

Department of Cell & Developmental Biology Graduate Program Guidelines & Regulations

- I. **Introduction.** To complete the requirements for the Ph.D. degree, graduate students in the Department of Cell & Developmental Biology must successfully complete required and elective courses, attend CDB departmental seminars, pass a qualifying examination, perform research and write and defend a thesis. The program requires the completion of at least 135 term-hours of course credit, of which 100 hours must be in either departmental courses or con-joint courses. Generally, students are expected to enroll in 12-16 credit-hours per quarter (including summer quarter).

Students usually enter the CDB graduate program through the Program in Molecular and Cellular Biosciences (PMCB). The first year of graduate studies in the PMCB program involves three laboratory research rotations and completion of core courses (CON605, CON650, CON661, CON662, CON663, CON664 and two of CON665, CON667 and CON668) that contribute to fulfilling CDB course requirements (see below).

- II. **Required courses.** The following courses must be successfully completed with a grade of “B” or better except for courses graded on a pass/not-passed (P/NP) basis for which a grade of P must be received.

| Course Number | Title | Term | Credit Hours |
|---------------------------------------------|------------------------------------------------------|----------------------|--------------|
| CELL607A | CDB Departmental Seminar | All terms after PMCB | |
| CON605 | PMCB Literature and Journal Club | Fall/Winter/Spring | 6 |
| CON650 | Practice and Ethics of Science | Fall | 1 |
| CON661 | Structure and Function of Biological Molecules | Fall | 3 |
| CON662 | Genetic Mechanisms | Fall | 3 |
| CON663 | Bioregulation | Winter | 3 |
| CON664 | Cell Structure and Function | Winter | 3 |
| | Two Journal Club Courses | Any term | >2 |
| | 3 Elective Courses | Any term | >6 |
| Two of the following three Conjoint courses | | | |
| CON665 | Development, Differentiation and Cancer | Spring | 3 |
| CON666 | Organ Systems | Spring | 3 |
| CON667 | Molecular Biophysics and Experimental Bioinformatics | Spring | 3 |

- A. **Credit for previous course work.** If a student feels that they have completed an equivalent, graduate-level course to any of the required courses, they may petition to have the course requirement waived. To petition, the student should write a memo to the chair of the CDB Graduate Studies Committee requesting that the course requirement be waived and explaining why the student feels that the previous course is equivalent to the

- required course. A course outline or syllabus that indicates the subjects covered by the previous course should be included with the memo.
- B. **CDB Departmental Seminar.** All students are required to enroll in and attend CELL 607A, CDB Departmental Seminar, throughout their graduate tenure. Students are required to present a Departmental seminar on their thesis work during the second year of graduate studies and at least once more before graduation (usually in the 3rd or 4th year).
 - C. **Journal Clubs.** Students are required to enroll in at least two-hours of journal club courses prior to taking their qualifying exam. Possibilities include the Cell Biology Journal Club (Linda Musil, course director), the Developmental Biology Journal Club (Jan Christian, course director) and the Signal Transduction Journal Club (Peter Rotwein, course director).
 - D. **Elective Courses.** CDB requires that students successfully complete at least three elective graduate courses offered by CDB or other departments on campus prior to taking their qualifying exam. Below is a listing of some of the more popular electives taken by our students:
 - 1. **CELL 611, Histology – The Structure and Function of Cells in Tissues.** Bruce Magun and Karmen Schmidt, course directors. Offered every other year. Introduction to the organization and differentiated function of the major tissues and organs of the body. Students will develop expertise in the histological identification of tissues and organs under the light microscope. One hour per week will deal with discussion of a paper that uses histological or histochemical analysis of tissues in combination with transgenesis or other molecular approaches.
 - 2. **CELL 615, Developmental Neurobiology.** Philip Copenhaver, course director. Offered every other year. Topics covered include (i) Patterning of the vertebrate nervous system, (ii) mechanisms of cell determination, (iii) neural cell migration and growth cones, (iv) mechanisms of target recognition and synaptic plasticity, and (v) role of cell death.
 - 3. **CELL 616, Cancer Biology.** Bruce Magun and Molly. Kulesz-Martin, course directors. Offered every other year. Topics covered include (i) cell cycle, (ii) growth factor signalling pathways, (iii) role of transcription factors in cell cycle control, (iv) DNA damage and repair, and (v) mechanisms of carcinogenesis.
 - 4. **CELL 618, Mechanisms of Development.** Jan Christian, course director. Offered every other year. Topics covered include i) signal transduction and transcriptional regulation of cell fate, ii) RNA localization and translational control of development, iii) asymmetric cell division, iv) embryonic inductions, v) signaling networks that establish the major body axes, vi) stem cell plasticity and vii) organogenesis.
 - 5. **CELL 620 Model Systems Biology.** David Ransom/Melissa Wong, course directors. Offered every other year. This course provides an introduction to the

biology and genetics of the major animal model systems as well as laboratory demonstrations of state-of-the-art techniques. Students will gain a solid understanding of how mice, zebrafish, *Xenopus*, chickens, flies, moths and nematodes are used as tools to study key cell and molecular biology problems. This will help students better interpret the results of the many papers coming out each day in major journals. This course should also aid in making informed choices of thesis and qualifying exam topics. Grades will be based on student presentations of current topics and a final exam. Students at all levels are encouraged to participate.

6. **CELL 622, Topics in Transcriptional Regulation.** Richard Maurer/David Ransom, course directors. Offered every other year. Specific topics concerning mechanisms regulating gene expression will be covered. Some topics will focus on the role of particular transcription factor or co-activator families. Other topics will examine the role of transcriptional changes in regulating physiological processes. The course will involve lectures by faculty and interactive discussion of current papers. Students will be required to prepare a written research proposal. Prerequisite: CON663.
7. **CELL654, Signal Transduction.** David Morton, course director. Offered every other year. Topics include (i) G-protein coupled receptors, (ii) tyrosine kinase receptors, (iii) MAP kinase cascade, and (iv) transcription factors.

III. **Academic Progress.** The department requires that graduate students maintain an overall 3.0 grade point average in coursework (A = 4; B = 3; C = 2; D = 1). Courses graded on a P/NP basis do not contribute to calculation of the grade point average. If a student's cumulative grade point average drops below 3.0, the student will be placed on academic probation, requiring that he/she bring up his/her grade point average to at least a 3.0 within the next 12 months. Please note that academic probation may limit the availability of some kinds of student loans or other financial aid (for further information contact Registrar's office). Any student who fails to achieve a grade point average of 3.0 within the one year time limit will be subject to dismissal from the department.

Students must earn a grade of "B" or better in required courses (defined in Section II). A student who receives a "C" or worse grade for a required course will be placed on academic probation. To remove academic probation due to a poor grade for a required course, the student must achieve a grade of "B" or better for that course within the next 12 months. A student who fails to remove academic probation due to a poor grade in a required course within the one year time limit will be subject to dismissal from the department.

Graduate students must make appropriate progress in research activities. A CDB student who receives a grade of not-passed (NP) for a research registration (CELL 503, 601 or 603) will immediately be placed on academic probation. Academic probation status will be removed when a grade of passed (P) is received for a subsequent research registration. Students who receive a grade of NP for a total of two terms of research registration (CELL 503, 601 or 603) will be subject to dismissal from the department.

Following advancement to candidacy, students must meet with their thesis advisory committee on a regular basis. Students who do not meet with their thesis advisory committee within six months of advancement to candidacy or within 12 months of a previous thesis advisory committee meeting will be placed on academic probation. Students who do not meet with their thesis advisory committee within one year of advancement to candidacy or within 18 months of a previous thesis advisory committee meeting will be subject to disciplinary action including dismissal.

- IV. **Ethical and Professional Behavior.** CDB graduate students are expected to maintain high ethical standards. Graduate students should demonstrate honesty in all aspects of research activities. Students should learn about and avoid sources of error in scientific research. It is essential that students do not misrepresent scientific findings or misappropriate credit. All graduate students are required to take a course concerning ethics and science. Students should show cooperation, responsibility and respect in working with other students and faculty. Students should be considerate of the cultural and individual diversity of their colleagues.

Students who are involved in unethical or unprofessional conduct such as cheating, misrepresentation of research findings, plagiarism (failure to credit the original author) or disruption of the learning process are subject to disciplinary actions including dismissal from the department.

It should also be noted that students observing unethical behavior by students, faculty or others on campus are obligated to bring these transgressions to the attention of the appropriate person.

- V. **Student Salaries/Stipends.** For the first, PMCB year of graduate studies, the graduate research assistant salary is supported by the PMCB program. At the completion of the PMCB year, students select a department and a faculty mentor to direct their research. When students enter the CDB graduate program and select a faculty mentor, the faculty mentor becomes responsible for financial support of the student's graduate research assistant salary. Eligibility for continuing financial support of salary/stipend is dependent on timely and appropriate progress in course work and research. It should be noted that the Department/School is not responsible for continuing support of student salary/stipends.
- VI. **Qualifying Examination.** The qualifying exam takes place at the end of the second year of graduate studies and is administered by PMCB. For information about the qualifying exam, please contact the PMCB office. A student must pass the qualifying examination in its entirety before being admitted to candidacy for the Ph.D. degree.
- VII. **CDB Graduate Studies Committee.** This committee will serve as general oversight of the CDB graduate program. This committee will also serve as the PMCB departmental qualifying exam subcommittee. The committee will review the three qualifying exam topics submitted by each student and approve the final topic(s) to be prepared for the qualifying exam and will appoint the qualifying examination panel for each student. This committee will also review and approve appointments to thesis advisory committees.
- VIII. **Thesis Advisory Committee.** Immediately following passing the qualifying exam, students in consultation with their mentor should nominate a Thesis Advisory Committee. This

committee consists of the mentor and at least three other faculty members, with at least one committee member from outside of CDB. Members of this committee should be chosen based on their research area or technical expertise. The main purpose of this committee is to provide the student with guidance periodically during thesis research. Members of this committee may also serve subsequently on the Thesis Examination Committee. In this way, these faculty members will be familiar with the research, and will have the opportunity to communicate possible concerns they may have about your work early to allow time to address these concerns. Committee membership must be approved by the CDB Graduate Studies Committee. A memo nominating the Thesis advisory committee should be sent to the chair of the CDB Graduate Studies Committee. Students must meet with their Thesis Advisory Committee within 6 months of passing the Qualifying Examination and at least once a year after the initial meeting. Thesis Advisory Committee meetings will usually involve oral presentation by the student of thesis research goals and progress. During the initial meeting, one member of the committee should be selected to serve as chair of the committee. Following each committee meeting, the chair should prepare a brief memo evaluating the student's progress which should be sent to the chair of the CDB Graduate Studies Committee.

- IX. **Student Seminar – Third Year.** Students will present a research seminar during the third year of graduate studies. A meeting with the thesis advisory committee should be scheduled within two weeks of seminar to discuss the project and future directions.
- X. **Thesis and Oral Thesis Examination:** Candidates for the Ph.D. degree must present a written description of the experimental investigation carried out during their course of study in the form of a thesis. Information on the format of the thesis and the oral thesis examination should be obtained from the office of the Associate Dean for Graduate Studies. Students who defend their thesis near the end of the spring term should note deadlines established by the School of Medicine. The thesis must demonstrate ability on the part of the student to plan and execute original experimental work, and the results must represent a definite contribution to scientific knowledge. Although there is flexibility in the amount of work required for the thesis, in general the thesis should represent the equivalent of at least two publications in significant, peer-reviewed journals. **CDB requires that the Thesis Advisory Committee must meet to review and approve the proposed thesis research before a thesis defense can be scheduled. The chair of the Thesis Advisory Committee should send a memo to the chair of the CDB Graduate Studies Committee recording approval of the thesis project and approval for scheduling the oral thesis defense.** The composition of the Oral Thesis Examining Committee should be suggested by the student and mentor, and must be approved by the CDB Graduate Studies Committee and the department chair. After these approvals are obtained, final approval of the composition of this committee must be obtained from the Associate Dean for Graduate Studies.
- XI. **Time limit for completing degree requirements.** It is School of Medicine Graduate Council policy that students must complete all requirements for the Ph.D. within 7 years of matriculation. Students that do not complete degree requirements within this deadline may be dismissed from the graduate program. Students, mentors and the Thesis Advisory Committee should consider this deadline when evaluating thesis research goals and progress.

XII. **Exceptions.** No exceptions from the policies and procedures described in these guidelines can be made without approval by the CDB faculty. In matters related to coursework, exceptions must first be approved by the CDB Graduate Studies Committee before review and consideration for approval by the CDB faculty.

XIII. **General Timetable for most graduate students** (12-16 credit-hours should be taken each term, including Summer terms):

A. **Year 1 – PMCB Core Courses.**

The main goal for the first year is to pass coursework with a "B" or better grade and to identify a mentor with whom to work. In addition to the required course work, it may be desirable to take one or more elective courses. Some electives are offered once every two years and it may be desirable to take some electives during the first year in order to prepare for the qualifying exam at the end of the second year.

B. **Year 2 – Complete PMCB and CDB course requirements and prepare for qualifying exam.** Students should enroll in elective courses and journal clubs to fulfill requirements for taking the qualifying exam. The majority of the student's time and effort should be in research. A major goal for the second year is to begin to acquire the laboratory skills and conceptual framework necessary for thesis work. The student should also be spending free moments reading the scientific literature. PMCB students are required to take the qualifying exam during the summer of their second year. Immediately following passing the qualifying exam, students in consultation with their mentor should nominate a Thesis Advisory Committee which must be approved by the CDB Graduate Studies Committee. Students must meet with their Thesis Advisory Committee within 6 months of passing the Qualifying Examination.

C. **Year 3 until graduation** –The student must meet with their Thesis Advisory Committee at least once a year to bring them up to date on research progress and to discuss future directions. The student must present a research seminar during the third year. About 6 months prior to anticipated thesis defense it useful to meet with the Thesis Advisory Committee to establish a consensus on items that need to be completed. It is expected that most graduate students will defend their thesis sometime in the fifth or sixth year. It is School of Medicine Graduate Council policy that students should complete all requirements for the Ph.D. within 7 years of matriculation. Students that do not complete degree requirements within this deadline may be dismissed from the graduate program. Students should also note that CDB requires that the Thesis Advisory Committee must meet to review and approve the proposed thesis research before a thesis defense can be scheduled. The chair of the Thesis Advisory Committee should send a memo to the chair of the CDB Graduate Studies Committee recording approval of the thesis project and approval for scheduling the oral thesis defense.