

# CELLULAR AND MOLECULAR BIOLOGY, PHD

The graduate program in Cellular and Molecular Biology (CMB) has been a pioneer in graduate education fields of cell biology and molecular biology at the University of Wisconsin–Madison since 1961. The program is research-oriented and interdisciplinary leading to the PhD degree. UW–Madison has one of the largest and most prestigious biology facilities in the world, well-noted for its cooperation and collaboration across department boundaries. Cellular and Molecular Biology (CMB) is an important part of that interdepartmental strength, providing students with the opportunity to work with more than 200 faculty members in 40 departments.

Research and coursework experience allow students to obtain a solid foundation in cell biology and molecular biology that is tailored to their professional objectives. Research focus groups are composed of students and faculty studying a common research area. The focus groups are: cancer biology, cell adhesion and cytoskeleton, cellular and molecular metabolism, developmental biology and regenerative medicine, immunology, membrane biology and protein trafficking, molecular and genome biology of microbes, physiology, plant biology, RNA biology, systems biology, transcriptional mechanisms, and virology.

## ADMISSIONS

### ADMISSIONS

Please consult the table below for key information about this degree program's admissions requirements. The program may have more detailed admissions requirements, which can be found below the table or on the program's website.

Graduate admissions is a two-step process between academic programs and the Graduate School. **Applicants must meet the minimum requirements (<https://grad.wisc.edu/apply/requirements/>) of the Graduate School as well as the program(s).** Once you have researched the graduate program(s) you are interested in, apply online (<https://grad.wisc.edu/apply/>).

Requirements	Detail
Fall Deadline	December 1
Spring Deadline	The program does not admit in the spring.
Summer Deadline	The program does not admit in the summer.
GRE (Graduate Record Examinations)	Not required.
English Proficiency Test	Every applicant whose native language is not English, or whose undergraduate instruction was not exclusively in English, must provide an English proficiency test score earned within two years of the anticipated term of enrollment. Refer to the Graduate School: Minimum Requirements for Admission policy: <a href="https://policy.wisc.edu/library/UW-1241">https://policy.wisc.edu/library/UW-1241</a> ( <a href="https://policy.wisc.edu/library/UW-1241/">https://policy.wisc.edu/library/UW-1241/</a> ).

Other Test(s) (e.g., GMAT, MCAT) n/a

Letters of Recommendation Required 3

Admission to the program is highly competitive. Admission is based on demonstrated ability and interest in biology, chemistry, and the physical sciences; three letters of recommendation; and the personal statement. Previous research experience is required. All application materials must be received by the fall deadline in order to be reviewed by the Cellular and Molecular Biology Admissions Committee. More information about Cellular and Molecular Biology Admissions can be found on the Cellular Molecular Biology website (<https://cmb.wisc.edu/admissions/>).

## FUNDING

### FUNDING

#### GRADUATE SCHOOL RESOURCES

Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further funding information (<https://grad.wisc.edu/funding/>) is available from the Graduate School. Be sure to check with your program for individual policies and restrictions related to funding.

#### PROGRAM RESOURCES

All students accepted into the PhD degree program receive financial support from Graduate School fellowships, interdepartmental training grants, and/or research assistantships. The program strives to maintain a nationally competitive stipend. Students are guaranteed a stipend each year in addition to tuition remission. The current stipend rate can be found on the Financial (<https://cmb.wisc.edu/financial-health-insurance/>) page of the CMB handbook. Graduate students are also eligible for comprehensive health insurance; individual or family coverage is available at a minimal cost. Students are strongly encouraged to apply for a National Science Foundation Graduate Fellowship at the time of application to graduate school and/or during the first or second year on campus.

## REQUIREMENTS

### MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum academic progress and degree requirements (<http://guide.wisc.edu/graduate/#policiesandrequirements>), in addition to the program requirements listed below.

### MAJOR REQUIREMENTS

#### MODE OF INSTRUCTION

Face to Face	Evening/Weekend	Online	Hybrid	Accelerated
Yes	No	No	No	No

## Mode of Instruction Definitions

**Accelerated:** Accelerated programs are offered at a fast pace that condenses the time to completion. Students typically take enough credits aimed at completing the program in a year or two.

**Evening/Weekend:** Courses meet on the UW–Madison campus only in evenings and/or on weekends to accommodate typical business schedules. Students have the advantages of face-to-face courses with the flexibility to keep work and other life commitments.

**Face-to-Face:** Courses typically meet during weekdays on the UW–Madison Campus.

**Hybrid:** These programs combine face-to-face and online learning formats. Contact the program for more specific information.

**Online:** These programs are offered 100% online. Some programs may require an on-campus orientation or residency experience, but the courses will be facilitated in an online format.

## CURRICULAR REQUIREMENTS

### Requirement Detail

Minimum Credit Requirement	51 credits
Minimum Residence Credit Requirement	32 credits
Minimum Graduate Coursework Requirement	51 credits credits must be graduate-level coursework. Refer to the Graduate School: Minimum Graduate Coursework (50%) Requirement policy: <a href="https://policy.wisc.edu/library/UW-1244">https://policy.wisc.edu/library/UW-1244</a> ( <a href="https://policy.wisc.edu/library/UW-1244/">https://policy.wisc.edu/library/UW-1244/</a> ).
Overall Graduate GPA Requirement	3.00 GPA required. Refer to the Graduate School: Grade Point Average (GPA) Requirement policy: <a href="https://policy.wisc.edu/library/UW-1203">https://policy.wisc.edu/library/UW-1203</a> ( <a href="https://policy.wisc.edu/library/UW-1203/">https://policy.wisc.edu/library/UW-1203/</a> ).
Other Grade Requirements	n/a
Assessments and Examinations	Doctoral students are required to take a comprehensive preliminary/oral examination at the end of their second year. In order to complete their preliminary exam, students must have cleared their record of all Incomplete and Progress grades (other than research and thesis). Deposit of the doctoral dissertation in the Graduate School is required.
Language Requirements	No language requirements.
Graduate School Breadth Requirement	Doctoral students in the CMB program are not required to complete a doctoral minor or graduate/professional certificate, but may choose to.

## REQUIRED COURSES

Eleven credits of coursework, not including 990 research credits, are required to complete the CMB course requirements. One course must be taken from the "molecular biology core" list of courses and one course must be taken from the "cell biology core" list of courses. The remaining credits can come from either the "molecular biology / cell biology core" or "elective" list of classes to bring the total number of credits to ten. In addition, one credit must be fulfilled through the required ethics course.

All Cellular and Molecular Biology course requirements must be completed by the end of the student's second year, before completing the preliminary exam and obtaining dissertator status.

Code	Title	Credits
<b>Course Requirements <sup>1</sup></b>		
<i>Molecular Biology Core</i>		3
Choose one of the following:		
BIOCHEM/ GENETICS/ MD GENET 620	Eukaryotic Molecular Biology	
BIOCHEM/ GENETICS/ MICROBIO 612	Prokaryotic Molecular Biology	
ONCOLOGY/ M M & I/ PL PATH 640	General Virology–Multiplication of Viruses	
<i>Cell Biology Core</i>		2-3
Choose one of the following:		
BOTANY 860	Plant Cell Biology	
ZOOLOGY/ NEURODPT/ NTP 765	Developmental Neuroscience	
PATH 750	Cellular and Molecular Biology/ Pathology	
ONCOLOGY 703	Carcinogenesis and Tumor Cell Biology	
GENETICS/ CRB 710	Developmental Genetics	
GENETICS/ BOTANY/M M & I/ PL PATH 655	Biology and Genetics of Fungi	
<i>Ethics Core</i>		1
BIOCHEM 729	Advanced Topics	
ONCOLOGY 715	Ethics in Science	
SURG SCI 812	Research Ethics and Career Development	
Remaining credits can come from either the core or elective list of classes to bring the total number of credits to eleven.		
<i>Elective Courses</i>		4-5
B M E 510	Introduction to Tissue Engineering	
B M E 520	Stem Cell Bioengineering	
B M E/CBE 783	Design of Biological Molecules	
B M E/CRB 670	Biology of Heart Disease and Regeneration	
B M E 545	Engineering Extracellular Matrices	
B M E 556	Systems Biology: Mammalian Signaling Networks	
B M I/ COMP SCI 576	Introduction to Bioinformatics	
B M I/STAT 541	Introduction to Biostatistics	
B M I/STAT 877	Statistical Methods for Molecular Biology	
B M I 826	Special Topics in Biostatistics and Biomedical Informatics	

BIOCHEM/B M I/ BMOLCHEM/ MATH 609	Mathematical Methods for Systems Biology
BOTANY/ BIOCHEM/ GENETICS 840	Regulatory Mechanisms in Plant Development
BIOCHEM/ BOTANY 621	Plant Biochemistry
BIOCHEM/ NUTR SCI 619	Advanced Nutrition: Intermediary Metabolism of Macronutrients
BIOCHEM 570	Computational Modeling of Biological Systems
BIOCHEM 601	Protein and Enzyme Structure and Function
BMOLCHEM 675	Advanced or Special Topics in Biomolecular Chemistry
BOTANY/ ENTOM/ PL PATH 505	Plant-Microbe Interactions: Molecular and Ecological Aspects
BOTANY/ PL PATH 563	Phylogenetic Analysis of Molecular Data
CHEM 665	Biophysical Chemistry
CRB/ MEDICINE 701	Cell Signaling and Human Disease
CRB 640	Fundamentals of Stem Cell and Regenerative Biology
CRB 650	Molecular and Cellular Organogenesis
F&W ECOL/ HORT/STAT 571	Statistical Methods for Bioscience I
GENETICS/ HORT 550	Molecular Approaches for Potential Crop Improvement
GENETICS/ CHEM 626	Genomic Science
GENETICS/ BIOCHEM 631	Plant Genetics and Development
GENETICS 633	Population Genetics
GENETICS/ MD GENET 677	Advanced Topics in Genetics
GENETICS 885	Advanced Genomic and Proteomic Analysis
M M & I/PATH- BIO 528	Immunology
M M & I 677	Advanced Topics in Medical Microbiology
M M & I 740	Mechanisms of Microbial Pathogenesis
MICROBIO 657	Bioinformatics for Microbiologists
NEURODPT/NTP/ PSYCH 611	Systems Neuroscience
NTP 670	Stem Cells and the Central Nervous System
M M & I/PATH- BIO 750	Host-Parasite Relationships in Vertebrate Viral Disease
MED PHYS 671	Selected Topics in Medical Physics

MICROBIO/ BMOLCHEM 668	Microbiology at Atomic Resolution
MICROBIO 607	Advanced Microbial Genetics
NEURODPT/ NTP 610	Cellular and Molecular Neuroscience
ONCOLOGY 675	Advanced or Special Topics in Cancer Research
ONCOLOGY 778	Bioinformatics for Biologists
OPHTHALM 750	Ocular Diseases of the Mammalian Vision System
PATH 751	Biology of Aging
PATH 803	Pathogenesis of Major Human Diseases
PATH 807	Immunopathology: The Immune System in Health and Disease
PATH-BIO 675	Special Topics
ZOOLOGY 604	Computer-based Gene and Disease/Disorder Research Lab

### Research Credits

A minimum of 51 credits taken in graduate level courses are required: the 11 above, and the remaining credits can be 990 research credits. 41

**Total Credits** 51

<sup>1</sup> EXCEPTION: MD/PhD students are only required to take 3 credits from the Core Curriculum or the Elective Courses list.

<sup>2</sup> EXCEPTION: MD/PhD students are not required to take an ethics course because they received this training in their MD courses.

## POLICIES

### GRADUATE SCHOOL POLICIES

The Graduate School's Academic Policies and Procedures (<https://grad.wisc.edu/acadpolicy/>) provide essential information regarding general university policies. Program authority to set degree policies beyond the minimum required by the Graduate School lies with the degree program faculty. Policies set by the academic degree program can be found below.

### MAJOR-SPECIFIC POLICIES

#### PRIOR COURSEWORK

##### Graduate Credits Earned at Other Institutions

On a case-by-case basis, refer to the Graduate School: Transfer Credits for Prior Coursework (<https://policy.wisc.edu/library/UW-1216/>) policy.

##### Undergraduate Credits Earned at Other Institutions or UW-Madison

On a case-by-case basis, refer to the Graduate School: Transfer Credits for Prior Coursework (<https://policy.wisc.edu/library/UW-1216/>) policy.

##### Credits Earned as a Professional Student at UW-Madison (Law, Medicine, Pharmacy, and Veterinary careers)

On a case-by-case basis, refer to the Graduate School: Transfer Credits for Prior Coursework (<https://policy.wisc.edu/library/UW-1216/>) policy.

## Credits Earned as a University Special student at UW–Madison

On a case-by-case basis, refer to the Graduate School: Transfer Credits for Prior Coursework (<https://policy.wisc.edu/library/UW-1216/>) policy.

## PROBATION

Refer to the Graduate School: Probation (<https://policy.wisc.edu/library/UW-1217/>) policy.

## ADVISOR / COMMITTEE

The thesis advisor will assist the graduate student throughout the duration of their PhD studies. Upon choosing a thesis advisor, the student should formulate goals and expectations when starting in a permanent lab home. The student and thesis advisor should work together to ensure that mutual goals and expectations are met. The thesis advisor will monitor and guide the student's progress toward the PhD degree, provide the student with advice about how and when to meet the degree requirements of the program, and help the student decide on appropriate coursework during PhD studies.

After joining a thesis lab, students are required to form a thesis committee. The purpose of the thesis committee is to: guide the student through the process of earning the PhD degree and meeting all Cellular and Molecular Biology program requirements; assist the student in developing as an independent scientist in the student's area of research; provide the student with an array of ideas and opportunities regarding the direction of the research and thesis project; and evaluate the student's research proposal, attend curriculum certification, preliminary exam, annual progress report, and thesis defense.

The thesis committee consists of five faculty members, including the thesis advisor. All committee members must be readers when the student defends their dissertation. Three committee members, including the thesis advisor, must be faculty trainers in the Cellular and Molecular Biology program. Two committee members must be outside the student's direct area of expertise.

## CREDITS PER TERM ALLOWED

15 credits

## TIME LIMITS

Refer to the Graduate School: Time Limits (<https://policy.wisc.edu/library/UW-1221/>) policy.

## GRIEVANCES AND APPEALS

These resources may be helpful in addressing your concerns:

- Bias or Hate Reporting (<https://doso.students.wisc.edu/bias-or-hate-reporting/>)
- Graduate Assistantship Policies and Procedures (<https://hr.wisc.edu/policies/gapp/#grievance-procedure>)
- Hostile and Intimidating Behavior Policies and Procedures (<https://hr.wisc.edu/hib/>)
  - Office of the Provost for Faculty and Staff Affairs (<https://facstaff.provost.wisc.edu/>)
- Employee Assistance (<http://www.eao.wisc.edu/>) (for personal counseling and workplace consultation around communication and conflict involving graduate assistants and other employees, post-doctoral students, faculty and staff)
- Employee Disability Resource Office (<https://employeedisabilities.wisc.edu/>) (for qualified employees or applicants with disabilities to have equal employment opportunities)
- Graduate School (<https://grad.wisc.edu/>) (for informal advice at any level of review and for official appeals of program/departmental or school/college grievance decisions)
- Office of Compliance (<https://compliance.wisc.edu/>) (for class harassment and discrimination, including sexual harassment and sexual violence)
- Office Student Assistance and Support (OSAS) (<https://osas.wisc.edu/>) (for all students to seek grievance assistance and support)
- Office of Student Conduct and Community Standards (<https://conduct.students.wisc.edu/>) (for conflicts involving students)
- Ombuds Office for Faculty and Staff (<http://www.ombuds.wisc.edu/>) (for employed graduate students and post-docs, as well as faculty and staff)
- Title IX (<https://compliance.wisc.edu/titleix/>) (for concerns about discrimination)

## Overview

If a student feels unfairly treated or aggrieved by faculty, staff, or another student, the University offers several avenues to resolve the grievance.

Students' concerns about unfair treatment are best handled directly with the person responsible for the objectionable action. If the student is uncomfortable making direct contact with the individual(s) involved, they should contact the advisor or the person in charge of the unit where the action occurred (CMB Program Administration or Chair, Lab Department Administration or Chair, Lab Manager, etc.). Many departments and schools/colleges have established specific procedures for handling such situations; check their web pages for more information. If such procedures exist at the local level, these should be investigated first. For more information, see the Graduate School Academic Policies and Procedures. (<http://grad.wisc.edu/acadpolicy/#grievancesandappeals>)

## Procedure

Procedures for proper accounting of student grievances within the CMB Program:

- The student is encouraged to speak first with the person toward whom the grievance is directed to see if a situation can be resolved interpersonally at this level.
- Should satisfactory resolution not be achieved, the student should contact the CMB Office and the CMB Program Chair to discuss the grievance. The program will facilitate problem resolution through informal channels and facilitate any complaints or issues of students. The first attempt is to help the student informally address the grievance prior to any formal complaint. Students are also encouraged to talk with their faculty advisor or thesis committee members if appropriate.
- If the issue is not resolved to the student's satisfaction, the student can submit a formal grievance in writing to the CMB Office and CMB Program Chair. The written formal grievance must be submitted within 60 days of the alleged unfair treatment.
- On receipt of a written complaint, a faculty committee will be convened within 10 working days by the CMB Program to manage the grievance. The program faculty committee will obtain a written response from the person toward whom the complaint is directed. This response will be shared with the person filing the grievance.
- Within 10 working days of being convened, the faculty committee will make a decision regarding the grievance. The CMB Program

will report on the committee's decision and any action taken by the committee in writing to both the student and the party toward whom the complaint was directed.

- At this point, if either party (the student or the person toward whom the grievance is directed) is unsatisfied with the decision of the faculty committee, the party may file a written appeal within 10 working days of the committee's decision. The appeal will go to the tenure home School/College of the grieving student's primary advisor.

The Graduate School has procedures for students wishing to further appeal a grievance decision made at the school/college level. These policies are described in the Graduate School's Academic Policies and Procedures. (<https://grad.wisc.edu/documents/grievances-and-appeals/>)

## OTHER

Cellular and Molecular Biology students all earn a stipend that is set by the program each year, and tuition is covered. First year rotating students are funded through the Cellular and Molecular Biology program during the first semester. After the first semester, students are typically funded by their thesis advisor. In some cases, students earn individual fellowships or training grant slots and are funded through these mechanisms. Contact the Cellular and Molecular Biology program for specific questions about stipend level, etc.

## PROFESSIONAL DEVELOPMENT

### PROFESSIONAL DEVELOPMENT GRADUATE SCHOOL RESOURCES

Take advantage of the Graduate School's professional development resources (<https://grad.wisc.edu/pd/>) to build skills, thrive academically, and launch your career.

### PROGRAM RESOURCES

The CMB program offers and encourages participation in many professional development opportunities. The student-led Professional Development Committee plans events such as visiting speakers, panelists, and an annual mock interview event. The program shares information about alumni and their current employment with CMB students and encourages collaboration between the two groups. At the annual student retreat, students hear a panel featuring CMB alumni working in academic and non-academic positions. Program requirements such as an annual oral presentation and an annual thesis committee meeting foster professional development skills. Students also have opportunities to participate in program governance and leadership roles in other program activities such as advising and orientation, recruiting, admissions, the Diversity, Equity & Inclusion Committee, and the Coordinating Committee. A weekly email newsletter publicizes other relevant upcoming professional development opportunities. More information can be found on the CMB Professional Development page (<https://cmb.wisc.edu/professional-development/>).

## LEARNING OUTCOMES

### LEARNING OUTCOMES

1. Gain a broad understanding of the cellular and molecular principles that underlie biological processes.
2. Develop proficiency in a chosen area of cellular and molecular biology.

3. Learn to think critically and problem solve to address research challenges using a broad range of theories, research methods, and approaches to scientific inquiry.
4. Create research and scholarship that makes a substantive contribution to the field of cellular and molecular biology.
5. Experience collaboration with scientists within the lab, the department, the program, the university, and beyond.
6. Clearly and effectively communicate scientific ideas and research to both scientists and non-scientists in written and oral forms.
7. Exhibit and foster ethical and professional conduct.
8. Gain exposure to potential career paths and develop leadership and professional skills that will prepare them for a successful and rewarding career.
9. Develop and apply skills to foster a climate of inclusion for diverse members of the scientific community.

## PEOPLE

### PEOPLE

**Faculty Chairs:** David Wassarman (Program Chair), Daniela Drummond-Barbosa (Admissions Chair), Caroline Alexander (Awards Chair), Beth Weaver (Curriculum Chair), Colleen McDowell (Diversity Chair)

**Focus Group Chairs:** Caroline Alexander (Cancer Biology), Wilmara Salgado-Pabon (Cell Adhesion and Cytoskeleton), Dudley Lamming (Cellular and Molecular Metabolism), Junsu Kang (Developmental Biology and Regenerative Medicine), Lisa Arendt (Immunology), Sebastian Bednarek (Membrane Biology and Protein Trafficking), Robert Landick (Molecular and Genome Biology of Microbes), Raunak Sinha (Physiology), Hiroshi Maeda (Plant Biology), David Brow (RNA Biology), Megan McClean (Systems Biology), Melissa Harrison (Transcriptional Mechanisms), Paul Ahlquist (Virology).

For a list of all participating faculty, see the program website (<http://www.cmb.wisc.edu>).