplishments, progress in mastering new techniques, difficulties encountered, course work completed, meetings attended, and include copies of any abstracts or publications where the student is an author. It should also outline plans for the coming year and report on plans for meeting any additional course work that the thesis committee may have recommended. Each CMB graduate student is required to meet with his/her committee at least once each year or the student can be placed on academic probation. During this meeting, students should be prepared to make a formal presentation of their progress on the dissertation proposal, using the report they prepared as a basis for further discussion by the committee.

Master's Degree - Thesis (Plan A)

Requirements:

Duration: Master's degree students must complete at least 2 semesters of full-time work (or four 6-week summer sessions) or the equivalent.

Course requirements: The plan A MS requires a minimum of 30 credits in 500-700 level courses, 18 must be 600 level or greater excluding 631, 699, 700. Required courses: CMB 621, CMB 622, CMB 626, CMB 611, CMB 654, and CMB 699, 700 are required. At least 6 credits of 699 and 6 credits of 700 are required. One journal club a year 654X or 705 are required annually. Students must take the written and oral parts of the qualifying exam in the 2nd year to continue in the program, and must pass both to advance to candidacy. Students who do not pass either part of the exam are given one opportunity to retake that part and pass, typically the next semester, but no later than one year after the first attempt. If they do not pass on the second attempt, they are dismissed from the graduate program, and are denied entry to other graduate programs at UH by Graduate Division. Plan A students must complete form II before enrolling in CMB700. Plan A students must be enrolled in thesis 700 in the semester that they will graduate.

Time limit: All requirements for the MS degree must be completed within two years of the date of admission. Extensions of this time limit require the approval of the Graduate Program Chair and Graduate Division. Students may apply for a leave of absence with the Office of Graduate Education if they have personal or medical needs that inhibit their progress to completion of the degree, for up to one year. Approved leave of absence is not counted against this time limit. <https://manoa.hawaii.edu/graduate/time-allowed-for-completion-of-degree/>.

Thesis committee: Three members, at least two from CMB graduate faculty are required. <https://manoa.hawaii.edu/graduate/committee-composition-potential-members/>. Advancement to candidacy for the MS plan A follows completion of all required courses and passage of the qualifying exam, and is recorded on Manoa Graduate Division Master's Plan A - Pre-Candidacy Progress (Form 1) on Kualii Build. A thesis proposal is prepared within one semester after advancement to candidacy. The proposal is reviewed by the thesis committee and recorded on Manoa Graduate Division Master's Plan A - Advance to Candidacy (Form 2). The student may then enroll in thesis research in subsequent semesters (the relevant 700 level designation depending on departmental affiliation of the major advisor).

Thesis defense: The final examination for the MS plan A is a thesis defense: an oral presentation of the work and questions on that work from the thesis committee. The defense is open to all faculty and students, and usually takes the form of a 30 to 45-minute long presentation, followed by questions from the audience. Manoa Graduate Division Master's Plan A - Thesis Evaluation (Forms 3) and Manoa Graduate Division Master's Plan A - Thesis Submission (Form 4) are filed after successful defense and completion of thesis on Kualii Build..

Copies of the completed thesis must be submitted to the committee members four weeks prior to the date of the final examination unless the committee agrees on an alternative deadline. All members of the thesis committee must be present at the defense; see "Proxy members in thesis defenses" in the Graduate Division manual for exceptions (<https://manoa.hawaii.edu/graduate/final-defense/>). A majority of the committee, including the chair must approve of the defense for the student to pass. A student failing the final defense for the first time may repeat it only with approval from both the graduate program and Graduate Division. A student failing for the second time is dismissed from both the graduate program and Graduate Division.

The thesis: See "Theses and Dissertations" and the Dissertation and Thesis Specifications issued by Graduate Division (<https://manoa.hawaii.edu/graduate/thesis-dissertation/>). An electronic copy of the thesis must also be deposited with the Graduate Chair for retention in the CMB program office.

Timeline summary for MS Plan A:

Start of year 1: meet with CMB program chair

End of semester 1: choose advisor

Start of year 2: pass qualifying exam, form committee, submit thesis proposal for approval, apply for admission to candidacy

Within 2 years of admission to program: complete degree requirements and write thesis

Four weeks before thesis defense, submit thesis to committee

By Graduate Division deadline for the semester, thesis defense and submission of Forms 3, 4.

For details on graduation requirements, see Graduation Checklist for Masters Plan A Thesis candidates:

https://manoa.hawaii.edu/graduate/wp-content/uploads/graduation_checklist_for_masters_plan_a_thesis.pdf

Master's Degree - Non-Thesis (Plan B)**Requirements:**

Duration: Master's degree students must complete at least 2 semesters of full-time work (or four 6-week summer sessions) or the equivalent (<https://manoa.hawaii.edu/graduate/masters-plan-b/>).

Course requirements: The plan B MS requires a minimum of 30 credits in 500-700 level courses. The plan A MS requires a minimum of 30 credits in 500-700 level courses, 18 must be 600 level or greater excluding 631 and 699.

Required courses: CMB 621, CMB 622, CMB 626, CMB 611, CMB 654 and 699 are required. **Time limit:** All requirements for the MS degree must have been completed within two years of the date of admission. Extensions of this time limit require approval of the Graduate Program Chair and Graduate Division. Students may apply for a leave of absence with Graduate Division if they have personal or medical needs that inhibit their progress to completion of the degree, for up to one year. Approved leave of absence is not counted against this time limit. <https://manoa.hawaii.edu/graduate/time-allowed-for-completion-of-degree/>

There is no committee for Plan B. The student will prepare a report, oral presentation or do an approved project to fulfill the MS Plan B requirements.

Admission to candidacy for the MS plan B follows completion of all required courses and passage of the qualifying exam. The advisor is responsible for approval of a coherent program of courses and a research topic that will be the subject of the student's Master's paper or culminating project. After completing the course work, the student writes a short research paper and makes an oral presentation of the work. When this is completed, the chair informs Graduate Division by memo that the student has completed all requirements and a Certification Form for Plan B Degree Award form is filed.

Timeline summary for MS Plan B:

Start of year 1: meet with CMB program chair and choose advisor

End of year 1: program plan approved by advisor, make up any undergraduate deficiencies

Start of year 2: pass qualifying exam, advance to candidacy

Within 2 years of admission to program, complete degree requirements, write research paper or complete approved project.

Students must notify Graduate Division of their intent to graduate with the appropriate form to have the degree awarded, it is not automatically awarded upon completion of all course requirements.

Doctor of Philosophy Degree

Students may apply directly for admission to the PhD program without first completing a MS degree, or may transfer into the PhD program upon completion of the MS. In either case, applications for admission to the PhD program are submitted to Graduate Division and evaluated by the Admissions Committee. The application must include a written statement of the applicant's goals and accomplishments, transcripts, GRE exam scores, letters of support from faculty members who know the applicant well, and any material (reprints of publications, abstracts, board certifications, patent applications etc.) that give evidence of the student's accomplishments and maturity to begin doctoral studies.

Applicants wishing to transfer to the PhD program upon completion of a MS degree at UH Manoa may request a waiver of the first-year requirements if they meet the following conditions:

- 1) Documentation of completion of three research rotations in CMB graduate faculty laboratories
- 2) Completion of CMB 621-622 courses with grade of B or higher in both semesters.
- 3) Documentation of support from a faculty member willing to serve as Dissertation advisor.
- 4) Pass the Qualifying exam at the PhD level

Requirements:

Duration: Doctoral degree students must complete at least 3 semesters of full-time work (or the equivalent in credit hours) at UH Manoa.

Course requirements: No coursework or minimum number of credits is required of transferring MS students other than as specified by the student's PhD committee. Students entering with MD, BA, or BS degrees or their equivalents must complete the following during their first year:

- CMB 621-622, Molecular and Cellular Biology core course (two semesters)
- CMB 631, Research rotations (three)

Students must complete the following during their second year:

- CMB 626, Ethics in Biomedical Research
- TRMD655 Principles of Biostatistics, or equivalent
- CMB 669, Essentials in Grant Writing
- CMB 699, Directed Research in your lab of choice

CMB 611 Seminar in Biomedical Sciences must be taken each semester until the student has passed their comprehensive exam or completes Form 2. Depending on their area of research interest, their Dissertation advisor and Committee may specify additional required course work.

Publication requirement: All PhD students are required to publish at least one peer-reviewed article to a scientific journal prior to awarding of the degree. The article must be either published, in press, or accepted for publication. It is highly recommended that the article be first-authored by the student. However, in some circumstances, co-authored articles will be considered as acceptable with justification from the student's committee and on a case-by-case basis.

Oral presentations: All Ph.D. students are required to present a 15 minute power point presentation at the Fall CMB retreat in their 3rd year, 1 poster presentation at a local or national meeting, and a 45 minute seminar in the CMB 611 course.

Teaching experience: Faculty in the CMB graduate program consider teaching as an integral part of the academic training program and teaching experience is recommended for all doctoral students, especially those

who anticipate applying for university teaching positions in US institutions of higher learning. This experience is usually in the form of a graduate teaching assistantship.

Time limit: Time to degree is typically four to five years with full-time enrollment. Students may apply for a leave of absence with the Office of Graduate Education for up to one year if they have personal or medical needs that inhibit their progress to completion of the degree. Approved leave of absence is not counted against this time limit. Extensions of this time limit require approval of the Graduate Chair and Graduate Division <https://manoa.hawaii.edu/graduate/time-allowed-for-completion-of-degree/>

Dissertation committee: Five graduate faculty members, at least four from CMB graduate faculty (including the Dissertation Advisor) are required. The advisor must be a full member of the CMB graduate faculty. Any member of the UH graduate faculty can serve on a CMB dissertation committee; to include persons not on the UH graduate faculty (for instance, a physician who may provide assistance with clinical applications in a particular medical research problem), a petition with their CV should be submitted to the Graduate Chair, for approval by Graduate Division. <https://manoa.hawaii.edu/graduate/committee-composition-potential-members/>

University Representative: One member of the dissertation committee is the University representative. He or she should be a full member of the graduate faculty as well as having experience serving as a member on dissertation committees at UHM. Additionally, he or she should possess sufficient familiarity with the student's research topic to be able to review and comment on the manuscript, but this is not required. The university representative fulfills the following functions:

- 1) Represents Graduate Division on the committee, ensuring administration of proper procedures and fair treatment of the student;
- 2) Ensures that the level of research and integrity of the work is indeed appropriate to the student's degree objective; and
- 3) Provides disciplinary expertise and an academic perspective that may or may not be possessed by the other committee members.

Advancement to Candidacy: After completing all coursework required to either fulfill the degree requirements or to remedy undergraduate deficiencies and passage of the qualifying exam, the student will be admitted to candidacy. This is reported on Manoa Graduate Division Doctorate - Pre-Candidacy Progress (Form 1).

Approval of dissertation proposal: A dissertation proposal must be prepared and accepted by the dissertation committee within two semesters of advancement to candidacy and a comprehensive exam passed. This is recorded on Manoa Graduate Division Doctorate - Advance to Candidacy (Form 2). The student may then enroll in dissertation research (a departmental 800 level distinction) in subsequent semesters. If the student does not complete the comprehensive exam in Year 3, the student will be placed on academic probation and must complete the comprehensive exam in Year 4 or be dismissed from the CMB graduate program.

Comprehensive exam: The comprehensive examination, administered by the Dissertation Committee consists of an oral and written examination.

The written exam is written by the student as an NIH F31 style Specific Aims (one page), and a 6 page scientific proposal (http://grants.nih.gov/training/F_files_nrsa.htm). Additionally, the exam must have references and have Human Subjects or Vertebrate Animal Section if applicable. The six page scientific proposal should have a research strategy that includes a well-defined research project that is hypothesis-driven. The student should describe the background leading to the proposed research, the significance of the research, the research approach (design and methods) for achieving the Specific Aims, the rationale for the proposed approach, potential pitfalls,

and expected/ alternative outcomes of the proposed studies. It is beneficial to include pertinent preliminary data to demonstrate feasibility (<http://grants.nih.gov/grants/guide/pa-files/PA-14-147.html>). The written proposal is submitted to the dissertation committee 2 weeks prior to the exam.

The oral exam consists of two parts: a 20-30 minute oral presentation on the proposal (grant) and a 2nd part where the faculty members ask the students questions relevant to the proposal for up to 1 hour and can last up to two hours. The exam usually lasts 1.5 to 2 hours.

The entire Dissertation Committee must be present at the exam. A majority of the Dissertation Committee, including the chair, must vote "pass", otherwise the student fails the exam. Students failing the comprehensive exam may repeat it only once. Students who fail the second examination are dismissed from the CMB program. Students must complete the comprehensive examination within two semesters of admission to the PhD candidacy (that is, within three years of their entry into the PhD program). The status of the student's performance on the comprehensive exam is also recorded on Manoa Graduate Division Doctorate - Advance to Candidacy (Form 2).

Dissertation defense: Under the guidance of the Dissertation Committee, the candidate prepares a doctoral dissertation according to the rules established by Graduate Division (<https://manoa.hawaii.edu/graduate/thesis-dissertation/>). The candidate then defends the Dissertation before the committee and the acceptance of the Dissertation is ruled complete by the filing Manoa Graduate Division Doctorate - Dissertation Evaluation (Form 3) on Kualii Build. and Manoa Graduate Division Doctorate - Dissertation Submission (Form 4). The thesis defense is a 45 minute public seminar. All doctoral students are required to complete the submission and publication of their thesis as described <https://manoa.hawaii.edu/graduate/content/submission-publication>. An electronic copy of the thesis should be submitted to the Graduate Program Chair.

Theses and Dissertations

The thesis or dissertation is a scholarly contribution to knowledge. It presents research conducted by the student under the supervision of the thesis/dissertation committee chair. The final submission becomes a permanent and official addition to the body of scholarship undertaken at UHM. The dissertation should exhibit originality in the sense that it does not duplicate the work of someone else.

The thesis or dissertation is a written manuscript. It usually includes an original introduction chapter, chapter(s) on the scientific work conducted, and a conclusion or final chapter. The chapters are all referenced and formatted per the University of Hawaii, Graduate Division.

Timeline summary for the PhD degree

Start of year 1: preliminary conference with Graduate Chair

End of year 1: complete CMB 621-622, 626 courses and undergraduate deficiencies; complete 3 laboratory rotations, choose advisor

Start of year 2: pass qualifying exam (Form 1), form dissertation committee and have pre-proposal meeting

End of year 2: TPMD 655 and CMB 669

End of year 3- Present proposal plan. pass the comprehensive exam (Page 9) (Form 2)

Within 4-6 years of program admission, completion of degree

Four weeks before defense, submit dissertation to committee

Three weeks before defense, schedule defense and notify Graduate Division

By Graduate Division deadline for semester, dissertation defense (Form 3)

By Graduate Division deadline for semester, dissertation approved and submitted to Graduate Division (Form 4)

For details on graduation requirements, see Graduation Checklist for PhD/Doctoral Candidates:
https://manoa.hawaii.edu/graduate/wp-content/uploads/graduation_checklist_for_phd_doctoral_candidates.pdf

Specialized Courses for Elective Credit

You, your advisor, and your committee can decide what electives are important for you to fulfill the necessary unit requirements for your degree from this list and other courses offered on a specialized basis.

Cell and Molecular Biology

MBBE 691 Experimental Techniques & Bioinformatics
MICR 625 Advanced Immunology
MICR 632 Advanced Microbial Physiology
MICR 655 Advanced Virology
MICR 671 Bacterial Genetics
TRMD 604 Concepts in Immunology and Immunopathogenesis
TRMD 671 Advanced Medical Parasitology
TRMD 672 Advanced Medical Virology

Neurobiology

CMB 606 Neurosciences
CMB 705 Special Topics in Neurosciences
CMB 640 Neuropharmacology
ZOOL 642 Cellular Neurophysiology
ZOOL 712 Topics in Nerve/Muscle Physiology

4. Academic Rules, Regulations, and Policies

See <https://manoa.hawaii.edu/graduate/grades-regulations/>

Academic probation: Students whose cumulative grade point average fails to meet the GPA minimum requirements after completing 12 credit hours or two semesters of course work are placed on academic probation for the following semester. Students admitted conditionally (due to low undergraduate GPA) will be placed on academic probation if they fail to meet the minimum GPA requirement after completing one semester. Students who fail to attain the required minimum GPA at the end of the probationary semester are dismissed from graduate school.

PhD students are required to have committee meetings in their second year and annually thereafter. Otherwise this will be defined as a lack of academic progress and the student will be put on academic probation. Students who fail to meet this requirement during academic probation may be dismissed.

PhD students are required to complete their Form II by the end of their 7th semester. Otherwise this will be defined as lack of academic progress and the student will be put on academic probation. Students who fail to meet this requirement during academic probation may be dismissed. Additional information can be found at <https://manoa.hawaii.edu/graduate/disciplinary-actions/>

Enrollment: After admission to candidacy, students must be registered each semester (excluding summer session) for course work, thesis/dissertation, or research credit. Students who are not enrolled or on approved leaves of absence are regarded as having withdrawn from the degree program, and will be required to apply for readmission if they wish to resume graduate studies. See <https://manoa.hawaii.edu/graduate/enrollment-policies/>.

Course loads: A graduate student is considered as enrolled full time if her/his course load is:

8-16 credits if not a graduate assistant (TA, GA, RA)

6-9 credits if a graduate assistant (TA, GA, RA)

at least one credit of Dissertation 800 if a doctoral candidate

six credits of Thesis 700 if a MS Plan A candidate and all degree requirements met

Audited courses do not count towards these course load limits. The upper limits may be exceeded with permission from the student's advisor, the Graduate Chair, and Graduate Division. See <https://manoa.hawaii.edu/graduate/content/course-loads-full-time-definition>.

Students must be enrolled in at least one course or register for one credit of 800 for PhD candidates and 6 credits of 700 for MS Plan candidates during the semester in which they graduate. 500 level courses may be taken by MS plan B students who have fulfilled all degree course requirements. It does not carry credit but does require payment of tuition. 700-level (thesis 700) may only be taken by MS Plan A candidates, and only after the thesis proposal has been approved and Form 2 has been filed. Six credits of thesis 700 are required for the MS Plan A degree, and students must be registered for 6 credits of thesis 700 in the semester in which they graduate. 800-level courses may only be taken by PhD candidates, and only after the dissertation proposal has been approved and Form 2 filed. PhD Students must be registered for dissertation 800 the semester in which they graduate.

Grades: Only courses in which students earn a letter grade of B or better can be counted towards degree requirements. Graduate students may take courses credit/no credit (CR/NC) or may audit courses, but such courses cannot be counted towards degree requirements.

Incompletes: An "I" (Incomplete) is given to students who fail to complete a small but important part of a semester's work in a course before the semester grades are determined. Students are expected to complete all courses and will be allowed to graduate with "I" grades on their transcript only by permission from the Graduate Chair and Graduate Division. Students receiving an "I" should contact the instructor to determine the steps to be taken to remove the "I".

Transfer of credits: See <https://manoa.hawaii.edu/graduate/credit-policies/>.

Leaves of absence: Students who have been admitted to candidacy may be granted leave from their studies upon approval by the Dean of Graduate Division. Leave of absence is not granted for a period longer than one year. The date of return from a leave must be set at the time the leave is requested. Students not returning from leave on time will be required to apply for readmission to the university in accordance with established regulations.

Students on approved leave do not pay tuition, fees, and time on approved leave is not counted against the time limits for completion of degree programs, and no readmission procedure is required. Students returning from approved leave should request the bio/info and residency forms from Graduate Division Records Office, by the established returnee deadline so that registration materials can be readied.

Research regulations: Federal, State, and University regulations require that proposed research projects of certain types be reviewed and approved to ensure that the proposed research complies with applicable protective standards and laws. Students who are unsure whether these regulations apply to their research should consult with their advisor, their Dissertation or Thesis Committee members, with Graduate Division, the Office of Research Compliance or the Office of Research Services.

1. Animal care and use: University employees or students intending to conduct research involving non-human vertebrate animals must submit an application to the Animal Care and Use Committee for review and approval prior to any such use of animals. Applications and information may be obtained from the Office of Research Compliance –Animal Resource Center Services and IACUC.

2. Human subjects: University employees or students intending to conduct research involving human subjects must submit an application to the Committee on Human Studies for review and approval prior to any such use of human subjects. Applications and information may be obtained from the Office of Research Compliance.

3. Biosafety: Transfer of certain biological materials between laboratories, the Kaka’ako and Manoa campus and satellite research facilities (such as Kewalo Marine Lab, and all hospitals) using a private vehicle may be illegal. Transfer of potentially infectious materials (i.e. vertebrate blood or tissues) on passenger aircraft such as inter-island air flights as carry-on baggage is also illegal. Those using biological agents must take appropriate training and comply with established biosafety procedures. They may interact with the Institutional Biosafety Committee (IBC) and should consult the Office of Research Compliance for training and authorizations.

4. Environmental health and safety hazards: University employees or students whose research may involve recombinant DNA, radioactive materials, scuba diving, or hazardous materials should contact the Environmental Health and Safety Office for information and guidance. This office provides information about appropriate safety and laboratory standards, as well as applications for approvals from the Radiation Safety Committee, and the Diving Control Board. Transfer of certain hazardous chemicals and reagents between the Kaka’ako and Manoa campus and satellite research facilities (such as Kewalo Marine Lab, and all hospitals) using a private vehicle may be illegal.

5. Office of Research Integrity: The Responsible Conduct of Research Program (RCRP) at UH Manoa helps assure funding agencies that research, teaching, and services supported by those agencies are above reproach. According to federal regulations, in order to receive federal funds, universities must assure the agencies annually that the University has in place policies and procedures for handling allegations of research misconduct (defined as the falsification, fabrication, or plagiarism of research results) and whistleblower retaliation. The Office of Research Compliance should be contacted regarding these issues.

6. The Kaka’ako and Institute of Biogenesis Laboratories at UH Manoa are all biosafety level 2 laboratories. Minor under the age of 14 are not allowed in the laboratory areas. Please see your Graduate Program Chair regarding access of minors age 14-16 and 16-18 to laboratory spaces.

7. All individuals in laboratories and offices should have an ID: students, staff, faculty, volunteers, and visitors. Please contact security if you have any concerns.

Counseling:

The John A. Burns School of Medicine provides basic psychological counseling services from the Counseling Student and Development Center (http://manoa.hawaii.edu/counseling/about/meet_the_staff.php). You can call them at 808-956-7927. Dr. Katherine Fast counsels students confidentially in the medical education building (http://manoa.hawaii.edu/counseling/about/meet_the_staff.php#kfast).

Title IX – Gender Discrimination and Sexual Harassment

Title IX is a federal law that states: "No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or

activity receiving Federal financial assistance."

Title IX of the Education Amendments of 1972 protects people from discrimination based on sex in education programs or activities which receive Federal financial assistance. Under Title IX of the Education Amendment Act of 1972, the University of Hawaii has a responsibility to ensure that students have a learning environment that is free of gender discrimination and sexual harassment. The United States Department of Education (ED) maintains an Office for Civil Rights, with 12 enforcement offices throughout the nation and a headquarters office in Washington, D.C., to enforce Title IX.

Please review the following web site: <https://manoa.hawaii.edu/graduate/title-ix-gender-discrimination-and-sexual-harassment/>

If you want to report a Title IX concern, please contact:

Dee Uwono

Director and Title IX Coordinator

Hawai'i Hall #112

2500 Campus Road

Honolulu, HI 96822

Telephone: (808) 956-2299

Email: t9uhm@hawaii.edu

5. Graduate Assistantships and Other Types of Support

Graduate assistantships (GA)/Teaching: GA are available from academic departments and programs engaged in undergraduate education and affiliated with this graduate program (Biology, Chemistry, Genetics and Molecular Biology, Zoology, Botany, and Microbiology) for students who have a minimum 3.0 GPA and who are not in the first year of their PhD program. Assistantships carry a stipend that is paid on a 12-month basis for 12 months of service, or may be only for a single semester. Tuition is waived. Graduate assistants are expected to spend half-time (not more than 20 hours/week) working for the department or program of instruction, usually configured as 12 hrs/week in undergraduate instruction and 8 hrs/wk in associated duties. Teaching assistantships are normally approved by the instructor of record, and applicants must have a background appropriate to the course that they are applying to student teach in. See <https://manoa.hawaii.edu/graduate/content/graduate-assistants>.

1. Course load: All graduate assistants must carry a minimum of 6 credit hours, but may carry a maximum of 9 credit hours each semester. Audit hours do not count towards the minimum. The 6 credit hours may be at any level, (500-800). Graduate assistants taking only 1 credit of Dissertation 800 may be certified by Graduate Division as carrying a full load. To be eligible for such certification, receipt of Student Progress Form 2 verifying that the dissertation proposal has been approved must be recorded in the Graduate Division.

2. Foreign teaching assistantships: The English Language Institute has developed a course that provides practice for foreign teaching assistants in speaking in classroom situations with an emphasis on oral skills, ESL 111. Practicum for Foreign Teaching Assistants.

GA/Research Assistantships: Research assistantships frequently are available to qualified students in connection with funded research projects. Such assistantships are rarely available until after faculty have had

the opportunity to assess the student's research potential. The stipend may be more than that of a teaching assistantship. See <https://manoa.hawaii.edu/graduate/graduate-assistants/>.

National Science Foundation (NSF), National Institutes of Health (NIH) and American Heart Association (AHA) pre-doctoral fellowships: These US government and the AHA make a number of awards each year to hundreds of highly qualified graduate students who are either entering a new graduate program with an undergraduate degree or are currently in a graduate program but have not completed 30 credit hours of work (typically, a first year student who gets a bright idea after participating in a research rotation but wants to work on a project not currently funded in that faculty member's lab). The fellowships give a stipend for one-three years. The student can use them at any institution with any qualified faculty member. Students write a short research proposal, submit supporting letters from faculty who know their potential and can address their ability to perform independent research. The applicant should have competitive GRE scores in order to have a reasonable chance of success in these programs.

Advancing Science in America (ARCS) Foundation: Colleges with faculty participating in the CMB program award research fellowships to outstanding graduate students on an annual basis. The student must be a US citizen and is nominated by their advisor. After screening by a committee in the Dean's office, one student is selected to represent that academic unit for the university, and receives a cash award of \$5000. See <https://honolulu.arcsfoundation.org>

Graduate Division teaching awards: In recognition that student teaching is a valuable and important skill, the Dean of Graduate Division makes an annual award for the best Graduate Assistant contributing to the UH learning community. TAs are nominated by students and faculty, and nominations are screened by a committee. The winner is honored with an award of \$1000 and recognition of meritorious teaching at the annual fall convocation.

Scholarships and small research grants See the Bank of Hawaii grants, Sigma Xi grants in aid of research, AAUW, Kamehameha Schools/Bishop Estate, Soroptimists, etc. Some research societies also make best student paper awards for publication of a student's thesis work when submitted to their journals. Your advisor is probably the best source of information about special programs and supplements available in a particular discipline.

Additional employment: The educational responsibilities of being a graduate student and working as a GA are a full time commitment. It is not recommended that graduate students have extracurricular employment.

Health insurance: Graduate assistants may enroll in the State of Hawaii Employer-Union Health Benefits Trust Fund (EUTF) medical insurance program if appointed at 0.50 FTE. There are several plans to choose from, both single and family, with the cost shared in part by the State. See <https://eutf.hawaii.gov..>

Housing: See <http://manoa.hawaii.edu/housing/>

Parking: Parking is limited at the University of Hawaii at Manoa. See <http://manoa.hawaii.edu/commuter/index.html>. Please see your departmental administrator for parking at Kaka'ako.