

CELL AND DEVELOPMENTAL BIOLOGY

GRADUATE PROGRAM GUIDELINES

October 2019

The University of Iowa

Carver College of Medicine

Department of Anatomy and Cell Biology



Cell and Developmental Biology Graduate Program

Bowen Science Building

Iowa City, Iowa 52242-1109

I. RULES AND REGULATIONS OF THE GRADUATE COLLEGE

Through the Graduate College, the Cell and Developmental Graduate Program offers a curriculum leading to the Doctor of Philosophy (Ph.D.). Regulations concerning graduate study at the University are found in the *General Catalog of the University of Iowa* (General Catalog), and in the *Manual of Rules and Regulations of the Graduate College* (Graduate Manual).

In addition to the above-mentioned requirements, the Cell and Developmental Graduate Program has established further requirements, standards, and procedures for graduate training. These are contained in this document, *Cell and Developmental Graduate Program Guidelines* (Guidelines).

Students applying to, or matriculating in, the Cell and Developmental Graduate Program, as well as faculty participating in graduate training sponsored by the Cell and Developmental Graduate Program, are subject to the regulations of the Graduate College as well as the Graduate Program Guidelines. In any instance of conflict, or apparent conflict, between the Program Guidelines and the Graduate Manual, the Graduate Manual shall prevail.

II. ADMINISTRATION OF GRADUATE PROGRAM

Admission to graduate training in laboratories in the Anatomy and Cell Biology Department occurs through 1) the Cell and Developmental Biology Program, 2) through direct admission into a specific laboratory.

Cell and Developmental Graduate Program Advisory Committee

The Graduate Program Advisory Committee shall function as the student's Thesis Advisor until such time as the student chooses an advisor.

Cell and Developmental Graduate Program Committee

This Committee is responsible for the direction of the graduate program in the Cell and Developmental Graduate Program, and for the progress of candidates toward their degrees, as detailed in these Guidelines. This Committee reports to and advises the faculty on issues related to the graduate program. It also advises and evaluates students in the Cell and Developmental Graduate Program, as well as making recommendations to the Program's faculty, and to the Department Head, regarding student progress. This Committee is also responsible for graduate program implementations. The Graduate Program Committee is presided over by the Graduate Program Director and is composed of members of the graduate faculty in the Cell and Developmental Graduate Program, who are appointed by the Department Head in consultation with Graduate Program Director. At the Committee's discretion, the graduate student representative on the Graduate Admissions Committee may also become a member of the Graduate Program Committee, although this student representative shall not take part in

evaluating other graduate students. In addition, the Department Head may serve as an *ex officio* member of this Committee.

III. Ph.D. PROGRAM

A. General Information

The Ph.D. is awarded in recognition of advanced coursework completed, and in recognition of a substantial, original research contribution culminating in an acceptable dissertation. With intensive, full time residence, the typical range of time to Ph.D. degree in the Cell and Developmental Graduate Program is four to six years with the average being 5.3 years but no longer than 7 years, barring special circumstances. Study in the Cell and Developmental Ph.D. Graduate Program is a full-time undertaking. Employment or study outside of the Cell and Developmental Graduate Program is prohibited, since this would hinder a student's progress (exceptions may be granted for employment that complements the student's training, for instance tutoring).

The Ph.D. is awarded upon satisfactory completion of:

- 72 hours of graduate coursework;
- one semester of teaching experience;
- the Comprehensive Examination;
- the research prospectus;
- authored research publication(s), the number, quality, content and impact of which is determined by thesis committee (a minimum of one publication published or "in press," is the program's expectation);
- the dissertation, communicating the results of the doctoral research; and
- the Ph.D. final examination.

A Master's degree is not prerequisite to the Ph.D.

B. Application and Admission

The application procedures are those required by the Graduate College and are detailed in the General Catalog and Graduate Manual. Briefly, students may enter the program in two ways.

Admission through the Biomedical Sciences Graduate Program

Most commonly, students enter the CDB graduate program by applying to the Biomedical Sciences Program (also called the Biomedical Sciences Graduate Program) (Application is online at <https://www.medicine.uiowa.edu/biomed/>). The Biomedical Sciences Program is a common portal to several graduate programs, including the CDB graduate program.

Direct admission into a laboratory in the Cell and Developmental Graduate Program

Applications from students wishing to be admitted directly into the *Cell and Developmental Biology* Graduate Program are accepted and reviewed by the Admissions Committee on a case-by-case basis.

Applicants should hold a baccalaureate degree, with preparation in the sciences and mathematics to include:

- mathematics, through calculus;
- chemistry, through organic;
- statistics, one semester (or equivalent);
- biochemistry, one semester (or equivalent);
- other advanced biology course, one semester (or equivalent); and
- physics (one year).

An undergraduate major in the biological sciences or chemistry offers a distinct advantage to those seeking advanced training, as does a Master's degree in these or related areas. Applicants are evaluated based upon undergraduate academic performance, GRE scores on the General Test (the Subject Test in the student's major area is encouraged), three letters of recommendation, TOEFL scores where applicable, and whenever possible, an interview with the applicant.

International applicants with TOEFL scores between 550 and 600, whose first language is not English are required by the Cell and Developmental Graduate Program to pass English competency certification within the first 16 months of entry into the Cell and Developmental Graduate Program. Included in this certification is an evaluation given to prospective teaching assistants. Newly admitted graduate students whose first language is not English are encouraged to begin this certification process by enrolling in ESL coursework the summer prior to the first academic year.

C. Course, Teaching and Publication Requirements

The following describes the specific courses, teaching and publication authorship requirements for all students matriculating in the Ph.D. program. These requirements are in addition to any specified in the Graduate Manual:

1. Registration and Standard Schedule

Prior to satisfactory completion of the comprehensive examination, each student shall register for no fewer than 15 semester hours each fall and spring semester, and 0 semester hours each summer session, unless the student will be defending his/her Comprehensive Examination during the summer session. In this case, the student will be registered for 2 semester hours of research (ACB:5206:OIND). A total of 72 semester hours is required for the Ph.D.

2. Graduate Student Seminar (ACB:5224:0001)

Departmental graduate students are required to register and participate in this 1 semester-hour course each fall and spring semester until graduation. Students are expected to attend all departmental seminars (including all seminars held at non-regular times) and to complete an anonymous peer evaluation for trainee seminars. No more than two (2) unexcused absences will be permitted *per academic year*; otherwise a grade of “unsatisfactory” will be given. Absences must be cleared *in advance* with the course director. Attendance and completed evaluations are required every semester, including during the student’s final dissertation semester, even though students do not register for the seminar during that semester.

3. Graduate Research in Cell and Developmental Biology (ACB:5206:OIND)

Students are to be registered in this course for a minimum of one 1 semester-hour each fall and spring semester until graduation. Students are to be registered for 2 semester hours of graduate research if they plan to complete their comprehensive examination during the summer of their second year of study. Students are expected to make arrangements with the individual faculty directing the program of study carried out under this course number. The course will be graded Satisfactory/Unsatisfactory.

4. Graduate Student Teaching Requirements

Students are required to complete 3 sh teaching requirement. Students may teach in a combination of 1 or 2 sh courses or one 3 sh course to meet the requirement. Teaching requirements must be met prior to the final thesis defense and graduation. Most students meet the requirement in the third year after completing the comprehensive exam. The student must earn a satisfactory report from the Course Director in order to receive credit for meeting this obligation.

Students may petition the Graduate Program Committee to serve as TA in a variety of courses offered to undergraduates, medical students, and graduate students. The Graduate Program Committee in communication with the Department Head will make the final decision for approval of the request. All assignments are with the permission of the course director.

NOTE: The curriculum is revised from year to year, so the courses listed below are examples,

but they may not be offered in any given year.

Mechanisms of Cellular Organization ACB:6220:0001

Microscopy of Biomedical Research ACB:5218:0001

Critical Thinking Modules (1 s.h., 5-week modules)

 Biochem & Mol Biology ACB:6237:0001

 Genetics ACB:6238:0001

 Cell Biology ACB:6239:0001

Principles of Molecular and Cellular Biology BMED:5207

Fundamentals of Gene Expression BISC:5201:0001

Dental Gross ACB:8120:0800

Principles of Human Anatomy ACB:3110:0001

Gross Anatomy for Graduate Students ACB:5203:0001

Dental Histology ACB:8121:0800

5. Required Courses in Major Subject Areas

Students may petition the Graduate Program Committee for variance from the schedule proposed below.

Note: The curriculum is modified frequently; contact the program administrator for an up-to-date list of required courses.

Fall 1st Year

Principles in Molecular and Cellular Biology (BMED:5207)(3 sh)

Biostatistics for Biomedical Research (PCOL:5204) (1 sh)

Topics in Molecular and Cellular Biology (MMED:6280) (1 sh) (literature review course)

Scholarly Integrity/ Responsible Conduct of Research 0: On-line: Collaborative Instructional Training Initiative (0 sh)

Graduate Research in Cell and Developmental Biology (Laboratory rotations)
(ACB:5206:OIND) (Arranged sh)

Cell and Developmental Biology Graduate Student Seminar (ACB:5224) (1 sh)

Spring 1st Year

Three of the following 1 sh modules (depending on current offerings, and on recommendation from student advisory committee, and graduate program director):

- Transcription RNA (MMED:6215) (1 sh)
- Epigenetics, Cancer and Mouse Models (MMED:6217) (1 sh)
- Growth Factor Receptor Signaling [MMED:6225](#)
- Cell Cycle Control [MMED:6226](#)
- Cell Fate Decisions [MMED:6227](#)

Critical Thinking in Molecular Medicine (literature review course) [MMED:6280](#)

Graduate Research in Cell and Developmental Biology (Laboratory rotations)
(ACB:5206:OIND) (Arranged sh)

Cell and Developmental Biology Graduate Student Seminar (ACB:5224) (1 sh)

Fall 2nd Year

Critical Thinking in Biochemistry and Molecular Biology (ACB:6237) (1 sh)

Critical Thinking in Genetics (ACB:6238) (1 sh)

Critical Thinking in Cell Biology (ACB:6239) (1 sh)

Graduate Research in Cell and Developmental Biology (ACB:5206:OIND) (Arranged sh)

Genetic Analysis of Biological Systems (GENE:6150) (3 sh)

Scholarly Integrity/ Responsible Conduct of Research – Part 1 (BMED:7270) (0 sh)

Elective

Cell and Developmental Biology Graduate Student Seminar (ACB:5224) (1 sh)

Spring 2nd Year

Critical Thinking in Cellular Physiology (ACB:6249) (1 sh)

Critical Thinking in Development (ACB:6248) (1 sh)

Critical Thinking in Scientific Writing and Presentation (ACB:6250) (1sh)

Graduate Research in Cell and Developmental Biology (ACB:5206:OIND) (Arranged sh)

Scholarly Integrity/ Responsible Conduct of Research – Part 11 (BMED:7271) (0 sh)

Elective

Cell and Developmental Biology Graduate Student Seminar (ACB:5224) (1 sh)

Students must maintain a GPA of 3.0 (B) or better in Major Subject Areas. If a student's average falls below a 3.0, he/she will be placed on probation as per Graduate College guidelines. HOS, Medical Neuroscience, and Gross Anatomy Electives will be graded on a Satisfactory/Unsatisfactory basis. As specified under section 3.C.4., students must earn an 80% or better final grade to qualify to TA that course.

6. Required Courses in Background and Elective Subject Areas

In addition to the required core and strongly recommended courses in the subject area, students must complete a minimum of three (3) semester hours in Elective courses prior to the thesis defense. As of Fall 2016, the courses that have been approved by the CDB Graduate Program Committee shown here: <https://www.medicine.uiowa.edu/acb/education/cell-and-developmental-biology-program/electives>

7. Credits for Course and Teaching Requirements

Students may receive credit toward meeting specific course and teaching requirements by substituting transferred graduate credits, credits for courses taken prior to entry into the Cell and Developmental Biology graduate program, and credits for professional courses, as specified in the Graduate Manual. Approval for applying these credits toward meeting the course and teaching requirements of the Cell and Developmental Biology graduate program will only be granted upon specific written request by the student, followed by evaluation and recommendation of the Graduate Program Committee, and approval by the Graduate Program Director.

8. Publication Authorship Requirements

In partial fulfillment of the requirements for obtaining a Ph.D. in Anatomy and Cell Biology, it is expected that the student will have contributed as author to at least one research publication. The publication(s) must demonstrate primary authorship and be at the “accepted” phase of the publication process. The number of publications, quality, content, and impact will be determined by the thesis committee.

D. Maintenance of Good Standing

1. Grade Point Average (GPA) and Course Grades

Graduate students in the Ph.D. program are required to maintain a minimum cumulative grade point average of 3.0 for graduate work at the University of Iowa.

Graduate Research (ACB:5206:OIND) is graded on a Satisfactory/Unsatisfactory basis. A grade of unsatisfactory is immediately referred to the Graduate Program Committee and may result in the dismissal of the student from the Cell and Developmental Graduate Program.

2. Probation/Dismissal

Failure to maintain the minimum required cumulative grade point average for graduate work will result in the student being placed on probation by the Graduate College, and may further result in dismissal of the student from the Ph.D. program. Also, a student deemed not to be making satisfactory progress toward the degree may be placed on Program probation or dismissed from the program. In cases of Program probation, stipend support is discontinued. (Section XIV of these Guidelines.) "Satisfactory progress," as determined by the Graduate Program Committee and Department Head, in consultation with the student's advisor, means that the student is conforming to applicable standards and timetables as specified in these Guidelines. (See also Section IX of these Guidelines.)

The Graduate Manual defines and provides details regarding the policies on academic standing, probation, and dismissal. A student dismissed from the Cell and Developmental Graduate Program has a right to appeal. (See the Graduate Manual and also Section X of these Guidelines.)

3. Biannual Review

At the close of the fall semester, all students will meet with the Graduate Advisory Committee. At the close of the spring semester, the Committee will also meet with all new and pre-comps students as well as any post-comps students who may wish to meet. Prior to the meeting, the student will detail his/her progress since the previous meeting and also outline future plans in a letter to the Committee. This letter and the interview with the Committee will serve as a forum for the student to address concerns about his/her training and to review plans for coursework, as well as for the comprehensive and thesis examinations. If the student has completed coursework and TA requirements, meeting with the Committee is voluntary and at the discretion of the student and his/her Thesis Advisor.

E. Rotations and choice of a thesis advisor

In order to optimize the fit between students and their potential Thesis Advisors, during year 1, students rotate in three laboratories for approximately 10 weeks each. At the end of year 1, through mutual agreement between the student and the laboratory head, the student selects a research laboratory from among the three rotation labs and begins his/her thesis research project.

Students are expected to contact laboratory heads (Principal Investigators) directly (by email) to determine if the faculty head is accepting rotating students that year. Rotations are organized by mutual agreement of the student and the laboratory head. In any given year, a given laboratory head may not be accepting students. Students should only rotate in labs in which the laboratory head has adequate funding to accept them as thesis students. A verbal commitment from the laboratory head to this effect is sufficient.

Approximate Rotation Schedule (precise dates will depend on the start of the school year and weekends):

First rotation: August 26* - November 15

Second rotation: November 18– February 14

Third rotation: February 17– May 8**

*Incoming students are encouraged to identify potential labs for their rotations before arriving in Iowa.

** A final decision for your dissertation laboratory is due by May 15 of year one.

The student and proposed Thesis Advisor must be in agreement that the thesis advisor will:

- Counsel the student in matters concerning coursework and other Department of Anatomy and Cell Biology requirements;
- Guide the student in laboratory research leading to the dissertation;
- Assist in selection of the Thesis Committee and serve as Chair of that Committee; and
- Provide adequate resources including equipment, supplies, and other materials necessary for conducting the research leading to the dissertation.

At the time of selection of the Thesis Advisor, or in the event that the student changes his/her Thesis Advisor, a written request endorsed by the proposed Thesis Advisor must be submitted to the Graduate Program Committee and the Department Head for approval. In the event that a student wishes to change his/her Thesis Advisor and cannot gain approval from his/her current advisor, the student should address the Graduate Program Director with his/her concerns.

F. The Comprehensive Examination

1. General Information

The Comprehensive Examination, as defined in the Graduate Manual, is "an inclusive evaluation of the candidate's mastery of the major and related fields of study, including the tools of research in which competence has been certified." As administered in the Cell and Developmental Graduate Program, for the Ph.D. degree, the Comprehensive Examination consists of two components: a written Research Proposal in research grant application format, and an Oral Defense of this proposal.

The written Research Proposal is in the area of the student's predicted future thesis work (i.e., "on topic"). It is understood that the student should have already begun research related to his/her future thesis and the topic of this examination by the time the Comprehensive Examination is to be taken. The Thesis Advisor will therefore have had scientific input into the formulation of the proposed thesis work, but the proposal itself is to be written by the student. It must not, for instance, simply be extracted from a research grant written by the Thesis Advisor.

However, for the committee to evaluate the student's ability to design experiments, one aim (about one third of the proposed work) of the Research Proposal must have been designed by the student, without discussions that include the Thesis Advisor. This aim can nonetheless be still related to the student's thesis project.

The Comprehensive Examination will read the written Research Proposal and subsequently oversee the oral defense of it (described below). In this way it will assess the student's knowledge in major fields of study, and the student's abilities in problem solving, critical evaluation of research literature, experimental design (including design of appropriate controls). Although the student will prepare and defend a research document in a particular discipline of research, oral examination may extend to basic concepts related to his/her proposed research, as well as to graduate courses taken by the candidate.

Students are strongly encouraged to elicit feedback and input from fellow graduate students with respect to their written Research Proposal and through "mock examinations" conducted prior to the Comprehensive Examination.

2. Eligibility

Students are eligible to undertake the Comprehensive Examination when the following minimum requirements are met:

- a.** The student must be in good academic standing as defined by the Department and the Graduate College, maintaining a minimum grade point average of 3.0 for all graduate coursework.
- b.** The student must have successfully completed the first- and second-year courses as specified in the Graduate Guidelines.

3. Comprehensive Examination

Students are expected to take the Comprehensive Examination at the end of Spring term in the second year (four semesters or equivalent) of graduate school. Once eligibility is established, the student must file the **CDB Request for Comprehensive Examination** form to initiate the process of examination. Below is a narrative description of the process. Additionally, students are encouraged to use the attached **Checklist** form in preparation for the Comprehensive Examination.

a. The Comprehensive Exam Committee

- The examination is administered by a Comprehensive Examination Committee consisting of no fewer than five members of the Graduate Faculty appointed by the Graduate College Dean (the Dean) upon recommendation of the Cell and Developmental Graduate Program. The student's Thesis Advisor may not serve as a member of the student's Comprehensive Examination Committee.
- At least four of the faculty members must be members of the University of Iowa tenure-track faculty. At the Program's discretion, it may request the Dean's permission to replace one of the five members of the Graduate Faculty by a recognized scholar of professorial rank from another academic institution.
- At least two of the faculty members hold any appointment in Cell and Developmental Biology program and are members of the University of Iowa tenure-track faculty. It is permissible for all members of the committee to be members of the Cell and Developmental Biology program.
- The committee must include members from at least two University departments.
- A voting member may be added at the discretion of the Dean.
- The members of the Comprehensive Examination Committee will be chosen based on student and advisor recommendations, and will have expertise within the area of the proposed exam. Once the committee has been formulated, it is the student's responsibility to submit members' names to the Graduate Program Director for approval.
- After the Comprehensive Examination is completed, the individuals of the Comprehensive Examination Committee will comprise the student's Thesis Committee, except the Chairperson of the Comprehensive Examination Committee will be replaced by the student's Thesis Advisor.

b. Timing and sequence

- In the winter of Year 2 in the program (i.e., end of Fall term or beginning of Spring term), the student, in consultation with his or her advisor, should pick appropriate committee members and request their participation in the committee by email. A given candidate may be unavailable or unwilling to serve, in which case additional candidates should be contacted.
- In Spring term of Year 2, prior to the comprehensive exam, student should schedule an initial thesis committee meeting (1 to 1.5 hours).
 - No later than a week before the initial thesis committee meeting, the student should submit a two-page document, as follows:
 - In the first page, provide an outline introducing the student's prior training and accomplishments. List a) undergraduate institution, b) a sentence or two describing research projects completed as an undergraduate, c) classes and grades of graduate courses taken at University of Iowa, d) prior rotation labs, e) awards, f) publications, and g) meetings attended.
 - The second page is an abstract of the thesis. Include a sentence or two each for a) public health burden, b) summary of the state of current understanding, c) an

- important knowledge gap, d) an hypothesis, and e) a plan to test the hypothesis, possibly broken in to three aims.
- At the initial committee meeting, the student will present his/her thesis plan for thirty minutes, and field questions for thirty minutes. In this presentation, the student should not include the experiment he or she has conceived independently that he or she and will present in the comprehensive exam.
 - In Year 2, ideally shortly after Spring term (i.e., May or June), but no later than the end of Fall term of Year 3, students should submit the *CDB Request for Comprehensive Examination* form to the Graduate Program Director. Students will take their Comprehensive Examination either at the end of their second year or during the summer prior to their third year in graduate school. Exceptions to this deadline must be pre-approved by the Graduate Program Director in consultation with the Graduate Program Committee.
 - The filing of this request should include a formal research Abstract and Specific Aims for the proposed work (no more than one page each, single-spaced, Arial, size 11). These will be used to advise the student during his/her preparation of the written document. The Research Abstract and Specific Aims will be circulated to all members of the Comprehensive Examination Committee and comments will be given to the Chairperson for review.
 - Within two weeks of the receipt of the Abstract and Specific Aims, the Chairperson of the Comprehensive Examination Committee will approve the abstract, and meet with the student. The purpose of this meeting is to:
 - 1) determine the appropriateness of the Specific Aims for further development into a full proposal,
 - 2) advise the student on developing the Aims into a research proposal,
 - 3) relay any feedback or concerns the Committee may have regarding the proposal,
 - 4) answer any questions the student might have about the examination.
 - Immediately after the abstract has been approved, the student should schedule the Oral Examination of the Research Proposal to take place within eight weeks.
 - Once the student has received feedback on the research proposal from the Comprehensive Examination Committee, he/she should prepare the written research proposal. The student is permitted to interact with the Chairperson of the Comprehensive Examination Committee during the preparation of his/her written Research Proposal.
 - Within six weeks of approval of the Abstract/Specific Aims, and no less than two weeks prior to the date set for the oral examination, the student should submit an electronic copy of the written proposal to the chair of the Comprehensive Examination Committee. In some cases, a committee member may request a printed copy.
 - In addition to the written formal **Plan of Study** listing of all graduate courses taken that apply toward the degree, as well as a listing of courses in progress or to be completed following the Comprehensive Examination, and **Request for Doctoral Comprehensive Examination** form, must be submitted to the Graduate College at least two weeks before the examination is to take place.

c. Written Proposal

- Written Proposal is to follow the form of a standard National Institutes of Health (NIH) R01 research grant as outlined below and will cover the area of the research proposed for the student's anticipated thesis dissertation.
- The proposal should be no longer than 24 double-spaced pages (Font: Arial, Minimum size: 11, Minimum margins: 0.5"), not including the Specific Aims page (submitted earlier, or the references). The emphasis should be on quality of the proposal and not necessarily on the volume of the writing.
- It is expected that by the time the student is ready for his/her Comprehensive Examination, he/she will have spent approximately 1 year in the chosen dissertation laboratory, and have generated preliminary data for his/her proposal. However, in the event that the chosen dissertation project has not progressed sufficiently, the student may expand the Background and Significance section of the proposal to include a more in-depth review of the literature that supports it.
- From the time a student's written proposal is submitted to the Committee to the time of the oral examination, the written document may not be revised or corrected, nor may any additional written or other materials be submitted by the student to the Comprehensive Examination Committee.
- The written proposal should include an **Assurance** form documenting that the proposal was written by the student must be submitted with the final proposal and signed by both the student and Thesis Advisor.

d. Oral Examination of Research Proposal. The oral examination of the student's research proposal will last approximately 2-3 hrs. The Comprehensive Examination will begin with a brief oral presentation by the student on the proposed research project. This presentation should last no more than 30 minutes and should not comprehensively review the proposal, but rather highlight specific aims and approaches that will be used to address the hypotheses. Useful background information can also be provided.

e. Criteria for evaluation of written proposal and oral examination. The following criteria are among those used in evaluating the student's performance during the oral examination and defense of the research proposal:

For the written research proposal:

- Adequacy of the student's review of appropriate literature and evidence of his/her understanding of how it relates to the proposed research.
- Merits of the specific questions and hypotheses being addressed and validity of the experimental approaches proposed.
- Adequacy of testing of the hypotheses, including positive and negative controls, as appropriate.

- Appropriateness of conclusions and interpretations of predicted experimental results.
- Overall significance of the proposed research.
- Innovation of research approaches to address the scientific questions proposed.
- Overall professional quality of the written document, including style, format and neatness.

For the oral examination:

- Ability of the student to organize, present, and defend the proposal clearly and concisely.
- Ability of the student to clarify or qualify statements presented in the proposal.
- Ability of the student to discuss the feasibility of the proposed research and recognize and explain alternative experimental approaches that may be required.
- Ability of student to recognize and explain potential pitfalls and weaknesses.
- Ability of the student to project future directions of the proposed research.
- Ability of the student to defend assumptions made in the proposal.
- Ability of the student to respond effectively to questions related to the general topic of the proposal and relevant subject matter, especially as it pertains to his/her graduate course work.

f. In the event of a report of satisfactory (pass), the Comprehensive Examination Committee will report to the Graduate Program Director and the student that the student has been advanced to candidacy for the Ph.D. degree.

g. In the event of a report of reservations, the Comprehensive Examination Committee will report these reservations in writing to the Graduate Program Director and Department Head for transmission to the Graduate College and the student. The student must satisfactorily address the reservations in a timely manner, as specified in the written report. On the recommendation of the Comprehensive Examination Committee and Graduate Program Committee, remediation to address the reservations may include assignment of additional course work, assignment and discussion of specific readings, further examination in a particular area, rewriting of portions of the proposal, or other specified academic or research work as appropriate. When the reservations have been addressed to the satisfaction of the Comprehensive Examination Committee, the Committee will so inform the Graduate Program Director, the Graduate College and the student.

h. In the event of a report of unsatisfactory, the student may request a re-examination that must be scheduled within the session (spring, summer or fall) following that in which the first examination took place. However, the re-examination cannot take place sooner than four months after the first examination. Permission for re-examination must receive the approval of the

Comprehensive Examination Committee and the Graduate Program Committee. A second failure of this examination will result in dismissal of the student from the Ph.D. Graduate Program. In the event that the request for re-examination is denied, the student will immediately be dismissed from the Cell and Developmental Biology Ph.D. Graduate Program.

4. Written Document (Research Plan)

Organize in the order listed below items a-e, to answer the following questions: (1) What do you intend to do? (2) Why is the work important? (3) What has already been done? and (4) How are you going to do the work? **Do not exceed the size of an R01 application: 2 page Specific Aims, plus a 24 page proposal for items C-E** (double-spaced, 0.5 inch margins, font size 11pt Arial or larger). All tables, graphs, figures, diagrams and charts must be included within the 24-page limit (not including references).

a. Abstract. Short description of research proposal in narrative form. **One double-spaced page is recommended. (not included in page limit)**

b. Specific Aims. List the broad, long-term objectives and what the specific research proposed in this application is intended to accomplish. State the hypotheses to be tested. **Two double-spaced pages, maximum.**

c. Background and Significance. Briefly sketch the background leading to the present application, critically evaluate existing knowledge, and specifically identify the gaps that the project is intended to fill. State concisely the importance and health relevance of the research described in this application by relating the specific aims to the broad, long-term objectives. **Two to four double-spaced pages are recommended.**

d. Preliminary Studies. Use this section to provide an account of your preliminary studies that are pertinent to the application, and to help to establish your experience and competence, as well as the feasibility of the proposed project. This section may include methods that are later referenced in the Experimental Research Plan. **Eight to 12 double-spaced pages are recommended for the narrative portion of the Preliminary Studies.**

e. Experimental Research Plan. Describe the research design and the procedures to be used to accomplish the specific aims of the project. Include how the data will be collected, analyzed, and interpreted. Describe any new methodology and its advantage over existing methodologies that have not been discussed in the Preliminary Studies Section. Discuss expected experimental results and conclusions from the proposed research, as well as potential difficulties and limitations of the proposed procedures and alternative approaches to achieve the aims. At the end of this section, provide a tentative sequence or timetable for the project. **This Section should be about 12 double-spaced pages, or approximately half of the entire proposal in length.**

f. Literature Cited. List all references **cited in all sections**. Each reference must include the title, names of all authors, book or journal, volume number, page numbers, and year of publication. The references should be limited to relevant and current literature. While there is no page limitation, it is important to be concise and to select only those literature references that are pertinent to the proposed research. **This Section is outside the 24-page limit for the proposal.**

(Forms for the Comprehensive examination are in Appendix B)

G. Post Comprehensive Enrollment

- After successful completion of the Comprehensive Examination, a student is required to register each fall and spring semester until the degree is awarded.
- Each fall and spring semester a student is in residence and until graduation, he/she will register for no less than one (1) semester hour in Research (ACB:5206:OIND), and one (1) semester-hour in Graduate Student Seminar (ACB:5224).
- Students will not be registered for the summer semester unless the comprehensive examination is scheduled during the summer semester.
- In his/her final semester, the doctoral student will be registered for Doctoral Final Registration (GRAD:6003:0001) one (1) semester-hour.

H. The Thesis Research Committee and the Prospectus

1. The Thesis Research Committee

The Thesis Research Committee is comprised of the same members as the Comprehensive Examination Committee, with the exception of the Chairperson who is replaced with the student's Thesis Advisor. Approval of the Thesis Research Committee members is made by the Graduate College upon receipt of the **Request for Final Examination form**.

It is the responsibility of the Thesis Research Committee to:

- guide the student in the formulation of his/her research through advice and examination of the prospectus;
- serve as an expert resource for the student in the area in which the research is undertaken;
- monitor the progress and quality of the research undertaken and, at the completion of the research, the preparation of the dissertation; and
- conduct the Final Examination as prescribed by the Graduate College.

To fulfill these objectives, each student's Thesis Research Committee is expected to meet annually, at a minimum, to review the prospectus, to review progress, and to conduct the final examination. These meetings are commonly scheduled when all committee members are available to attend and following the student's annual presentation during the Anatomy and Cell Biology Departmental Seminar.

2. The Prospectus

The prospectus is a detailed statement of: the research objectives, the current state of the research problem as described in the literature, the methods and procedures to be used to test the hypotheses advanced, and the means by which data will be summarized, analyzed, and interpreted. This document, of no more than two pages in length must be submitted to the Thesis Research Committee no less than one week prior to the date of the committee meeting. The Comprehensive Examination Proposal will normally serve as the Thesis Prospectus, with minor modification if necessary.

I. The Dissertation and Final Examination

1. General Information

At the beginning of the semester in which the student expects to graduate, an **Application for Degree** form (obtained by the student at the Registrar's Office), signed by the advisor, is submitted by the student to the Registrar's Office no later than the date specified for the session in which the student expects to receive the degree. These dates are published in the Schedule of Courses. The student must also complete the **Request for Final Examination** form as required in the Graduate Manual.

2. The Dissertation

Directions for the formal preparation of the dissertation can be found in the Graduate College Thesis Manual, which is available in the Office of the Graduate Examiner or on-line at: <http://www.grad.uiowa.edu/Students/ThesisResources/Manual.htm>. These directions must be followed carefully to assure acceptance of the dissertation by the Graduate College. Students should consult the Graduate Examiner in the Graduate College about any questions that may arise during preparation of the dissertation.

The dissertation will be made available to all members of the Thesis Research Committee no less than two weeks prior to the date of the final examination. The format to be followed in the writing of the dissertation must be approved by the student's Thesis Research Committee, and must conform to the general guidelines set by the Graduate College.

3. Final Examination

The Final Examination consists of an oral presentation of the dissertation, which is open to the

public, followed by defense of the thesis to the Thesis Research Committee only.

A student may not schedule the Final Examination without prior approval by each member of the Thesis Research Committee. This usually occurs at the Committee Meeting prior to the defense. Following this review, the Thesis Advisor will poll the Committee to determine when the Final Examination may proceed, and a date will be set. The Final Examination may not be held until at least the semester following that in which the Comprehensive Examination is passed, and must also await completion of the first check of the thesis by the Graduate College. However, the student must pass the Final Examination no later than five years after passing the Comprehensive Examination. Failure to meet this deadline will result in a Comprehensive Re-examination.

4. Post Thesis-Defense Interview

Following successful completion of the Thesis defense, the student has the option of meeting one final time with the Graduate Advisory Committee. This meeting will serve as an exit interview from which the Department gains feedback on the effectiveness of the program.

IV. MASTER OF SCIENCE

A. General Information

The Department of Anatomy and Cell Biology generally does not admit students directly to the Master's Program unless the student is pursuing a dual professional degree or holds a terminal professional degree. (See Section VII of these Guidelines.)

The M.S. degree is awarded upon satisfactory completion of: a) 30 hours of graduate coursework, 21 hours of which must be didactic; b) a teaching assignment in one course in Anatomy & Cell Biology; c) a thesis covering independent research; and d) the Master's Final Examination. At least two years of full-time study are necessary for most students to fulfill the requirements necessary to obtain this degree.

B. Application and Admission

The same standards apply as for admission to the Ph.D. program. (See Section III.B. of these Guidelines.)

C. Course and Teaching Requirements

Course and teaching requirements are the same as those for the Ph.D. program with the following exception: students are required to complete satisfactorily 30 hours of graduate

coursework and one graduate student teaching assignment. In the final semester, Master's students will be required to register for Master's Final Registration (000:001) for zero (0) semester hours, but at a two (2) semester-hour tuition payment.

D. Maintenance of Good Standing

The same standards apply as for the Ph.D. program. (See Section III.D. of these Guidelines.)

E. Prospectus and Thesis Advisor

A research prospectus is required of M.S. candidates, as it is for Ph.D. candidates. (See Section III.H.2. of these Guidelines.) The Master's prospectus is completed as soon as practicable after the candidate has selected a Thesis Advisor and a research area. Under normal circumstances, this will be accomplished by the end of the first year (or equivalent) of the M.S. program. The research for the Master's degree is generally focused upon a more limited and circumscribed problem than for the Ph.D., and the prospectus is therefore generally briefer.

F. The Research Committee and Final Examination

The Thesis Advisor and student will propose to the Department of Anatomy and Cell Biology Head a Research Committee composed of no fewer than three members of the Graduate Faculty appointed by the dean upon recommendation of the Anatomy and Cell Biology Department. At least two of the faculty members must be members of the University of Iowa tenure-track faculty and at least two of the faculty members hold any appointment in Anatomy and Cell Biology and are members of the University of Iowa tenure-track faculty. At the department's discretion, it may request the Dean's permission to replace one of the three members of the Graduate Faculty by a recognized scholar of professorial rank from another academic institution. Also, a voting member may be added at the discretion of the Graduate College Dean.

Upon approval by the Department Head, the list of nominees will be forwarded to the Graduate College by submission of the Request for Final Examination form. The Research Committee, of which the Thesis Advisor serves as Chair, is responsible for evaluating the prospectus, for guiding the research program, and for conducting the Master's Final Examination as prescribed in the Graduate Manual. The Master's Final Examination consists of a seminar in which the student presents his/her Master's thesis research and defends it to the Research Committee.

V. PROFESSIONAL IMPROVEMENT PROGRAM

A student may be admitted as a Professional Improvement student for two semesters if coursework in the Cell and Developmental Biology Program would improve or enhance job-

related activities. Requests for extension of the two-semester limit should be directed to the Graduate Program Committee. Professional Improvement student status does not lead to an academic degree, and the Program provides no financial aid.

VI. INTERDISCIPLINARY PH.D. PROGRAM

The Dean of the Graduate College regulates ad hoc degree requirements at the University level; if the Department of Anatomy and Cell Biology is the sponsor of such a degree, its Graduate Program Committee will review the requirements set by the Ad Hoc Committee to ensure that the Department of Anatomy and Cell Biology standards are upheld. No financial aid is provided by the Department of Anatomy and Cell Biology.

VII. COMBINED DEGREE PROGRAMS

The Cell and Developmental Graduate Program faculty participate in various interdisciplinary graduate programs and in the M.D./Ph.D. combined degree program. Guidelines for admission and regulations pertaining to these programs may be obtained from the Program Office in the Department of Anatomy and Cell Biology.

Combined degree programs in the Cell and Developmental Graduate Program for the M.D./Ph.D. and D.D.S./Ph.D. are regulated by guidelines available in the appropriate Collegiate Dean's Office. The Cell and Developmental Graduate Program Committee will consider dual degree candidates only if they are first admitted to the cooperating professional school. Such students may apply for these combined degree programs at any time during medical or dental school. M.D./Ph.D. or D.D.S./Ph.D. students applying to the Cell and Developmental Graduate Program should do so under the guidelines prescribed for the Ph.D. graduate program in Anatomy, and all other requirements for the degree are those specified in Section III of these Guidelines.

VIII. CHANGE IN DEGREE OBJECTIVE

A student wishing to change the degree objective from the Ph.D. to the Master's must make a formal request, which will be reviewed by the Graduate Program Committee and the Department Head; the Head will notify the student of the decision.

IX. STUDENT EVALUATIONS

The Advisory Committee shall meet with all students in the Ph.D., M.S., or combined M.D./Ph.D. Program, during the fall semester to review the student's progress and determine that he/she is making satisfactory progress toward the degree objectives. The Advisory Committee will meet with just precomps students during the spring semester. Prior to this meeting, the student will detail in a letter to the Committee his or her progress since the previous meeting, and also outline future plans. This letter and the interview with the Committee will become one basis for recommendations regarding continuation in the Cell and Developmental Biology Graduate Program, and become part of the student's permanent record. Additional evaluations of student progress are based upon the student's performance in coursework, research, and teaching, as reflected in grade reports and written assessments by the faculty members directing the student's research and teaching.

X. APPEAL OF PROBATION/DISMISSAL

A student may appeal actions pertaining to academic standing, probation, and dismissal according to the following procedures:

- The student must specify in a letter to the Department Head the action that is being appealed, and supply any relevant information supporting the appeal.
- After reviewing the letter of appeal, the Department Head shall appoint a committee of three of the Department's faculty who can reasonably be expected to render an objective opinion on the subject.
- This committee will a) meet with the student, b) examine all documentary information, and c) make a written report to the Department Head that includes its recommendation for resolution of the appeal.
- The Department Head will decide the resolution of the appeal and notify the student thereof.
- The Dean of the Graduate College shall decide all appeals based on the rules and regulations of the Graduate College.

XI. LEAVE OF ABSENCE

Enrollment in the Cell and Developmental Biology Graduate Program includes all three regular academic sessions. A leave of absence during any session must be specifically arranged and approved in advance by the Thesis Advisor and Department Head. A student desiring a leave of absence must petition the Thesis Advisor in writing, giving the reasons for the request. If approved, a leave of absence is granted for a specified period of up to one year, and may be renewable for up to one additional year. The student will be dismissed, and required to petition

the Graduate Program Committee for re-admission to the Graduate Program after an absence exceeding the period specifically granted. No stipend support will be provided during the time student is on leave of absence. Please refer to the Graduate College Handbook for further details: <https://www.grad.uiowa.edu/graduate-college-manual?portal=current-students>

XII. STUDENT VACATIONS

Graduate training is a full-time, 12-month professional commitment with the Thesis Advisor and with the Program. The University policy on vacation and sick leave for graduate students is negotiated with COGS, the graduate student union. Students are entitled to the official holidays according to the University calendar. Students shall receive the nine paid University holidays: New Year's Day, Dr. Martin Luther King Jr.'s Birthday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, Christmas Day, and the day before/after Christmas (as specified by the University). Other vacation time should be arranged in consultation with the Thesis Advisor.

Because full-time residence is considered essential to progress toward the degree and to continuity of any research conducted in the Cell and Developmental Graduate Program, vacation time should not exceed 15 days per calendar year (January 1 through December 31). Absences in excess of this limit may result in loss of pay.

Graduate students may be absent due to illness for up to 18 working days per calendar year without loss of pay.

University policy dictates that the same procedures and forms be completed prior to departure for vacation as would be completed for an off-campus assignment (not at the Cell and Developmental Biology Program expense). NIH Trainees, by NIH policy, are requested to schedule their vacations during normal University student breaks. Students must notify their Thesis Advisor about absences (vacation, sick leave) from the lab. Vacations or any other planned absences should be discussed in advance with the Thesis Advisor and reported to the Program Office (email notification is sufficient). Absences in excess of the above allowances must be requested in writing and approved by the Thesis Advisor and Program Director.

XIII. OFF-CAMPUS ASSIGNMENTS

On occasion, it may be desirable for a student to participate in the Traveling Scholar Program or in other off-campus activities deemed appropriate to the student's graduate training. Participation in such activities must have the approval of the Thesis Advisor and the Department Head. Before

undertaking any approved off-campus assignment, the student must complete the following forms and submit them to the Department Head for approval:

- a **Request for Leave of Absence** form (see Section IX. of these guidelines);
- a memo from the graduate student's Thesis Advisor approving a specific period of absence and a specific expenditure of funds, as well as identifying the source of those funds; and
- a memo from the relevant Course Director(s), approving an absence for a specific period of time (if absence is to be taken while the student is fulfilling his/her teaching assistant requirement).

XIV. FINANCIAL AID AND GRADUATE APPOINTMENTS

Financial aid is available only to students pursuing the Ph.D. degree. Graduate appointments to scholarships, fellowships, and assistantships are subject to rules of the Graduate College. Other forms of support through the Program, or through part-time employment in research or teaching in the Department of Anatomy and Cell Biology, are subject to the respective regulations of the Department of Anatomy and Cell Biology. All appointments are made by the Dean of the appropriate college on recommendation of the Program, and are subject to the availability of funds.

A student in the Ph.D. program will ordinarily receive stipend and tuition support as long as the student maintains good academic standing and is deemed to be making satisfactory progress toward the degree, but not ordinarily to exceed a total of five years of study in the Cell and Developmental Biology Graduate Program. "Good standing" and "satisfactory progress" are defined in the Graduate Manual and elsewhere in this document. (See Section III.D. of these Guidelines.)

A student in the Master of Science program will not ordinarily receive any financial assistance in the form of stipend, tuition, fellowship, or assistantship.

XV. IMPLEMENTATION OF GUIDELINES

Students admitted to graduate programs subsequent to adoption of these Guidelines will be subject to these Guidelines. Students previously enrolled for graduate degrees in the Cell and Developmental Biology Program may elect to follow the requirements of these Guidelines or those Guidelines under which they were admitted to graduate study.

XVI. EXCEPTIONS

All appeals arising based on rules and regulations of the Graduate College will be decided through established grievance procedures of the College.

APPENDIX A

Forms:

Report on/Request for Doctoral Comprehensive Examination

Doctoral Plan of Study Summary Sheet

Report of/Request for Final examination: Advanced Degree

Application for Graduate College Degree

See attached documents.

APPENDIX B

Request for Comprehensive Examination Form

Comprehensive Examination Assurance Form

Comprehensive Examination Checklist Form

See attached documents.

**CELL AND DEVELOPMENTAL BIOLOGY GRADUATE
COMPREHENSIVE EXAMINATION
CDB Request for Comprehensive Examination Form**

Student's Name: _____

Mentor's Name: _____

Date: _____

Month/Year of Proposed Comprehensive Examination: ____/____

Title of Proposed Written Research Proposal: _____

Please indicate the proposed examination committee which must include at least two members of the Cell and Developmental Biology program, and must include members of at least two University departments.

Chair: _____ Department: _____ Phone: _____

Name: _____ Department: _____ Phone: _____

Name: _____ Department: _____ Phone: _____

Name: _____ Department: _____ Phone: _____

Name: _____ Department: _____ Phone: _____

_____ Ph.D. Candidate

Signature

Date

_____ Current Mentor

Signature

Date

The above signed agree that the written comprehensive document will be the sole work of the graduate student, and not extracted from grant material written by the mentor. The mentor will be asked to review the written document prior to submission to the graduate examination committee, and to confirm in writing that the document was written in its entirety by the Ph.D. candidate.

Signature Date Chair, Comp Exam Committee

Signature Date Graduate Program Director

**CELL AND DEVELOPMENTAL GRADUATE PROGRAM
COMPREHENSIVE EXAMINATION
Assurance Form**

**(Place this form at the end of your Comprehensive
Examination written Research Proposal)**

Student's Name: _____

Mentor's Name: _____

Title of Proposed Written Research Proposal: _____

The undersigned Ph.D. candidate hereby confirms that the attached written Research Proposal was written in its entirety by the candidate.

_____ _____ Ph.D. Candidate
Signature Date

The undersigned mentor has read the comprehensive examination Research Proposal, and by signing below, documents that the Research Proposal is not extracted from grants written by the mentor.

_____ _____ Current Mentor
Signature Date

CELL AND DEVELOPMENTAL BIOLOGY GRADUATE PROGRAM
COMPREHENSIVE EXAMINATION
Checklist

**(Use this form to make sure you complete
all steps in preparing for your comprehensive examination)**

- Step 1:** File "**CDB Request for Comprehensive Examination Form**", along with a draft of the Abstract and Specific Aims for the Research Proposal to the Graduate Program Office.

- Step 2:** Within **two weeks** of the receipt of the Abstract and Specific Aims, the Chairperson of the Comprehensive Examination Committee will meet with the student. The purpose of this meeting is to: 1) determine the appropriateness of the Specific Aims for further development into a full proposal, 2) advise the student on developing the Aims into a research proposal, 3) relay any feedback or concerns the Committee may have regarding the proposal and 4) answer any questions the student might have about the examination. The meeting will be scheduled by the Graduate Program Administrator.

- Step 3:** Once the Abstract and Specific Aims are approved, a date will be scheduled for the Comprehensive Examination at **approximately two months from the approval date**.

- Step 4:** **Within two weeks prior** to the scheduled Comprehensive Examination, six complete copies of the research proposal should be submitted to the Graduate Program Administrator.

APPENDIX C

The University of Iowa Policy on Non-Discrimination

The University of Iowa prohibits discrimination in employment, educational programs, and activities on the basis of race, creed, color, religion, national origin, age, sex, pregnancy, disability, genetic information, status as a U.S. veteran, service in the U.S. military, sexual orientation, gender identity, associational preferences, or any other classification that deprives the person of consideration as an individual. The university also affirms its commitment to providing equal opportunities and equal access to university facilities. For additional information on nondiscrimination policies, contact the Director, Office of Equal Opportunity and Diversity, The University of Iowa, 202 Jessup Hall, Iowa City, IA, 52242-1316, 319-335-0705 (voice), 319-335-0697 (TDD), diversity@uiowa.edu.

APPENDIX D

The University of Iowa Policy on Human Rights

The university is guided by the precepts that in no aspect of its programs shall there be differences in the treatment of persons because of race, creed, color, religion, national origin, age, sex, pregnancy, disability, genetic information, status as a U.S. veteran, service in the U.S. military, sexual orientation, gender identity, associational preferences, or any other classification that deprives the person of consideration as an individual, and that equal opportunity and access to facilities shall be available to all. To review the complete policy, please

APPENDIX E

The University of Iowa Policy on Sexual Harassment and Consensual Relationships

Sexual harassment and other unwelcome sexual behavior are reprehensible and will not be tolerated by the university. Sexual or romantic relationships between a student and a faculty or staff member who functions in an instructional context with the student are prohibited by this policy.