Cell & Developmental Biology Graduate Student Handbook 2023 – 2024

Contents

1. The Department

The Department of Cell & Developmental Biology (CDB) faculty together with the Graduate College have established the requirements necessary to achieve the Doctor of Philosophy (Ph.D.) degree in our program. As you are developing your research and teaching skills, we expect that you, together with your faculty thesis advisor and Thesis Committee Members, will take responsibility for achieving the goals of the graduate program. Success depends on reaching the Graduate Degree Milestones and completing degree requirements in a timely manner.

The Graduate Program Contact person manages the department office and she is also the graduate program contact. Her office is located in Room B107 CLSL. The personnel in the office will assist you with any registration, payroll or other administrative matters. Any departmental reimbursements and travel arrangements will be taken care of by the office staff. The School of Molecular and Cellular Biology (MCB) administrative office is located in Room 393 Morrill Hall. Their role is to assist you in business matters, such as purchase orders for research supplies and externally-funded fellowships.

The CDB Graduate Program Committee handles all matters concerning students' progress in the program. The Head of the Department and the Associate Head of the Department are also available to discuss any academic or research problems with students, if necessary.

Should a student decide to leave his/her current thesis lab at any point for any reason, he/she must immediately meet with The Graduate Program Contact person to discuss the implications. A mandatory meeting with the Graduate College, and ISSS if the student is an international student, will be scheduled to fully understand the student's options.

2. Degree Requirements

2.1 Ph.D. Degree Requirements

Candidates for the Ph.D. degree must complete the following.

Graduate College Requirements:

- Completion of at least 96 credit hours of work beyond the baccalaureate degree.
- Submission of an acceptable thesis.
- All requirements for the Ph.D. must be completed within 7 years after initial registration in the Graduate College. Petition to extend this time-to-degree ***may*** be approved by the department and the Graduate College for up to 12 months.
- If the Ph.D. is not completed within 5 years after the Preliminary Examination, the student will be required to take a second Preliminary Examination. Please see the Graduate College Handbook for more details (http://www.grad.illinois.edu/gradhandbook/).

Cell & Developmental Biology Department Requirements:

The CDB Graduate Program Committee evaluates factors that determine satisfactory academic progress. Failure to meet these requirements will result in the committee recommending to the Graduate College that the student be placed on probation or dismissed from the Graduate College. In particular, a student who fails to meet CDB Graduate Program Milestones in a timely fashion will be put on a departmental or Graduate College hold. This means that the student will not be given a research appointment (will not be paid) until the deficiency is corrected.

- Successful completion of the course requirements set by the Department of CDB, for a total of at least 96 credit hours – see Sections 4 & 5.
- An overall grade point average (GPA) of at least 3.0 in all ***graded*** 400- and 500-level courses.
- Passing grade on the Preliminary Examination, held during April of the second year. Under special circumstances the exam period may be extended into March and May dates. This examination is designed to determine if the student is qualified for advancement to a Ph.D. degree.
- Form a Thesis Committee by the first day of the spring semester of the third year.
- After successful completion of the Preliminary Exam, present a Departmental Student Research Seminar each academic year. The Seminar will be coupled to an Annual Meeting of the Thesis Committee to review the student's progress. In preparation for this meeting, the student and advisor will complete the annual review form to be submitted to the committee.
- Experience teaching for at least one semester (one semester of 50% TA or the equivalent). International CDB graduate students must be eligible to teach within 3 years of entering the graduate program.
- All students are required to publish significant findings of their primary thesis research, as a first author, in peer-reviewed journals.
- Attend at least one national scientific meeting in their chosen field, and present a first-authored poster or talk at that conference. It is expected that the advisor's research funding will support this travel. However, if no source of funding is available, students in their fourth year or beyond who have not yet attended a meeting may receive full support from the Department to attend one national meeting.

  To be eligible for departmental support each student must:

  - Demonstrate that he or she has applied for external funding for this travel; for example, most conferences do offer student travel awards.
  - Have been accepted to the meeting as a presenter of a first-author poster or talk.
  - Provide a letter from his or her advisor describing the benefits of attending that particular meeting and the need for departmental financial support.

  Students who are selected to present a talk at a national conference will be eligible for the CDB Platform Presentation Award. A student may receive unlimited departmental awards in this category throughout his/her graduate career, but the presentations must be on different scientific projects.
- Hold a pre-defense meeting with the Thesis Committee to evaluate student progress approximately six months prior to the date of the final thesis defense. This meeting can take place in conjunction with the student's required annual oral presentation and meeting with the thesis committee.
- Submission and successful defense of a dissertation prepared on original research, performed under the direction of a faculty member or an Affiliate of the CDB Department. The dissertation must be submitted to the thesis committee at least two weeks prior to the date of defense. Defense will be held with the committee only. Upon passing the defense, a public seminar presentation of the student's thesis work will be scheduled at an earliest possible date, preferably in a Monday or Wednesday departmental seminar slot. The Department will approve

the dissertation only after the public seminar. See sections "Ph.D. Thesis (Dissertation)" Section 11.2 and "Thesis Defense (Final Examination)" Section 11.3.

3. Advising

All students are admitted into the School of MCB umbrella program. The first semester, the Associate Director of the MCB graduate program will serve as the primary advisor. When the student becomes a member of CDB the student's PI will be the primary advisor and the first point of contact when he/she seeks advice or assistance with issues relating to the graduate program. Students should also feel free to bring up problems or concerns about their progression in the program with the Director of Graduate Studies, the Associate Head, or the Head of the Department.

4. The First Semester of Graduate School

Coursework

During the first semester of the first year of graduate school, all students are School of MCB graduate students. As such, they take the MCB core graduate courses:

- MCB 501 - Advanced Biochemistry (4 hrs)
- MCB 502 - Advanced Molecular Genetics (4 hrs)

The students also register for lab rotations

- MCB 581 - 1st rotation (3 hrs)
- MCB 582 - 2nd rotation (3 hrs)
- MCB 583 - 3rd rotation (3 hrs)

Thus, for the first semester of the first year of graduate school, the student will be enrolled for a total of 17 credit hours. Lab rotations are graded on an S/U basis.

5. Coursework after the Second Semester

Each student is required to register for a full-time credit load including summer until CDB program requirements are completed. To obtain a Ph.D. degree a student must complete **96 hours** of graduate credit, of which **21 hours** must be graded formal coursework. Eight (8) of the required 21 graded hours of coursework will have already been taken in the first semester (MCB501, MCB502), leaving 13 credit hours to be completed once a student joins CDB.

All coursework must be discussed and agreed upon between the advisor and the student, whether or not the coursework is a part of the program requirement.

Specific requirements:

- MCB 580 - Research Ethics and Responsibilities (1 hr, S/U).

  This class must be taken in the fall semester of the second year.

- CDB 595 A & C - Department and Graduate Student Seminar (6 hrs, S/U).

  These credits are only counted toward the 100 hour total prior to completing the Preliminary Exam. Students are required to register for one credit hour of each of the CDB seminars every fall and spring semester that they register. Students must attend a minimum of 75% of the seminars for both CDB 595 A & C to get a "Satisfactory" grade. Two cumulative "Unsatisfactory" grades in either or both of these courses will be considered not meeting the graduate program requirements and therefore will put the student in poor academic standing.

- CDB 590/599 - Thesis Research (64 hrs S/U)

Students should register for CDB 590 before they pass their Preliminary Examination and CDB 599 after they pass the prelim exam.

- MCB 540 (Scientific Writing, 3 hrs, graded). This class must be taken in the fall semester of the second year.
- Elective courses (10 graded hours total)

  May be chosen from any MCB courses at 400 level or above at any time before graduation.

  Occasionally, classes taken outside of MCB fulfill a niche that cannot be accommodated by an MCB course. In order for such courses to be counted toward the program requirement, they must be agreed upon by your advisor and must also be approved by the CDB Graduate Program Committee.

Number of hours per semester:

- Students who are employed as TAs need to register for 14 credit hours of research and courses combined.
- Students who are employed as RAs need to register for 16 credit hours of research and courses combined.
- 6 credit hours for summer research, regardless of the mechanism that the student is supported by.
- International students may be advised to take a reduced load during a semester when they are enrolled in a remedial English course (ESL).
- The credit hours needed after signing up for courses should be assigned to CDB 590 or CDB 599, as appropriate.

These hours may vary if a student is on a fellowship. Please contact The Graduate Program Contact person, if you have questions.

6. Teaching

6.1 Requirements

Becoming a proficient teacher is an important part of graduate education. The department requires each graduate student to teach the equivalent of 50% for one semester. Non-native English speaking CDB graduate students must be eligible to teach within 3 years of their entering the graduate program. Ph.D. candidates who are not eligible to teach within this time period may be dismissed from the Ph.D. program.

6.2 UIUC Teaching Assistant English Language Proficiency Requirements

Illinois state law requires that all instructors at the University of Illinois be orally proficient in English to be eligible to teach. All non-native English speaking students applying for appointments as teaching assistants at UIUC must first satisfy the English proficiency admission requirements of the Graduate College and the appointing academic unit.

6.3 The EPI (English Proficiency Interview)

All non-native speakers of English who scored below 24 in TOEFL iBT speaking test and wish to provide classroom instruction are required to pass the EPI with a score of 4CP, 5 or 6. There are no exceptions.

- If the student earns a 5 or 6, the student is eligible to TA.
- If the student receives a 4CP grade, the student is required to successfully complete “ESL 508: Seminar for International TAs” during or before the first semester of teaching.

- If the student earns a score of 4, 3 or 2, the student may retake the test after successful completion of an English improvement activity. Students have a maximum of 3 attempts.
- Not passing the EPI is grounds for dismissal from the department.

7. Preliminary Examination

The Preliminary Exam is required by the Graduate College to determine if the student is qualified for advancement to candidacy for the Ph.D. degree. This examination consists of two parts: a written proposal and an oral defense, to be completed in April of the student's second year.

If a student has unusual and compelling circumstances (e.g., switching of research advisor or serious illness) during the first two years of graduate study that prevents him/her from taking the Preliminary Examination by the end of the second year, the student may request an extension in a letter to the Chair of the CDB Graduate Program Committee, before March 1st of the second year. Also, the student must ask his/her advisor to submit a letter to support the petition. If the extension is granted, the student must take the Preliminary Examination during the following September CDB examination period. In the event an extension is denied, the student will take the Preliminary Examination as previously scheduled.

7.1 Preliminary Exam Committee

The CDB Graduate Program Committee oversees the administering of Prelim Exams for all students. Each prelim exam committee consists of four faculty members, including 3 CDB faculty members assigned by the Graduate Program Committee and 1 faculty member from outside the Department chosen by the student. Members of the Graduate Program Committee serve as chairs of the prelim exam committees. The committees are formed in January for April exams. A checklist form is used in the evaluation of both written and oral parts of the exam. Students are strongly encouraged to become familiar with this checklist during their preparation for the exam.

7.2 Preliminary Exam Written Proposal

The student must prepare a research proposal describing his or her thesis project. It is the student's responsibility to write his/her own proposal. However, the advisor must read drafts of these documents and provide both intellectual guidance and editorial feedback to help the students learn how to undertake good scientific writing.

The written proposal should be **no longer than 7 pages** in length (excluding the cover page and references). The written proposal must be submitted to the CDB Office by **March 15** of the second year in the graduate program. No revision of the proposal will be accepted by the office or by the committee after this date. The format of the written proposal must follow guidelines below and will be checked by the CDB Office prior to distributing to prelim exam committee members.

The format of the written proposal will follow that of the NIH F31 pre-doctoral fellowship application, which specifically includes the Specific Aims and Research Strategy sections. The guidelines for those sections are listed below, and come from NIH publication PHS SF424 (R&R), with a few comments added for clarity.

These websites may help get you started:

http://www.biosciencewriters.com/NIH-Grant-Applications-The-Anatomy-of-a-Specific-Aims-Page.aspx

https://depts.washington.edu/anesth/research/grantsmanship/session3_WritingEffectiveSpecificAims.pdf

For fonts use Arial, Helvetica, Palatino Linotype, or Georgia typeface, a black font color, and a font size of 11 points or larger. (A Symbol font may be used to insert Greek letters or special characters; the font size requirement still applies).

Type density, including characters and spaces, must be no more than 15 characters per inch. Type may be no more than six lines per inch.

Use standard paper size (8 ½"x11"). Use at least one-half inch margins (top, bottom, left and right) for all pages. No information should appear in the margins.

Proposal Sections:

Cover Page: The cover page should include the title of the project, your name, the date, time and place of the oral defense, and list the members of the Exam Committee with the designated Chair indicated.

Specific Aims *(limited to one page):* State the goals of the proposed research and summarize the expected outcome(s), including the impact that the results of the proposed research will exert on the research field(s) involved. This section outlines the objectives and describes concisely what the specific research described in the proposal is intended to accomplish and a hypotheses to be treated. This page will typically include an introductory paragraph or two that concisely states the scientific problem and hypothesis, followed by a numbered list of 2-3 Specific Aims designed to address that hypothesis. A short but concise description of each Aim should be included after a title that accurately summarizes the Aim.

Research Strategy *(limited to 6 pages including all figures and tables):* Organize the Research Strategy in the specified order and start each section with the appropriate section heading:

Significance

Innovation

Approach (and alternative approaches)

Cite published experimental details in the Research Strategy and provide the full reference in the References Cited section.

(a) ***Significance*:**

- Explain the importance of the problem or critical barrier to progress in the field that the proposed project addresses.
- Explain how the proposed project will improve scientific knowledge, technical capability, and/or clinical practice in one or more broad fields.
- Describe how the concepts, methods, technologies, treatments, services, or preventative interventions that drive this field will be changed if the proposed aims are achieved.

(b) ***Innovation****: (the Innovation section is optional, but can be used to help your committee members understand how your project will yield novel insights or develop novel approaches that will advance your chosen field.)*

- Explain how the application challenges and seeks to shift current research or clinical practice paradigms.
- Describe any novel theoretical concepts, approaches or methodologies, instrumentation or interventions to be developed or used, and any advantage over existing methodologies, instrumentation, or interventions.

- Explain any refinements, improvements, or new applications of theoretical concepts, approaches or methodologies, instrumentation, or interventions.

(c) ***Approach****: This section should include the background necessary for a reader to understand the problem you wish to solve, and to understand the basis for your hypothesis.* The section should include:

- A review of the scientific literature sufficient to inform your committee of the relevant issues and unsolved problems that lead to your hypothesis
- Preliminary Data that support your hypothesis (please be sure to give proper attribution if the data presented are not your own)
- A section that describes the approach – both experimental and analytical - that you will use to attain each of your Specific Aims.

You need to convince your committee that the experiments you plan can be completed in time span consistent with a Ph.D. thesis studentship, that is, within the next 3-4 years.

For each Aim it is essential to identify potential issues that might arise in the course of the experiments you propose and alternative approaches (methods or strategies) you could use in case your favored strategy were to fail. You should also be prepared to discuss alternative hypotheses and state how you might change your strategy if results indicate that your original hypothesis is incorrect.

From the NIH manual:

- Describe the overall strategy, methodology, and analyses to be used to accomplish the specific aims of the project. Include how the data will be collected, analyzed, and interpreted.
- Discuss potential problems, alternative strategies, and benchmarks for success anticipated to achieve the aims.
- If the project is in the early stages of development, describe any strategy to establish feasibility, and address the management of any high risk aspects of the proposed work.
- If an applicant has multiple Specific Aims, then the applicant should address Significance, Innovation and Approach for each Specific Aim individually. For the CDB exam this should be brief and in addition to the overall project significance section, described above. You should also incorporate information on any of your Preliminary Studies that pertain to each Specific Aim within the Significance and Approach subsections, where this is best suited.

References cited *(No page limits): This section provides full literature references, following the standard format, which includes the authors' names (in the correct order, as published), year of publication, title of the manuscript, title of the journal in which the work was published, volume and page numbers.*

Before the exam: remind the advisor that they need to prepare a one-page letter that comments on the technical ability and productivity of the student. This letter needs to be submitted to the CDB office before the exam begins.

7.3 Preliminary Exam Oral Defense

The oral defense will be scheduled for two hours. The student should be prepared to explain all aspects of the project, including other studies relevant to the proposed research (i.e., relevant background and literature), research goals and their significance in the context of the field, all proposed experiments and techniques needed to undertake this research. Specific guidelines on the oral exam format:

1. The oral exam will start with and consist entirely of committee asking the student questions.
2. During the exam the student can write or draw on the white board when answering questions.
3. The student should bring a laptop with slides containing data, which can be shown only at the request of the committee. Each slide must be clearly labeled with the name of the individual who did the experiment.
4. The question session of the exam will be no longer than 1.5 hours, after which the committee will deliberate while the student waits in the CDB office. The exam shall be no longer than 2 hours, including time needed to deliver the exam result to the student.

7.4 Preliminary Exam Evaluation and Outcome

On the basis of the written proposal and the oral defense, the committee will evaluate the student's progress and potential to carry out Ph.D. degree-level research.

A formal checklist will be used to assist in the evaluation of the student's performance at this exam. It is highly recommended that the students familiarize themselves with the checklist form as they prepare for the exam. The committee will evaluate the proposed research, the student's background knowledge and grasp of any relevant material, as well as the student's ability to communicate effectively and to think critically about his/her research project.

Following the meeting, the committee will meet with the student to explain their decision. The Chair will compose a letter of evaluation to the student and advisor ***no later than two weeks following the examination.***

There are three potential outcomes of a Preliminary Examination:

- Fail: Students who fail will not be advanced to candidacy to the Ph.D. degree. They will be placed on probationary academic status immediately. The exam committee must determine, at the conclusion of the exam, whether it is recommended that the student retake the exam. If a retake is recommended, the student must retake and pass the entire Preliminary Examination within 12 months of the initial examination date according to University policies, or the student will be dismissed from the CDB graduate program. If the exam committee does not recommend retake, the student must leave the program at the end of the semester in which they took the exam.

  A student on academic probation (GPA < 3.0) who fails the prelim exam will not be allowed to retake the exam and will be dismissed from the program.

- Deferral: For students who are deferred, the committee may recommend writing revisions, or revisions plus a new oral defense. A final decision on the exam outcome must be made within 180 days of the original exam per Graduate College policies. A Preliminary Examination cannot be deferred twice and the outcome of a deferred exam is either "pass" or "fail."

- Pass: Students who pass are advanced to candidacy to the Ph.D. degree.

8. Ph.D. Thesis Committee

The Thesis Committee is established after successful completion of the Preliminary Exam. At any time, if necessary, it is possible to replace a member of the Thesis Committee, with permission from the CDB Graduate Program Committee.

Each student, in consultation with the thesis advisor and with the prior agreement of the faculty selected, will submit the names of three additional professors for the Thesis Committee to the CDB Graduate Program Committee ***no later than the start of the Spring semester of the third year***. Three members of the committee, including the student's advisor, must be primary CDB faculty members, at least two of the members must have attained tenure, and the fourth member must have a **primary** faculty appointment outside the department. ***The student's advisor is formally a member of the Ph.D. thesis committee***. With approval by the Graduate Program Committee, an additional member may be recruited to the committee - for example, to bring in new expertise as the project develops - as long as the above criteria have been met.

It is the student's responsibility to ask potential committee members to serve on the committee. The student will forward to The Graduate Program Contact person emails of faculty members confirming their willingness to serve. **The committee chair must be a tenured primary CDB member other than the thesis advisor. The student can suggest a chair (please provide justification), but the final decision will be made by the department.** The Graduate Program Committee will review and approve the prospective Thesis Committee. The Graduate Program Committee may also suggest an alternate member. The student must inform the outside member of his or her role on the Thesis Committee.

The Thesis Committee will meet yearly to evaluate the student's progress and to provide advice. Each Ph.D. candidate will give an annual research seminar. All members of the committee, including the thesis advisor, are expected to attend the student's seminar and a meeting each year, usually held immediately after the presentation, to provide feedback and advice to the candidate.

9. Graduate Student Annual Research and Academic Progress Review

Campus policy stipulates that graduate units must conduct annual academic progress reviews for all graduate students enrolled in degree-seeking programs at least once every academic year. A written copy of the review must be given to the student and be placed in the student's academic file. The review must include: a student self-report and assessment; a written review prepared by the advisor; an opportunity for the student to discuss this review with the advisor in person.

This review will occur within the framework of the Department's Preliminary Examinations and Annual Student Seminars:

1st-year students: An annual review form will be completed and signed by both the student and the advisor by May 15.

2nd-year students: The student's written Preliminary Examination proposal and defense of the proposal, and the decision and summary statements by the exam committee serve as the review process. See Preliminary Examination Section 7 for details.

All students, *after completion of the Preliminary Examination (beginning 3rd-year):* The student annual seminar and meeting with thesis committee serve as the review. See Graduate Student Annual Seminar and Progress Review Section 10 for details.

Meetings with 6th year and above students

The Graduate Program Committee will meet individually with each senior student in the spring of their 6th year and each following year as they remain in the program. The ultimate goal of the meeting is to help facilitate timely completion of the student's PhD studies. This meeting would be above and beyond any scheduled annual meetings with the thesis committee, and would only include the student and graduate program committee faculty. Committee members will be asked to excuse themselves from meetings with their own students.

10. Graduate Student Annual Seminar and Progress Review

10.1 Overview of Annual Progress Review

Each year progress review will be performed for the Ph.D. candidate in his/her 3rd year or beyond. This review must be completed ***no later than last day of spring semester (early May)***, which entails the following:

- The student will present a Departmental Research Seminar.
- An annual review form (for 3rd-4th year students or for 5th+ year students) must be completed by both the student and the advisor one week before the annual review meeting.
- If the student is in his/her 4th year or beyond and has not published a first-author manuscript, a manuscript draft or detailed outline of a paper in progress must be submitted to the Thesis Committee together with the annual review form. At a minimum the outline must contain a set of completed figures *and an outline of planned figures* with a detailed description of (1) the conclusions illustrated by completed figures, and (2) the question to be addressed by each figure planned.
- After the seminar the student will send the presentation slides electronically to the CDB Office.
- The student will meet with the Thesis Committee to discuss progress and future research directions. This meeting is generally scheduled for a time immediately following the annual seminar, but must take place within one month following the seminar.

10.2 Annual Student Seminar Presentation

The presentation should not exceed 20 minutes, followed by 10 minutes of Q&A. The advisor will serve as moderator to keep the seminar on time. In the absence of the advisor, chair of the student's thesis committee will be the moderator. Each talk should include a focused synopsis of:

- Background, significance and rationale for the project (may include research question or hypothesis)
- Most informative results to date, emphasizing new experiments done and results collected over the past year
- Current interpretations and/or revised working model
- Future goals

Different time may be spent per section depending on career stage. For example, in Year 3, more time may be spent justifying or describing the project. By Year 6, more time should be spent on results and well-supported interpretations.

The purpose of these talks is to:

- Provide valuable experience for the student in developing and honing their public presentation skills
- Inform other students and faculty of the student's research, and
- Allow the student to receive constructive input from the CDB community

The talks should be styled as if for a broad audience that is generally knowledgeable but not specifically expert in the student's field. The student's thesis committee is expected to attend this talk and evaluate the student's progress as well as provide feedback to improve presentation skills. If the student has made progress on additional experiments or a second project, and they wish to share this information in a second ppt with the committee alone, that is fully supported. The committee will receive a copy of the student's presentation from the previous year for comparison.

10.3 Annual Review Meeting

The annual review meeting should involve all committee members if possible. **The Chair must be present**, and the student's advisor is also expected to attend.

The purpose of this meeting is to give committee members a chance to evaluate the student's progress toward the degree. However, it is also a forum for students to gain valuable technical and scientific advice. The committee will have received the annual review form completed by the student and his/her advisor prior to this meeting.

10.4 Evaluation

The committee Chair will complete a form summarizing the committee's evaluation of the candidate's progress and approved by all committee members, *no later than 2 weeks following the student's meeting*. The form will be submitted to the CDB Office and will be forwarded to the student and advisor.

The report will include the following components:

- Overall Assessment: of the student's progress, seminar presentation, and written documents
- Strengths and Weaknesses: in concise summary
- Constructive advice on how to address any major concerns

An overall rating of "satisfactory" or "unsatisfactory" should be provided by the committee and included at the top of the report each year.

Satisfactory progress will be assigned to students who have:

- Met obligations regarding submission of required documents
- Provided adequate information to their committee, responded knowledgably to questions, and responded to concerns from previous years
- Made overall satisfactory progress (despite normal research setbacks and possible issues) toward their degree

Unsatisfactory will be reserved to students who:

- Fail to submit their required documents, and fail to complete the meeting with their committee
- Fail to provide adequate information to their committee, fail to answer critical questions knowledgably, or fail to respond to concerns from previous years

- Fail to make adequate progress toward their degree, due to problems beyond normal research setbacks and technical issues

11. The Final Year

11.1 Pre-defense Meeting

Each student who is *within a year of graduating* is responsible for scheduling the pre-defense meeting with the Thesis Committee. *The final defense cannot be scheduled until the student has the approval of the Thesis Committee and the Advisor at the pre-defense meeting.*

Schedule a meeting with The Graduate Program Contact person in the CDB Office, well in advance of scheduling your pre-defense meeting, to make sure you have completed all the necessary requirements for a Ph.D. degree.

The advisor, as a member of the thesis committee, must attend the pre-defense meeting. This meeting provides an opportunity for the Committee to evaluate the student's progress, suggest any additional experiments that may be necessary before completion of the thesis, and determine whether the expected time-frame for completion of the thesis is reasonable.

A week prior to the pre-defense meeting, the student must provide the committee with the following:

- An outline of the thesis (indicating sections that have been completed and any experiments that have not yet been completed)
- A final version of the introductory chapter
- Evidence of having published significant findings of their primary thesis research, as a first author, in peer-reviewed journals
- Drafts of any papers that are being reviewed for publication or about to be submitted
- An updated *curriculum vitae* (CV)

11.2 Ph.D. Thesis (Dissertation)

The Graduate College has strict requirements for the thesis format. A copy of these thesis guidelines can be obtained from the Graduate College website or from the Thesis Office. Please read these thesis guidelines http://www.grad.illinois.edu/thesis-dissertation carefully before writing your thesis.

Once you have made all revisions that were suggested by your thesis committee, the format of your thesis will be reviewed by the CDB Office. Once approved by the Department, the thesis can be sent to the Graduate College. The Thesis Office will review your thesis and if any changes are necessary will send an email of necessary corrections. A time lag of up to, but not exceeding, three (3) semesters is permitted between time of the final exam (thesis defense) and official deposit of the thesis in the Graduate College, but the degree is not official nor conferred until all other degree requirements have been met and the thesis is deposited. The Graduate College website outlines the steps necessary for the deposit of the thesis.

11.3 Thesis Defense (Final Examination)

The Final Thesis Defense Committee will be the same as the Thesis Committee with the research advisor serving as the Director of Research.

The Ph.D. candidate should arrange a time with the committee and reserve a room for the final defense, and inform the CDB Office of the time and place of defense. The student is expected to submit his/her thesis to committee members ***at least 2 weeks prior*** to the final defense. The committee will read the thesis and make suggestions for corrections and any additional work which may be necessary to complete the Ph.D. If it is determined by the committee that the required changes are so extensive that this timeline cannot be met, or if the changes could be made but the student fails to meet this two-week deadline, the defense will need to be rescheduled.

The final thesis defense consists of a public seminar followed by Q&A with the thesis committee. Upon passing the defense the committee and the department will sign the "Final Examination Result" form. **One bound copy** of the final thesis must be turned in to the CDB Office after the Graduate College has approved the thesis for deposit.

When a thesis is successfully defended and deposited, the DFR grades for CDB 599 will be changed to S (satisfactory). If the student fails the final defense, the grade becomes U (unsatisfactory), and the thesis cannot be deposited. No credit will be given for CDB 599 unless a thesis is deposited.

11.4 Electronic Deposit of Thesis (EDT) http://www.grad.illinois.edu/thesis-dissertation

When you submit your thesis to the Graduate College, you will be asked to select a release option for your work in IDEALS. These options go into effect when the Graduate College transfers your thesis to IDEALS. Take time to review "IDEALS Deposit Agreement: Non-Exclusive Distribution and Preservation License" prior to submission.

IDEALS Release Options

Read the detailed information about IDEALS at:
http://www.grad.illinois.edu/thesis/release-options

ProQuest Release Options (Optional)

Read the detailed information about ProQuest at:
http://www.grad.illinois.edu/thesis/release-options

11.5 The Graduate College Calendar

The Graduate College Calendar lists the dates of important deadlines for graduate students. Degrees are conferred three times per year, in May, December, and August.

11.6 Degree Certification

Since degree conferral occurs at the end of the semester, after completing the thesis deposit, a student may request a Degree Certification Letter (DCL) by downloading the form from the Graduate College website. After completing and signing the top half of the form, submit the DCL request to the CDB Office, who will complete the departmental section and route the completed request to the Graduate Student Academic Services (GSAS) Office for processing.

12. Additional Requirements, Situations and Expectations

12.1 Experimental Records and Data

All experimental procedures and results should be carefully recorded in the student's lab notebooks. Laboratory notebooks should be systematic and thorough enough to be scrutinized by other scientists or granting agencies. According to federal funding agencies, University of Illinois, and Departmental policy, all lab notes and data are

considered property of the laboratory where the research was done and should remain in the laboratory when the student leaves. With permission of the research advisor, the student may take a copy of these materials upon leaving the lab.

12.2 Ethical Conduct

Students and faculty are expected to hold the highest ethical standards during their pursuit of scholarly research and teaching. Each student must complete MCB 580, Research Ethics & Responsibilities. Students should become familiar with the definition of academic misconduct. All students are expected to adhere to the standards of intellectual and academic integrity.

12.3 Vacation and Sick Leave

Success in any biology Ph.D. program and a scientific career thereafter requires hard work and dedication. In contrast to classwork, experiments may continue on weekends and between semesters year round. The time between classes is often the most productive time to do experiments. Graduate students are not eligible for vacation except for the official University holidays.

Graduate students who wish to schedule a vacation must have the time approved by his/her advisor well in advance. Research and teaching assistants are entitled to 13 days of non-accruable sick leave each year. In the event of more protracted illness, leave without pay may be requested (see below).

12.4 Academic Leaves of Absence

Below is a short description of the Academic Leave of Absence. It is your responsibility to read all the information regarding an Academic Leave Of Absence:

Graduate Students in degree-seeking programs are entitled to a total of two terms (fall and/or spring semesters) of academic leave of the types described below, in the course of a single degree program. Students who anticipate not being enrolled for one or more terms, (fall or spring semesters, not summer), for whatever reason must meet with their program adviser before the first day of classes of their period of non-enrollment to apply for and receive approval for an Academic Leave of Absence. Students who are enrolled in summer only programs must apply for a Leave of Absence before taking a summer term off.

There are two categories of Academic Leaves of Absence:

- Personal Academic Leaves of Absence may be requested for a variety of reasons, including but not limited to leave for health reasons, for personal reasons, for active military service, or to take care of dependents or family members.
- Academic Progress Leaves of Absence may be requested for instances of academic activity such as Study Abroad when the student registers at another institution, or fieldwork when the student is not using UIUC resources including faculty time, nor receiving financial support paid through the University. Expectations of progress to be made during the Leave should be documented in the student's academic file. International Students: International students must meet with an ISSS adviser prior to requesting a leave and the ISSS adviser must sign the.

12.5 Grounds for Dismissal

There are several situations that will cause a student to lose their good standing status, and they can be grounds for dismissal from the program:

- Academic probation (cumulative GPA less than 3.0)
- A student with a GPA < 3.0 at the end of their third year will be dismissed from the PhD program.
- Failure to fulfill coursework requirements, such as two cumulative "unsatisfactory" grades in CDB 595A and/or CDB 595C
- Failure of the Preliminary Examination
- Not eligible to teach within 3 years of entering the graduate program
- Failure to make satisfactory progress deemed by the thesis committee
- The student is automatically and immediately considered to be in poor academic standing in CDB if he/she does not have a thesis lab.

13. Financial

13.1 Appointments

Four types of financial assistance are available to graduate students:

- Teaching assistantships
- Research assistantships
- Fellowships
- Training grant appointments

13.2 Paychecks

Paychecks and reimbursements from the University will be direct deposited into your bank account.

13.3 Tuition Waivers

Each student holding an appointment of at least 25% but not more than 67% receive a tuition waiver. Fees must be paid by the student.

13.4 Fees

Registered graduate students must pay all applicable fees.

14. Master's Degree

CDB does not recruit students into a separate Master's degree program. The program exists only to assist Ph.D. students in good standing who may wish to receive the Master's degree. The CDB Master's degree requires that students complete all of the same coursework required of Ph.D. students during their first two academic years, Section 5. If a student has passed the Prelim Exam and fulfilled all the course requirement, then a Master's degree can be granted at any time, upon the student's request. The CDB office will assist with the Department and Graduate College procedures.

If a student fails the Prelim Exam but has otherwise fulfilled all requirements of the Ph.D. program in the first two years and would like to be considered for a Master's degree, the Graduate Program Committee will, in consultation with the student's Prelim Exam committee, determine whether or not the student qualifies to receive a Master's degree.

Should the committee approve of a path to Master's degree, the student must also fulfill all research requirements set forth by the advisor, including completion of bench work and documentation of research results.

15. Departmental Grievance Policy

Most conflicts and problems that arise can be resolved informally, without invoking formal grievance procedures. University policy strongly encourages all students who believe they have a dispute or conflict to use all appropriate avenues for informal resolution before initiating the Graduate College grievance process.

A graduate student who has a problem should first discuss that problem with the person who seems to be the source of the difficulty. If that discussion is inappropriate or unfruitful, the problem could still be resolved informally with assistance from other individuals in the department. We encourage meeting with your advisor, members of your thesis committee, Director of Graduate Studies, or Associate Head of the department. The Head of the department is also available to discuss any issues if necessary.

Graduate students may file a formal grievance with the Graduate College if informal efforts to resolve the problem are not successful. The grievance may be filed directly with the Graduate College. Students who wish to consult with a Graduate College dean about a possible grievance situation may call the Graduate College to make an appointment.

Annual Review Form

Forward the Annual Review Form to your advisor when your portion is complete. Cc your advisor when you send the completed form to the CDB office.

1. Briefly list your project's current Specific Aims and note how they may have changed since your last annual meeting.

2. Summarize, as bulleted list, your major accomplishments in the past year.

3. Summarize any technical or other problems you have encountered over the past year and how have, or have planned to, surmount them.

4. Summarize your plans for the next year.

5. List any manuscripts published, in preparation or planned for the next year.
   Serine 970 of RNA helicase MOV10 is phosphorylated, controls unwinding activity and fate of AGO2 target mRNAs

6. Do you have plans to attend a national conference this year? If yes, which one?

7. Expected Graduation Year _____

For the advisor:

Please comment on the following questions. For each question, briefly summarize your strategy for helping the student overcome any perceived hurdles to success in the PhD program.

1. Does the student have a deep understanding of the rationale and goals of their project?

2. Does the student read the scientific literature deeply, critically and broadly, in order to build a solid foundation for understanding their field of interest and the fundamentals of the discipline?

3. Is the student demonstrating an increasing ability to participate in scientific discourse with the advisor, lab mates, and other scientists in the field?

4. How well can the student plan and/or execute specific experiments without significant feedback from the advisor? Is the student able to successfully adopt new experimental procedures whenever needed?

5. How well can the student troubleshoot experiments on their own and develop a plan for the next steps / experiments – either to test alternative explanations by different experiments or additional controls or to propose alternative approaches?

6. Is the student diligently maintaining lab notes (physical or digital) to properly document experiments and store data?

7. Is the student spending enough time in the lab to complete the project(s)?

8. Is the student goal-orientated and working efficiently to complete the PhD in a timely manner?

9. Do you agree with the student's projected timeline for degree completion?

If NO, please state your expected timeline and why it differs from what the student has written.

CDB Preliminary Exam Checklist

Name:

UIN:

Exam: *day and time*

Committee Members:

Grading Scale

Above Expectations (A) Meets Expectations (M) Below Expectations (B)

Final outcome of this exam: ☐

	Oral			Written		
	A	M	B	A	M	B
1. Research question and rationale	☐	☐	☐	☐	☐	☐

Can the student identify a big-picture question and describe the significance of addressing this question within and, if relevant, beyond the context of the field?

Specific Comments:

2. Background and literature	☐	☐	☐	☐	☐	☐

Does the student demonstrate an understanding of the current literature in the field, to a level expected for a 2nd year student, which identifies knowledge gaps/unanswered questions and supports the rationale of the proposed project? Has the student begun to critically considered the literature and prior work that supports their proposed project? Has the student, appropriately for their 2nd year level, considered the general strengths and weaknesses of the methodologies they plan to use?

Specific Comments:

	Oral	Written

	A	M	B	A	M	B
3. Experimental rationale, design and methods	☐	☐	☐	☐	☐	☐

<u>For a hypothesis-driven thesis project</u>, are experimentally testable sub-questions or hypotheses formulated to address the central question? Are the proposed experiments organized and prioritized in a logical manner to address each question/hypothesis? Are various methodologies compared for their strengths and limitations? Is the research design feasible and likely to generate clear, interpretable data? Are alternative outcomes and potential pitfalls thoroughly considered?

<u>For a methods/technique-development thesis project</u>, are the aims organized and prioritized in a logical manner to address critical steps in the proposed techniques development? Is there an experimental plan for validation of the methodologies/techniques/measurements being developed? Is there a biological driver application to which this method/technique will be applied, and, if so, is there a suitable experimental plan? Are alternative outcomes and potential pitfalls thoroughly considered?

<u>For a discovery-based thesis project</u>, are the experimental systems adequately justified with an appropriate scientific rationale to justify the work. Is there a concrete plan for how the experimental data will be analyzed and an expectation of what types of observations might be expected? Is there a logical rationale for how the observations may discover new information of impact for the field? Is there a biological driver application to which this method/technique will be applied, and, if so, is there a suitable experimental plan? Are alternative outcomes and potential pitfalls thoroughly considered?

Specific Comments:

4. Scope of proposed research	☐	☐	☐	☐	☐	☐

Is the proposed project of sufficient scope for a PhD thesis? Is the proposal sufficiently ambitious to address an important question or methodological need in depth and to achieve mechanistic understanding when applicable? If the proposed project is overly ambitious for a PhD thesis, are various aims and experiments appropriately prioritized such that partial completion of the project will still be impactful?

Specific Comments:

5. Productivity ☐ ☐ ☐ ☐ ☐ ☐

Are there any preliminary data? If not, why not? Are there data that gave a negative result but was well-controlled and informative? If data are given, are there controls, an indication of the number of times the experiment was performed, and statistics?

Specific Comments:

	Oral			Written		
	A	M	B	A	M	B
Overall assessment:	☐	☐	☐	☐	☐	☐

A or M for both: PASS

B for both: FAIL

An A/M and a B: FAIL, DEFER or PASS

This form will be completed by committee chair at the end of exam, and shared with the student along with a summary letter.

Example 3. Graduate Mentor/Mentee Compact

(Professor Stephanie Robert, University of Wisconsin–Madison)

The relationships between doctoral students and their advisors/mentors are important. Doctoral students rely on their mentors for stewardship and support to develop as independent scholars. Mentors often experience the relationships with their mentees as very rewarding – helping individuals reach their goals, seeding the field with strong scholars, and reaping benefits from the intellectual exchange. Because of the importance of these relationships, clarity of expectations and communication can help develop and maintain a strong mentor/mentee relationship. Towards this end, this document aims to make clear some of the expectations that I have for my mentees, and what my mentees can expect from me.

What my mentees can expect from me

I am eager to help you achieve your goals, and am committed to doing the best I can to support and advocate for you. I enjoy helping other people achieve their goals, and my mentees are a priority for me.

I will help you navigate your way through the doctoral program. Although you are ultimately responsible for your deadlines and progress, I am pleased to help you interpret the guidelines and plan with you about strategies to get your professional needs met.

I will make time for you. I am very busy with a range of duties, but my mentees are a priority for me. If you need to meet with me sooner than planned, I expect you to contact me and tell me so. You should trust that I will be honest and tell you what I can and can't do regarding the timing of that meeting.

I do not expect you to be just like me. I am here to help you develop the career that you want for yourself. That may be in academia and it may not be. I am open to you having career goals of various types and am committed to helping you achieve them.

Life is too short to not follow the path you want. I believe that doctoral programs are not for everyone. If, during the course of your study, you decide that you may not want to continue with your doctoral degree, I encourage you to talk with me about it. There are good and bad reasons for doing a doctoral degree. I am open to you changing your goals and deciding that this is not the right path for you. I am willing to help talk you through your options.

I am not Facebook friends with current students. It's just my policy.

I prefer e-mail as the best way to reach me. I don't check my office phone messages consistently. I do not like to text about work, except in special circumstances. I don't like people to call me on my cell phone for work reasons, except in special circumstances (e.g., you are late for a meeting with me, an emergency happens).

I try to respond to e-mail within one business day, when I am in town. If you haven't heard from me in a couple days, or if it is urgent, please resend your message, as it may have gotten lost in the e-pile.

Although I am not responsible for funding you, *I will do my best to help you find appropriate funding for your doctoral studies.*

I don't have to be your primary mentor. If there is someone else who you think would be a better mentor/advisor for you, I am open to having that conversation. Having an appropriate primary mentor/advisor to help you reach your goals is important, and I am committed to helping you achieve your goals, even if it isn't with me as your mentor.

I expect that I will not be your only mentor. I would hate to think that you would be limited by only my advice and guidance. I encourage you to find others who can mentor you to meet different needs that you have. I will not be jealous but rather pleased if you get advice and assistance from others. Inevitably, you will get conflicting advice from me and others, and we can talk about that too.

I will be honest about the strengths and weaknesses of your work. For better or for worse, I am usually straightforward and direct with my feedback, and you can expect that from me.

I understand that my role as mentor changes over time as a mentee's needs change, and as a mentee moves towards independence. I will aim for clear communication about my changing expectations of you and you should aim for clear communication about your changing needs and concerns. Towards this end, every spring the Doctoral Program asks each doctoral student to report on his/her progress over the previous year and to highlight plans for the next year. We will use this as a time to thoroughly discuss your progress and plans.

Below is a list of some of the topics that I am prepared to help you with. I can either help you with these topics directly, or can help you find other people or opportunities to get your needs met in these domains. These topics will each become important to you at different stages in your development as an independent scholar. You should feel free to raise a discussion of any of these topics below, topics above, and other topics in our meetings.

• Choosing appropriate courses	• Networking with others in your area
• Dealing with and addressing individual and structural oppression and discrimination at the university and in academia	• Turning your research into publications – developing and submitting the manuscript, responding to reviewers, etc.
• Developing a preliminary exam topic and proposal	• Developing protocols for the IRB for your research
• Developing a dissertation topic and proposal	• Developing and practicing research presentation skills

• Forming and communicating with preliminary exam and dissertation committees	• Preparing presentations and/or posters for professional meetings
• Finding appropriate TA and PA opportunities	• Discussing job options and preparing for the job market
• Applying for funding, as appropriate	• Brainstorming ideas for time management
• Finding other mentors to help you with topics that are not my strengths	• Brainstorming ideas for maintaining work/life balance
• Finding teaching opportunities	• Help you develop attainable goals and a plan for attaining them
• Developing teaching skills	• Conducting peer review of research
• Supervising independent studies, if appropriate	• Helping you manage and mentor your own students

What I expect from my mentees

I expect that you and I will both work to communicate our expectations of each other as clearly as we can, to foster a strong working relationship. This includes being frank with each other about our own strengths and weaknesses and their implications for how we can work together most productively.

I expect you to be the driver of your educational experience. I expect you to understand what is expected of you from our program and the graduate school, but to also determine how to best get your educational and professional needs met and to advocate for yourself.

I expect that you will read the ***Doctoral Student Guidelines****,* and update yourself on that information at each stage of your program. I can help interpret the Guidelines, but I expect you to take the initiative to review program guidelines first before asking for my guidance.

It is your responsibility to make sure you are following the Guidelines of the program (taking the appropriate coursework, meeting deadlines, etc.). I am here to help you determine how best to do so, but it is not my job to keep track.

I expect that if something is happening in your life that is getting in the way of your doctoral work, you will tell me so that we can problem solve how to get the work done, determine realistic timelines, etc. You can decide how much to share with me—but I need to know the general scope of the constraints to help you minimize the impact on your professional development and timely progress.

I expect you to let me know when you need to meet with me. At different points in the program, we will have more or less frequent contact. If there is something you need to talk about sooner than our next meeting, you should contact me to set up a time to meet.

I expect that you will be open to receiving constructive criticism of your work – or that you will commit to improve on your ability to learn from constructive criticism of your work. You are a student because you have things you want to learn, and learning from critiques of your work is often the best way to improve. I hope to model taking constructive criticism well – test me!

I expect you to disagree with me. This is your life, your career, and your doctoral program. If you disagree with a comment or suggestion I make, you need to communicate that to me and be your own advocate.

I encourage your feedback. I am a flawed individual and I will make mistakes. I still am a work in progress and am trying to become a better mentor and individual over time. If I say something that angers or upsets you, I hope that you will let me know so that we can talk about it. One or both of us will likely benefit from that conversation.

I expect you to respond promptly to my e-mails – within one business day, preferably.

I expect you to take advantage of opportunities other than those I present to you – for example, attending professional development sessions offered by the graduate school, the teaching academy, and institutes and centers on campus. This is a part of you taking control of your professional goals.

I expect you to work hard towards your professional goals while also working towards a sustainable work/life balance. Both hard work and work/life balance are important to sustaining a successful professional career over the long term.

Example of a Lab Data Integrity Protocol

An electronic (OneNote) or paper notebook ***must be kept contemporaneously*** with all work in the lab. All notebooks should be written in English.

Shared, standardized, protocols will be kept on our a lab computer and in Illinois Box

When opening reagents, please write your initials and the date on the container. Place the packing slip in the "Reagents Binder". Write on the packing slip where it is stored (freezer/rack/box, etc…)

When labeling bottles of solutions include bottle's contents, your initials, and the date (month/day/year).

Adhere to ALCOA Plus and SLIDR:

- Data Quality (ALCOA)
  - Attributed to who
  - Legible record
  - Contemporaneous/Immediately recorded
  - Original entry
  - Accurate record
- Data Integrity (ALCOA Plus)
  - Complete, consistent record
  - Enduring, organized and readily available record
- Updates (i.e. correcting information or making changes; SLIDR)
  - Single Line through text to be corrected
  - Initials
  - Date
  - Reason for correction/change

For each new project/experiment, include both prescriptive and descriptive documentation:

Prescriptive/Prospective Statement ("Plan")

- Title
- Purpose, what are you doing and why? What is the rationale? What is to be gained?
- What protocols will be used? Their source? Relevant references?
- What reagents will be used? Equipment? Is it all available?
- What are the controls?
- Ideas for analysis or interpretation

Descriptive Documentation ("Method")

- Date of the experiment (month/day/year) and time? If not working alone, who is helping?
- What was done?
- What reagents were used, including catalog info, open dates, lot numbers?
- If applicable, position of newly generated reagents in freezer
- Calculations (preferably verified by you or someone else)
- Include notes, thoughts, mistakes, unexpected results, attempts that did not work
- Organize, organize, organize (If keeping a paper notebook, make an index on first several pages.)
- Record original, source information or data, including scraps of paper, notes on paper towels, print-outs, *et cetera* - Scan these or take a photo and include in your notebook with the relevant experiment.
- Data, quantification method, quantified data, notes of any changes made to raw data
- Interpretations, next steps for trouble-shooting, future projects

**Ensure that your notebook is secure. This includes backing it up and keeping it in a safe place.
***Know that in accordance with NIH policy (2023), all data and code should be managed and documented such that it could be shared with a data/code repository or another lab. Thus, it must be documented to an extent that allows it to be repeated or recycled.

Excel Spreadsheets: Supplemental spreadsheets for data quantification and analysis should be completely self-explanatory and easily mappable to the original data files. Your organization should allow any lab member to reconstruct what you have done.

Guidelines:

- In the spreadsheet, include the date(s) the original experiment was done, a brief description of how it was done, and the file names of the raw data.
- If quantifications are done on images, please include any information about how the image was processed prior to quantification.
- Include a detailed description of how quantification was done (box size, box position, channels used, *et cetera*).
- If some images or data points were excluded, describe the standards for inclusion/exclusion (e.g. excluded movies that didn't capture all of cellularization, excluded movies where cellularization took >70 minutes, *et cetera*).
- If you perform multiple "versions" of a quantification, make the versions separate tabs in the spreadsheet. Make it very clear in the spreadsheet which version was used for making figures. Also, include a brief rationale for why you changed your method of quantification.
- When you are assembling data for a paper, make a new spreadsheet that contains all the original/source data. Use tabs in the spreadsheet for individual plots. (Follow eLIFE requirements.)

Confocal Images: During your time in the lab, you may generate tens of thousands of images. From the beginning you must implement an organization system to ensure that these images are cataloged so that any lab member can understand and retrieve raw images from your collection.

Guidelines:

- A raw source image must always be retained. If the raw images cannot be retrieved, then no versions of the image can be published. Nor can quantified data from the image be published.
- Dates can be used as unique identifiers for images; so, the date of acquisition should be linked to every image. The simplest way to do this is to include the date in the image name with additional identifying info regarding the experiment, sequence of acquisition, et cetera. (Examples: 062818Gly1min 01.lsm; 062818Gly1min 02.lsm)
- The acquisition date should always accompany the image. Even when the image is cropped, adjusted or quantified, the acquisition date should be linked.
- When images are acquired in .lsm or .czi format, they will contain information regarding acquisition settings. *This does not negate the need to keep notes and information regarding acquisition*. Acquisition information should be recorded in your lab notebook. Every imaging session must be cross-referenced to an experiment that is recorded in your notebook, and information about the probes used should be easily retrievable.
- When using images to prepare figures, the raw source image should be noted in a central spreadsheet regarding figure prep. Also, raw image should be duplicated and included in the figure prep folder with all edited versions.

MATLAB and Other Coding: At a minimum you will plot data using code, and it is likely that you will use code for numerous data analysis tasks that you undertake. From the beginning you must implement organization and documentation systems to ensure that these codes, and how you used them, are cataloged so that any lab member can retrieve, understand and repeat your analysis. MATLAB beginners need to have completed the "On Ramp" introduction.

Guidelines:

- Codes should have descriptive titles and should be thoroughly commented throughout. If you change the name of a code, include that information on the Code Names Master Sheet on the lab Google Drive.
- Each code needs to have an accompanying Word file to document the (i) lineage of the code and what version of MATLAB was used to generate or modify the code; (ii) instructions for how to acquire and process images to be used with the code; (iii) information about what plugins or auxiliary files are needed to run the code; (iv) and any other specific notes that are essential to allow someone else to run the code.
- When modifying code, do not delete items. Instead, deactivate lines and insert a comment to explain.
- An introduction for generating MATLAB plots is provided on the lab Google Drive. When adding to this document, include information such as what an example plot looks like and what changes need to be made in AI.
- For statistical analysis, refer to the resources in the Statistics folder on the lab Google Drive.

Checklist for setting up *every* new experiment:

o Have I considered: What is the single question that my experiment addresses?

o Have I considered: Is my new experiment founded on rigorous prior results?

o What is my experience level regarding this experiment?
- What additional information do I need to perform the experiment at an expert level?
- Where or from whom can I get this information?

o Am I conducting a totally new experiment, or am I repeating someone else's experiment?
- If repeating, what are all the sources for the protocol? Have I carefully read those sources?
- How will I ensure that I faithfully repeat the experiment of the earlier investigator?
- Have I properly considered the steps that the earlier investigator might have left out or inadequately described?
- Is there a possibility of shadowing someone when they do this experiment to reveal "hidden" steps? Can I watch a JoVE or YouTube video?

o Have I written a detailed protocol prior to starting my experiment?
- Does my protocol include sufficient detail to be published as a STAR protocol?
- If I am repeating an earlier investigator's protocol, have I re-written the protocol for myself? Do I know the rationale behind each step?

o Do I have all the reagents required for the experiment?
- If I am repeating an experiment based on an earlier protocol, have I collected the same reagents that were used by the prior investigator?
- Do I know the concentrations, pH, supplier, *et cetera* of the reagents used by the prior investigator?

o What are the controls for my experiment?
- Have I considered possible outcomes of my experiment? What will the results look like if the experiment works? If it fails?

o Have I completed a mental dry run of the experiment?
- Do I have the equipment required?
- Is my experiment manageable? How many samples will I be working with? Does the timing make sense?

o What steps have I taken to develop and perform a reproducible protocol?

o What questions do I still have about my experiment?