# Cell and Developmental Biology (CDB) Guide for Graduate Students

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## 1. OVERVIEW

The graduate program in **Cell and Developmental Biology (CDB)** provides state of the art research training in cell-based biology, including impacts on organismal development, homeostasis, and disease. It is hosted by the Department of Cell Biology, Neurobiology and Anatomy (CBNA), but includes faculty mentors across multiple Departments and Centers of the Medical College of Wisconsin. Successful completion of this program leads to a Doctor of Philosophy (PhD) degree. This is accomplished through a combination of coursework, seminars, journal clubs, and "hands-on" research in the laboratory of a faculty mentor. This guide is intended to provide students with a list of requirements and a general timeline for completion of requirements for the PhD degree.

Students enter the CDB Program after matriculation through either the **Interdisciplinary Program in Biomedical Sciences (IDP)**, the **Neuroscience Doctoral Program (NDP),** the **Medical Student Training Program (MSTP),** or through **Direct Admission (DA)** into CDB**.** The IDP and NDP are graduate recruitment programs that involve faculty from multiple departments at MCW, and each program has a set of core course requirements and laboratory research rotations for first year graduate students. Students in MSTP matriculate after completing the first 2 years of medical school and laboratory research rotations. Direct Admission students directly join a CDB faculty members laboratory without research rotations but participate in the core curriculum offered by IDP/NDP.

## 2. PROGRAM LEADERSHIP AND COMMITTEES

### 2.1 Leadership

CBNA Chair: Jonathan Marchant, PhD
Program Director: Michaela Patterson, PhD (Term: July 1, 2024 – June 30, 2027), mpatterson@mcw.edu
Associate Program Director: Brian Link, PhD (Term: July 1, 2024 – June 30, 2025), blink@mcw.edu
Associate Program Director: Ken Taniguchi, PhD (Term: July 1, 2025 – June 30, 2027), ktaniguchi@mcw.edu
CDB Program Coordinator: Amy Ludwig-Kubinski, aludwig@mcw.edu
CBNA Departmental Administrator: Linda Skeris, lskeris@mcw.edu

### 2.2 CDB Program Committee

This committee serves as advisors to the Program Director. They also select the Program Director (3 year terms, 2 terms max) and Associate Director (2-3 year terms) from eligible candidates within the committee. Current members include:

CDB Program Director: Michaela Patterson, PhD
CDB Associate Program Director: Ken Taniguchi, PhD (effective July 1, 2025)
NDP Program Director: Allison Ebert, PhD
Member at large: Hervé Falet, PhD
Member at large: Brian Link, PhD
Member at large: Brian Lin, PhD
Student Member: Alanna Sullivan
CBNA Chair (non-voting member): Jonathan Marchant, PhD

### 2.3 CDB Social & Wellness Committee

This committee is tasked to identify strategies and events that will boost camaraderie and morale within the CDB program. Faculty members can also serve as a point of contact for students with concerns of any type.

Faculty Representative: Sid Rao, MD, PhD; sridhar.rao@versiti.org
Faculty Representative: Cheryl Stucky, PhD; cstucky@mcw.edu
Faculty Representative: Ross Collery, PhD; rcollery@mcw.edu
Student Representative: Hannah Tebbs (BSB4)
Student Representative: Mallika Khurana Misyuk (MCW Centers, “off floor”)
Student Representative: Allison Hall (Eye Institute)
Student Representative: Emily Boyd (Versiti Blood Research Institute)
Student Representative: Kaitlyn Thatcher (At-large representative)

## 3. SUMMARY OF CDB PHD PROGRAM REQUIREMENTS

Here, we summarize the requirements a student entering CDB must complete in order to obtain a Doctor of Philosophy degree (Ph.D.) from the program. Some are Graduate School (GS) requirements and these can be found in the "PhD Completion checklist" on the Graduate School website. Note: to find additional details about each individual requirement please read the dedicated subsection on that topic, which can be found in this guide.

*All paperwork associated with each requirement, regardless of whether it is a CDB or GS requirement, should be turned into the CDB Program Coordinator, Amy Ludwig-Kubinski (aludwig@mcw.edu). If the requirement is also a GS requirement, then it should also be turned in directly to the GS.

### 3.1 Summary of CDB Requirements, including those required by the Graduate School

| Requirement | Section | Brief details |
|---|---|---|
| Attendance and participation in program seminars and scholarly activities | | Students should complete "hands on" research in the laboratory of a faculty mentor and participate in programing related to their scientific discipline. |
| 6 hours of additional course | **4** | Beyond the first-year curriculum (DA, IDP, NDP) or after the first two years of medical school (MSTP). |
| Participation in *Seminars in Cell Biology* 31301 course | **4** | Students should register every Fall and Spring term from 2nd year and beyond. |
| Form a Thesis Committee | **5** | By September 15 of the 2nd year. GS Requirement |
| Qualifying Exam | **6** | Typically completed in 2nd year. GS Requirement |
| Dissertation Proposal Approval and Advancement to Candidacy | **7** | Required At least 18 months before defense; recommended in 3rd year. GS Requirement |
| Annual Thesis Committee meetings | **8** | Students must host an annual meeting with their advisory committee and submit a Summary Report. |
| Annual Responsible Conduct of Research Training | **9** | Every year from the 2nd year and beyond, offered in spring and fall |
| Publish two first author papers in peer-reviewed journals | **10** | |
| Dissertation Defense | **11** | The dissertation defense should be scheduled 3-6 months in advance of desired date. GS Requirement |

### 3.2 Good Academic Standing

The Graduate School has clear criteria to remain in good academic standing (e.g., maintaining a GPA >3.0). In addition, CDB requires good academic standing within the program. A student must ensure that ALL requirements and major benchmarks are fulfilled to remain in good academic standing. Failure to remain in good academic standing will result in loss of professional development funds and forfeiture of opportunity for departmental travel awards for a minimum of 6 months. Repeated failures to stay in good academic standing may result in dismissal from the program.

## 4. CREDIT REQUIREMENT AND DISTRIBUTION

To maintain full-time status, graduate students are required to take a minimum of 6 credits in the summer, 9 credits in the fall, and 9 credits in the spring semesters. Accrual of at least 60 graduate course credits is needed for the PhD degree. Credits are granted by successful completion of coursework, Journal Clubs, or Readings and Research.

All students in CDB are required to take 6 hours of additional coursework either beyond the first semester (DA, IDP, NDP) or after the first two years of medical school (MSTP). Typically, credits are earned by completing advanced elective courses and cannot come from journal clubs or elective seminars. Additionally, courses offered outside of MCW are highly encouraged. To request that an external course be approved for credit, complete the *External Course Approval Form* (**found on the CDB webpage - documents**) and submit it to the CDB Program Director prior to taking outside courses so that appropriate credits can be awarded.

In addition to 6 credits of advanced coursework, students are required to register and participate in the *Seminars in Cell Biology* course in years 2+.

## 5. FORMATION OF A THESIS COMMITTEE

For IDP, NDP, MSTP, and DA students who join their lab between January-March of their first year, the thesis advisory committee will be assembled, and form received by the Graduate School by September 15 (i.e. ~ 6-9 months after joining the program. For students who join their dissertation lab outside of this normal phase, the PhD dissertation committee should be assembled within 6 months of starting in the CDB graduate program. The purpose of the committee is to provide guidance and evaluate the student's progress to a thesis that meets committee approval and fulfills the dissertation requirement for the doctoral research degree. The Graduate School expects the student to be trained in the 3 general qualities (Scholarship, Innovation, Professionalism) that relate to 3 core competencies (Knowledge & Skills, Communication, and Management & Leadership).

The committee must consist of at least five members. The members are the student's laboratory advisor or direct mentor, plus four additional faculty. The remainder of the committee members should be chosen by the student, together with counsel from their advisor, and should include at least two Graduate Faculty members of CDB (one of these is the primary mentor) and one member from another graduate program at the Medical College of Wisconsin. One member from outside the Institution is encouraged. Once set, the student completes the thesis committee form of the Graduate School by getting the signatures of approval from the advisor and the Program Director. The completed form should be submitted to both the Graduate School and to the Program Coordinator of CDB by the above indicated date.

*Committee Chair:* The primary mentor cannot chair the Thesis Advisory Committee for their own mentee; however, the chair should be a member of the CDB faculty. The Chair of the committee should be named at the time of committee formation.

## 6. QUALIFYING EXAM

Students must pass a Qualifying Examination that is required for continuation of work toward the PhD. For students who enter the program between January-March, this requirement is usually fulfilled in the Fall semester after joining their lab. For those who join outside the normal cycle, this exam should be completed ~9-10 months after joining their thesis lab.

### 6.1 Exam Components

The Qualifying Exam is made up of two parts:

**A written proposal:** This NIH F31-style document will consist of 7 total pages, including a 1-page specific aims page and 6-page Research Strategy. References need not fall into the 7-page limit and can be an unlimited number of additional pages. The proposal should focus on the student's intended thesis project as it is currently imagined (i.e. "on-topic"). This document is most commonly produced during the Course 16293, entitled *Writing an Individual Fellowship*, which is taken by PhD students in the Fall of their second year. Some students may participate in a different, but similarly themed, writing course. The primary mentor is encouraged to be involved in editing and reviewing of the document before it is submitted to the student's committee, however the document should be the work of the student. The document must be turned into the committee two weeks prior to the scheduled exam date. If this deadline is not met, the committee may elect to postpone the exam. Independent, of whether the oral exam is postponed, failure to meet the deadline the first time would constitute failure to stay in good academic standing (see section 3.2). A second failure to meet the deadline would constitute a "No Pass" on the first attempt.

**An oral examination:** Here, the student will give a 20–30-minute uninterrupted overview of their written proposal to members of the QE committee. Subsequent to this overview, members of QE committee will query the student on all aspects of the proposal in a question-and-answer (Q&A) session. A successful Q&A session will identify the student's boundaries and thus should push into areas they may not be able to answer. The Q&A

session can vary in length depending on the situation, but most common is 1.5-2 hours, for a total of 2-3 hours for the entire oral exam.

### 6.2 Examiners (Exam Committee)

The student's thesis advisory committee will also serve as the QE committee. Members should be identified, and the committee should be formed by September of the second year. One member, other than the student's primary mentor, will serve as Chair for the exam. If the student has already identified the Chair of their thesis committee, then that member can also serve as the chair of the QE exam. If a student has not yet identified a chair of their committee, then the CDB Program Director will name a temporary Chair ahead of the exam. The Chair of either committee cannot be the primary mentor. The Chair is responsible for facilitating the discussion and making sure all committee members have an opportunity to ask questions while ensuring that the conversation does not get off topic. There is a separate Guide given to all QE Committee Chairs to provide guidance on the role.

Note: The primary mentor attends the student's oral QE exam, participates in questions, but does not have a final vote and is asked to leave the room while the remainder of the committee deliberates the outcome.

### 6.3 Potential Outcomes

Once the question-and-answer portion of the oral exam concludes, the student is asked to leave the room. The Primary Mentor may weigh in and make final comments on the student's performance and recommend "assignments" or remedies that would be viewed as valuable should the committee identify a deficiency that should be corrected. The Primary mentor is then asked to leave the room as well.

Under the facilitation of the Committee Chair, the remainder of the QE committee should deliberate if the student performed to a satisfactory level on both the written and oral components of their exam. Should a deficiency be identified in one or more of the components the committee should then discuss an assignment to address the deficienc(ies). Possible outcomes include:

**Pass:** The student mastered both the written and oral component of the exam. They demonstrated competency in the proposed project and critical thinking skills. Consider the numbered items described above in "Oral examination". No additional assignment is warranted in this case and a full pass is granted.

**Decision is deferred:** One or more deficiencies were identified in some aspect of the exam, however the deficienc(ies) were viewed as minor and/or span only a single component of the exam. In this case, the committee should defer their decision and identify an assignment that would explicitly test on the identified deficiency. The assignment can be an additional writing assignment related to their project, corrections to their written proposal, a second oral exam of a published article, etc. The identified deficiency should warrant a relatively modest correction and thus the assignment should be achievable in 2-3 weeks' time. Following the meeting, the Committee Chair should write a formal letter to the student and Program Director describing the assignment and the expectations to convert this deferral to a full pass. After turning in the assignment, the committee will again deliberate to assess if the remediation assignment was completed to a satisfactory level. If deemed satisfactory, the committee would grant the full pass.

**No Pass:** Multiple and/or major deficiencies were identified during the exam. The deficiencies may have spanned both the written and oral components of the exam. In this case, the solution is for the student to re-take the exam in its entirety in ~2-3 months. In this instance, the Committee Chair should write a formal letter to the student and Program Director expressing the major deficiencies that the student needs to address to successfully pass on their second try. Note: If "No Pass" is selected, the student has just one additional chance to correct the deficiency and attain a passing grade. Failure to pass on their second try will result in a Fail on the QE and may warrant removal from the program.

### 6.4 Statement of the usage of Artificial Intelligence on the *Qualifying Exam*

PhD-level science requires the unique application of research, resource-gathering, critical thinking, reflection, and problem-solving skills. Substitution of Artificial Intelligence (AI) for original thought limits your personal and professional learning and constitutes plagiarism. For this reason, use of generative AI as a source of original content or creative composition is strictly prohibited on the CDB Qualifying Exam. However, its use as a grammatical check for work originally drafted by the student, could be acceptable, but must be clearly and transparently acknowledged. Further, if a student indicates use of AI, the committee should probe their process as part of the exam – the student should be prepared to explain what AI tool was used, what statement(s) were used as input, and how the new statement was selected from this process – this will allow the committee to determine if the student's process breached creative composition. We further encourage all students considering the use of AI to discuss their plan with the program, their mentor, or their committee chair to determine in advance if its use would be considered appropriate or not.

## 7. DISSERTATION PROPOSAL APPROVAL & ADVANCEMENT TO CANDIDACY

At least eighteen months prior to anticipated thesis defense, the student must host a committee meeting dedicated to the approval of their proposed thesis project and file a **Dissertation Proposal Approval Form** (found on Graduate School website). For this meeting, the student should turn in an F-style written proposal directly to all committee members two weeks prior to the committee meeting. Note: while there may be substantial overlap with the proposal submitted for the Qualifying Exam, this is a distinct requirement.

Typically, this requirement is done as part of the second thesis committee meeting during the third year, though it can also be held in the 4th year.

## 8. ANNUAL THESIS COMMITTEE MEETINGS

Students are expected to have full committee meetings as necessary, but at least once annually. Typically, the first committee meeting is the *Qualifying Exam* and the second is where the student presents their *Thesis Proposal* for approval. Meetings should be in-person, although hybrid/virtual is acceptable. At least 4 members are required for quorum (regardless of if in-person or virtual). Prior to the start of each meeting or at the end of the meeting, the student may be asked to leave the room so that the committee can address progress and potential concerns in a candid manner, ensuring that all committee members are on the same page. Following each meeting, it is required that the student complete a *CDB Committee Meeting Summary and Development Plan* (**found on the CDB webpage - documents**). A template for this summary is also available through the CDB website.

As stated, committee meetings must be hosted at least every 12 months. One exception to this rule will be granted: students will have up to 15-16 months after the date on which they hosted their *Qualifying Exam* to host their second committee meeting. This single exception is in place to help committee meetings become spread out across the academic year. Students who fail to host a meeting within 12 months of their last meeting (or 16 months following the *Qualifying Exam*) will be placed in bad academic standing for no less than 6 months.

## 9. ANNUAL RESPONSIBLE CONDUCT OF RESEARCH TRAINING

By federal NIH funding rules, and as required by the Graduate School, all trainees must complete Responsible Conduct of Research (RCR) Training on an annual basis. RCR training is offered in both the spring and fall terms. Failure to satisfy this annual requirement constitutes a failure to remain in good academic standing. Please refer to section 3.2 Good Academic Standing for potential consequences.

## 10. TWO FIRST AUTHOR PAPER REQUIREMENT

As a minimum, a student's thesis research culminates in publication of at least 2 articles in peer-reviewed journals for which the student is first author. At minimum, one should be accepted for publication, if not already in press, while

the other can at the "submitted" stage. If a student believes that an exception to this policy should be made, they may petition the Program Director to waive the requirement by preparing and submitting the *Petition to waive the two first author publication policy* (**found on the CDB webpage - documents**).

## 11. DISSERTATION DEFENSE

The Graduate School has many specific requirements related to formatting, scheduling, and advertising the public defense. Therefore, a candidate should consult with the Graduate School's Handbook for specific details and is required to schedule a meeting with the Graduate school to review forms and procedures.

The written dissertation, following formatting guidelines dictated by the Graduate School, should be turned into all committee member at least 2 weeks prior to the anticipated defense date. Before the examination day, the student should contact the Graduate School to determine which forms are to be completed by the committee and by the student to satisfy the dissertation requirements. The forms are available on the Graduate School website.

The Dissertation Presentation must be open to the public and a minimum of 5 committee members must be in attendance to fulfill quorum requirements. A private defense follows the public seminar.

### 11.1 Necessary notifications & deadlines

- **3-6 months** (3 months minimum, 6 months preferred) candidate should notify the CDB Program Administrator of their intended date so that she can help secure an appropriate room.
- **≥60 days** prior to defense, candidate should notify CBNA Departmental Administrator, Linda Skeris (lskeris@mcw.edu) of plans for post-doctoral studies in the thesis lab as this is considered a "staff hire".
- **≥6 weeks** prior to defense, the candidate should contact the Graduate School for an appointment to review forms and procedures related to Graduate School requirements for defense and graduation.
- **≥30 days** prior to public defense date the defense must be advertised campus-wide.
- **≥2 weeks** in advance of anticipated defense date, the student should submit a completed copy of their final dissertation to all committee members.

## 12. PROGRAM REQUIREMENTS SUMMARIZED BY YEAR

### 12.1 Year 1

*For IDP, NDP, and DA students, the 1st year requirements are:*

**Fall Term**

Fundamentals of Biological Sciences I - III
Techniques in Molecular and Cellular Biology
Intro to Biomedical Research (IDP only)
Rotations, or Readings & Research

**Spring Term**

Fundamentals of Biological Sciences IV
Elective(s) (IDP, DA, and MSTP) – these count towards the 6 additional credit requirements of CDB
Fundamentals of Neuroscience (NDP only)
Graduate Neuroanatomy (NDP only)
Statistics
Professional Development I
* By March of the 1st year, IDP and NDP students are expected to have chosen a faculty advisor in whose laboratory they will conduct research that will form a basis of their PhD dissertation. Choice of an advisor who is part of Cell and Developmental Biology places the student in this program.

**Summer Term**

Writing a Scientific Paper course

Ethics & Integrity in Science course (10222) – also required for MSTP students.
Consider establishing the thesis advisory committee (see Thesis Advisory Committee section)

*For MSTP students:*
The 1st year in graduate school begins after they complete Fusion Phase 1 of medical school, identify a thesis advisor, and join the program. The most typical time to join a laboratory and the program is in January (~18 months after matriculating to MCW), however exceptions are seen on occasion. MSTP students who join the program in January should pursue electives in the Spring term to fulfill their 6 additional credit requirement. MSTP students are also required to take Ethics & Integrity in Science.

## 12.2 Year 2

**Fall Term**
Writing an Individual Fellowship course
Professional Development II (16291)
Seminars in Cell Biology (31301)
Neuroscience Journal Club (NDP required, but open to others; (12298)
Responsible Conduct of Research (RCR) (unless planned to be taken in Spring)
Readings and Research
Establish Thesis Advisory Committee (Completed form must be received by Grad School by Sept 15th)
Qualifying Exam*

**Spring Term**
Students may take an additional elective course
Seminars in Cell Biology
Responsible Conduct of Research (RCR) (unless already taken in Fall)
Research Ethics Discussion series (10444)
Readings and Research

**Summer Term**
Readings and Research

*Most students (IDP, NDP, DA, and MSTP) will pursue their *Qualifying Exam* in November-December of their second year. If a student joined a lab later, they can request an extension on this projected timeline, with a target of ~9-10 months after joining their thesis lab.

## 12.3 Years 3&4

In years 3 and 4, the graduate student should present their research-in-progress findings in 20-45 minute seminar format. Examples include, but are not limited to, the following: *Seminars in Cell Biology*, Cardiac Biology and Heart Failure Meeting, Vision Science Seminar, Developmental and Stem Cell Biology Group Meeting, or Neuroscience Group Seminar.

**Fall and Spring Terms:**
Any relevant elective course(s)
Seminars in Cell Biology
Responsible Conduct of Research (RCR)
Readings and Research
Thesis advisory committee meeting OR Thesis Proposal Approval meeting (>18 months before defense)

**Summer Term:**
Readings and Research

**12.4** **Year 5 and beyond (if needed)**

**Fall and Winter/Spring Terms:**

Seminars in Cell Biology
Responsible Conduct of Research (RCR)
Reading and Research or Dissertation Writing*
Thesis advisor committee meeting(s)
Defense of Dissertation