

GRADUATE PROGRAM IN CELLULAR & MOLECULAR BIOLOGY

UNIVERSITY OF MICHIGAN

CMB STUDENT AND FACULTY HANDBOOK

2020-2021 Academic Year

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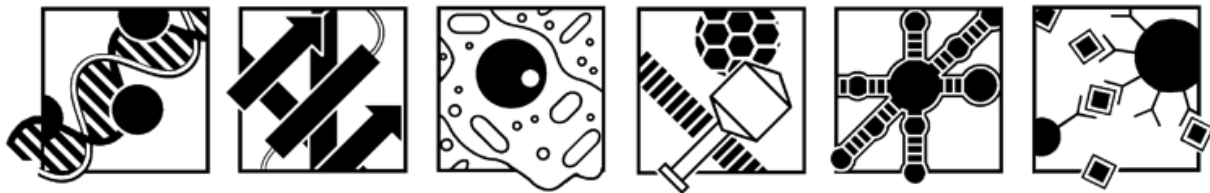


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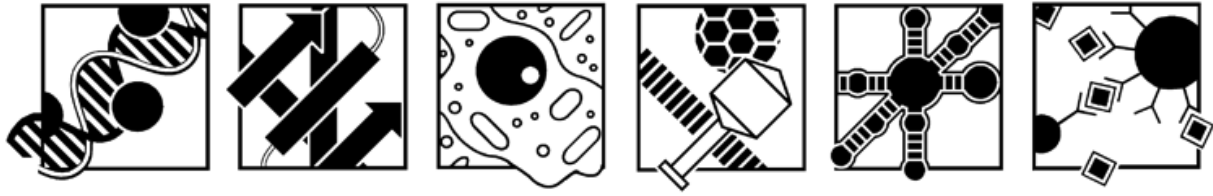
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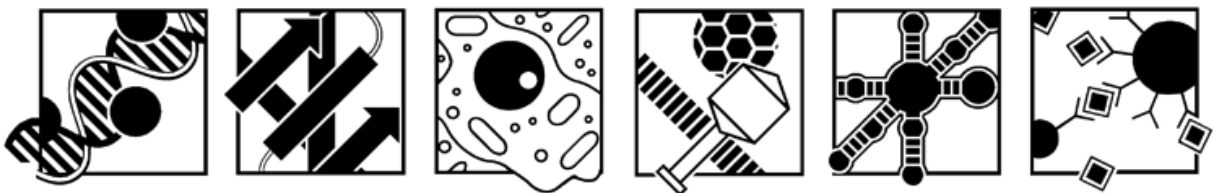
CMB PROGRAM COMMITTEE

Name (Faculty)	Department
Manoj Puthenveedu , <i>Director</i>	Pharmacology
Benjamin Allen , <i>Assoc. Director</i>	Cell and Developmental Biology
Robert S. Fuller , <i>Assoc. Director</i>	Biological Chemistry
Marina Pasca di Magliano , <i>Assoc. Director</i>	Surgery
David Antonetti	Ophthalmology & Visual Sciences / Molec & Integrative Physiol
Vernon Carruthers	Microbiology & Immunology
David Ferguson	Pathology
Sue Hammoud	Human Genetics
Ken Inoki	Molecular and Integrative Physiology/ Internal Medicine
Ann Miller	Molecular, Cell and Developmental Biology
Lois Weisman	Cell and Developmental Biology
Megan Weivoda	Periodontics and Oral Medicine
<u>Ex-officio:</u>	
Scott Barolo	Cell and Developmental Biology, Director of PIBS
Kathleen Collins	Internal Medicine, MSTP Director
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Name (Student)	Mentor
Haley Amemiya	Peter Freddolino
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Nico Gomez	Sami Barnada
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CMB HANDBOOK STUDENT SUPPLEMENT



GRADUATE PROGRAM IN CELLULAR AND MOLECULAR BIOLOGY

GENERAL INFORMATION AND TIMETABLE

The Graduate Program in Cellular and Molecular Biology (CMB) at the University of Michigan is a University-wide, interdisciplinary Ph.D.-granting Program. It provides broad-based training in research involving cellular and molecular biology. CMB trains students to address biological problems from multiple perspectives through individualized, flexible programs of coursework and research.

This guide outlines the steps necessary for students to complete the requirements for the Ph.D. degree in the CMB Program. A provisional timetable for completion of the program is provided, although each student is guided through the program individually. Students can select CMB after the first year in the Program in Biomedical Sciences (PIBS) or after the second year in the Medical Scientist Training Program (MSTP). The timetable is organized according to candidacy status for the Ph.D. degree.

IDP – CMB Students will be required to have Individual Development Plans (IDPs) (requirement began Fall 2015). These plans should be updated annually.

Milestones:

1. Students who enter through PIBS (CMB-PIBS Students):

First Year (Pre-Candidate)

Lab Rotations (at least 2; additional possible)	Summer before to end of 1 st year
Course work	Fall & Winter semesters
Training in Responsible Conduct of Research (RCR)	Fall semester (within PIBS)
Selection of Dissertation Advisor	By end of 1 st year
Student Seminar (CMB 850) if interested in CMB	Fall and/or Winter semester

Second Year (Pre-Candidate)

Course work	End of Fall semester 2 nd year recommended
Student Seminar (CMB 850)	Attend throughout graduate training
Presentation of first seminar for CMB 850	By end of 2 nd year
Short Courses (CMB 630)	May begin taking short courses
Preliminary exam	Winter of 2 nd year
Advancement to Candidacy	End of 2 nd year
Assembly of Dissertation Committee	Immediately after passing prelim exam
Attend Dissertation Defenses	Attend 4

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Third Year and Later (Candidate)

Dissertation Committee Meetings	By 6 months after candidacy, every 6 months thereafter
Student Seminar (CMB 850)	Attend throughout graduate training
Short Courses (CMB 630)	Attend at least 4 total
Teaching (one term)	During 3 rd or 4 th year
Attend Dissertation Defenses	Attend 4 each year
Write & defend dissertation, complete Ph.D. requirements	Target end of 5 th year

2. Students who enter through MSTP (CMB-MSTP Students)

(Note: For CMB-MSTP students, years in CMB are termed G1, G2, etc., in line with M1-M4 nomenclature. For most purposes G1 CMB-MSTP students are equivalent to 2nd year CMB-PIBS students, but some requirements differ.)

M1 & M2 Students

Lab Rotations (at least 2; additional possible)	M1 & M2 summers
Course work	M1 & M2 pre-clinical curriculum
Selection of Dissertation Advisor and join CMB	Prior to G1 year

G1 Year (Pre-Candidate)

Course work	Complete by end of G1 year
Training in Responsible Conduct of Research (RCR)	Fall semester
Student Seminar (CMB 850)	Attend throughout graduate training
Presentation of first seminar for CMB 850	By end of G1 year
Short Courses (CMB 630)	May begin taking short courses
Preliminary exam	Winter of G1 year
Advancement to Candidacy	End of G1 year
Assembly of Dissertation Committee	Immediately after passing prelim exam
Attend Dissertation Defenses	Attend 4

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G2 Year and Later (Candidate)

Dissertation Committee Meetings	By 6 months after candidacy, every 6 months thereafter
Student Seminar (CMB 850)	Attend throughout graduate training
Short Courses (CMB 630)	Attend at least 4 total
Teaching (one term)	During G2 or G3 year
Attend Dissertation Defenses	Attend 4 each year
Completion of Degree Requirements	End of G4 year preferred

Please feel free to discuss any aspect of this guide with members of the CMB Program Committee at any time. A major asset of the CMB program is its flexibility. The Program Committee considers petitions to alter requirements of the training program outlined here to meet the needs of individual students.

ACADEMIC ADVISING

Advising System. The CMB Director serves as advisor for PIBS and MSTP students interested in CMB, 2nd year CMB-PIBS students, CMB-MSTP students in the G1 year, and any CMB-PIBS students in a 6th or later year and any CMB-MSTP students in a G5 year. The CMB Associate Directors advise the 3rd-5th year CMB-PIBS and G2-G4 CMB-MSTP students, each following an assigned class for three years. Students may request meetings with the advisors at any time, in addition to scheduled annual meetings.

PIBS students interested in CMB meet with the CMB Director prior to the start of the fall and winter semesters for information about CMB, rotations and coursework during the first year. CMB students on the Academic Advisory Committee are also available to meet with PIBS students to discuss course selection and scheduling from a student perspective. If students need additional information about available courses, CMB faculty from various departments who are knowledgeable about relevant courses are available to meet with pre-candidate students.

Each pre-candidate CMB student meets individually with the CMB Director twice a year, before Fall and Winter terms, to discuss course work, lab rotations, student seminars, prelim preparations and performance. These meetings facilitate the transition from the first PIBS year into the CMB Program and preparation for the prelim exam.

CMB students who have achieved candidacy meet individually with the CMB Director or assigned Associate Director at least once each year. At the end of each term, the CMB Directors review each student's academic record and dissertation committee meeting reports.

COURSE SELECTION

Objectives for the CMB curriculum:

- Provide flexibility and efficiency for integrating coursework and dissertation research.
- Maximize curriculum possibilities for each student by customizing coursework that builds on pre-graduate education.
- Facilitate transition from PIBS year or M1 & M2 years into CMB.

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I. Areas to be covered in coursework – CMB-PIBS Students

- a. Core coursework: CMB-PIBS students are required to take 3 credits of coursework in each of 3 areas (9 credits total):
 - i. Biochemistry;
 - ii. Cell Biology;
 - iii. Genetics.
- b. The specific courses elected to fulfill these requirements should be based on student's prior educational background. See discussion of proficiency levels on p. 9 and basic coursework options described below.
- c. Elective coursework: CMB students take 6 additional elective credits. It is recommended that the electives be selected to complement the student's research interests and needs. Course offerings change frequently, so students should check the [PIBS Curriculum Guide](#) for the most recent listings.

II. Areas to be covered in coursework – CMB-MSTP Students.

- a. Core coursework: MSTP students receive 18 credit hours for medical school and required MSTP coursework. This includes training in biochemistry and cell biology that satisfies CMB requirements in these areas. CMB-MSTP students are required to take 3 credits of coursework in genetics (e.g. Human Genetics 541),
- b. Elective coursework: CMB-MSTP students take a minimum of three additional elective credits in graduate coursework to fulfill CMB requirements. Course offerings change frequently, so students should check the [PIBS Curriculum Guide](#) for the most recent listings.
- c. Quantitative Training: Beginning with students joining the program in 2014 (both PIBS and MSTP), and strongly recommended for those who joined in 2013, CMB students will be required to take 2-3 credit hours of coursework that provides quantitative training. This requirement can be met by taking, either as an elective or as a CMB core course from the list on pp. 9-11, in any one of the four general areas indicated, or any other course approved by the CMB Director.
- d. Responsible Conduct of Research Training (PIBS 503) (1 credit) – Offered each year. To be taken in PIBS 1st year. Training in Responsible Conduct of Research or RCR training is required of every PIBS student. See p.13 for details (Training in Ethical Issues in Science).
- e. CMB Student Seminar (CMB 850) (1 credit) – Mandatory weekly attendance throughout Ph.D. training, starting in the second year. Register each Fall and Winter term. Note: PIBS now requires attendance at the student seminar of one of the PIBS Ph.D. programs during Fall and Winter semesters of 1st year. PIBS students interested in CMB are encouraged to register for CMB850.

2nd year CMB-PIBS and G1 CMB-MSTP students present a critical review of a report in the scientific literature; senior students present their own research. Students and faculty participate in the seminar discussion and periodically serve as seminar evaluators. Training in presentation skills is built into preparation and presentation of seminars. See "The CMB Student Seminar (CMB 850)" p. 11. Preparation of CMB 850 presentation is mentored by faculty and student rehearsal and seminar evaluator.

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- f. CMB Short Course (CMB 630) (1 credit) – Advanced Topics in Molecular Biology. Offered Fall and Winter terms. Students attend at least four different terms prior to completion of degree.

Each of these “Short Courses” is a student-designed mini-symposium consisting of a series of seminars and discussions on a special topic of current interest to students, presented by leaders in the field, invited over several weeks each semester. The courses are designed to facilitate student interactions with visiting speakers. (Sponsored cooperatively by the CMB Program and the Human Genetics Program). See p. 12 for details.

- g. Ethics Refresher Training – Workshops on Responsible Conduct of Research are held every two years during the in-town CMB retreat. Attendance is mandatory.

Individualizing Coursework Selections (sample curricula – see Appendix 2):

The overall goal of coursework is to give CMB students familiarity with each basic area at a level of competence to understand and interpret the current scientific literature. An additional goal of coursework for CMB students is to gain experience reading and interpreting primary literature, typically in a more discussion-oriented setting than traditional lecture-based courses. Students with a degree and/or substantial prior classwork in one of the basic coursework areas (e.g., Bachelor’s in Biochemistry, or Genetics) are encouraged to take primary literature-based courses.

Levels of Proficiency:

The following levels of proficiency generally describe the prior background students may have in a particular area to guide them in course selection, and allow flexibility for students to tailor a curriculum specific to their own backgrounds.

- **Level 1.** No background/coursework in the basic area. An introductory class is recommended; in some cases, this may be an upper-level undergraduate course (400-500 level).
- **Level 2.** Some background in the basic coursework area, but not sufficient for Ph.D. training. A mid-level survey course is recommended (500 level – corresponding to current PIBS “core” courses).
- **Level 3.** Graduate-level background has already been achieved by the student, such as graduate-level courses or a Bachelor’s degree in the area. Courses based on primary literature are recommended.

It is important that students discuss their previous coursework with the curriculum advisors and/or the program director to determine the appropriate level for each basic area. It will be helpful for students to provide recent transcripts and syllabi or descriptions of previous courses when requesting a more advanced level (3). Students should give considerable thought regarding their level of familiarity in each area to ensure that they are sufficiently knowledgeable if proposing to move up a level. Additionally, students should discuss with the mentor whether they should strengthen background in areas critical for their success in their chosen laboratory.

Core coursework options:

Courses listed are recommendations; a student may request permission for other classes. Note that course offerings change frequently. Students should check the [PIBS Curriculum Guide](#) for the most recent listings.

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Biochemistry (3 credits)

- Level 1. BIOLCHEM 515-Introductory Biochemistry (FA/WI terms 3 cr)
- Level 2. BIOLCHEM/CHEMBIO 501/502-Chemical Biology I/II (FA/WI 3 cr/3 cr)
- Level 3. BIOLCHEM 528 Biology and Chemistry of enzymes 2 cr 1st half of WI semester
BIOLCHEM 640-Post-transcriptional mechanisms (WI term 2 cr)
BIOLCHEM 650-Mechanisms of Eukaryotic Gene Expression (WI term 3 cr)
BIOLCHEM 660- Molecules of Life (FA term 2 cr)
BIOLCHEM 673- Kinetics & Ligand Binding (WI term 2 cr)
BIOLCHEM/CDB/M&I 675 - Advanced Topics in Protein Trafficking and Localization (WI term 2 cr every other yr)
BIOLCHEM 690 Biochemical Regulatory Mechanisms (FA term 2cr)

Cell Biology (3 credits)

- Level 1. MCDB 428-Cell Biology (WI term 4 cr)
- Level 2. CDB 530-Cell Biology (FA term 3 cr)
PHYSIOL 576/578-Signal Transduction/Membrane and Cellular Physiology (1 cr/2 cr)
- Level 3. CDB 560 – Quantitative Fluorescence Microscopy (WI term 3 cr)
CDB 581 – Developmental Genetics (FA term 3 cr)
CDB 582 – Organogenesis: Stem Cells to Regenerative Biology (WI term 3 cr)
MICROBIOL 640-642- Molecular and Cellular Immunology I/II/III (3 cr/1 cr/1 cr)
CANC BIO 553-Molecular Biology of Cancer (2 cr)
CDB 550-Histology (4 cr)
BC/PHYS/PHRM 591 – Special Topics in Signal Transduction (2 cr)

Genetics (3 credits)

- Level 1. MCDB 427-Molecular Genetics (FA term 4 cr)
- Level 2. HUMGEN 541-Molecular Genetics (FA term 3 cr)
CDB 581 – Developmental Genetics (FA term 3 cr)
- Level 3. BIOLCHEM 650-Mechanisms of Eukaryotic Gene Expression (WI term 3 cr)
HUMGEN/PHYSIOL 555- Integrative Genomics (WI term 3 cr)
HUMGEN 542-Genetic Basis for Disease (WI term 3 cr)
HUMGEN 544 – Basic Concepts in Population and Statistical Genetics (3 cr)
CDB 582 – Organogenesis: Stem cells to Regenerative Biology (WI term 3 cr)

Additional Considerations

Training in scientific writing and writing proposals is highly valuable for students preparing for the preliminary examination as well as for future grant writing.

Pharmacology 502 (FA term 2 cr) is HIGHLY recommended (but not required) for 2nd year students as it helps students develop a first draft of their prelim proposal.

The following courses typically include grant writing:

- PHYS/HG 555 – Integrative Genomics (WI)
- CDB 582 – Organogenesis: Stem Cells to Regenerative Biology (WI)
- BIOLCHEM 650 – Mechanisms of Eukaryotic Gene Expression (WI)
- BIOLCHEM 640 – Post-transcriptional mechanisms (WI)
- PIBS 502 – Introduction to Scientific Communication (WI)
- MCDB 615 – Topics in Cellular & Molecular Biology (WI)

Quantitative Training

Beginning with students joining the program in 2014 (both PIBS and MSTP), and strongly recommended for those who joined in 2013, CMB students are required to take 2-3 credit hours of coursework that provides quantitative training. This requirement can be met by taking, either as an

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elective or as a CMB core course courses from the list below in any one of the four general areas indicated, or any other course approved by the CMB Director. Coursework in statistics/biostatistics is highly recommended for any student without undergraduate statistics. Advanced training in statistics and/or statistical genetics is recommended for students whose research involves human and animal models or large scale datasets (genomic, proteomic, etc.).

Biostatistics/Statistics

Biostatistics

- 501 – Introduction to Biostatistics (prereq: algebra) (4 cr) Fall
- 512 – Analyzing Longitudinal & Clustered Data Using Statistical Software (prereq 501, 521 or equiv) (3 cr) Winter
- 521 – Applied Biostatistics (Fundamental statistics, prereq: calculus) (4 cr) Fall
- 522 – Biostatistical Analysis for Health-Related Studies (prereq: 521 or 501 w/permission) (3 cr) Winter
- 601 – Probability and Distribution Theory (prereq: 3 terms of calculus) (4 cr) Fall
- 602 – Biostatistical Inference (Fundamental theory of inferential statistical procedures, prereq: 601) (4 cr) Winter
- 646 – High Throughput Molecular Genetic and Epigenetic Data Analysis (prereq: Stat 400, Biostat 521, 522 or permission) (3 cr) Winter

Statistics

- 400 – Applied Statistical Methods (4 cr)
- 401 – Applied Statistical Methods II (4 cr)
- 470 – Introduction to the Design of Experiments (4 cr)

Bioinformatics/Computer Science

Computational Medicine and Bioinformatics

- BIOINF 524 – Foundations in Bioinformatics and Systems Biology (introduction to statistics and to bioinformatics tools on the web for students interested in using Web-based applications and browsers) (3 cr) Winter
- BIOINF 527 – Introduction to Bioinformatics and Computational Biology (for students with basic statistics and some programming knowledge who want to go deeper into bioinformatics) (4 cr) Fall
- BIOINF/PHYSIOL 520 – Computational Systems Biology in Physiology (3 cr)
- BIOINF 528 – Advanced Applications of Bioinformatics (3 cr) Fall
- BIOINF 545 – Data Analysis in Molecular Biology (3 cr)
- BIOINF 551 – Proteome Informatics (3 cr) Fall every other year
- BIOINF 575 – Programming Lab in Bioinformatics (introductory computer programming course for those interested in getting more involved in analysis) (3 cr)
- EECS 498 – Introductory Computer Programming (introductory computer programming course for those interested in getting more involved in analysis)
- Physiology 519 – Systems Biology (introduces relevant biochemistry and mathematical modeling before delving into systems biology applications)
- PHYSIOL/BIOINF 520 - Computational Systems Biology for Physiologists
- HUMGEN 551 – Computational Genomics (2cr) Winter

Quantitative Genetics

- HUMGEN 544 – Basic Concepts in Population and Statistical Genetics (3 cr) Fall
- BIOSTATS 666 – Statistical Models and Numerical Methods in Human Genetics (3 cr) Fall

Biophysics/Quantitative Biochemistry and Cell Biology

- BIOLCHEM 528 – Biology and Chemistry of Enzymes (2 cr) Winter
- BIOLCHEM 530 – Structural Biology in Solution (3 cr) Fall
- BIOLCHEM 673 – Kinetics & Mechanism (2 cr) Winter
- BIOLPHYS 520 – Biophysical Chemistry I (3 cr)

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BIOLPHYS 521 – Biophysical Chemistry II (3 cr)
BIOIPHYS 550 – Intro to Biophysics Laboratory (3 cr)
BIOIPHYS 602 – Protein Crystallography (3 cr)
BIOIPHYS 608 – Biophysical Principles in Microscopy (3 cr)
CDB 560 – Quantitative Fluorescence Microscopy (3 cr) Winter

Alternative Courses (up to 3 credits)

To facilitate the ability of students who did not follow the CMB curriculum at the outset to switch into CMB from other PIBS programs, in some cases the basic coursework may be fulfilled with an introductory survey class(es) from other PIBS programs. This is discussed on a case-by-case basis. Typically, these courses fulfill elective credits. Examples:

BIOINFO 525 or 527-Introduction to Bioinformatics
BIOPHYS 520- Energetics, Interactions, and Dynamics of Biomacromolecules
BIOSTAT 501-Introduction to Biostatistics
MCDB 614-Experimental Models in Molecular, Cellular and Developmental Biology
MICROBIOL 640-642-Molecular and Cellular Immunology
NEUROSCI 601-Principles of Neuroscience
PATH 581-Tissue, Cellular and Molecular Basics of Disease
PHARMACOL 611-Principles of Pharmacology
PHYSIOL 510- Systems & Integrative Physiology

Additional Considerations

1. Scientific Writing. Some courses, particularly in Level 3 courses, incorporate training in scientific writing. Students often find that this helps them to prepare for the preliminary examination and future grant writing. As preparation for the preliminary exam, taking Pharmacology 502 (Grant Writing Course, Fall) is highly recommended for 2nd year students.
2. Academic Performance. Students are required to earn a grade B or better in core course work, and maintain an overall average of B or better for coursework.

THE CMB STUDENT SEMINAR (CMB 850)

Overview

The Special Topics Seminars (CMB 850) in Fall and Winter terms consist of student seminars presented 12-1 p.m. every Monday. These seminars bring the Program together each week. All CMB students, including candidates, and CMB faculty, participate in and contribute to the student seminars. Pre-candidates in the CMB Program are required to register for the course. All candidate students are also required to attend (whether or not they enroll for credit). Attendance at CMB 850 will also be expected of CMB students who have a scheduled defense date, but those students need not register for the course in their final semester. First-year students in PIBS are encouraged to attend CMB 850 seminars and may request an opportunity to present a seminar. The seminar date for each student is indicated on a schedule prepared by the Student Seminar Coordinators at the beginning of each academic year. To accommodate attendance by all CMB faculty while maintaining the personal nature of student-faculty interactions, each CMB faculty member is assigned at least three attendance dates during the academic year. Two CMB faculty co-directors coordinate 15-20 faculty dedicated to serving as evaluators for the course each year (Student Seminar Committee).

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Pre-candidate students present a review of their own research. The presentation should be a critical evaluation of the work, not simply a summary of it. Third-year students generally serve as evaluators and chair the discussion session that follows the seminar.

Students work with a faculty advisor, generally the research mentor, to prepare the talk and practice it formally before the actual presentation. In addition, a practice session is scheduled during the week prior to the scheduled seminar and is attended by the mentor, a faculty evaluator, a student evaluator and others invited by the student. At the formal seminar, discussion and criticism of the research by the audience is encouraged. The assigned student discussant moderates the discussion, which includes students and faculty. At least one faculty member and a student evaluator discuss the presentation with each student at the end of the session and prepare a brief written evaluation, which is shared with the student and sent to the CMB office.

Specifics of Seminar Preparation

1. At the beginning of each Fall term, a schedule is set up for student presentations for the academic year. Each student is expected to contact their mentor to help prepare for the seminar.
2. At least four weeks prior to the presentation, each student should begin preparations with their faculty mentor. They should discuss the topic, identify interesting papers that put own research into context, and the student should begin preparing the presentation with advice from the faculty member. In keeping with the broad approaches in CMB training, it is recommended that students select papers from the highest quality journals of broad interest rather than from specialty journals.
3. One week prior to the seminar, the student should:
 - a. Provide the CMB Administrator with the principal references (including pdf or url), relevant secondary references and an abstract summarizing the topic. This is distributed to all CMB faculty and students by e-mail prior to the presentation.
 - b. Students should schedule a formal practice with the assigned faculty evaluator as well as the faculty advisor and student evaluators. Evaluators provide comments about the strengths and weaknesses of the presentation. Based on feedback from the practice session, the student has an opportunity to implement suggestions for the formal seminar presentation the following week. Student presenters are encouraged to make arrangements for this practice session with faculty and student evaluators one to two weeks before the practice session. For convenience, a rehearsal is typically scheduled the Wednesday before the seminar at 2 p.m.
4. The student presents the seminar to assembled CMB students, faculty and other interested individuals, and answers questions from the floor. Audiovisual equipment is available or requested via the CMB office. The assigned student discussant/evaluator provides a professional introduction to the speaker, prepares questions to lead off discussion during the seminar, and serves as moderator during the discussions. The discussant also provides a final evaluation to the presenting student following the seminar.

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5. A faculty member from the Student Seminar Committee and one of the student discussants meet with each student immediately after the presentation to discuss strengths and weaknesses of the seminar. Written critiques from the evaluators are made available to the student.

THE CMB SHORT COURSE (CMBIOL/HUMGEN 630)

Advanced Topics in Molecular Biology

The CMB Short Course is designed to introduce students to high profile or “hot topics” research areas and allows students to interact closely with leading investigators from other institutions. Each Short Course is a mini-symposium composed of four to five presentations on a thematic topic, which takes place over several weeks during the academic semester. A volunteer committee of CMB students develops the Short Course topic and invites speakers and hosts speakers during their visit to the university. Students in the CMB Program are required to enroll in the Short Course for at least four semesters during their graduate studies. Students enrolled in CMB 630 are required to attend all Short Course seminars, to attend any additional scheduled discussion sessions, and to complete assignments related to the Short Course, as determined by the Short Course coordinators. Generally, enrolled students attend the public seminar, meet with the speaker in a discussion session separate from the seminar presentation and are asked to submit at least one question for each speaker. Additional sessions interacting with the speaker often include lunch and/or a question and answer session with the speakers on the day of the Short Course seminar.

TRAINING IN ETHICAL ISSUES IN SCIENCE **(Responsible Conduct of Research)**

To ensure that all students have appropriate training in research responsibility they are required to take PIBS 503: Research Responsibility and Ethics. This course consists of a series of small group discussions in which issues related to responsible research and ethics are discussed. The syllabus satisfies NIH mandates, required for trainees supported on F, K and T series awards are required to comply. Rather than formal lectures, the course consists of lectures and panel discussion, which are provided in the form of podcasts. The podcasts as well as case studies and other resources related to the podcasts are provided on a Course Tools website, and an interactive calendar that lists the topic, time, place and date of small group discussions for 12-16 students. The small group discussions are provided by 72 faculty volunteers from all the PIBS programs and by training grant faculty members and are offered throughout the Fall term. Students may select times and places for the small-group discussions that fit their schedules.

The seven discussion topics, with associated case studies, are:

- 1) Fraud, Fabrication and Plagiarism
- 2) Peer review (grant applications/publications), data storage and ownership
- 3) Conflict of Interest (scientific and financial)
- 4) Human Subjects in Research
- 5) Animal Subjects in Research
- 6) Dual Use
- 7) Issues of research ethics and collaboration in the global workplace

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In addition, students are required to engage in a one-hour discussion of ethical issues with their current research supervisors.

On entering the graduate program through PIBS, students are also issued copies of the Rackham Graduate School “Student Handbook” and the University of Michigan Medical School “Guidelines for Responsible Conduct of Research.” The former addresses the standards of student behavior expected of all members of the graduate community. The latter discusses in depth the responsibilities of a Ph.D. mentor, appropriate methods of data collection and analysis, guidelines for manuscript authorship and issues pertaining to relationships between industry and academic institutions. Students will be expected to sign a statement stating that they understand the potential penalties (including dismissal from the graduate school and the possibility that a doctoral degree will not be awarded) for fraud, fabrication and plagiarism in course papers, prelims and dissertations and presentations/websites.

Refresher Training in the Responsible Conduct of Research

Recognizing the importance of maintaining a conversation about ethical issues in scientific research and in line with mandates from the NIH Institute of General Medical Sciences, students will participate in biannual ethics refresher workshops. The first of these workshops was held concurrently with the 2013 Spring CMB Retreat.

LABORATORY ROTATIONS

During the first year, under the auspices of PIBS, each student participates in research immediately upon entering the University by completing at least two laboratory rotations. Students interested in CMB must complete at least one rotation under the supervision of a CMB program faculty member. The duration of one laboratory rotation is generally eight weeks (a half term), and can include summer rotations prior to and after the first academic school year. The student receives academic credit for each rotation by enrolling in PIBS 600 or in CMB 990 (pre-candidate research)/CMB 599 (MSTP pre-candidate research) for a number of hours arranged in consultation with the sponsoring faculty member. At least two laboratory rotations should be completed during the first 10 months of enrollment and must be completed prior to the selection of a dissertation mentor. Students may choose to do additional rotations before selecting a mentor. The appropriateness of rotations with faculty outside of CMB will be reviewed by the CMB Program Committee.

New students are urged to become acquainted with research interests of the CMB Program Faculty. These are detailed in the **CMB Program flyer** and on the [CMB website](#) under “People.” Faculty new to CMB present their research at “New Faculty” luncheons coordinated by CMB. A valuable source of information is the program-wide CMB poster session held during the annual CMB Symposium in the Spring each academic year. Students also learn about CMB faculty research in private discussions with faculty members, public seminars and research presentations, and in literature surveys.

Picking the right rotations is critical for finding a dissertation lab where the student will be successful. Before choosing a rotation lab, students should meet with the professor to discuss expectations and research projects. Some questions students may want to ask before choosing a rotation lab:

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- Is the lab currently taking new students? How many other students are interested in rotating and how many new students can the mentor accept into the lab?
- What does the mentor expect from rotation students? How much time do rotation students generally spend in the lab and how much data are students expected to produce?
- What projects are available? Does the mentor expect the student to complete a project on a grant or do graduate students have more freedom to define their own research projects?
- How many people are in the lab and are the other members of the lab experienced researchers? Do the members of the lab enjoy training students? Are lab members happy in the lab?
- How are lab meetings and meetings with the mentor structured? Is there a venue for supportive and open discussion of student's work within the lab and with the mentor?
- Does the lab have sufficient funds to support a graduate student through the duration of the dissertation research? Where does the funding come from? Are students expected to apply for training grants or write grant proposals to secure their own funding?
- What is the mentor's managing style? Younger researchers are more likely to be in the lab and involved in training students on a day-to-day basis, while more senior professors often have administrative and professional duties that keep them away from the lab some of the time.
- How long has it taken previous graduate students to complete their degrees?

CMB Rotation Advisory Committees: An associate director arranges rotation advisory committees for new PIBS students who are interested in CMB during the summer before matriculation. The goal of these committees is to provide names of additional faculty who may be of interest to a student and to provide guidance in selection of rotation mentors.

SELECTION OF DISSERTATION MENTOR AND RESEARCH

Each student selects a dissertation mentor from the CMB faculty to guide his or her dissertation research. As soon as possible after completion of laboratory rotations, the student should submit his/her choice of mentor to PIBS and to the CMB program director. The selection of the dissertation mentor should generally occur by the end of the first academic year of study.

Once a student selects a lab, CMB research credits are elected each term. The research is conducted in the context of CMB 990 for pre-candidates (non-MSTP), CMB 599 for MSTP pre-candidates, and CMB 995 for candidates.

The dissertation mentor submits a "Semester Report" of dissertation research progress to the CMB office each term throughout the student's training. This report should first be discussed and signed by both mentor and student. It is then reviewed by the program directors. The mentor and student are responsible for coordinating dissertation committee meetings every six months, and submitting dissertation committee reports within two weeks of each meeting. For convenience and to keep students on track, the CMB office will automatically schedule the next meeting six months later, on the same day of the week, unless the mentor and student schedule an alternative date and time.

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CMB PRELIMINARY EXAMINATION

The CMB preliminary examination involves students writing an original research proposal (written component) and defending it before a committee of CMB faculty members (oral component). The written and oral components of the preliminary examination must each be passed before a student achieves candidacy for the Ph.D. degree.

1. Purpose

The preliminary exam (prelim) tests the student's ability to reason analytically and to develop ideas and experimental approaches. The exam gives the student an opportunity to demonstrate creativity, imagination and knowledge of one area of current research. The prelim is to be completed in the student's second year (first CMB year for MSTP students). The specific timing for completion of the prelim will be announced in each academic year. Requests for extensions must be submitted in writing to the CMB Program Director. The entire process should take approximately 8 weeks.

2. Choosing a Topic

The purpose of the prelim exam is to evaluate the student's ability to think and plan independently and in a scientific manner and to ascertain the student's background knowledge. The specific project for the prelim proposal should be focused and mechanistic, should involve the development of one or more hypothesis and should propose experimental approaches that will critically test their hypotheses. The project should be related to the mentor's research area and should be chosen in consultation with the mentor, unless a strong case for an independent proposal is made by the student and agreed to by the mentor and prelim coordinator.

The specific project can be based on the student's research, and should represent the *original ideas of the student* synthesized from interactions with the mentor. It is strongly advised, therefore, that from the time the student joins the mentor's lab, the student should be engaged in mastering the literature and methodologies relevant to the likely prelim project and in intensive discussions with the mentor about the directions and aims of the student's dissertation research.

3. Selection and Approval of Topic

Based on the extensive discussions the student and mentor have had over the period the student has been in the lab, the student will meet with and discuss a proposed prelim topic with the prelim coordinator. The student submits the proposal topic in the form of a title and a brief abstract (one paragraph) to the prelim coordinator. This abstract should include background information, information concerning how the project evolves from the previous studies (the rationale) and the hypothesis or hypotheses to be tested. It may include a brief overview of experimental approaches to be taken.

As a general guideline, the proposal is expected to be of sufficient quality to develop into a dissertation project, but it is not required that the Proposal develop into the student's dissertation project.

3. Submission of Specific Aims to the Prelim Coordinator

Once the topic is approved, the student will write a draft of the Abstract/Specific Aims page for review by the prelim coordinator (see below, **4. Specific Aims**). The student should develop the aims independent of the mentor. The aims should not be identical to the aims of any current or pending grant in the mentor's lab, although it is recognized that the aims may be similar to the mentor's aims. Once the

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student has begun drafting the specific aims, the student should not discuss the content of the written prelin or planned oral presentation with the mentor until the oral exam is completed. The student may of course continue to talk to the mentor about ongoing research in the lab. It is difficult to draw an exact line here, but the purpose of the exam is for the student to develop an independent proposal based on the experience of the student in the mentor's lab. The scope of the work proposed should be appropriate for a Ph.D. candidate to accomplish in 3-4 years with the goal of publishing at least two first-author papers based on the research.

- a. **Pharm 502.** Taking Pharmacology 502 is highly recommended but not required of 2nd-year CMB students. It is the policy of Pharm 502 that mentors be involved in evaluation of the written proposal the student develops in this course, a situation that is in some ways counter, in spirit, to the CMB prelin process. The program asks that mentors and students limit mentor involvement in development of the Pharm 502 proposal to light editing and commentary.

4. Format of Specific Aims Page

The Specific Aims Page should be in the format of an NIH research grant application and should consist of: (1) an abstract that provides key background information, establishes the question(s) to be addressed and the hypothesis/hypotheses posed to evaluate the question; and (2) the specific experimental aims that will provide critical tests of the hypothesis/hypotheses. The enumerated specific aims should include a concise statement of each aim followed by a description of the general experimental approach that will be used in pursuing that aim. This page will serve as the "Specific Aims" page as in an NIH research grant application and will become the first page of the prelin proposal. This page may be revised in response to comments by the committee and can be revised further as the student writes the full proposal.

5. Preliminary Examination Committee

a. Members

The student submits the names of two CMB faculty members who **have agreed to serve** on the examining committee at the time that the Specific Aims page is submitted. The student's dissertation advisor may not serve as a member of this committee, but can advise the student on selection of faculty for the committee. The Prelim Coordinator appoints two additional members and appoints one prelin committee member to serve as committee chair. It is estimated that composing the committee will be completed within one week.

b. Arranging the Meeting

Once the committee is completed, the coordinator will notify the student. As soon as possible, the student is responsible for arranging a day and time during the designated CMB prelin exam period that all of the committee can attend the oral exam. The CMB Administrator will help the student reserve a room and obtain appropriate audiovisual aids for that day and time.

The student is responsible for seeing that each committee member receives a copy of the Specific Aims page describing the research problem. The committee members will review these Specific Aims to determine ultimate feasibility and acceptability of the outlined project. The Preliminary Exam Committee Chair will communicate to the student (YES or NO) within **ONE WEEK** whether the Specific Aims are appropriate. If the Specific Aims are deemed NOT appropriate, the

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Committee Chair will explain the problems with the proposed project and the student will have one opportunity to revise and resubmit the Specific Aim page to the committee within one week.

c. Role of Prelim Coordinators

The Director and Associate Directors will serve as Prelim Coordinators who will help the student form a Prelim Committee and ensure that the timeline of the Prelim exam is followed. Each student will be assigned to work with one of the Prelim Coordinators. The student should set up a meeting with the assigned Prelim Coordinator in accordance with the timeline to discuss the prelim topic. The Prelim Coordinator will use information from this discussion and the draft of the student's Specific Aims page, submitted later, as a guide for composing the prelim exam committee. As indicated above, the coordinator will finalize the prelim committee by adding two CMB faculty as committee members in addition to the two identified by the student and will appoint a Prelim Committee Chair from among the committee members. The Prelim Coordinators will compose the prelim committees as soon as possible after receiving the student's faculty selections, with target date for completion noted in the timeline.

d. Role of Prelim Committee Chair and Members

The Prelim Committee Chair represents the Prelim Committee and is responsible for giving feedback to the student on behalf of the committee, within one week following submission of the Specific Aims. In addition, the Prelim Committee Chair runs the oral exam and is responsible for summarizing and communicating the outcome of the prelim exam to the student and the CMB program. The members will provide feedback to the chair on the specific aims and may request revisions. Requests for revisions should be compiled and transmitted to the student by the Chair. Committee members will provide to the chair written evaluations of both the written and oral proposal. Once the written proposal is received, committee members may request a delay in the oral exam if serious problems are found with the written proposal. Sets of instructions will be provided to the Prelim Committee Chairs and members.

The student may meet with the Prelim Committee Chair to discuss/submit the Specific Aims page. It is advised that the student introduce him/herself to the committee members prior to the oral exam, e.g., by hand-delivering the proposal to the committee members (see below).

6. Written Proposal Guidelines and Format

The written proposal must contain background information and a brief summary of an original experimental approach to a scientific problem of current interest in cellular and molecular biology. **The proposal can be up to 10 pages in length, single-spaced, inclusive of figures but exclusive of references.** Fonts should not smaller than Arial 11. The written proposal should use the NIH research grant format: i.e. 1-page hypothesis and Specific Aims (see "Specific Aims" description above), approximately 2-4 pages significance and rationale, including pertinent background, and approximately 5-7 pages experimental design and methods, including justification of the approach taken, controls, interpretation of possible results, priority of experiments, limitations and alternative approaches. A preliminary data section is not necessary but may be included. A timeline is not necessary but may be helpful.

The student is responsible for deciding independently on the problem and devising logical and convincing experimental approaches. When writing the proposal and preparing an oral presentation, students may ask peers and faculty for advice on execution of specific techniques or specific

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interpretation of published work. Faculty can suggest reading materials, but should avoid taking active part in experimental design. Fellow students (but not faculty) can proofread (for spelling and grammar only) the proposal. When in doubt about appropriate boundaries of advice from others, the student is expected to consult with the Chair of his/her Preliminary Exam Committee or Prelim Coordinator. Students preparing for the exam can look over copies of previous student proposals that were considered excellent, which are kept on file by the CMB Administrator. The deadline for submission of the proposal will follow the designated timeline. It is recommended that the written proposal be hand-delivered to each member of the examining committee in addition to providing an electronic copy. A copy should also be submitted to the CMB office.

The student should not approach Prelim Committee members to seek advice on the written proposal prior to the oral exam, but it is recommended that students meet with Prelim Committee members in order to introduce themselves. The Prelim Committee chair may contact the student if committee members identify major flaws in the written proposal. Requirements to revise the written proposal may result in a delay in the oral exam.

7. Oral Exam

- a. **Focus:** The oral exam tests the student's ability to reason analytically and to develop ideas and defend them in front of other scientists. Thus, the emphasis is on hypothesis testing and experimental design. The student should have broad knowledge of the foundational literature of the field. The student should be familiar with the key past experiments performed that led to the hypothesis and the important basic concepts of the approaches to be used (i.e. if studying a membrane receptor, the student must know aspects of that receptor binding, whether the cell type is appropriate for studying that receptor, whether antibodies or cDNAs have been made to that receptor). The committee members will expect students to be familiar enough with each technique proposed to understand its theoretical basis, as well as its appropriateness and limitations in addressing the hypothesis being tested. Consulting methods papers, such as those found in *Methods in Enzymology* or *Methods in Cell Biology*, is highly recommended to ensure that the student thoroughly understands the details, strengths and weaknesses of experimental procedures that are central to the proposal. However, detailed knowledge of such things as buffer ingredients and incubation times is less important, unless they are vital to the interpretation of the results. For example, if one proposes to use PCR, one should know how PCR works, whether the necessary starting materials are available, whether PCR is the best approach to address the question being asked, and the limitations of using PCR. One does not need to know the exact ions needed for the PCR reaction to take place, nor the incubation time of the step. In contrast, if one were studying ion channels, one would be expected to know the ion concentrations in the buffers to be used to measure ion transport.
- b. **Practice oral exam:** It is highly recommended that the student hold at least one practice oral exam with students or postdocs who have relevant expertise. The participants should question the student in a realistic fashion.
- c. **Format of the oral examination:** Prior to the meeting, the committee members will provide the chair with written comments on the written proposal using the written proposal evaluation form. At the start of the examination the student will be asked to leave the room for a few minutes while the examining committee has a chance to discuss the student, their evaluations of the

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written proposal and how they wish to organize the examination. The student will then be asked to give a ~20-30-minute oral presentation with PowerPoint slides. The student may provide the Committee members with a printed version of the PowerPoint presentation. The presentation should begin with the hypothesis, specific aims, and significance. However, the emphasis in the presentation should be on the experimental approaches to be taken to address the hypothesis. The members of the committee may wait until the presentation is over, or may ask questions as points are presented. At the end of the presentation committee members will then ask questions for the remainder of the examination. The total time for the exam should be about 2 hours.

It is expected that the students should have a thorough understanding of the experiments proposed and how to interpret them, as well as a solid grasp of the key literature in the field of inquiry. Furthermore, the curriculum for all CMB students is based on a solid foundation in biochemistry, genetics and cell biology, and students should demonstrate a breadth of knowledge in these areas if relevant coursework had been completed. At least some of the questions from the committee should address the extent to which the student can think independently of the proposal using their knowledge in these areas.

- d. Evaluation:** When all committee members have had the opportunity to ask all the questions they wish, the student will be asked to leave the room. The committee will then discuss whether the student has displayed sufficient depth and breadth of scientific knowledge, insight into experimental design, and ability to think critically, analytically and quantitatively, to predict a high likelihood of success in pursuit of a Ph.D. dissertation.

For the outcome of the prelim, the written and oral exams will be evaluated separately by the committee. A student will either receive a pass, a conditional pass or a fail on each component (written and oral) and the committee will also decide on an overall grade. An overall conditional pass will require remediation by the student. This may, for example, involve the student revising part of the written exam. An overall failure will require that the student retake the exam within 6 months. The agreed outcome of the exam should be communicated orally to the student immediately following the committee's deliberation. The student will be invited back into the room and the chair should communicate the outcome and discuss with the student the strengths and weaknesses of the performance on the prelim.

The committee members will provide the Chair with written comments on the oral exam not later than one day after the exam, using the oral exam evaluation form. The chair will use the evaluations of the written and oral exam and write a summary evaluation of both parts of the exam that will include a summary of the committee's discussion of the oral and written following the oral exam. This summary should include separate overall grades (unconditional pass, conditional pass or fail) for the written and oral that have been agreed upon by the committee, as well as the overall grade. The chair should submit the evaluations and summary to the Prelim Coordinator, the CMB Director and the CMB office (cmbgrad@umich.edu) within one week of the exam. The report and outcome of the Preliminary Exam represent a recommendation to the CMB Program Committee concerning advancement to candidacy for the Ph.D.

The CMB Director will forward the evaluations to the student and the student's mentor. In writing their evaluations, committee members should keep in mind that the student will read them.

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8. Outcomes

- Unconditional Pass: No further action is necessary.
- Conditional Pass: Remediation as requested by the committee. Instructions for remediation should be communicated orally to the student by the chair immediately after the exam and also in writing not later than a week after the exam. These instructions should be communicated to the CMB Director and Prelim Coordinator as well.
- Failure: The Committee Chair will discuss the situation with the CMB Director and the student and a plan for retaking the exam will be formulated. This plan will be discussed with the student and the mentor. The student will have up to six months to prepare for retaking the exam. The length of time allotted reflects the fact that students who fail the exam usually need to fill in substantial gaps in their preparation.

9. Timeline (For 2020-2021 Academic Year)

All prelim exams should take place in an approximately 2-week time frame specified for each academic year. A specific timeline based on the calendar will be distributed each year.

Oct. 21 - Oct. 30	Student meets with Prelim Coordinator; student submits proposal topic in the form of a title and brief abstract (one paragraph) to Coordinator
Nov. 2	Deadline for Coordinator to approve student's prelim proposal topic
Nov. 11	Draft of Abstract/Specific Aims Page submitted to Prelim Coordinator; student submits names of 2 CMB faculty who have agreed to serve on the student's prelim committee and who will be present during the exam period
Nov. 11 - Nov. 20	Coordinator identifies 2 additional CMB faculty who have agreed to serve on the student's prelim committee and who will be present during the exam period; Coordinator obtains agreement of one committee member to serve as chair.
Nov. 20	Deadline for Coordinator to approve student's Abstract/Specific Aims page. Coordinator submits approved Abstract/Specific Aims page to the student's committee.
Nov. 30 - Dec. 11	The student should receive feedback from the Committee on the Specific Aims from the Chair. At the Chair's discretion, the student may meet with Chair during this time to discuss the Committee's feedback on specific aims.
Dec. 18	Deadline for Committee to approve Abstract/Specific Aims page; chair communicates approval to student and student begins writing proposal (however, see below).

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- Dec. 18 - Jan. 8** If committee cannot approve Abstract/Specific Aims page by Dec. 18, this period is set aside for further revisions. Abstract/Specific Aims pages should be approved for all students by Jan 8.
- Feb. 1** Student submits full written proposal to committee
- Feb. 1 - Feb. 8** Committee evaluates written proposal; If serious problems are found with the written proposal, this should be communicated to the student, the coordinator and the Director; the timing of the oral exam may be delayed.
- Feb. 8 - Feb. 26** Oral Prelim Exam Period. All oral exams should be scheduled during this interval unless the committee finds it necessary to delay the exam or there are unavoidable scheduling difficulties.

Note that upon **prior approval of the Prelim Coordinator and Committee Chair**, the December 18 deadline for abstract submission may be extended by a day or two until final exams for Fall Semester classes are completed.

ADVANCEMENT TO CANDIDACY

The final approval as to whether the student is advanced to candidacy will be made by the faculty members of the CMB Program Committee, and will incorporate the totality of the student's record. Each student's academic record and laboratory progress are reviewed by the Director and the CMB Program Committee after the student takes the preliminary exam. The Prelim Exam summary statement, together with information from the student's file relating to performance in courses, research rotations and dissertation work will be included. Factors considered in determining a student's eligibility for advancement to candidacy include: (a) academic record meets Rackham requirements (average of B or better), (b) required CMB coursework (biochem, cell biology, genetics) has been accomplished with grades of B or better, (c) laboratory progress is satisfactory based on completion of rotations and satisfactory reports from the dissertation mentor. The student's dissertation mentor is asked to write a detailed evaluation of the student's performance in conjunction with the review for advancement to candidacy. If clarification is needed, the student's dissertation mentor or prelim committee chair may be asked to attend the Program Committee meeting when the student's performance is discussed. If deficiencies are identified, the Program Committee will recommend procedures for correcting the deficiencies to bring the student to eligible status before that student advances to candidacy.

Once the Program Committee decides to advance the student to candidacy, the CMB Office will process the candidacy with Rackham. Students must register for Fall and Winter terms after advancing to candidacy. Additional requirements can be found on Rackham's Doctoral Degrees policy page (<https://rackham.umich.edu/academic-policies/section4/>).

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DISSERTATION COMMITTEE AND DISSERTATION RESEARCH

Principles:

Dissertation committees provide research and career guidance to students. Goals include (1) monitoring the quality, efficiency and significance of the research, (2) helping to keep the research timeline efficient and on track to minimize the time to degree, (3) encouraging peer-reviewed publication of research findings and (4) providing advice on career paths.

The committee should communicate a clear set of expectations to the student regarding; (1) the content of the work presented, (2) progress in dissertation research, (3) publication – both quality and quantity, and (4) career planning. The guidance of the committee may vary depending on a student's career goals and should be flexible if career goals change.

Establishing the Dissertation Committee:

The committee will be established within **one month** after the student passes the preliminary exam. The dissertation mentor chairs the committee, which includes at least 3 additional members, each of whom must be affiliated with a Ph.D. program. At least two members of the committee in addition to the chair must be members of the CMB program faculty. Students should submit the names of proposed dissertation committee members along with an abstract of the proposed project for approval by the CMB Program Committee. The abstract should be one page, following the format of the Specific Aims page of an NIH research grant, including the following: Background, Specific Aims and Significance of the questions to be addressed. Changes in the composition of the committee membership at later times may be advisable and will be permitted if approved by the CMB Program Committee.

Responsibilities of Committee Members:

Committee members are responsible for attending dissertation committee meetings. They assess student progress and make recommendations for research directions and design, publication and career goals. The committee members should foster research excellence in the student, and facilitate the growth in intellectual independence and professional development of the student. Committee members should provide guidance to both the student and mentor as the student's research progresses.

Among the areas to be assessed are:

- Feasibility of the proposed project/aims
- Quality of the experimental design and results
- Progress on aims
- Focus of the research
- Level of student's effort and productivity
- Quality of the student's writing
- Quality of the student's oral presentation skills
- Progress towards independence
- Progress to publication
- When the student should be expected to begin writing the dissertation
- Ways in which the mentor could facilitate the student's research and professional development

Committee members are expected to read the materials provided by the student (proposal, progress reports, timeline, manuscripts, dissertation) in a timely fashion and to communicate clear expectations to

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the student regarding research effort, quality, publication and career planning. The committee is expected to provide substantive comments on dissertation committee meetings to the mentor.

First Dissertation Committee Meeting: Formal Written Dissertation Proposal

The first committee meeting is a crucial step in the transition to the dissertation research phase of a student's graduate career. The meeting should occur no later than November of the third year unless exceptional circumstances pertain, with approval of the Director. At this meeting the student is expected to present a detailed written proposal for his/her dissertation research. This proposal may borrow from the student's preliminary exam proposal, if appropriate, but should be prepared in consultation with the dissertation mentor, unlike the preliminary exam. The proposal should be submitted to committee members in written form (2-4 pages) at least three days in advance of the meeting. The written proposal should follow standard proposal format: specific aims, background/significance, summary of preliminary data, and research plan. The written and oral presentation should include a hypothetical timeline. In the oral presentation, preliminary data may be presented, but the focus of the first meeting should be on articulating a well thought-out research plan and on getting constructive feedback from the committee members on that plan. The student will provide the committee members with a copy of the PowerPoint presentation of the research proposal at the meeting.

Subsequent Dissertation Committee Meetings

1. **Scheduling Every 6 Months**: The student must meet with the dissertation committee at least **every six months** after the first meeting. Lack of research progress is not an excuse to delay a committee meeting; rather, it is a compelling reason to have one. The responsibility of holding timely meetings rests with both the student and the faculty mentor. To facilitate timely meetings, when a meeting is held, the CMB office will automatically schedule the next meeting on a date (same day of the week and same time) that is 6 months later. If there are conflicts, it is the responsibility of both the student and committee members to arrive at a date, ideally ± 2 weeks from the scheduled date. Students must advise the CMB office once each dissertation committee meeting is scheduled. A student who has not had a committee meeting within a 9-month period will be considered 'not in good standing'. The mentor of such a student will not be permitted to accept additional CMB students until this situation is rectified. In special circumstances, a waiver of this rule may be granted by the Director of the CMB Program upon receiving a clear explanation for the delay in holding the meeting.
2. **Written Progress Reports**: The student and mentor should discuss the content of the dissertation committee meeting prior to the meeting and the student should provide committee members with a brief written **Progress Report** (1-2 pages) at least 3 days prior to the meeting. The Progress Report should include a brief restatement of the aims, a summary of progress, a discussion of problems encountered and a plan for future work. The plan for future work should be organized in terms of 6-month research goals and longer-term goals. The Progress Report should include a list of the student's publications and abstracts for national/international meetings attended; manuscripts planned, submitted and in preparation should be indicated. (*Students are advised to include name, year in program and the date, location and time of the meeting on the document*).
3. **Formal timeline**: Every year, each student should present to the dissertation committee a formal timeline for completion of the dissertation research. The timeline should include realistic

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estimates for accomplishing the research aims, and for achieving the typical benchmarks expected of CMB students, including writing research papers for publication and presenting research at scientific meetings. The timeline should also indicate the career path the student is aiming for. A template for the timeline is presented in Appendix 3. The committee should review and discuss the feasibility of the timeline. At subsequent dissertation committee meetings, updates of the timeline should be presented. The committee may offer career guidance at any time.

4. **Meeting Format:** For each meeting, the student should provide the committee with an electronic version of the PowerPoint to be presented at the meeting. The oral presentation by the student should focus on progress on the specific aims, problems encountered, plans for publication and future research plans – the latter organized in terms of immediate and long-term goals. If results indicate that aims need to be modified or discarded, this should be discussed and new aims may be proposed or recommended. Manuscripts accepted for publication should be provided electronically to committee members, but students may provide drafts of manuscripts if they would like to have comments from the faculty. There is no fixed length for a meeting but in most cases meetings will be 2 hours in length.

Career Development:

During the fourth and subsequent years, time should be reserved at the end of each meeting for discussion of career goals. The student should include a slide or two in her/his presentation on this topic.

Dissertation Committee Meeting Reports:

A written report of each dissertation committee meeting must be submitted to the CMB office within two weeks of each meeting. The dissertation mentor will prepare a written report on each committee meeting after receiving input from committee members and the student. The mentor should circulate a draft report to the committee members and the student before submitting it to the CMB office.

Guidelines on the content of this report, which includes both research progress and training progress, are detailed on the "CMB Dissertation Committee Meeting Progress Report" form (Appendix 2). The final report should be discussed with the student and signed by both the dissertation mentor and the student. The report of the first meeting should include a copy of the student's dissertation research proposal; subsequent reports should include a copy of the student's **Progress Report** and timeline for that meeting. The report is then submitted to the CMB office for the student's file. The after-meeting report will be reviewed by the Program Director and/or Associate Directors and may be reviewed by the Program Committee. The Program views this reporting as a crucial responsibility of the faculty mentor.

Semester Reports (CMB 599/990/995 Course Grades and Research Progress):

After advancement to candidacy, students enroll in CMB 995 (Dissertation Research) for 8 credit hours each Fall and Winter term. Pre-candidates enroll in CMB 990 (Pre-Candidate Research) or CMB 599 (MSTP Pre-Candidate Research). The mentor is responsible for submitting a grade report ("S" for satisfactory, "U" for unsatisfactory) each term. The form is titled: "CMB Semester Report on Candidate (or Pre-Candidate) Dissertation Research" (Appendix 5) and must be signed by both the mentor and student. A recent Dissertation Committee Meeting Report may be submitted with the Semester Report, but the Semester Report is needed as the mentor must submit a research grade each semester. Mentors are also responsible for entering/approving the student's grade in the Wolverine Access Faculty Center.

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Dissertation and Defense:

Upon approval by the dissertation committee, the student will write a scholarly dissertation formatted according to the guidelines of the Rackham Graduate School. Published manuscripts are often included as chapters in the dissertation, with appropriate attributions (and recognition of contributions of others). In addition, a scholarly introduction and discussion are included to provide an integrated dissertation. The discussion is expected to be more than a restatement of the results of the dissertation studies. A scholarly discussion includes the important implications of the work, how it expands the field, and the critical future directions for the research area. The dissertation research is defended at a public seminar followed by a meeting with the dissertation committee. Students must be registered for the semester in which the dissertation is defended. The [Navigating Your Degree](#) page on the Rackham website should be consulted for detailed instructions regarding the Ph.D. dissertation, the defense, and other information related to graduate training.

Dissertation Defense Attendance:

All members of the CMB student body are expected to attend at least four CMB dissertation defenses each academic year. It is expected that by the end of the fifth year in the program, students will be ready to propose a dissertation defense date. It is recognized that the timing of research varies and that students will have different timelines. However, beyond the fifth year, it is recommended that students schedule dissertation committee meetings more frequently (e.g. every three months) to facilitate research progress toward timely completion of the dissertation and defense.

Expectations of the CMB Program for Completion of the Ph.D.:

The CMB program expects that students will develop a high degree of intellectual independence and the ability to create an outstanding research plan, and to conduct well-controlled, definitive experiments. While publishing 3 or more peer-reviewed, first-author research papers is a worthwhile goal to pursue, it is understood that many factors figure into a student's publication record. A **minimum** acceptable standard for publication by the time of the dissertation defense is one first-author research manuscript submitted for publication to a peer-reviewed journal, in which the student has both written the bulk of the paper and contributed the majority of the data. The student is expected to have presented his/her work in oral or poster form at at least one national meeting.

TEACHING

All CMB students are required to participate as a teaching assistant (TA, GSI) for one term, generally teaching shortly after achieving candidacy. The CMB Program Committee provides a list of courses appropriate for CMB students to teach. As a minimum, students are expected to attend lectures, prepare material to present in a formal class context (review session or lecture), and to participate in student evaluation (exams). The teaching requirement must be fulfilled prior to completion of the degree. A CMB faculty member serves as Teaching Coordinator. That faculty member and/or the CMB Program Administrator act as liaisons with the contributing departments and assist students in securing teaching positions. Once a teaching position is arranged, the student submits to the CMB office the name of the course and the course director. Directors of courses in which CMB students teach submit a written description of teaching activities and evaluation of the student's performance at the end of the course (the "CMB Teaching Report" – see Appendix 7). Institutional teaching awards recognize excellence in teaching, indicating the value placed on learning these skills.

GRADUATE PROGRAM IN CELLULAR AND MOLECULAR BIOLOGY

SPECIAL RESEARCH AND CAREER TRAINING ACTIVITIES IN CMB

Annual Spring CMB Symposium and Poster Session:

A centerpiece of the CMB Program is the Annual Symposium and Poster Session at the end of each academic year. The symposium opens with a keynote address by a prominent scientist whose work represents landmark contributions in cellular and molecular biology. The keynote address has been named "The Myron Levine Lectureship" in honor of former CMB Director Myron (Mike) Levine. Immediately following the lecture, CMB students and faculty participate in a dynamic poster session. The Rackham Graduate School provides awards for the top three poster presentations; students present their posters to CMB faculty judges as they would at a national meeting. The well-attended CMB poster session also provides an opportunity for incoming students and others in the university community to find out about research in the laboratories of CMB faculty. **Attendance and presentation of a poster are mandatory for CMB students. CMB faculty who do not have students are strongly encouraged to have a poster presented by their lab.**

Fall CMB Retreat:

The Fall CMB Retreat encourages students and faculty to interact in an informal setting to promote scientific collaboration and collegiality within the program. A weekend (Friday-Sunday), off-site retreat alternates annually with a one-day, in-town retreat, to permit attendance by more faculty. Advanced students give short formal research presentations, as they would at a national meeting. New PIBS and MSTP students are invited and will have opportunities to interact with faculty who are looking for rotation students. Awards are given for both talks. Members of the retreat committee invite and host a keynote speaker and invite select CMB faculty to present talks as well. The keynote address has been named "The Jessica Schwartz Lectureship" in honor of former CMB Director Jessica Schwartz. The retreat committee and career committee organize a career workshop at the off-site retreat, often inviting CMB alumni (**sometimes done outside of retreat**). A refresher workshop on Responsible Conduct of Research is held at the in-town retreat (may be moved to a different date). Recreational activities and free time allow students and faculty to socialize in an informal setting. **Attendance at the Retreat is mandatory for CMB students.**

Career Development Workshops:

The CMB Career Committee organizes workshops on career planning throughout the year.

Student-to-Student Mentoring:

The CMB program sponsors "Students Mentoring Students," an informal mechanism for senior CMB students to mentor students entering CMB from PIBS or MSTP. In this way, students in different labs and different parts of the campus get to know one another better. The mentoring student and incoming student have opportunities for informal and self-directed interactions such as discussion of academic issues, administrative issues, lab issues or other topics of interest. The mentoring program is inaugurated at the beginning of the academic year.

Social Events:

Other informal events are organized for students and faculty by the CMB social committee and/or the CMB office throughout the academic year, including the Fall picnic, the holiday party and trivia nights. CMB students play key roles planning events and acting as hosts to visiting students during the annual graduate student recruitment weekends each year.

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Travel to Scientific Meetings:

The CMB Program encourages students to present their work at local, regional, and national and international scientific meetings. The program provides a contribution to expenses for student travel to scientific meetings upon request to the CMB Administrator and approval by the CMB Director. Students can also apply to Rackham for travel support.

Travel to Career-Related Meetings:

The CMB Program will also grant a one-time contribution to assist students traveling to a meeting related to career development. The request should be made to the CMB Administrator for approval by the CMB Director. Students can also apply to Rackham and PIBS for travel support for career-related meetings.

STUDENT FUNDING

CMB students in good standing receive full financial support during their studies, according to PIBS policy. Support is provided for tuition, stipend, and individual health insurance. Support for the first ten months is provided by PIBS. MSTP students are supported for 36 months while in a dual degree program. Beyond this, funding is the responsibility of the dissertation mentor. Most mentors encourage students to apply for fellowship support, some of which is available by application to CMB. CMB funding awards are based on student merit. When funding awards do not cover the full stipend amount, mentors are responsible for covering the shortfall to bring the stipend to the PIBS level. In accordance with NIH policy, students may not be supported longer than 7 years.

POLICIES ON STUDENT EMPLOYMENT, VACATIONS, AND ABSENCES

Student Employment Outside the Program:

The CMB Program follows NIH policy that students may not be employed outside their training program. The CMB faculty believe that Ph.D. training is a full-time endeavor. Outside employment subtracts from the time and mental energy a student devotes to his or her research. No student in the CMB Program may be employed outside the program without permission of both the mentor and the Program Committee.

Vacation, Leaves of Absence:

Participation in the CMB program, without regard to the source of financial support, is to be full time; that is, 12 months per year. Participation includes regularly scheduled program events and registration in the graduate school for relevant course work, directed research and dissertation research. Other relevant activity such as detached study, internships, or other off-campus course work may be taken with the Director's approval in consultation with the Program Committee and research mentor. Other activity will be viewed as personal and may be undertaken subject to the following policy covering Vacations, Leaves and Absences.

Vacations:

The CMB program adheres to the vacation policy set forth by PIBS. Students are entitled to time off during vacation periods, such as university-designated holidays, Winter and Spring breaks, and may request time off during the summer. Students must discuss proposed vacation periods with their mentors

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well ahead of time, and vacation time is expected not to exceed 4 weeks per year, including all university breaks and mentor-approved vacations. Any further vacation time should have the additional approval of the CMB Director, and it may be granted without financial support. Since progress towards completion of dissertation studies is normally directly related to the amount of time devoted worked in the lab, it is highly recommended that students enrolled in classes take advantage of time off from classwork to make progress in the laboratory.

Leaves of Absence (Adapted from the Rackham Website):

Ph.D. students may request a leave of absence when certain life events prevent continued active participation in their degree program. [Rackham's Leave of Absence Policy](#) enables students to officially suspend work toward their degree for a limited time.

Students may request a leave of absence as early as six months prior to the term the leave is to start. A leave will be granted to students for illness (either physical or mental) or injury, to enable them to provide care or assistance for family or dependents, to allow them to meet military service obligations, or for other personal reasons. Leaves of absence in the first three categories may be for up to 2 years or for the duration of military service. Application for leaves for medical, family or military reasons require specific types of documentation. Students are eligible for a leave of absence for personal reasons only once in their Ph.D. career, and this leave is limited in duration to 6 months. The one-time leave for personal reasons does not require the student to provide a specific reason. Students must request this type of leave before the drop/add period in a Fall or Winter term.

Checklists, a flow chart, and step-by-step instructions for using the Leave of Absence system are available on the Rackham website to help navigate the leave of absence process. The student is required to meet with the CMB Director of their graduate program to plan for a leave of absence. The student and the Director should discuss possible alternatives to a leave of absence. All requests for Leaves of Absence must be submitted to Rackham via website (below) and are reviewed by the CMB Program Director and CMB Program Committee. A formal letter indicating the duration of the leave is kept in the CMB office.

For detailed information on the process of initiating a leave of absence, [consult the Rackham website!](#)

While on a Leave of Absence, students are eligible for limited university services. At the conclusion of a leave, students will automatically return to active study status. Funding and other commitments made to students prior to the leave will carry over and are available as they resume active work toward their degrees.

For specific questions about Leaves of Absence, contact the Leave of Absence Coordinator by e-mail rackham.loa@umich.edu or call (734) 615-5670.

Parental Accommodation Policy (Maternity Leave):

All eligible students will be granted a Parental Accommodation period up to six weeks long immediately following the birth of a child or the adoption of a child under the age of 6 for whom the student has parental responsibilities. During this period of accommodation, the student may continue to be enrolled as a full-time student. Additional information can be found at the following Rackham website [here!](#)

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CMB POLICY REGARDING A CHANGE OF MENTOR AND LABORATORY

Statement of Principles:

Occasionally, circumstances may lead a student to contemplate leaving his/her dissertation lab. CMB has established a policy to guide the student in this situation. As much as possible, this is intended to be a no-fault policy, assuming the student is in good academic standing. This policy is not intended to relieve the student of the responsibility for finding a new mentor, but to provide access to resources in a supportive and positive environment.

Change of Mentor/Laboratory Policy:

1. A student considering changing mentors should consult with the CMB director as soon as possible to discuss all options, recognizing that changing dissertation labs can have significant consequences, including a delayed time to degree.
2. If the student and the CMB Director determine that a change of mentors is warranted, the program will provide the following assistance:
 - a. CMB would support a formal, but flexible, timeline of rotations to aid in identifying a new dissertation mentor, e.g., two, one-month rotations with a negotiable third rotation.
 - b. CMB would assign one or more faculty advisors (e.g., the Director, an Associate Director, or other CMB faculty member) to assist the student in identifying possible rotation mentors. As part of this process, the student is expected to provide a document that summarizes their reasons for leaving their dissertation lab. In addition, they should indicate the reason(s) that changing labs will help them achieve their short- and long-term goals. The intent of this requirement is to provide a formal process through which students and CMB advisors will be more likely to make decisions and recommendations consistent with the students' long-term goals. This will be a confidential document* that will be used solely to assist the Director or their surrogate in providing the best possible guidance for the student.

*Note that certain circumstances may require disclosure to the University Office of Institutional Equity.

3. CMB would offer to mediate discussions between the former mentor and student regarding the disposition of the student's data, including possible recognition in future publications. The mediator could be a member of the CMB Program Committee, the student's dissertation committee or another suitable university faculty member. Any agreement made would have to be satisfactory to both the student and mentor.
4. CMB would assist in identifying a volunteer peer-mentor to assist the student in negotiating the change of labs.
5. CMB would encourage the student to request 2 letters of support from faculty who are well-suited to evaluate the student. These letters would be made available to potential rotation mentors to add perspective and context.

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6. Because the process of changing labs can be stressful, students should consider taking advantage of a number of campus resources available to them (see below).

UNIVERSITY RESOURCES FOR STUDENTS

Campus Mental Health Resources

Review Rackham's "got stress?" brochure, a resource developed especially for graduate students to help normalize feelings of stress and reduce the stigma of talking to someone about concerns. This brochure also includes a map of counseling/treatment and support/referral resources. An electronic version of the brochure is available on the following website:

http://www.rackham.umich.edu/student_life/health_and_wellness/resources/mental_health/

CAPS Groups for Graduate Students:

Seeking a supportive and therapeutic forum in which you can share experiences of a U-M graduate student, receive support and feedback, while developing life-affirming strategies for navigating these experiences? Consider talking with [Counseling and Psychological Services \(CAPS\)](#) about any of the [groups or workshops](#) or simply stop by for one of the drop-ins. Give CAPS a call at (734) 764-8312 if you have ANY questions at all.

CAPS is centrally located on the third floor of the Michigan Union (3100) .

Hours: Mon-Thurs 8am-7pm, Fri 8am-5pm (Fall/Winter); Mon-Fri 8am-5pm (Spring/Summer).

Center for Statistical Consultation and Research:

CSCAR provides free statistical consulting to all UM faculty, staff, and graduate students with the design, planning, analysis, and presentation of research studies. CSCAR also offers workshops on statistical methods, statistical software, and qualitative data analysis. Spring workshop offerings include Statistics Review, SAS, SPSS, Stata, SEM and Analysis with R. Visit the [CSCAR](#) website for current offerings and additional information.

English Language Institute:

The mission of [the English Language Institute](#) Instructional Division is to provide English language instruction to members of the University of Michigan community that promotes effective academic and intercultural communication within and across disciplines at the University of Michigan. They can be reached through the web or by calling (734) 764-2413.

Office of the Ombuds:

The [Ombuds office](#) is a place where student questions, complaints and concerns about the functioning of the University can be discussed confidentially in a safe environment. The Office offers informal dispute resolution services, provides resources and referrals, and helps students consider options available to them. The Office of the Ombuds can be reached through the web or by calling (734) 763-3545.

Rackham Graduate Student Emergency Funds:

The [Rackham Graduate Student Emergency Fund](#) is intended to help meet the financial needs of Rackham graduate students who encounter an emergency situation or one-time, unusual, or unforeseen expenses during their degree program including medical emergencies, major accidents, and expenses related to the death of an immediate family member.

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Rackham Graduate Student Research Grant.

The [Rackham Graduate Student Research Grant](#) is designed to support Rackham graduate students who need assistance to carry out research that advances their progress toward their degree.

Rackham Conference Travel Grant:

The [Rackham Conference Travel Grant](#) is intended to provide opportunities for Rackham graduate students to become familiar with, and participate in the life of, their academic professions. As part of its University-wide commitment to advancing international research and training, the International Institute provides funding for 30 awards to international destinations. The remainder of the funding comes from Rackham. You must submit your applications before the first day of the conference for travel through the end of the final term of registration. The conference may occur any time up through your final semester of registration.

Services for Students with Disabilities:

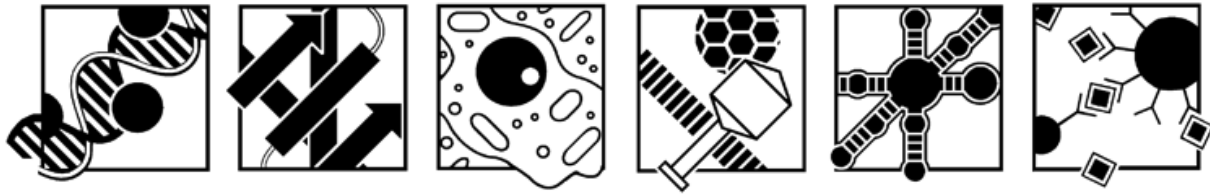
All academic accommodations for students with disabilities are handled through the [Office of Services for Students with Disabilities \(SSD\)](#). The SSD staff will work with you to determine reasonable academic accommodations. SSD can be reached through the web or by calling (734) 763-3000.

Students with Children Website:

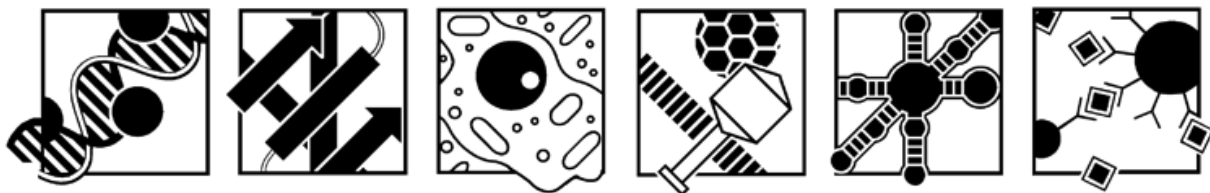
This [site](#) is dedicated to the needs of students at U-M who juggle parenting/family care, study, and work. Resources include childcare, financial assistance, social support, housing, and health care information. For additional information on work/life supports for faculty, staff and students, please also visit [the Work/Life Resource Center site](#) and the [U-M Child Care Gateway](#).

Sweetland Center for Writing:

The [Sweetland Center for Writing](#), a comprehensive writing center, exists to support student writing at all levels and in all forms and modes. They can be reached through the web or by calling (734) 764-0429.



CMB HANDBOOK STUDENT COMMITTEE SUPPLEMENT



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CMB STUDENT COMMITTEE DESCRIPTIONS

Program Committee – Between 2 and 4 students represent the CMB student body at Program Committee meetings, which occur every two months. The committee meets to discuss admission of incoming students and faculty members, program and course requirements, recruiting, CMB funding, approval of dissertation committees, and many other items pertaining to the continued growth and success of the CMB program. Special meetings, especially during the recruiting period near the beginning of the year, are also required as part of this position.

Short Course Committee (Fall) – Four students plan the Fall short course, which is held in conjunction with the Genetics Training Program. These students, with the aid of a faculty advisor, select the short course topic and invite outstanding leaders in the field to participate as speakers in the short course. They also help in coordinating the seminar times/locations and student lunches with the speakers. General guidelines/timelines are available from the CMB office to assist in planning the seminar, which requires advanced preparation to secure a good panel of speakers. This committee works best if all of the members of the short course committee have similar research interests, and is an excellent opportunity to meet top researchers in that field!

CMB Retreat Committee – Four CMB students work with two faculty coordinators with the planning and scheduling of the annual retreat, which is a weekend in mid-October. This includes finding the location, getting a keynote speaker, and creating activities. The retreat alternates between on-site and off-site venues every year.

CMB Symposium Committee – Two CMB students are needed to assist the faculty coordinator with the Spring CMB Symposium. This includes coordinating the CMB Poster Session, which follows the Myron Levine Lecture.

Recruitment Committee – Persons from this committee, together with the Program and Social Committee members, help to coordinate the CMB activities during the PIBS recruitment weekends, as well as the visits of recruits who visit Michigan on alternate weekends. The duties of this committee include assigning student recruits to CMB student hosts, assigning/selecting restaurants and nighttime activities for the weekend, planning CMB program presentations (e.g. poster presentations), etc. This is approximately a 2-month commitment during which meetings occur approximately every 2 weeks.

Recruiting Program Coordinators – During recruiting season (Jan-Feb), two students to help organize the presentations at the lunch and reception each recruiting weekend, where students and faculty make presentations about CMB to visitors. (Students will line up speakers, host the presentations, set up PowerPoint/audiovisuals, etc.).

Student Advisors on the Academic Advisory Committee – Two-four students are available at the same time as the faculty advisors to advise pre-candidates on course choices, rotations, student seminars, and prelims. Meetings with pre-candidates occur twice a year, and advisors must themselves have achieved candidacy. It is preferable to have at least one student advisor be a former PIBS student since incoming students now come through PIBS.

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Career Development – The Career Development Committee consists of students and a faculty advisor who plan workshops and that explore the diverse career options available to CMB graduates.

Social Committee – Consisting of 3-4 students who are in charge of scheduling CMB student gatherings and social outings. These gatherings in the past have included the Welcome Barbeque and Holiday Party for students and faculty, bowling nights, ice-skating, gatherings at a local restaurant, etc. The goal of this committee is to promote and facilitate camaraderie between CMB students. Some funding may be obtained for these events from the CMB program. Committee members also play a limited role in planning activities related to recruitment and the Retreat.

CMB Newsletter Editor/Coordinator – Two students serve as editors of the biannual CMB Newsletter. This can be spearheaded by multiple students who are willing to create a 4-6-page newsletter keeping the CMB faculty and students abreast of various CMB activities and important events or accomplishments in the lives of faculty, students, and alumni. The newsletter has also been added to the CMB web site, particularly for recruitment, outreach and contact with alumni.

CMB Website Committee – Two students will be in charge of monitoring the CMB website for necessary updates, including the addition of new students, faculty, and alumni; updating the calendar; and reviewing overall content for accuracy, relevance, and user-friendliness. Students will also coordinate the acquisition of photos for student profiles and events. Ideally, at least one of these students will be familiar with website maintenance so they can help with updates and monitor website performance using Google Analytics.

CMB Event Photographers – One or several students who like to take photos, take responsibility to do so at CMB events, and provide photos both for the CMB website, and for the Newsletter Coordinators. CMB can provide the digital camera.

Summer Journal Club – The Journal Club is a student-only, informal meeting space where students can gather to discuss a paper (or their own writing), chosen by that week's facilitator. Journal Club typically meets every other week, but students can create their own schedule. Two students will be in charge of recruiting students, setting the schedule, collecting materials, and sending reminders.

DEI Task Force – This task force will be chaired by the faculty and student diversity allies, and will include at least two additional CMB students as well as at least two additional CMB faculty. The responsibilities of this task force will include (but not be limited to):

- 1) Soliciting and determining DEI topics/speakers for CMB 850
- 2) Updating the CMB Handbook and website to include defined DEI sections
- 3) Working with the short course and symposium committees to ensure diversity in speaker selections
- 4) Reviewing DEI statements from new CMB Faculty applicants and during the review of continuing CMB Faculty
- 5) Determining the best use of funds from the Rackham Faculty Ally Diversity Grants
- 6) Identifying and implementing new DEI opportunities for CMB, including the assessment of these events on the climate within CMB
- 7) Posting the minutes of all CMB DEI task force meetings on the CMB website for review and comment by all members of the CMB community

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OTHER U OF M STUDENT ORGANIZATIONS:

Association of Multicultural Scientists – The Association of Multicultural Scientists is a graduate student-run organization supported by the PIBS program to promote diversity within the graduate programs through the recruitment and retention of historically underrepresented groups. Their primary role is to assist the membership in the successful completion of the Ph.D. by offering programs and support which will meet academic, social, and professional needs in an atmosphere of cultural context and comfort.

Biomedical Graduate Student Government (BGSF) – The purpose of BGSF is to promote and represent the interests of graduate students in the biomedical sciences. They provide an organized way for graduate students to voice their opinions on their education and to provide services and programs which enhance their graduate experiences.

SACNAS – In the Fall of 2015, a group of CMB and other students established a University of Michigan Chapter of the national organization, SACNAS, the Society for the Advancement of Hispanics/Chicanos and Native Americans in Science. SACNAS at UMich is an inclusive organization dedicated to fostering the success of underrepresented scientists in attaining advanced degrees, careers, and positions of leadership in STEM.. The purpose of the UMich chapter is (1) to promote recruitment and retention of underrepresented minorities in STEM and (2) to provide a forum for students from different science majors to come together for academic, community service and social activities at the University of Michigan.

AMS and the SACNAS Chapter work together closely for the interests of underrepresented STEM students at Michigan.

More U of M organizations can be found on the [PIBS student organization website](#) or on [MaizePaiges](#).

GRADUATE PROGRAM IN CELLULAR AND MOLECULAR BIOLOGY

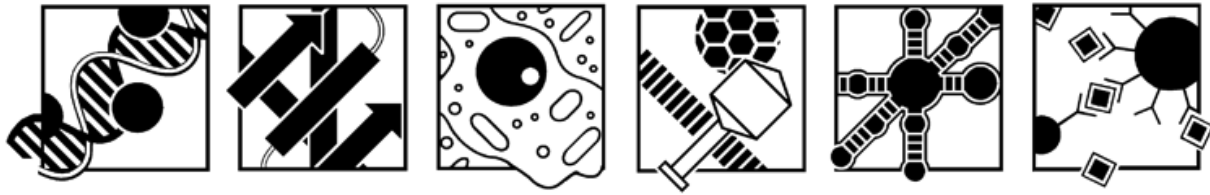
2020-2021 CMB STUDENT COMMITTEE MEMBERS

Program Committee:	Haley Amemiya* Sumin Kim Nico Gomez Maria Virgilio
Fall 2020 Short Course:	Hannah Bell Shahana Chumki* Sylvia Emly Elizabeth Gensterblum-Miller Gabe Manske
Fall 2021 Short Course:	Hannah Bell* Brandon Chen Ansley Conchola Wesley Huang Brynne Raines Lulu Tseng
Fall 2020 Retreat – 11 th Annual:	Collin Marshall Ariel McShane Rosa Menjivar Anna Michmerhuizen
Fall 2021 Retreat – 12 th Annual:	Wesley Huang Ariel McShane*
Spring 2021 CMB Symposium – 39 th Annual:	Wesley Huang Stephanie Crilly
Recruitment Committee:	Ariel McShane Rosa Menjivar* Vani Ravichandran* Angela Tuckowski
Student Advisors:	Molly Kuo* Vani Ravichandran* Andrew Valesano* Angela Tuckowski
Career Development:	Hannah Bell Sylvia Emly Sumin Kim*
Social Committee:	Emily Eberhardt Marshall Howington* Brynne Raines Angela Tuckowski
Newsletter:	Chris Bidlack Sarah Connolly
Website/Social Media:	Emily Eberhardt
Photographer:	Chris Bidlack
Summer Journal Club:	Chris Bidlack Brynne Raines

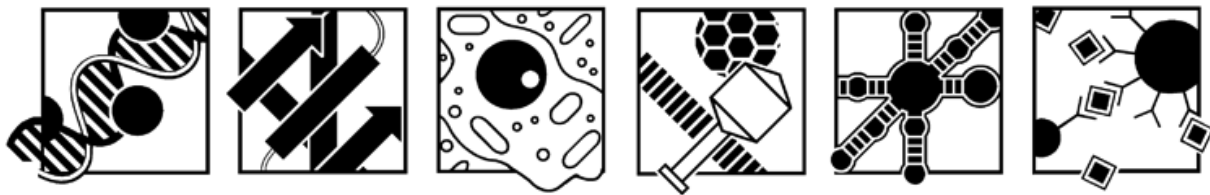
GRADUATE PROGRAM IN CELLULAR AND MOLECULAR BIOLOGY

<p>CMB DEI Task Force: ~ <i>DEI Student Diversity Allies</i></p>	<p><i>Haley Amemiya</i> ~ Brandon Chen Emily Eberhardt Elizabeth Gensterblum-Miller Maha Hamed Sumin Kim Rosa Menjivar <i>Allyson Munneke</i> ~ Vani Ravichandran</p>
<p>PIBS-AMS: (<i>Members in CMB</i>)</p>	<p>Chris Bidlack Brandon Chen Maha Hamed Rosa Menjivar* Harihar Milaganur Mohan</p>
<p>PIBS-BGSG: (<i>Members in CMB</i>)</p>	<p>Ariel McShane Harihar Milaganur Mohan Kaitlyn Speckhart Maria Virgilio</p>
<p>UM-SACNAS: (<i>Members in CMB</i>)</p>	<p>Rosa Menjivar*</p>

*Students on committee more than one year.



CMB HANDBOOK FACULTY SUPPLEMENT



GRADUATE PROGRAM IN CELLULAR AND MOLECULAR BIOLOGY

ACTIVITIES EXPECTED OF ALL CMB FACULTY

Attend CMB 850 – Student Seminar:

CMB 850 is the student seminar course that meets each Monday from 12-1pm (snacks are provided), from September through May. Entering students (2nd-year PIBS / G1 MSTP) and Senior students present their own research; they often invite faculty members of their dissertation committees to attend. Students also serve as moderators of discussion and evaluators of presentations.

All CMB faculty are scheduled to attend at least three CMB student seminar presentations during the academic year, should participate in the discussion, and sign the attendance sheet. Attendance dates for faculty are assigned at beginning of academic year. If a faculty member cannot attend on assigned date, it is expected that he/she will attend on another convenient date.

Preliminary Exam Committees (4 faculty/committee):

All CMB faculty are expected to serve on CMB preliminary examination committees when asked, either by student or by Prelim Coordinators. Prelim Exams are scheduled during a 2-week period, generally mid- to late-February, or early March. Faculty on prelim committees are expected to provide constructive feedback to students within a week of receiving the student's abstract, and within a week of receiving the prelim proposal. Feedback can be communicated directly to student, or via the Prelim Exam Committee Chair appointed by the Prelim Exam Coordinator.

Dissertation Exam Committees (4-5 faculty/committee for each candidate student):

All CMB faculty are expected to serve on CMB dissertation committees when asked by students. The first dissertation committee meeting occurs within 6 months of a student being advanced to candidacy. Regular dissertation committee meetings then occur every 6 months, or more frequently when a committee so advises. Dissertation committee members receive the dissertation 10 days prior to the scheduled defense, and submit an evaluation to Rackham 3 days prior to defense. The dissertation defense consists of a public seminar, followed by a private defense with members of the dissertation committee.

CMB Program Events and Activities:

All CMB faculty are expected to make an effort to attend CMB events throughout the year. Annual CMB events include the: Welcome Picnic (August), Annual Symposium and Poster Session, CMB events during PIBS recruiting weekends (January/February), CMB/Genetics short courses (Fall and Winter), the Holiday Party, and the CMB Retreat. Additional activities throughout the year include new faculty-student lunches, career development workshops, summer journal club, NSF workshops, and various social activities.

GRADUATE PROGRAM IN CELLULAR AND MOLECULAR BIOLOGY

ADDITIONAL ACTIVITIES FOR CMB FACULTY (OVERVIEW)

(Descriptions on Following Page)

Courses and Curriculum

CMB 850 (Student Seminar) – Faculty Coordinators/Advisors, Evaluators, Attendees

CMB 630 (Short Course) – Faculty Coordinators/Advisors

PIBS Curriculum Committee Representative

PIBS 503 – Research Responsibility Course Discussion Leader

Pharm 502 – Grant Writing Course Section Leader

Student Training

Preliminary Exam Coordinators

Preliminary Exam Committees

Dissertation Exam Committees

Academic Advising

Fellowship Appointments and Awards

Career Development Workshops

Student Recruitment

PIBS Recruitment Committee Reps

CMB Admissions Committee

CMB Recruiting Events

Diversity Recruiting/DEI Faculty Ally

CMB Program Events

CMB Annual Symposium – Coordinators and Poster Judges

CMB Retreat Coordinators

Faculty Affairs

New Faculty Lunches

Faculty Review

Communications

Newsletter Committee Advisor

Website/Social Media Advisor

Administration and Policy

Program Committee

GRADUATE PROGRAM IN CELLULAR AND MOLECULAR BIOLOGY

ADDITIONAL ACTIVITIES FOR CMB FACULTY (DESCRIPTIONS)

Courses and Curriculum

CMB 850 – Faculty Attendees (15-20/week)

Faculty are assigned to attend 2-3 student seminars per year, of the CMB 850 seminar course that meets each Monday, 12-1 pm, from September through May. In addition to their assigned weeks, faculty are encouraged to attend as many weekly seminars as possible and to provide feedback for the student presenters.

CMB 850 Course Directors (2 faculty)

Two CMB faculty coordinators share responsibility for attending the weekly seminars. They also develop the schedule for student presentations, rehearsals and evaluations, composing the full year schedule during the summer before. The Course Directors are responsible for recruiting faculty to serve as seminar and rehearsal evaluators. The administrator does monitor student attendance, and grade students with a grade of “S” or “U,” but course directors serve as advisors and must approve absences.

CMB 850 Evaluators (20-25 faculty)

Each week, a CMB faculty evaluator provides feedback to CMB student presenters on their seminars, both during the rehearsals, usually the Wednesday preceding the seminar, and at the final seminar on Monday. Course Directors recruit the team of Evaluators, and work with faculty to determine convenient dates for them to serve as evaluators, arranged at the beginning of the academic year. At the rehearsal, with mentor present, the evaluator provides feedback to the student for preparing and delivering a professional seminar presentation. At the Monday seminar, the evaluator stays briefly after the seminar to provide oral feedback, and completes a brief form summarizing evaluation that is shared with student and submitted to the CMB office.

CMB 630 – Short Course Faculty Coordinators (1-2 faculty)

The CMB Short Course is a mini-symposium on a topic selected by students, who invite speakers and organize the course, which takes place during the Fall term. The course is co-sponsored by the Genetics Training Program, and GTP students organize the Winter Short Course. Faculty Coordinators (1-2) are selected by student organizers to work with them to plan and implement the Short Course. Students work with faculty coordinators to invite four speakers to participate in the Short Course. Faculty Coordinators present an introductory seminar on the topic of the Short Course, and help coordinate visits. Coordinators often meet with the invited speakers for dinner. The administrator is responsible for grading registered students with a grade of “S” or “U,” and tracking attendance, but Course Coordinators do approve absences.

CMB Representatives - PIBS Curriculum Committee (1-2 faculty)

Curricular issues for the 13 participating graduate programs are coordinated through PIBS. CMB students take an individualized program of didactic courses that are offered by Departments and Programs throughout the university. Each graduate program, including CMB, identifies one or two faculty representatives to the PIBS curriculum committee, which meets 1-2 times per year, as needed.

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PIBS 503: Research Responsibility – Small-Group Discussion Leader (1 faculty member)

The Research Responsibility course, which takes place each Fall term, is now online, including podcasts. The material is accompanied by a required set of small-group discussions. Faculty from all graduate programs, including CMB, participate in conducting small-group discussions, by arrangement with the Course Director. The discussions are often scheduled as a cluster, including on Saturday.

Pharm 502: Grant Writing – Small-Group Session Leader (1-2 faculty members)

The Grant Writing Course, which takes place during Winter term, involves lectures and small-group sessions. Faculty from all graduate programs, including CMB, participate in conducting small-group discussions, by arrangement with the Course Director.

Student Training

Preliminary Exam Coordinators (Director and Associate Directors)

Prelim Coordinators work with students and their mentors to ensure that students complete their preliminary exams in a timely fashion, according to the deadlines put forth by the Program Committee. The coordinators approve the topic for the prelim exam. Students select two CMB faculty to serve on their prelim committees, and the Prelim Coordinators arrange for two additional faculty for each prelim committee, and identify one of the faculty members to serve as Committee Chair. Typically, each Prelim Coordinator works with 4-5 students.

Preliminary Exam Committees (4 faculty/committee)

All CMB faculty are expected to serve on CMB preliminary examination committees when asked, either by the student or by Prelim Coordinators. Prelim Exams are scheduled during a two-week period, generally mid- to late-February or early March. Faculty on prelim committees are expected to provide constructive feedback to students within a week of receiving the student's abstract, and within a week of receiving the prelim proposal. Feedback can be communicated directly to the student, or via the Prelim Exam Committee Chair appointed by the Prelim Exam Coordinator.

Dissertation Exam Committees (4-5 faculty/committee for each candidate student)

All CMB faculty are expected to serve on CMB dissertation committees when asked by students. The first dissertation committee meeting occurs within 6 months of a student being advanced to candidacy. Regular dissertation committee meetings then occur every 6 months, or more frequently when a committee so advises. Dissertation committee members receive the dissertation 10 days prior to the scheduled defense, and submit an evaluation to Rackham 3 days prior to the defense. The dissertation defense consists of a public seminar, followed by a private defense with members of the dissertation committee.

Teaching Coordinators (Associate Directors)

CMB students are required to teach for one semester. They generally teach during the year after being advanced to candidacy. The CMB Directors serve as advisors on teaching opportunities for students, and often serve as liaisons to departments that are seeking TAs and GSIs. The CMB Administrator also solicits info from SSRs.

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Academic Advising (CMB Directors)

CMB faculty members familiar with course offerings meet with students prior to course registration (generally July, Aug/Sept, and Nov), to advise them on course selections in the context of PIBS and CMB.

Fellowship Appointments and Awards Committee (CMB Directors)

Appointments to the CMB Training Grant are recommended by the Fellowships and Awards Committee. Students selecting CMB for the Ph.D. program submit materials (research statement, transcript, etc.) in conjunction with their mentors. The call for nominations occurs in the Spring, and selections are made prior to the anniversary of the Training Grant (July 1).

CMB Training Grant Policy

We will not allow a student on the CMB training grant to be appointed to a second NIGMS predoctoral training grant. Conversely, if a student has been appointed to another NIGMS training grant (with the exception of the MSTP training grant), that student will be ineligible for future appointment to the CMB training grant.

CMB students have been recipients of national, university and Medical School awards. The Awards committee reviews nominations for awards several times during the year. These include: the CMB Training Grant and Rackham Regents Fellowship (July), Medical School Research, Teaching and Service Awards (August), national Harold M. Weintraub Award (November), Rackham Predoctoral Fellowship (November), and the Distinguished Dissertation Award (November). Committee members draft nomination letters as needed.

Career Development Coordinator (1 faculty member)

CMB presents a number of workshops for students on topics pertinent to career development. During Fall term, the first session of CMB 850 provides guidelines and tips on how to give an effective scientific seminar. An NSF workshop is also held to help students prepare their applications for an NSF fellowship. Prior to the preliminary exam period, CMB organizes a workshop on how to write a **prelim proposal**. Throughout the year, several workshops are presented on relevant topics, such as how to conduct a job search, write a CV, and faculty/student/alumni panels representing different career options are held. The coordinator of the career workshops recruits faculty and alumni to participate in the presentations.

Recruiting New Students

CMB Admissions Committee (10-12 faculty)

CMB Admissions Committee has a meeting for internal review of our applicants a day or two before the PIBS meeting. The committee is composed of 10-12 faculty members, including the faculty representing CMB on the PIBS Admissions Committee. After each recruiting weekend the CMB Admissions Committee meets once interview evaluations have been submitted (1-2 days later), to rank applicants for making offers.

CMB Recruiting Activities (multiple faculty)

During PIBS recruiting weekends (January/February), CMB faculty have opportunities to interview applicants individually (followed by submitting written evaluations), to attend a

GRADUATE PROGRAM IN CELLULAR AND MOLECULAR BIOLOGY

reception to meet all PIBS/CMB applicants, to attend dinners with applicants, and to participate in CMB program events. Some faculty will also have an opportunity to make brief presentations to applicants during lunch and receptions for applicants. Students often arrange research rotations with faculty whom they met during recruitment weekends.

CMB Program Events

CMB Annual Symposium

Coordinator/Host (1 faculty member)

A CMB faculty member invites a prominent scientist to present the Myron Levine Lecture at the Annual CMB Symposium during the Spring. Invitations are arranged at least one year ahead. The CMB faculty member then hosts the Myron Levine lecturer during his/her visit. The CMB office arranges the speaker's schedule, including a lunch with students and meetings/dinner with faculty members.

CMB Annual Symposium Poster Session Coordinators (2 faculty)

The CMB Poster Session immediately follows the Myron Levine Lecture and is attended by all CMB students and faculty laboratories. The primary responsibilities of the Poster Session coordinators take place during the month of May. The key responsibility for this position is organizing the judging of all of the student posters. The coordinators recruit a panel of judges (usually around 8-10), determine the timing of student presentations of their posters, and assign judges to evaluate specific posters. The evaluation of the posters takes place during the morning before the poster session. The coordinators assemble the rankings and provide information for presentation of Poster Awards. The coordinators also run the program at the Poster Session when awards are presented.

CMB Annual Symposium Poster Judges/Evaluators (8-10 faculty)

A team of 8-10 CMB faculty serve as judges of posters submitted by CMB students for the annual Poster Session. The judges listen to students present their posters, and select the top three posters for awards provided by the Rackham Graduate School. The judging takes place during the morning before the public Poster Session.

CMB Annual Retreat

Retreat Coordinator (1 associate director)

The CMB Retreat facilitates interactions between students and faculty in an informal setting at an off-site location, generally during a weekend in the Fall. The event features a prominent keynote speaker, short oral presentations of research (format as if at a national meeting) and poster session/mixer. Various activities are planned to allow students and faculty to socialize in an informal setting. The CMB Retreat Coordinators work with students on the committee to develop the Retreat Program and insure dynamic, educational and enjoyable interactions among students, speakers and invited faculty participants.

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Faculty Affairs

New Faculty Lunches – (Administrator)

CMB coordinates lunches during the Fall term where new faculty in the program present their research to first-year PIBS students and MSTP students who are still arranging research rotations. One CMB faculty member coordinates the faculty presentations by contacting new faculty, assigning dates for presentation, and serving as Chair of the session when CMB faculty members make presentations.

Faculty Review (6 faculty)

CMB faculty members are reviewed every 5 years; new CMB faculty members are reviewed 3 years after their appointment. The Faculty Review is conducted by a committee of 6 faculty members who serve staggered 3-year terms. At the time each faculty member is being reviewed, she/he fills out a questionnaire documenting participation in program activities, and also provides an updated NIH biosketch, including publications and grant support. The committee evaluates participation and resources to support students financially to determine eligibility for continued membership in CMB. The committee summarizes their evaluations and makes recommendations to the Program Committee.

Program Communications

Newsletter (1 faculty member)

The CMB Newsletter is printed twice a year, generally in the Fall term and in April. Student editors prepare and assemble the newsletter. The faculty coordinator works to keep the students on track and edit the newsletter before printing.

Website/Social Media (1-2 faculty & students)

To keep the CMB website current and up-to-date, 1-2 CMB faculty members, working with a designated CMB student(s) and the CMB office, monitor the website and recommend updates.

Administration and Policy

Program Committee (12-15 faculty)

The CMB Program Committee is the policy-making body of CMB and is comprised of approximately 12 faculty from departments represented among CMB faculty and students, and Directors of PIBS and MSTP. Students sign up directly to serve on this committee. The CMB Program Committee meets every other month to discuss student issues, faculty issues (including review of faculty applications), and program policies and procedures. Faculty are selected by the Director to serve 3-year terms on the CMB Program Committee and responsibilities are ongoing.

Faculty Diversity Ally Program

Faculty Diversity Allies work with Rackham Graduate School on issues of student recruitment, admissions, and retention. The allies also serve as contacts for students within individual graduate programs on diversity issues in graduate education. Please see [here](#) for more information. The Faculty Allies representative for CMB also coordinates the DEI Task Force, and meets with CMB students about any diversity-related matters of interest or concern.

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2020-2021 CMB FACULTY COMMITTEES

Director	Manoj Puthenveedu
Associate Directors	Benjamin Allen Robert Fuller Marina Pasca Di Magliano
Program Committee	<p>Ben Allen – CMB Associate Director (CDB) Kathy Collins – MSTP Director (Micro & Imm; Int Med) Bob Fuller – CMB Associate Director (BioChem) Marina Pasca Di Magliano – CMB Associate Director (Surgery) Manoj Puthenveedu – CMB Director (Pharmacology) David Antonetti-Opth & MIP Vern Carruthers – Micro & Imm David Ferguson – Pathology Sue Hammoud – Human Genetics Ken Inoki – MIP Ann Miller – MCDB Lois Weisman – CDB</p> <p><u>Ex-Officio:</u> Scott Barolo - PIBS Director Kathleen Collins - MSTP Director Mary O’Riordan - Med School Assoc Dean</p>
CMB 850 Evaluators	<p>Arun Anantharam Sami Barmada Matt Brody Adam Courtney Morgan DeSantis Patrice Fort Tom Glover Sue Hammoud Michael Imperiale Paul Jenkins Ajit Joglekar Adam Lauring Allen Liu Stephanie Moon Goutham Narla Lev Prasov Jordan Shavit Jason Spence Peter Todd Matthias Truttmann Billy Tsai Sriram Venneti Christiane Wobus</p>

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CMB Admissions	<p>Chairs: Dave Antonetti, Sue Hammoud</p> <p>Members:</p> <p>Ben Allen Sami Barmada Matt Brody Mark Chiang Josie Clowney Adam Courtney Morgan DeSantis Mara Duncan Rami Khoriaty Allen Liu Ryoma (Puck) Ohi Akira Ono Scott Pletcher Manoj Puthenveedu Ariella Shikanov Alan Smrcka Scott Soleimanpour Corey Speers Jason Spence Alice Telesnitsky Lois Weisman Megan Weivoda</p>
Faculty Review	Bob Fuller
New Faculty Lunches	Bob Fuller
CMB Student Advising	<p>Manoj Puthenveedu – PIBS, 2nd-year/G1, & 6th-year/G5+</p> <p>Bob Fuller – 3rd-year/G2</p> <p>Ben Allen – 4th-year/G3</p> <p>Marina Pasca Di Magliano – 5th-year/G4</p>
Prelim Coordinators	<p>Ben Allen</p> <p>Bob Fuller</p> <p>Manoj Puthenveedu</p>
Prelim Workshop	Manoj Puthenveedu
CMB 850	<p>Stephanie Bielas</p> <p>Scott Leiser</p>
CMB Recruiting	<p><u>ABRCMS</u>: Ben Allen (Rackham Diversity Ally), Brandon Chen (student)</p> <p><u>SACNAS</u>: Bob Fuller, Rosa Menjivar (student)</p>

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Rackham Diversity Allies:	Ben Allen Haley Amemiya (student) Allyson Munneke (student)
PIBS Preview:	Bob Fuller Manoj Puthenveedu Ariel McShane Rosa Menjivar
PIBS/MSTP Open House	Bob Fuller Ariel McShane (student) Rosa Menjivar (student)
Retreat	Manoj Puthenveedu
Newsletter	Karl Desch
Career Development	Mara Duncan
NSF Workshop	N/A for 2020-2021
PIBS 503 (Ethics)	All Training Faculty
PHARM 502 (Grant Writing)	Chad Brenner Jillian Pearring JoAnne Sekiguchi Sunny Wong
CMB 2020 Fall Retreat	N/A for 2020-2021
CMB 2021 Symposium	N/A for 2020-2021

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APPLYING FOR FACULTY MEMBERSHIP IN CMB

Faculty applications are reviewed directly by the CMB Program Committee to ensure that faculty members have appropriate resources, projects, and scientific training to provide a strong training environment for Ph.D. students.

The following are expected:

- Active research program and peer-reviewed publications in the area of cellular and molecular biology.
- Evidence that the applicant will provide outstanding mentorship to graduate students.
- Sufficient external funding to support a student and the student's research. For newly hired faculty, startup funds may also be considered if there is a letter of support from the department chair pledging financial support for the student should there be a lapse in funding.

To evaluate the above, faculty applicants should provide:

1. A cover letter from the faculty member, describing what type of projects might currently be available for a Ph.D. student; if any students and postdoctoral fellows have already been mentored; and a description of how these experiences turned out and where the students/postdocs are now would also be useful.
2. A curriculum vita (CV) or NIH-style biosketch describing training, professional history and publication record.
3. A description of current research support (NIH-style "Other Support" format is OK). Major competitive grant support is considered an important indicator of training resources, since CMB students are not expected to teach to support themselves after they are supported by PIBS/CMB. Please indicate all of the internal and external resources that you will have available to support a doctoral student and the student's research. If you do not have external support, indicate how you will budget your resources (including start-up) to reserve funds for support of a student and the student's research. If funding status is an issue, a letter from the department chair is needed stating that funds will be provided by the department during funding gaps, if needed, to support training of the student until their dissertation defense.
4. An NIH-style "Resources and Environment" statement describing the physical facilities available to the faculty member.
5. A one-page (maximum) statement of the faculty's research interests, to be used in the NIH training grant and website. Include a "one-line" (1-2 phrases) description of your research area as a title.
6. Two letters of reference from current faculty members of CMB. Current CMB faculty are listed on the CMB website.
7. In addition to the two letters of recommendation from current CMB faculty members, applicants are also asked to supply a letter of support from the chair of their department stating that should you have a CMB student in need of funding, the department will provide interim support for that student until you obtain funds to support that student. This letter should be addressed to the CMB director.

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Co-Mentoring Procedures:

New CMB junior faculty (assistant professors) who have not previously mentored a CMB student will choose a senior co-mentor who should be a CMB faculty member (associate or full professor) who has trained CMB students in the past. These mentors will have a role both for rotation students and for students who join the faculty member's lab.

1. Rotations – the senior co-mentor will meet with the new faculty member and discuss possible rotation projects and how to interact with a rotation student (this will of course be limited to "primary" CMB/PIBS rotation students). The co-mentor should meet with the student and mentor at least once during the rotation period.
2. CMB students who have joined labs of new CMB junior faculty
 - a. Co-mentor will meet with student and mentor once per quarter to discuss progress until the student has advanced to candidacy. The co-mentor will be available to meet with the student or junior faculty member separately.
 - b. The co-mentor can be on the prelim committee
 - c. The co-mentor member should serve on the dissertation committee

Faculty applicants should feel free to call the CMB Office (734-764-5428) if they have any questions about the CMB program or details of the application process. Materials can be sent directly to the CMB office (2966 Taubman Health Sciences Library, Box 5619, email: cmbgrad@umich.edu).

CMB FACULTY REVIEW

The CMB Faculty Review Committee (FRC) reviews a subset of the CMB faculty each year. The FRC is composed of six faculty members appointed by the CMB Director, who serve staggered 3 year terms. The FRC does not have formal student representation. However, students who would like to provide constructive input regarding CMB faculty are encouraged to do so either through the two student representatives on the Program Committee or by contacting the CMB Director.

New CMB faculty members are reviewed 3 years after their appointment. Other faculty are reviewed every 5 years. Approximately one-fifth of the CMB faculty is reviewed each year. Criteria for continued membership in CMB which the FRC will consider to evaluate faculty include: attendance at CMB 850; participation in the various CMB educational activities such as mentoring dissertation students, being on CMB dissertation committees and CMB prelim committees; serving on other CMB committees; and presenting a poster at CMB events such as the Spring Symposium.

Faculty participation will be documented by faculty sign-in at CMB 850 each week. In addition, once per year, all CMB faculty will be asked to fill out a brief annual participation questionnaire which is designed to take only about a minute to complete.

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Minimum faculty participation will be evaluated in the faculty review (detailed descriptions in ACTIVITIES FOR ALL CMB FACULTY section above):

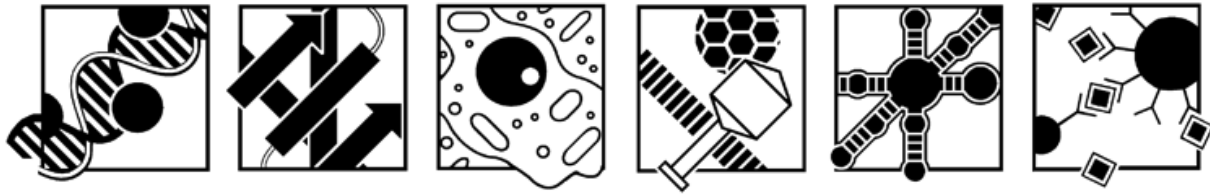
- attend the CMB student seminar series (CMB 850) at least three times per year. Attendance dates are assigned for faculty convenience; faculty who cannot attend as assigned can choose alternate dates.
- attend the annual CMB Symposium and Poster Session (typically in early to mid-May)
- serve on preliminary examination committees when asked
- serve on dissertation committees when asked

Other opportunities for CMB faculty participation that will be evaluated in the faculty review include (detailed descriptions in ADDITIONAL ACTIVITIES FOR CMB FACULTY):

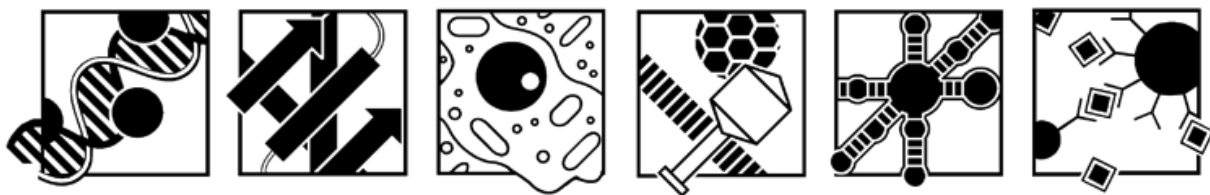
- CMB Short Courses
- CMB/PIBS Recruiting and Admissions section
- CMB Student Advising
- CMB Program Committee
- Mentoring CMB student dissertation research

In addition, at the time each faculty member is reviewed, she/he provides an updated NIH biosketch, including publications and grant support. Loss of funding should not lead to dismissal from CMB unless this is for a prolonged period of time. However, a CMB faculty member without long-term funding adequate to support a student and the student's research cannot accept new CMB graduate students into his/her lab.

CMB initiates the faculty review by asking the faculty member whether she/he wishes to apply for membership renewal. Faculty Review Committee members will review faculty by the above criteria and recommendations made to the Program Committee. Active faculty members who fulfill the criteria required for program membership will generally be renewed for 5 years. If the Faculty Review Committee determines that a faculty member no longer fits the criteria for continued membership in CMB, a recommendation will be made to the Program Committee that membership not be renewed. Re-application for admission to CMB is an option for any faculty member who would like to be re-considered for membership at a later date. The Faculty Review Committee and the Program Committee will evaluate the strengths and weaknesses of the actual review process on a regular basis, and make adjustments accordingly.



CMB HANDBOOK APPENDICES



GRADUATE PROGRAM IN CELLULAR AND MOLECULAR BIOLOGY

APPENDIX 1: Resources for Students and Faculty

Academic & Career Resources

- [Rackham Registration Deadlines/Academic Calendar](#)
- [Rackham Mentoring Guide \(For Students\)](#)
- [Rackham Graduate School \(Navigating Your Degree\)](#)
- [Rackham Graduate School \(Academic Policies\)](#)
- [Rackham Graduate School \(Contact Information\)](#)
- [Rackham Graduate School \(Professional Development\)](#)
- [OGPS Career & Professional Development](#)
- [U of M Career Center](#)
- [Center for Research on Learning and Teaching \(CRLT\)](#)
- [Science Magazine \(Careers\)](#)
- [Science Magazine \(ACE Career Articles by CMB students\)](#)

Disability Resources

- [Services for Students with Disabilities](#)

Dissertation Information

- [Rackham \(Dissertation Timeline\)](#)
- [Rackham Ph.D. Degree Conferral Deadlines](#)
- [Rackham \(Dissertation Committee Guidelines\)](#)
- [Rackham Dissertation Handbook](#)
- [Rackham \(Dissertation Formatting Guidelines\)](#)
- [Rackham \(Dissertation Editing Checklist\)](#)

For more questions that cannot be answered here, email the [Office of Academic Records & Dissertations](#) at oard.questions@umich.edu.

Diversity, Equity & Inclusion

Campus Resources

- [ODEI \(Office of Diversity, Equity, and Inclusion\)](#)
- [OHEI \(Office for Health Equity & Inclusion\)](#)

Graduate Student Organizations

- [OGPS List of Student Organizations](#)
- [MaizePaiges](#)
- [Students of Color of Rackham](#)
- [SACNAS \(Society for the Advancement of Chicanos/Hispanics and Native Americans in Science\)](#)
- [AMS \(Association of Multicultural Scientists\)](#)

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Funding

- [CMB Financial Support](#)
- [PIBS Financial Support](#)
- [Rackham Funding](#)
- [NIH Funding](#)
- [NSF Funding](#)
- [Science Magazine \(Where to Search for Funding\)](#)

Health & Wellness

- [Counseling & Psychological Services \(CAPS\)](#)
- [CAPS Counseling Groups](#)
- [OGPS Counselors & Health/Wellness Resources](#)
- [University Health Service](#)
- [University Health Service \(Stress & Mental Health Resources\)](#)
- [University Health Service \(Wellness\)](#)
- [Rackham Health & Wellness Links](#)

Outreach

- [Michigan Outreach](#)
- [FEMMES \(Women+ Excelling More in Math, Science, Engineering and the Sciences\)](#)
- [WISE \(Women in Science & Engineering\)](#)
- [GISE \(Girls in Science and Engineering Camp\)](#)
- [MHSPEA \(Michigan Health Sciences Pre-College Exposure Academy\)](#)
- [BRAINS RULE](#)
- [LIPS \(Leading Informed Policy with Science\)](#)
- [RELATE \(Researchers Expanding Lay-Audience Teaching and Engagement\)](#)
- [AWIS \(Association for Women in Science\)](#)

Poster Printing

- [FedEx Office](#)
- [ITS Campus Computing](#)
- [Dollar Bill Copying](#)
- [Kolossos Printing](#)
- [LSA Tech Services](#)
- [OfficeDepot](#)

Research Resources

- [Medical School Research Website](#)

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APPENDIX 2: Representative Academic Programs

EXAMPLE 1. FOR A CMB STUDENT INTERESTED IN CANCER BIOLOGY

<u>First year (PIBS)</u>	<u>Second year (CMB)</u>
<p>FALL TERM</p> <p>PIBS 503 – Research skills / Research responsibility and Ethics (1 cr) PIBS 600 – Research Rotation (variable cr) CMB 850 – CMB student seminar (optional, 1 cr) CMB 630 – CMB Short Course (optional, 1 cr)</p> <p>BCHM 550 – Macromolecular Structure & Function (3 cr) HumGen 541 – Molecular genetics (3 cr) Or BCHM 550 – Macromolecular Structure & Function (3 cr) CDB 530 – Cell Biol (3 cr)</p>	<p>FALL TERM</p> <p>CMB 850 – Student seminar (1 cr) CMB 630 – Advanced topics in Molecular Biology (1 cr) CMB 990 - Precandidate dissertation research (variable cr)</p> <p>MI/Path 553 – Molecular Biology of Cancer (3 cr) CDB 530 – Cell Biology (3 cr) or MI/Path 553 – Molecular Biology of Cancer (3 cr) Physiol/BCHM 591 – Special Topics in Signal Transduction (2 cr) or Pharm 612 – Antimicrobial & cancer pharmacol (2 cr)</p>
<p>WINTER TERM</p> <p>PIBS 600 – Research Rotation (variable cr) CMB 850 – CMB student seminar (optional, 1 cr) CMB 630 – CMB Short Course (optional, 1 cr)</p> <p>Path 581 – Tiss, Cell and Molec Basis of Disease (3 cr) Bioinf 525 – Foundations in Bioinformatics & Systems Biology (3 cr) or Bioinf 551 – Proteome Informatics (3 cr)</p>	<p>WINTER TERM</p> <p>CMB 850 – Student seminar (1 cr) CMB 630 – Advanced topics in Molecular Biology (1 cr) CMB 990 - Precandidate dissertation research (variable cr)</p> <p>BCHM 640 – Post-transcriptional mechanisms (2 cr) CanBiol 554 – Cancer Pathogenesis & Treatment (4 cr) or Physiol/HumGen 555 – Integrative Genomics (3 cr)</p>

Shaded areas denote PIBS and CMB courses

CMB 630 – Short Course is formally titled: Advanced Topics in Molecular Biology.

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EXAMPLE 2. FOR A CMB STUDENT INTERESTED IN STEM CELLS & DEVELOPMENTAL BIOLOGY

<u>First year (PIBS)</u>	<u>Second year (CMB)</u>
<p>FALL TERM</p> <p>PIBS 501/503 – Research skills / Research responsibility & Ethics (1 cr) PIBS 600 – Research Rotation (variable cr) CMB 850 – CMB student seminar (optional, 1 cr) CMB 630 – CMB Short Course (optional, 1 cr)</p> <p>CDB 530 – Cell Biology (3 cr) BCHM 550 – Macromolecular Structure & Function (3 cr)</p>	<p>FALL TERM</p> <p>CMB 850 – Student seminar (1 cr) CMB 630 – CMB Short Course (optional, 1 cr) CMB 990 - Precandidate dissertation research (variable cr)</p> <p>HumGen 541 – Molecular Genetics (3 cr) CDB 680 – Organogenesis of complex tissues (3 cr) or MCDB 614 – Experimental Models in Molecular, Cellular & Developmental Biology (3 cr)</p>
<p>WINTER TERM</p> <p>PIBS 600 – Research Rotation (variable cr) CMB 850 – CMB student seminar (optional, 1 cr) CMB 630 – CMB Short Course (optional, 1 cr)</p> <p>CDB 580 – Principles of Development (3 cr) Or CDB 550 – Histology (4 cr)</p> <p>BCHM 645 – Advanced Topics in Protein Trafficking (3 cr)</p>	<p>WINTER TERM</p> <p>CMB 850 – Student seminar (1 cr) CMB 630 – Advanced topics in Molecular Biology (1 cr) CMB 990 - Precandidate dissertation research (variable cr)</p> <p>Physiol/BCHM 576 – Signal transduction (1 cr) Bioinf 525 – Foundations in Bioinformatics & Systems Biology (3 cr)</p>

Shaded areas denote PIBS and CMB courses

CMB 630 – Short Course is formally titled “Advanced Topics in Molecular Biology”

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<u>EXAMPLE 3. FOR A CMB STUDENT INTERESTED IN GENETIC/EPIGENETIC MECHANISMS</u>	
<u>First year (PIBS)</u>	<u>Second year (CMB)</u>
<p><u>FALL TERM</u> PIBS 503 – Research skills / Research responsibility and Ethics (1 cr) PIBS 600 – Research Rotation (variable cr) CMB 850 – CMB student seminar (optional, 1 cr) CMB 630 – CMB Short Course (optional, 1 cr)</p> <p>HumGen 541 – Molecular Genetics (3 cr) BCHM 550 – Macromolecular Structure & Function (3 cr) or ChemBio 501 – Chemical Biology</p>	<p><u>FALL TERM</u> CMB 850 – Student seminar (1 cr) CMB 630 – Advanced topics in Molecular Biology (1 cr) CMB 990 - Precandidate dissertation research (variable cr)</p> <p>CDB 530 – Cell Biology (3 cr) Physiol/BCHM 591 – Special Topics in Signal Transduction (2 cr)</p>
<p><u>WINTER TERM</u> PIBS 600 – Research Rotation (variable cr) CMB 850 – CMB student seminar (optional, 1 cr) CMB 630 – CMB Short Course (optional, 1 cr)</p> <p>BCHM 650 – Mechanisms of Eukaryotic Gene Expression (3 cr) Bioinf 527 – Introduction to Bioinformatics & Computational Biol (4 cr) or Bioinf 545 – Data Analysis in Molecular Biology (3 cr)</p>	<p><u>WINTER TERM</u> CMB 850 – Student seminar (1 cr) CMB 630 – CMB Short Course (1 cr) CMB 990 - Precandidate dissertation research (variable cr)</p> <p>BCHM 640 – Post-transcriptional gene regulation (2 cr) Physiol/ HumGen 555 – Integrative Genomics (3 cr) or Biophys 440 - Biophysics of Diseases (3 cr)</p>

Shaded areas denote PIBS and CMB courses

CMB 630 – Short Course is formally titled “Advanced Topics in Molecular Biology”

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EXAMPLE 4. FOR A CMB STUDENT INTERESTED IN TRANSLATIONAL RESEARCH

<u>First year (PIBS)</u>	<u>Second year (CMB)</u>
<p>FALL TERM</p> <p>PIBS 503 – Research skills / Research responsibility and Ethics (1 cr) PIBS 600 – Research Rotation (variable cr) CMB 850 – CMB student seminar (optional, 1 cr) CMB 630 – CMB Short Course (optional, 1 cr)</p> <p>CDB 530 – Cell Biology (3 cr) HumGen 541 – Molecular Genetics (3 cr)</p>	<p>FALL TERM</p> <p>CMB 850 – Student seminar (1 cr) CMB 630 – CMB Short Course (1 cr) CMB 990 - Precandidate dissertation research (variable cr)</p> <p>BCHM 550 – Macromolecular Structure & Function (3 cr) Physiol 510 – Systems & Integrative Physiology (4 cr) or MI/Path 553 – Cancer Biology (3 cr)</p>
<p>WINTER TERM</p> <p>PIBS 600 – Research Rotation (variable cr) CMB 850 – CMB student seminar (optional, 1 cr) CMB 630 – CMB Short Course (optional, 1 cr)</p> <p>PIBS 507 – Introduction to Translational Research (3 cr) Physiol 520 – Computational Systems Biology in Physiology (3 cr) MI 619 – Pathogenic Evaluation of Animal Models of Human Disease (1 cr)</p>	<p>WINTER TERM</p> <p>CMB 850 – Student seminar (1 cr) CMB 630 – CMB Short Course (1 cr) CMB 990 - Precandidate dissertation research (variable cr)</p> <p>Physiol/HumGen 555 – Integrative Genomics (3 cr) or HumGen 542 – Molecular Genetic basis of human disease (3 cr)</p>

Shaded areas denote PIBS and CMB courses

CMB 630 – Short Course is formally titled “Advanced Topics in Molecular Biology”

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APPENDIX 3: CMB Candidate Timeline

Student Name: _____ Date: _____

Each CMB student should consider the following benchmarks and target timeline, and record accomplishments according to his/her own experience.

Benchmark	Target	Actual (Grad Yr & Date)
Present CMB student seminar (CMB 850)	Year 2	_____
Candidacy approved by CMB Program Committee	Year 2, May	_____
Form thesis committee	Year 2, by July	_____
First thesis committee meeting. Present detailed thesis proposal (set up 2-3 months ahead).	Year 3, by Nov	_____
Teach one semester (set up 1 term-1 yr ahead).	Year 3-5	_____
Second thesis committee meeting (set up 2-3 months ahead).	Year 3, by May	_____
Present research seminar (CMB 850)		_____
Thesis committee meeting every 6 months (distribute written Progress Report 3 days ahead) (set up 6 months ahead):		_____
Third	Year 4	_____
Fourth - present detailed timeline	Year 4	_____
Fifth	Year 5	_____
Sixth - approval for defense	Year 5	_____
Beyond: Thesis committee meeting every 3 months (set up 2-3 months ahead)		_____
<u>REQUIRED:</u>		
First-author research publication (Provide citation)	Year 3-5	_____
Update IDP (Science Careers IDP or MSTP IDP)	Annually	_____
Attend 4 CMB Dissertation Defenses	Annually	_____
Complete 4 CMB/HG 630 Short Courses	Before Defense	_____

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RECOMMENDED:

Present at national meeting (oral or poster) - (Apply for student travel funding)	Year 3-5	_____
Additional research publications: Bring updated CV & Bibliography		_____
Write review article	See above	_____
Apply for fellowship	Provide List	_____
Apply for Rackham Precandidate Research Grant	2 nd year	_____
Apply for Rackham Candidate Research Grant	3 rd year or later	_____
Supervise other trainees in lab	Note dates	_____

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APPENDIX 4:

PRELIM EXAM ELIGIBILITY REPORT FROM MENTOR

Student:

Date of Report:

Mentor Name:

Mentor signature:

Your Ph.D. student is being evaluated for eligibility to take the CMB Preliminary Exam and, if passed, to advance to candidacy. A critical factor in determining eligibility for these steps is your evaluation of this student's performance in the lab.

1. How long has this student been in your lab? (include dates)
2. Brief description of this student's research project:
3. Are you satisfied with this student's progress?
4. Please provide a detailed evaluation of this student, including strengths and weaknesses. *Consider performance in the laboratory, scientific maturity for a student at this stage of training, and any other factors that you think are relevant. Use additional pages as needed.*
5. Do you recommend that this student be advanced to candidacy for the Ph.D. if all other requirements are met, including academic performance and passing the Preliminary Exam? If not, why?

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APPENDIX 5A

SEMESTER REPORT ON CMB THESIS RESEARCH PROGRESS – (CMB 990 – PRE-CANDIDATE)

Student: _____

Mentor: _____

Course #: CMB 990 – Dissertation Research, Pre-Candidate

Term enrolled: *(circle one and add year):* Fall Winter **Year:** _____

Grade given (circle one): S (Satisfactory) U (Unsatisfactory)

(Mentor should also enter/approve grade via Wolverine Access Faculty Center)

Summary of research effort:

Time put into the laboratory work:

Extensive _____ Adequate _____ Little _____

Intellectual interest in the project:

Extensive _____ Adequate _____ Little _____

Student's capacity to grasp the appropriate concepts and follow the analytical transition between concept and experimental design:

Good _____ Average _____ Poor _____

Please rank (circle) student's own intellectual input into the experimental design:

Total passivity with all input from advisor	1	2	3	4	5	Strong creative contribution by the student
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(Continued)

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Please comment on the student's strengths and weaknesses in research (use additional pages as needed):

Are you satisfied with the student's progress?:

Additional comments from mentor or student (optional):

I have discussed this report with my mentor.

Student Signature: _____

Date: _____

Advisor Signature: _____

Date: _____

For Program Committee Use

Date of Discussion of Report:

Summary of Discussion:

Please return to the CMB office through [THIS LINK](#) (Google Doc). Thank you!

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APPENDIX 5B

SEMESTER REPORT ON CMB THESIS RESEARCH PROGRESS (CMB 599 – MSTP PRE-CANDIDATE)

Student: _____

Mentor: _____

Course#: CMB 599 – MSTP Dissertation Research, Pre-Candidate

Term enrolled: (*circle one and add year*): Fall Winter Year: _ ____

Grade given (*circle one*): S (Satisfactory) U (Unsatisfactory)

(Mentor should also enter/approve grade via Wolverine Access Faculty Center)

Summary of research effort:

Time put into the laboratory work:

Extensive _____ Adequate _____ Little _____

Intellectual interest in the project:

Extensive _____ Adequate _____ Little _____

Student's capacity to grasp the appropriate concepts and follow the analytical transition between concept and experimental design:

Good _____ Average _____ Poor _____

Please rank (circle) student's own intellectual input into the experimental design:

Total passivity with all input from advisor 1 2 3 4 5 Strong creative contribution by the student

Please comment on the student's strengths and weaknesses in research (use additional pages as needed):

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(Continued)

Are you satisfied with the student's progress?

Additional comments from mentor or student (optional):

I have discussed this report with my mentor.

Student Signature: _____

Date: _____

Advisor Signature: _____

Date: _____

For Program Committee use

Date of Discussion of Report:

Summary of Discussion:

Please return to the CMB office through [THIS LINK](#) (Google Doc). Thank you!

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APPENDIX 5C

SEMESTER REPORT ON CMB THESIS RESEARCH PROGRESS (CMB 995 – CANDIDATE)

Student: _____

Mentor: _____

Research Topic: _____

Course: CMB 995 – Dissertation Research Candidate

Term enrolled: *(circle one and add year):* Fall Winter **Year:** _____

Grade given (circle one): S (Satisfactory) U (Unsatisfactory)

(Mentor should also enter/approve grade via Wolverine Access Faculty Center)

Report:

If student has had a dissertation committee meeting within the past 6 months, attach the Dissertation Committee Progress Report submitted after that meeting. Feel free to add additional comments below.

If student has *not* had a dissertation committee meeting within the past 6 months, (1) provide a detailed explanation why this is the case and (2) **attach a detailed progress report** using the guidelines on the Dissertation Committee Progress Report form (attached). *It is the shared responsibility of the mentor and student to hold thesis committee meetings every 6 months.*

Additional Comments:

Student's Signature: _____

Advisor's Signature: _____

For Program Committee Use: Date of Discussion of Report:
Summary of Discussion:

Please return to the CMB office through [THIS LINK](#) (Google Doc). Thank you!

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APPENDIX 6

CMB DISSERTATION COMMITTEE PROGRESS REPORT

Submit report to CMB Office within 2 weeks after each meeting.

Meetings must take place every 6 months, but can be held more frequently.

It is a shared responsibility of the mentor and the student to hold a committee meeting every 6 months.

Student: _____ Yr in Program: _____

Date and Time of Meeting: _____

Members Present: (Mentor) _____

STUDENT PROGRESS REPORT. Mentor completes the following on additional page(s):

Attach a brief narrative to address any or all of the following, as appropriate:

A. Dissertation Title

B. Research progress:

1. Progress toward specific aims.
2. Progress toward publication.
3. Feasibility of current and proposed experiments.
4. Quality of experimental data.
5. Quality of scientific thinking
6. **Recommendations of the committee** for (a) next meeting and (b) long term research goals.

C. Training progress:

7. Quantity and quality of effort.
8. Independence.
9. Status of future career planning (Review timeline prepared by student).
10. Ways the mentor might facilitate student research progress and professional development.

The mentor should circulate this report to student and dissertation committee members before submission to the CMB office. Dissertation Committee members are expected to provide guidance to both the student and mentor.

Attach to this report a copy of the Dissertation Proposal (1st meeting) or Research Progress Report (subsequent meetings) prepared by student.

Signature of Chair _____ Date: _____

Signature of Student _____ Date: _____

Please return this form to the CMB Office at [THIS LINK](#) (Google Doc). Thank you!

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APPENDIX 7

CMB TEACHING REQUIREMENT REPORT

Student: _____

Duration of Assignment: _____

Course: _____

Supervisor: _____

Evaluation of Student Performance:

Signature of Supervisor

Date

Please return to the CMB office at cmbgrad@umich.edu. Thank you!