Graduate Program Guidelines
Department of Anatomy & Cell Biology
Wayne State University School of Medicine
Detroit, Michigan

2016-17
Department of Anatomy & Cell Biology

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Useful Weblinks

http://wayne.edu/gradschool/
This link provides important information on all PhD requirements. Students should visit this site often for any updates/changes.
Mission Statement

The Doctor of Philosophy (PhD) Program in Anatomy & Cell Biology prepares doctoral students for research and teaching careers in various areas encompassed by Anatomy and Cell Biology. Goals include providing students with a basic background in biomedical science, expertise in multiple sub-disciplines of Anatomy & Cell Biology, competence in a variety of experimental techniques, ability to read and understand current scientific literature, and experience in the development and implementation of experiments to test specific hypotheses. The primary audience of the program is undergraduate or master’s degree level students who show potential for future success as independent researchers and educators at the highest academic levels.

Learning Outcomes

1. Produce and defend an original significant contribution to scientific knowledge.
2. Demonstrate mastery of all subject material related to the program curriculum and dissertation project.
3. Conduct scholarly activities in an ethical manner, following the principles of the scientific process.
4. Effectively communicate scientific material publicly in both written and oral formats.

Program Description

The Department of Anatomy & Cell Biology offers training primarily in the broad research areas of vision science and neuroscience. Specific areas of vision research include mechanisms of immunity and inflammation in the cornea; the physiology and neurochemistry of retinal neurons; and blood flow, oxygen transport, and intracellular signaling cascades in ocular tissues. Neuroscience research includes studies of injury and plasticity in brain and spinal cord, mechanisms of neural signaling, and the development and function of glial cells.

Quick Facts

<table>
<thead>
<tr>
<th># PhD students in program per annum: 10-15</th>
<th># PhD students accepted/enrolled per annum: 2-4</th>
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<tr>
<td># PhD students complete program per annum: 2-3</td>
<td>Success rate (2001-2015): 67%</td>
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<tr>
<td>Average Time-to-Degree: 4.7 years</td>
<td>Average GPA of accepted/enrolled students: &gt;3.5</td>
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<tr>
<td>Average GRE performance of accepted/enrolled students: &gt;60%</td>
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Progression through the ACB PhD Program

The PhD program in Anatomy & Cell Biology requires the completion of 90 graduate credits. This total must include 12 credits in the major department (ANA) and 30 credits of dissertation research. The remaining credits are filled with elective courses offered within and outside of the department.

Curriculum Requirements: Students are required to complete a minimum of two core courses from a list that includes: Gross Anatomy (ANA 7010), Histology (ANA 7030), Neuroscience (ANA 7130), and Interdisciplinary Cell and Molecular Biology (IBS 7015). In addition to the traditional coursework leading to a PhD in Anatomy and Cell Biology, the department offers the option of obtaining a Concentration in Vision Science. Students wishing this specialization take courses on the Biology of the Eye and Mechanisms of Ocular Disease in conjunction with their own research in a vision science laboratory.
Laboratory Rotations: Laboratory rotations allow students to become acquainted with the diverse research interests of the faculty and to obtain hands-on experience in selected techniques. By the end of the first year, students select the permanent research advisor who will assist in the development and implementation of the dissertation research project.

Seminars/Journal Clubs/Research Presentations: Students attend departmental and school-wide seminars on a regular basis. There are also opportunities to attend various journal clubs as well as participate in Graduate Student Research Day held in September of each year.

Mandatory Steps Required by the University

There are various hurdles that involve the filing of paperwork at the University level. To complete the program in 4-5 years, please pay attention to the following timetable.

<table>
<thead>
<tr>
<th>Plan of Work</th>
<th>PhD Candidacy</th>
<th>Prospectus</th>
<th>Final Defense</th>
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</thead>
<tbody>
<tr>
<td>Yr 1</td>
<td>Yr 2</td>
<td>Yr 3</td>
<td>Yrs 4-5</td>
</tr>
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</table>

PLAN OF WORK
The Plan of Work (PoW) provides the student and graduate school with an official outline of the planned coursework that will satisfy 90 graduate credits. For each semester, students should be careful not to exceed the maximum number of credit hours covered by their appointment for tuition scholarship. This number may differ according to the student’s funding source and semester enrolled. Usually this number is 10 for Fall and Winter semesters and 2 for the Spring/Summer semester. Students that exceed the maximum amount of credits covered by their agreement or who take a course outside of the approved PoW will be held responsible for tuition payments. The PoW form requires approval of the Advisor and Graduate Director. The Graduate Director will help each student develop the PoW.

PHD CANDIDACY
The obtainment of PhD Candidacy allows the student to register for doctoral dissertation credits during Yrs 3-4 in the program. These occur in 4-blocks of 7.5 credits each (30 credits total). To obtain Candidacy the student must:

1) Have an approved Plan of Work on file with the University.

2) Name the members of the PhD Dissertation Committee.

   The dissertation committee consists of the Primary Advisor and 2 additional internal (departmental) members. Two of the internal members must have graduate faculty status. An external member is also required with no formal ties to the department.

3) Pass the Written Qualifying Exam.

   The Written Qualifying Exam is the PhD dissertation proposal that must be distributed to the dissertation committee for review and approval prior to filing for PhD Candidacy. It is the student’s responsibility to communicate with each committee member after submission in order to receive feedback about the written document. The student then makes changes to the document according to suggestions of each committee member in consultation with the primary advisor. After the final version of the document is approved, the student is considered to have passed the written qualifying exam.

PROSPECTUS
It is a University requirement that each PhD student must pass an Oral Qualifying Exam. The ACB program makes the Oral Qualifying Exam part of the Prospectus. The exam is basically an oral defense of the written dissertation proposal used by the student to obtain Candidacy. The Prospectus meeting is
the first dissertation committee meeting. During this meeting, the student gives a 45-50 minute seminar that outlines the scientific background and rationale of the project- including the specific aims, experimental design, preliminary studies, and predicted outcomes. The talk is immediately followed by a question & answer session between members of the dissertation committee and the student. The Graduate Director also attends this meeting and usually acts as the mediator and student advocate. However, the Graduate Director is also afforded an opportunity to ask questions. This part of the meeting can last 1-2 hours and is probably the most intense experience the student will have in graduate school. After the question period is over, the committee decides whether the student has demonstrated sufficient mastery of the scientific background, experimental design and methods of their research project based upon the oral presentation and response to committee questions. If the student passes the exam, the committee will sign the Prospectus form which can be filed with the University. If the student fails, a second exam will be scheduled at a later date (it cannot be within the same semester). Failure of the student to pass on second attempt is grounds for dismissal from the program.

FINANCIAL SUPPORT MECHANISM

The official PhD student appointment at the School of Medicine is in the category of Graduate Research Assistant (GRA). Appointments are administered by student’s home department (Anatomy & Cell Biology). During the first 2 years, the GRA appointment is supported by the SOM Office of Biomedical Graduate Programs. It is important to understand that the student's permanent advisor provides significant financial support beyond the second year of training. As such, it is critical that the advisor has sufficient grant funding to support the GRA position as well as the overall research project. The student should understand that the Department is under no obligation to provide any financial support for the student’s GRA position or research project. Since the GRA title emphasizes ‘research’, there are no teaching obligations associated with the GRA appointment.

LABORATORY ROTATIONS

Students are given the opportunity to complete three 8-week laboratory rotations prior to the selection of the permanent advisor. Depending upon the student’s coursework load and advisor availability, the rotation schedule can be made flexible, but should be completed by the end of the student’s first appointment year (August). Laboratory rotations allow both student and potential faculty advisor to determine if the selection is a good match. Students must consult with the Graduate Director to plan each rotation since financial support is a critical factor to the student’s success. At the beginning of each rotation, the student and rotation advisor should discuss expectations as well as the research grading policy (see below).

SELECTING THE PERMANENT ADVISOR

This is the most important decision of a student’s graduate career. The advisor shapes the direction of the student’s career and provides the environment for the PhD research project. Each advisor has a unique approach to the training of PhD students and it is the student's responsibility to discover the advisor’s philosophy of mentorship during the laboratory rotations. Final approval of the permanent advisor is granted by the Departmental Chair in consultation with the Graduate Director after evaluation of resources needed to support the student’s GRA appointment and overall PhD research project.

DISSERTATION COMMITTEE MEETINGS

The Prospectus meeting serves as the initial meeting of the student’s dissertation committee. From that date onward, students must meet with their dissertation committee once every 6-months in order to review progress made on the project. During each meeting, the student provides an oral presentation that reviews the central hypothesis and specific aims of the project and shows data obtained for each specific aim. The student answers questions posed by the committee as well as discusses the interpretation of the data. The dissertation committee may make suggestions designed to strengthen the
DOCTORAL DISSERTATION CREDITS

Students need 30 Doctoral Dissertation credits to achieve the PhD degree. These are obtained in 7.5 credit blocks (Doctoral Candidate Status I, II, III, IV) during the Fall and Winter semesters of Years 3 and 4. In order to register for PhD Dissertation credits, the student notifies the PhD Office of the Graduate School (phdstudents@wayne.edu) with their intent to enroll in a particular block of credits for the upcoming semester. When the override is granted, the student is contacted using their access ID email account (make sure that your email is receiving forwarded emails from the university). The student then completes the registration on-line. PhD Dissertation credit blocks are accumulated according to the following schedule:

<table>
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<th>Semester</th>
<th>Credits</th>
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<tr>
<td>Fall (Year 3)</td>
<td>ANA 9991 (7.5 cr)</td>
</tr>
<tr>
<td>Winter (Year 3)</td>
<td>ANA 9992 (7.5 cr)</td>
</tr>
<tr>
<td>Fall (Year 4)</td>
<td>ANA 9993 (7.5 cr)</td>
</tr>
<tr>
<td>Winter (Year 4)</td>
<td>ANA 9994 (7.5 cr)</td>
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The student can begin accumulating PhD Dissertation credits (30 credits total) during the semester in which plan to obtain Candidacy. They must have approved Plan of Work on file with the university. In order to register for the second block of PhD dissertation credits (ANA 9992), the approved PhD Candidacy form must be on file with the university. If the student achieves ≥90 credits prior to the dissertation defense, they can continue to register for ANA 9995 (Maintenance Status, 0 cr). This allows the student’s status to remain active at minimum cost while they are finishing their research project.

PHD DISSERTATION DEFENSE

When the dissertation committee and student have come to agreement that the student can proceed to the final defense, the student should plan sufficient time to flush out important matters concerning the final defense. A 3-month period is strongly recommended to satisfy the following issues:

1. The student must visit http://wayne.edu/gradschool/phd/defense/ and follow all University guidelines associated with proceeding to the Defense. A format check of the written dissertation is required and must occur by a specific deadline established by the Graduate School for a particular semester. There are other matters as well discussed on their website.

2. It is important to understand that the committee shall have a minimum of 2-weeks to read the written document AFTER IT HAS BEEN APPROVED BY THE PRIMARY ADVISOR. Some students take several months to write the document and go through multiple rounds of revisions with their advisor prior to having the final version ready for submission to the committee.

3. There should be a FINAL meeting of the dissertation committee to review all editorial comments or suggestions about the document and to obtain signatures on the Final Defense Report Form signifying that each committee member has read and approved the contents of the dissertation. In addition, it is often assumed that the student has developed sufficient expertise in all aspects of the project deserving of the PhD degree. This assumption should be tested during the final dissertation meeting and if deficiencies are discovered, they should be corrected immediately. DO NOT SCHEDULE THE FINAL DEFENSE DATE AND POST FLIERS UNTIL THIS ISSUE IS RESOLVED TO THE SATISFACTION OF THE COMMITTEE.

4. After all of the above issues are addressed, the student notifies the Graduate School that the written dissertation has been approved and schedules the public lecture-defense. The oral lecture is presented in front of a public audience. Following the public lecture, the audience is dismissed and the student proceeds to the Defense. During this period, the student answers
questions posed by the dissertation committee in a closed-door meeting. If the student passes the Defense portion of the exam as per University policy, the PhD degree is awarded.

DEPARTMENTAL SEMINARS

The departmental seminar series usually runs from September through April and is held in the Anatomy & Cell Biology Library (8366 Scott) on Wednesday at 12 Noon. Attendance is required and students receive 1 credit as part of ANA 7890. To receive credit, students should register for 1 credit ANA 7890 each Winter semester for 4 consecutive years.

OPPORTUNITIES TO DEVELOP PRESENTATION SKILLS

RETINA JOURNAL CLUB. Graduate students interested in retinal research are encouraged to attend and present in a journal club organized by Dr. Tomomi Ichinose. The purpose of the journal club is to provide students with formal instruction and experience in reviewing and presenting research findings published in high-impact, peer-reviewed journals. See - http://www.anatomy.med.wayne.edu/journal-club.php for the schedule.

GRADUATE STUDENT RESEARCH DAY. All graduate students are encouraged to present their research in poster or oral format in the annual WSU Graduate Student Research Day held in September at the School of Medicine. Participation in this event is considered important in the overall training experience offered by all PhD programs at the School of Medicine.

GRADUATE STUDENT EXHIBITION. All graduate students are encouraged to present their research in poster or oral format in the annual WSU Graduate Student Exhibition usually held in the spring on the main University campus. Participation in this event is considered important to “show case” the overall scholarly activity and creativity of graduate students across the University campus.

GRADING POLICY FOR RESEARCH CREDITS

Expectations of both student and advisor should be discussed at the beginning of each research experience, whether a laboratory rotation or research conducted in the laboratory of the primary advisor. The below grading scale used by the advisor to assign grades:

A (outstanding). The student exceeded expectations and generated high-quality data that can be used in grants or manuscripts. Effort and time put into the project is considered exceptional.

A- (excellent). The student met all expectations. More work may be needed to make the data ready for submission, but considerable progress was made and the data is usable. Effort and time put into the project is considered excellent.

B+ (above average). The student put forth a quality effort and generated a small amount of usable data. Effort and time put into the project is considered very good.

B (average). The student put forth a quality effort but was not able to get the experiments to work for no fault of their own. Effort and time put into the project is satisfactory.

B- (needs improvement). The student was not able to get experiments to work. They may have tried, but there were times when they clearly needed to increase their effort on the project.

C (failure). The student did not devote enough time and energy into the project. Experiments failed and the student's effort on the project is deemed unsatisfactory.
Preparing for the Written Qualifying Exam

The written qualifying exam is the *Dissertation Proposal*. It should be completed prior to entering Yr-3 of the program and is required in order to file for PhD Candidacy.

1. Meet with your Advisor to plan the outline of the written dissertation proposal as well as the structure of the dissertation committee.
   
   a) *Dissertation Proposal* contains the following information:
      
      - Scientific Background of the Project
      - Central Hypothesis and Specific Aims
      - Experimental Design & Methods
      - Preliminary Supportive Data (conducted by the student)
      - Anticipated Outcome & Significance
      - Potential Pitfalls and Solutions

      The document must demonstrate the student’s depth of knowledge about the overall project and is developed in consultation with the permanent advisor. When the advisor is satisfied with the document, the student submits it to all members of the dissertation committee for approval. Upon approval of the written document (usually within a 2-week period), the student is considered to have passed the Written Qualifying Exam and can file for Ph.D. Candidacy assuming all other requirements have been met. The document should be broad enough to test the student’s general knowledge of their research area as well as specific enough to focus on underlying mechanisms that will be later studied. Since the document is the dissertation proposal, it can also serve as the first chapter of the student’s future dissertation document. Do not exceed 50-pages excluding References. The usual size of the document is 20-30 pages.

   b) *Dissertation Committee* is composed of the following:
      
      - Primary advisor
      - 2 internal faculty members from the ACB Program.
      - 1 external member with not ties to the ACB Department or Program

      Two members of the committee must have Graduate Faculty Status. All members should be committed to helping to develop the student and have expertise in the student’s research area. The external member may be named now, but their early involvement in the qualifying exam process is at the option of the student and advisor.

2. Prepare the written document and submit the first draft of the written document to your advisor. It may take several rounds of revisions in order to obtain the advisor’s approval.

3. When approved by your advisor, submit the final revised written document to the committee.

4. One-week after written document submission, send an email to the committee to inquire whether they have questions about the document. Schedule a meeting with each committee member to discuss comments/suggestions and potential corrections to the document.

5. Two-weeks after submission, obtain comments/suggestions from each committee member and make the appropriate revisions to the document. Submit a final version of the document to the entire committee and the Graduate Director. Obtain signatures from each committee member and the Graduate Director on the PhD Candidacy form and submit to the PhD Office of the Graduate School.
Preparing for the Oral Qualifying Exam

The oral qualifying exam is the *Prospectus* and should be completed by the end of Yr-3 in the program. It is recommended that the oral exam be conducted within a few weeks of gaining approval of the written Dissertation Proposal. The exam consists of a 40-45 min oral presentation followed by another 1-2 hrs of committee questions based upon the written document and oral presentation. The exam is conducted in the presence of the student’s dissertation committee with the Graduate Director present to act as the Moderator. Another member of the Graduate Committee can substitute if the Graduate Director is not available.

1. Meet with your Advisor to plan the outline of the oral seminar. The oral seminar outlines the scientific background and rationale of the project- including the specific aims, experimental design, preliminary studies, and predicted outcomes. The talk is immediately followed by a question & answer session between members of the dissertation committee and the student.

2. Contact each committee member and Graduate Director and seek open dates to schedule the exam. Also contact Selina Hall in the dept office to book the conference room.

3. Construct and rehearse a 40-45 min powerpoint presentation that will serve as the oral seminar of the Dissertation Proposal. Rehearse your oral presentation with your advisor and other colleagues. Ask for sample questions from the audience to test your knowledge.

4. Send emails to the committee 1-week ahead of the exam to remind about the date and time of the oral exam.

**Note:** The question and answer period of the oral qualifying exam can last 1-2 hours and is probably the most grueling experience the student will face in graduate school. After the question period is over, the committee decides whether the student has demonstrated sufficient mastery of the scientific background, experimental design and methods of their research project based upon the oral presentation and response to committee questions.

If the student passes the exam, the committee will sign the Prospectus form that can be filed with the University.

If the student fails the exam, a second attempt will be scheduled at a later time. The date cannot be within the same semester as the first attempt. Failure of the student to pass on second attempt is grounds for dismissal from the program.
Guidelines for Dissertation Committee Meetings

The purpose of the dissertation committee is to provide a wide range of faculty expertise that will contribute ideas and suggestions to the progression and successful completion of the PhD dissertation project. Students are required to meet with their dissertation committee once every 6 months after the Prospectus meeting (see above).

Format for the Dissertation Committee Meeting

It is the student’s responsibility to schedule each dissertation committee meeting. Each meeting consists of a student oral presentation (powerpoint talk) that briefly reminds the committee of the specific aims of the project before proceeding to the experimental results obtained from each specific aim. The student should be prepared to answer questions during the presentation as per the request of individual committee members.

After the student's presentation, each member of the dissertation committee will have an opportunity to make comments and suggestions designed to strengthen the project. The Graduate Director will take careful notes on committee suggestions during the meeting that will be referred to in future meetings.

During the meeting, the advisor should not attempt to speak on behalf of the student. The advisor can help ensure that committee suggestions stay within the boundaries of the project and inform the committee whether the suggestions are feasible within a reasonable time frame that will ensure the successful completion of the project.

All subsequent meetings held every 6 months should focus on new results obtained for each Specific Aim of the project. The student should present these results in Powerpoint format at each meeting. If significant changes are made to the project that go beyond the original Prospectus, the student should provide this information to the committee in written format as an Addendum to the Prospectus.

How to Act Upon Committee Suggestions

The student is expected to act upon the suggestions of the committee in consultation with the advisor. The student and advisor may decide jointly that certain suggestions should be incorporated into the project while other suggestions may be rejected. Under circumstances of rejection, the student must convey the rationale for rejection in writing (email is acceptable) to the committee. Sample reasons include problems of feasibility or detraction from the original specific aims of the project. If the rationale for rejecting a suggestion is not considered acceptable by committee members, another meeting must be called to resolve the issue. If such a meeting is necessary, the Graduate Officer will attend in order to mediate the process.

Dissertation Committee Meeting Report

During the meeting, the Graduate Director records committee suggestions on a departmental Dissertation Committee Meeting Report form (see below). This form provides written documentation of committee suggestions that must be addressed at future Dissertation Committee meetings. The final report should state the committee’s agreement that the student should proceed to the writing phase of the Defense of the Dissertation.
LEARNING OUTCOME (LO) ASSESSMENT

Assessment of LO1: Produce and defend an original significant contribution to scientific knowledge.

• Ability to develop and execute an original research project that makes a significant contribution to scientific knowledge will be assessed by the dissertation advisory committee during semi-annual committee meetings and at the final dissertation defense.
• The primary advisor will also complete a series of evaluations documenting student progress in mastering research techniques and methodologies, as well as all necessary background knowledge pertaining to the dissertation project.
• External evidence of success will be assessed by original research publications, securement of post-graduate employment, and honors/awards relevant to the student’s professional career path.

Assessment of LO2: Demonstrate mastery of all subject material related to the program curriculum and dissertation project.

• Mastery of subject material related to the program curriculum will be assessed by exam testing and final grades obtained in coursework.
• Mastery of subject material related to the research area and dissertation project will be assessed by dissertation committee meetings and the final defense of the dissertation.
• Ability to critically read and evaluate pertinent literature will be assessed by seminar attendance, journal club participation, performance on qualifying exams, and dissertation committee meetings.

Assessment of LO3: Conduct scholarly activities in an ethical manner, following the principles of the scientific process.

• Ethical conduct will be assessed through enrollment in BMS6010- Responsible Conduct in Biomedical Research.
• Potential instances of plagiarism will be monitored through the regular use of Safe Assign for written documents produced by the student.
• Students will participate in workshops on the scientific method and the proper use of statistics in the biological sciences.

Assessment of LO4: Effectively communicate scientific material publicly in both written and oral formats.

• Ability to present scientific material publically will be assessed by conference presentations of original research, journal club presentations, dissertation committee meetings, and the final dissertation defense.
• Demonstration of proficiency in scientific writing will be assessed by performance in written qualifying exams, primary authorship of original manuscripts, and the final dissertation document.