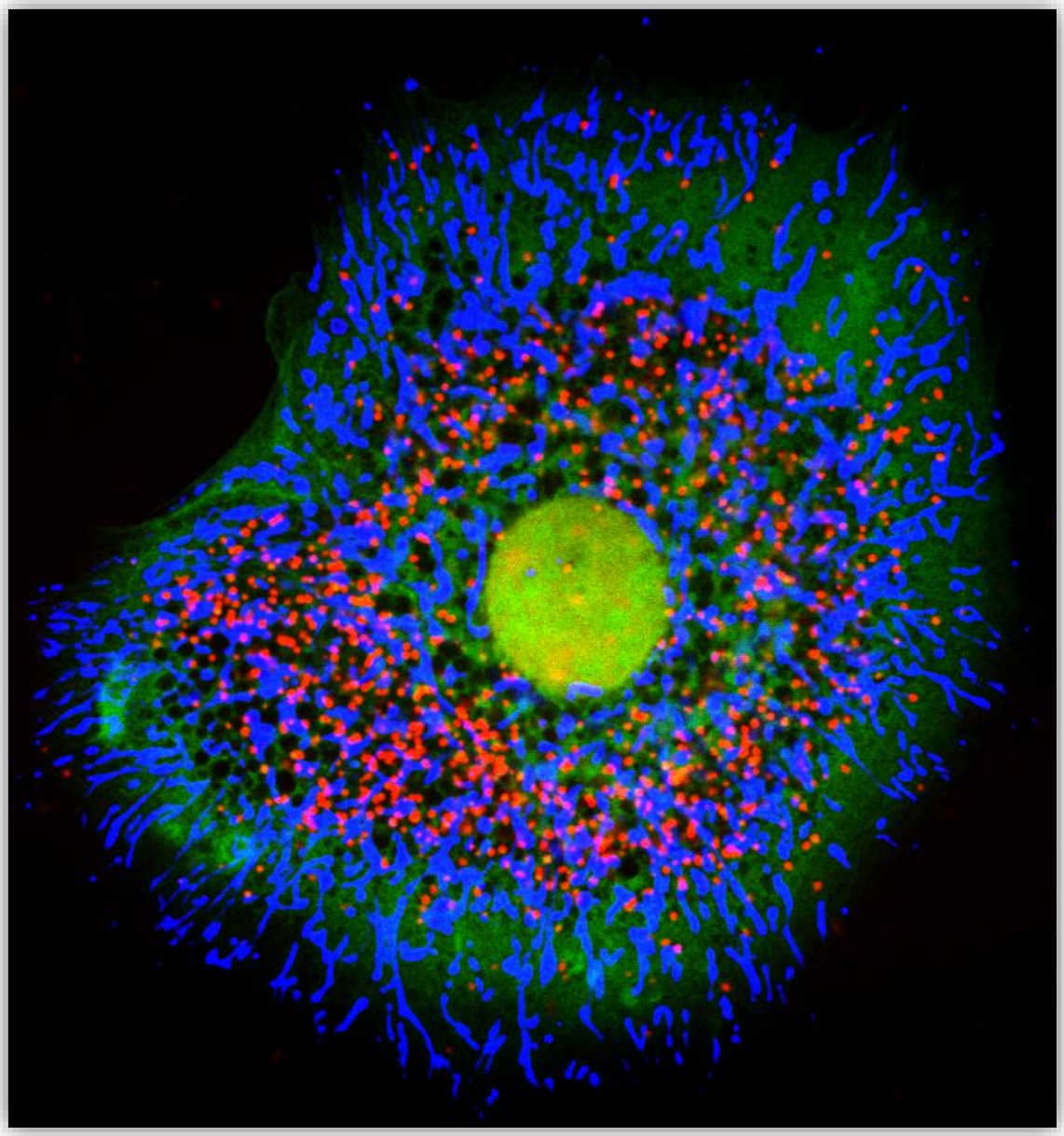
Cell Biology and Molecular Physiology Graduate Program Handbook 2022-2023



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INTRODUCTION

The Cell Biology and Molecular Physiology (CBMP) graduate program at the University of Pittsburgh is made up of a vibrant group of investigators and students who use tools of imaging, genetics, biochemistry, molecular biology, structural biology, computational modeling and physiological approaches to understand the integrated biology and physiology of cells, organs and whole animals. The faculty is drawn from both basic science and clinical departments and their research is focused on normal cellular biology and function, genetic disorders of ion channels, regulation of gene expression during development, DNA damage repair and cancer, models of neurodegeneration and aging, signal transduction in diabetes, cell biology and physiology of renal diseases and the regulation of male and female reproduction systems.

This handbook is designed to guide CBMP faculty and students through policies and procedures for the graduate program. General information regarding housing, parking and other University of Pittsburgh processes may be found by contacting the relevant offices or departments.

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I. DOCTOR OF PHILOSOPHY DEGREE

A. Admissions

The Cell Biology and Molecular Physiology (CBMP) graduate program is one of four programs available to students within the University of Pittsburgh School of Medicine's Interdisciplinary Biomedical Graduate Program (IBGP). Students who are interested in the CBMP graduate program apply for admission through the IBGP. The IBGP selects students from a large pool of qualified national and international applicants. They are graduates of prominent colleges and universities with exceptional research interests and aspirations. Each year, 15-20 students are admitted to the IBGP. Only students seeking the Ph.D. degree may apply.

Students interested in the IBGP must have a baccalaureate degree in natural or physical science or engineering. Competitive applicants will have a minimum grade point average of 3.2 (on a scale of 4) or its equivalent from an accredited institution. Strong performance in undergraduate science courses (chemistry, physics and biology) is expected. All successful applicants to the IBGP have research experience with most applicants spending at least one year working in a laboratory. A minimum of three letters of recommendation from faculty familiar with the applicant's research accomplishments are of immense value. The applicant's personal statement, particularly the research description, is also used in assessing an applicant's potential for graduate study.

Applicants who are citizens of countries where English is not the official language (and the Province of Quebec in Canada) are required to present proof of English language proficiency by submitting their official results of the Test of English as a Foreign Language (TOEFL) with a score greater than 100 or the International English Language Testing System (IELTS). Applicants who have earned an undergraduate degree or higher from a regionally accredited institution in the United States are excused from submitting English language proficiency test results.

The Admissions Committee arranges for competitive applicants to take an all-expense paid trip to the University of Pittsburgh to interview for admission. Applicants will also meet with current graduate students and have the opportunity to explore the city of Pittsburgh. Under special circumstances applicants may be interviewed by telephone or via video conference.

B. Financial Aid

All full-time graduate students receive financial support in the form of a stipend, full tuition remission, and health insurance coverage. Students may be supported through the following funding mechanisms:

1. **Dean's Fellowships:** All students are funded through the Dean's office during their first year in the program.
2. **Research Grants:** Students working on thesis research may be supported from research grants from their main advisor.
3. **Training Grants:** A small number of students working on thesis research are supported by training grants from specific programs.
4. **Teaching Fellowships:** Students are encouraged to apply for CBMP teaching fellowships after the first year in the program. Students must successfully complete the Histology course prior to being awarded the fellowship. Fellowships are awarded by the Chairman of the Cell Biology Department on the recommendations of the CBMP steering committee and the medical student

histology program director. Students will be awarded the fellowship for one year, with future teaching fellowships awarded upon satisfactory performance in the first year. Students may receive additional years of support by the fellowship as determined on a case by case basis by the Steering Committee and Department Chairman. Priority for fellowships is given to students in the CBMP program who work in Cell Biology Department labs.

5. **Foundation/Government Fellowships:** Students who qualify for foundation and government fellowships are strongly encouraged to apply for these awards. Completion of the grant writing course and comprehensive exam (see below) provide excellent preparation for timely submission of a competitive grant application.

Regardless of the source of the support, all IBGP students receive a stipend of $32,000 (2021-2022). Should a student receive a funding opportunity that is less than this level, the student's sponsor is expected to make up for the difference. The University of Pittsburgh will provide the student with individual health coverage. If the student wishes to enroll in a family plan he/she will be responsible for paying the difference in cost.

C. Interdisciplinary Biomedical Graduate Program (IBGP)

All first year students will be monitored by the IBGP Steering Committee to ensure that program requirements are being satisfactorily met. The purpose of IBGP is to help the student make an informed decision regarding which graduate program he/she will choose for a specialization. Upon completion of the interdisciplinary year, students will officially transfer into one of the four degree granting programs.

C.1. First-Year Curriculum

In order to be eligible for a specialized PhD program the graduate student is required to complete the following IBGP courses:
Foundations of Biomedical Sciences (8 credits)
Foundations Conference (4 credits)
Scientific Ethics (1 credit)
From Data to Knowledge (D2K) (3 credits)
Laboratory Research Rotation (1 credit per rotation; 3 rotations required)

C.2. Research Opportunities

A critical element of IBGP is its emphasis on laboratory research. Students are encouraged to think carefully about their scientific interests and to choose laboratory rotations driven by their interests. All IBGP students complete three laboratory rotations during their first year and then find a mentor and laboratory suitable for their dissertation studies. This matching process depends on continuing discussions between students, program advisors and the training faculty.

D. Transferring from IBGP to a Specialized Graduate Program

At the end of the student's first year in the IBGP, the student will transfer into a specialized degree program of choice. The student will need to identify a lab that they would like to work in and receive permission from their first year advisor to join the lab. After approval, the student will be given a transfer form to fill out and have signed by his/her mentor, the program director and the Associate

Dean. After the transfer form is signed, the Graduate Studies Office will officially reassign payroll paperwork to the person who handles the mentor's accounting.

E. Ph.D. Requirements

The general goal of the IBGP is to ensure that students have a strong foundation in biomedical science. Students are required to gain a broad understanding of the structure and function of cells and tissues, with a focus on the cellular biology or physiology of cells or cell systems.

A total of 72 graduate-level credits are **required** for the Ph.D. degree. It is important to note that 32 of the 72 credits must be satisfied through course work and the remaining 40 credits should be completed through the Ph.D. dissertation. Graduate students in joint programs, training programs or in special circumstances may require additional courses or an individualized course of study. The Graduate Advisory Committee will consider requests for changes or exemptions from program requirements on a case by case basis.

F. Courses

F.1. Required Courses for the Cell Biology and Molecular Physiology Graduate Program

All CBMP students are required to take the following core courses. Additional electives are listed below.

1. Cell Biology of Normal and Disease States (4 credits, spring): This course will explore topics related to basic biology, the cellular basis of disease processes, and recent advances in translational research. The course meets twice a week for a full semester and is taught through lectures and in-class discussions of primary literature.

One of the following imaging courses

2.1. Imaging Cell Biology in Living Systems (3 credits, spring): This course is focused on studying relevant problems in cell biology, immunology, developmental biology and neurobiology and how they have been solved using imaging approaches. The course will follow lecture/demo/journal club format.

OR

2.2. Multiparametric Microscopic Imaging (3 credits, summer): This lecture/lab course immerses students in the theory and practical aspects of modern microscopic imaging. The fields will cover the theory and implementation of all types of light and electron microscopy and computer aided imaging, image quantitation and ethical issues surrounding imaging technologies. Students will be expected to each a functional capability in a selected technology.

3. Grant Writing for Graduate Students (2 credit): Prior to taking the comprehensive exam students will enroll in the Graduate Student Writing Course during the second fall term. This course teaches fundamental skills for developing an F31 grant, using the student's proposed thesis topic and based on an NIH training grant format. All components of a complete NIH proposal are covered.

In addition to the core courses, all CBMP students will register for the ongoing classes listed below. Students will participate in required seminars, classes and journal clubs until a specific date has been set for their dissertation defense.

Journal Club (1 credit hour): Students will enroll in a journal club each term after completion of the first semester core curriculum until graduation. Students will have the choice of journal clubs pertaining to cell trafficking, DNA damage and repair, reproduction, ion channel physiology or others. Students will be required to present published manuscripts at least once each term and are required to attend all meetings of the class.

Experiments and Logic in Cell Biology (1 credit hour): The purpose of this course is to engage students in a self-directed seminar structured to stimulate the students' ability to think scientifically and critically as future scientists. The students will take on the role as either an Investigator or a Reviewer. The Investigator will post a one page description of his/her experiment(s) and up to three figures/tables of supporting data to evaluate. The Reviewers will post a one-page critique that independently evaluates and provides constructive suggestions on the experimental data and design, in terms of alternative rationales, interpretations, and next experiments.

Student Seminar Series (no credit): Although not technically a course, once students enter the program they are required to attend all sessions of the Student Seminar Series. Students are required to present their data at least once each year.

F.2. Electives

In addition to the core courses and seminars/journal clubs, CBMP students are welcome to take CBMP courses (listed below) as electives. Please note that taking additional courses offered outside of the program is also permitted and encouraged.

Histology (5 credits): The objective of this lecture/lab course is student comprehension of the relationship between cell structure and organ function, and the application of the knowledge to the identification of light and electron-microscopic images of cells and organs. Students interested in Histology or in teaching are encouraged to take this course as it may lead to a teaching fellowship.

Regulation of Membrane Traffic (2 credits, alternate summer): The focus of this course is to analyze membrane/protein traffic along both the biosynthetic and endocytic pathways; however, the more general goal is to teach students how to read and interpret the literature. There will be no formal tests in this course; instead, grades will depend on participation and 30 minute mini-lecture that the student will prepare as an introduction for one of the sessions.

Cell and Molecular Physiology (2 credits, TBA): This course is designed to give students a basic understanding of the functions of cells with a focus on the application of modern biophysical and molecular-genetic approaches in the analysis of cellular function. The course consists of lectures, problem-solving sessions, and examination of original papers.

Imaging Cell Biology in Living Systems (3 credits, spring): This course is focused on studying relevant problems in cell biology, immunology, developmental biology and neurobiology and how they have been solved using imaging. The course will follow a lecture/journal club format.

Multiparametric Microscopic Imaging (3 credits, summer): This lecture/lab course immerses students in the theory and practical aspects of modern microscopic imaging. The fields will cover the theory and implementation of all types of light and electron microscopy and computer aided imaging, image quantitation and ethical issues surrounding imaging technologies. Students will be expected to reach a functional capability in a selected technology.

F.3. Grading

Students in the CBMP graduate program will be evaluated through a variety of grading options. The type of grading scale will differ based upon the course and the instructor. Only the S/NC grading option may be used in evaluating thesis or dissertation research.

LG	Letter Grade
H/S/U	Honors/Satisfactory/Unsatisfactory
S/NC	Satisfactory/No Credit
LG and H/S/U	Letter Grade and Honors/Satisfactory/Unsatisfactory
LG and S/NC	Letter Grade and Satisfactory/No Credit

A student may choose to audit any graduate course on a space available basis. After obtaining the instructor's consent to audit a course, the student follows the same procedures as registering for credit. **Tuition is assessed for all audits.**

If a student is unable to complete course requirements due to the nature of the course, clinical work, or incomplete research he/she will receive an "I" (incomplete) grade which will stand until requirements are met. If the student is unable to complete course requirements because of extenuating personal circumstances he/she will receive a "G" grade (course work unfinished because of extenuating personal circumstances) until he/she is able to meet course expectations. Student's assigned "G" grades are required to complete course requirements no later than one year after the term in which the course was taken. Once the time limit has passed, the "G" grade will remain on the record, and the student will be required to re-register for the course if it is needed to complete requirements for graduation. A student may graduate without removing "G" and/or "I" grades from the record if all degree requirements have been met and the student's department recommends graduation.

An Instructor may change a student's grade by completing a Grade Change Request form. The dean of the school in which the course is offered or his or her designee must approve a grade change before it will be honored by the Registrar. Grade changes should be processed no later than one year after the initial grade was assessed. There may be reasons that give reason for a later change of grade, but they must be of an unusual nature. Any exception must receive the dean's approval. Changes in "I" grades are exempt from this policy.

A student's graduate Grade Point Average (GPA) is obtained by dividing the total number of letter grade credits taken in the graduate program into the total number of grade points earned in the graduate program. Only letter grades with GPA values will be used in computing the Grade Point Average.

A student may repeat any course in which a grade of B- or lower is received if permission to repeat the course is given by the student's adviser. The grade earned by repeating a course is used in place of the grade originally earned; however, the original grade is not erased from the transcript. No course may be repeated more than twice. No sequential course may be repeated for credit after a more advanced course in that sequence has been passed with a B or higher grade.

G. Faculty Advisors

In the event that a conflict arises between a student and his/her mentor, or there are disciplinary/health related problems, the director of the graduate program will be informed by either the student or mentor and the director will convene a meeting of the graduate program Steering Committee. The committee will select a subcommittee to evaluate the problem and mediate solutions. In some cases, the Dean of graduate studies will become involved as determined by the CBMP steering committee.

H. Research Credits

Students enrolled in the CBMP graduate program are expected to take MSCBMP 3800 to meet PhD Dissertation Research requirements. After advancement to candidacy for the PhD, students enroll in this course to pursue original experimental laboratory research, the results of which will provide the material of the doctoral dissertation. A minimum of 40 credits of this course are required for the PhD. Failure to maintain a satisfactory laboratory performance may result in the student being placed on probation. Should the problems not be effectively mediated in a timely manner the student may face termination from the CBMP program.

I. Comprehensive Examination and Admission to Candidacy

I.1. Introduction

The comprehensive examination will be based on the student's expected dissertation project. However, the exam must not correspond directly with a specific aim or part of the mentor's grants. This includes funded grants or pending grant applications. It is expected that the student will develop this proposal by themselves. The exam will be taken before completion of the first term of the third year as a graduate student, but preferably by the end of the student's second year. To be eligible for the examination the student must have:

- Matriculated from the Interdisciplinary Biomedical Graduate Program
- Maintained a GPA of a 3.0 (B) or better
- Completed all required courses of the program (see above).
- Completed at least three laboratory rotations
- Identified a primary advisor
- Accrued at least 32 academic credits.

The examination consists of two parts, which are functionally separate.

1. **The Written Examination**: As described in detail below, this NIH style grant application is designed to test the synthetic capabilities of the student (objective 1).
2. **The Oral Defense**: This part of the exam, taken after the written component, is designed to test the knowledge base of the student. How well does he/she think (objective 2)?

Objectives:

The comprehensive examination in CBMP is designed to assess two principal aspects of graduate student accomplishment.

1. **Synthetic/Reductive Ability:**

Given the fact that the exam is based on the students proposed research, that the student has completed a comprehensive grant writing class and has the opportunity to undertake an extensive literature review, it is expected that the written component will be in a very mature state. The student should be able to:

- Identify an important research problem to form the basis of their thesis research.
- Generate a testable hypothesis.
- Generate a set of aims to test this hypothesis.
- Define experiments that will adequately fulfill the aims.
- Define alternate experimental approaches.
- Formulate a written research plan in the form of a grant application which could be readily converted into a final grant application.

2. General Knowledge of Cell Biology/Physiology:

Does the student have a comprehensive knowledge of current cell biology and physiology within the broader rubric of his/her discipline? This encompasses:

- A general knowledge of the larger field of cell biology and physiology
- An advanced knowledge within his/her field of study

Goals of Examination:

The goals of the comprehensive examination are to:

- Assess the students' academic accomplishment in CBMP.
- Ensure that students leaving the program are well rounded and will represent the quality of the CBMP program appropriately.
- Define strengths and weaknesses in the student's educational base, such that if necessary, remediation may be proposed.
- Assess the student's ability to be creative, and to organize his/her thoughts in a convincing manner.
- Assess the student's ability to examine the literature and to identify important concepts and ideas for study.
- Evaluate the knowledge of methods and their appropriate application to solve a problem experimentally.

I.2. The Written Examination

The written exam consists of the components outlined below.

- Title Page (1 page)
- Abstract Page (200 words)
- Specific Aims (1 page)
- Research Strategy (6 pages)
  Significance (~2 pages)
  Approach, including preliminary data, methods/approach, expected results, limitations, pitfalls and alternate approaches (~4 pages)
- References (no more than 50, full citations)

Developing the Proposal:

The written proposal will be based on the student's proposed thesis work. It is critical that the student defines novel studies that have not been completed by other investigator's, or are merely derived from their mentor's grant applications. The student must adhere to the page limits described above, based on

the current F31 guidelines from the NIH. To create a comprehensive written exam the student should follow the 5 steps outlined below.

1. **Develop a Hypothesis:** The initial step is to develop a clear hypothesis which has yet to be tested. The goal is to fill in gaps of knowledge to provide a fuller appreciation of the "state of the art". This will involve reading recent reviews followed by focused reading in areas that seem particularly important. During this synthetic period the student should generate a testable hypothesis.

2. **Preliminary Data:** Preliminary data is the heart of most grant applications. Since the student may not have performed many of the experiments they wish to propose, they are permitted to take selected data from previous research to form a preliminary data section, this can be up to but no more than 3 figures from other people's work. Data and figures for this section should be carefully selected and appropriately cited.

3. **Specific Aims:** After defining a hypothesis and identifying preliminary data, the student should write out specific aims. The specific aims should be a list of the goals for each major subsection of the grant.

   The specific aims should start with a general statement describing the focus of the proposal. It should define why it is important to obtain this knowledge. NIH is interested in funding research that furthers the goals of NIH, i.e., improving health.

   Generally, the proposal should consist of no more than 3 primary aims. The aims should list the overall approach to be taken and should not be more than one page in length. It is important to recognize that the proposed work should be possible within the time course of the proposal which should be assumed to be no more than 3 years for the F31-type application from the NIH. A common error in student proposals is that the aims define a body of work which will be impossible to complete within the time allotted.

4. **Significance:** This is a description of why your work is important and how it fits into the bigger research picture. It is essential that the student is aware that this is **not** a review article of the field nor is it a background and significance of the area of research; *it is a background and significance of the proposal*. This section should define what is known, what is not known, and why that lack of knowledge is important.

5. **Experimental design:**
   The student will want to carefully choose an experimental design. They will want to ask themselves the following questions as they go through the process.
   - Do the experiments defined address the hypothesis being tested?
   - Are adequate controls defined?
   - Are the experiments described in a logical fashion?
   - Are appropriate alternate strategies proposed?
   - Are the statistical and analytical methods appropriately described?

   Be aware that knowledge of experimental methods, as well as the advantages and drawbacks of each experimental method will be of significance in your oral defense. So whatever the student proposes, he/she should know the advantages and limitations of each method.

Resources:

When writing any grant proposal investigators rely heavily on colleagues to choose the right experimental method and design to address scientific questions. When writing the comprehensive proposal the same rules apply. The difference is that you need to be able to defend the approaches taken in the oral exam. The table below lists permitted and non-permitted interactions with committees, faculty, mentors and students. In summary however, it is expected that the written proposal is the student's own work. The ideas laid out should be their own and they will be required to defend this in the oral portion of the exam.

	Permitted	Not Permitted
Contact with Committee	The student is encouraged to go to his/her committee for general intellectual guidance.	The student may not ask the committee for text or specific solutions.
Contact with Other Investigators and Students	This is open territory, remember, ideas are great but the student should be prepared to defend what he/she writes.	The student may not ask other investigators or students for text or specific solutions.
The Internet, library, Books, etc.	These resources are allowable as long as the student writes his/her own thoughts. Information found through literature should be attributed to the appropriate source (this is particularly important in the preliminary data section).	Attributing information that is not independent thought as your own is strictly prohibited.
Access to Grant Applications in the Field of Study	The student may reference existing grants for general guidance regarding formatting.	The student is not permitted to copy ideas from his/her mentor's grants or other grants specific to the topic.
Consultation with your Advisor	The student is permitted to discuss general ideas with your advisor	The student may not ask his/her advisor for direct, interactive help. This includes review of the proposal, direct suggestion of experimental approaches, etc.

I.3. The Oral Examination

The oral exam is designed to determine the knowledge base of the student and his/her ability to think and defend ideas in an open forum. This is a relatively rigorous exam; however, it is *not* the goal of the exam committee to fail any student, rather to determine that the student is appropriately trained to advance to candidacy.

The student will develop a presentation that is between 20 and 30 minutes long and does not use slides, i.e. a "chalk talk".

The presentation should include the information listed below.

- Outline of the hypothesis.
- Description of the preliminary data.
- Definition of the aims to be tested.
- Descriptions of the experimental methods to be used as well as analytical methods and problems/pitfalls.

As the student is preparing for the oral examination he/she should keep in mind that the exam will last approximately two hours. The majority of students do not complete their proposal presentations due to questions from the examiners. To accommodate this time restriction, it is critical that the presentation is focused and supports the proposal. If asked, the student should be ready to explain how the proposed study fits and advances the field of study. During the committee's discussion, it is likely that the student will be asked to expand upon and defend the protocols, methods, weaknesses and alternate experimental strategies. The student should be prepared for questions related to the proposal and more general inquiries about his/her training and research focus to date. The committee is free to address any related topic to determine if the student exhibits deficiencies in a particular area.

I.4. Administration

Requesting Examination:

To request examination, the student should write a brief email to the director of the CBMP graduate program asking to begin his/her examination on a specific date. Once a student formally requests examination, the director of the graduate program assembles an exam committee which consists of at least four CBMP faculty members with graduate faculty status from within the program. One of the faculty members will be elected to head the committee. The exam will require the student to develop an NIH style grant proposal. The student will then commence the development of the proposal on the agreed start date. The student has a maximum of 30 days from being of the examination to complete the assignment.

Submitting the Written Examination:

Within than 30 days the student should email the proposal to the graduate program administrator.

The administrator will forward the proposals to:

- The members of the exam committee (4)
- The graduate program director and/or associate director (oversees the exam)
- The students' advisor (non-voting member)

The exam committee will review the proposal and in one week or less deliver an assessment to the head of the committee and the graduate program director. The committee will decide that the proposal is

sufficiently well written, defended, organized and argued and that oral defense is appropriate, or that revisions are needed.

Revising the Examination:

If revisions are needed, members of the exam committee will provide a defined description of the shortcomings of the proposal to the head of the exam committee. In the past, the majority of revisions have been due to missing sections such as an "alternate strategies section" or analysis section. If this is the case the student will be required to meet with the head of the exam committee and then will be given time to correct these short comings. This period will not be longer than two weeks. After which the student will resubmit the proposal.

If corrections are deemed appropriate the student will defend orally. If the corrections are not viewed as satisfactory the student will fail the exam and will restart the written part of the exam again. One failure (written or oral) is allowed but if the student fails twice he/she will be terminated from the program.

Grading:

After the student has defended his/her proposal orally the committee will assess performance. Results are pass/fail; if the student adequately defends the proposal a pass grade is clearly deserved. If there are major holes in knowledge but generally the student defended the proposal well, some remediation will be proposed. However, if the proposal was generally very poorly defended with little evidence of preparation or knowledge of the field the student will fail and be expected to sit the oral part of the exam again (assuming the written document was well prepared).

Other Requirements:

The student will submit an NIH style biosketch to the graduate program director and administrator prior to the oral exam date as a requirement to pass the comprehensive exam.

J. Dissertation Committee

Within three months of passing the comprehensive examination, the student with the assistance of his/her mentor and the graduate program director will identify appropriate faculty members for the dissertation committee. The committee must be made up of at least three faculty members from CBMP, including the mentor, in addition to at least one member from another program. All members of the committee must have graduate faculty status unless special permission is given by the program director (for example members that are from outside the University). Once formed, the committee will decide upon a chairperson with the assistance of the graduate program director. The chairperson will have the responsibility of ensuring that all committee-related documents are completed and received by the appropriate officials. At this point, if all committee members agree, the student will be entered into candidacy through the IBGP, via approval of the Dean of Graduate Studies.

For the first committee meeting, the student should provide a written introduction to the problem being evaluated, the hypotheses being tested and a summary of experimental aims to address these hypotheses. As much of this information would be repetition of the comprehensive exam, this will likely be a modified version of this document with updates and changes to the proposed thesis topic. The

student should deliver the document to the committee members at least one week prior to the meeting. Following the meeting, the student will incorporate suggested changes to their project into their proposal and submit the necessary paperwork to the graduate program director and the IBGP.

The committee will monitor the student's progress through frequent (every 6 months) meetings. The student is responsible for arranging the biannual meetings. **If meetings do not occur regularly within 6 months the student may be placed on probation.** The student, mentor and the committee chairperson will work together to compile a report after each committee meeting. The report will include documentation of the student's progress and the goals to be accomplished before the next meeting. A numerical score of the student's progress (scale of 1 to 5) and a written summary will be provided by the chairperson after consultation with other committee members. A score of 1 will note outstanding progress while a 3 will signify adequate progress. If a student receives a score greater than 3, then the program director will investigate the situation with the committee members and the student to identify mechanisms to improve the student's progress. Students receiving scores greater than 3 after two consecutive meetings may be placed on probation.

In addition to meeting with the dissertation committee biannually, the student will meet with the CBMP program director once each year to discuss progress and any difficulties that he/she may be encountering. Prior to the meeting, the student's mentor will provide the program director with a summary and evaluation of the student's progress supplied on a CBMP template. A student self-evaluation will provide points of discussion for the meeting with their mentor and the director.

At a minimum, a first author paper should be **submitted for publication** before scheduling the final dissertation exam. It is highly encouraged that CBMP students have at least one first author paper **accepted** before scheduling the final dissertation exam as final graduation from the program will not occur until their paper is accepted.

K. Dissertation and Final Oral Exam

Dissertations will be prepared in accordance with the University of Pittsburgh regulations. The dissertation committee does not have to accept dissertations that are incorrectly formatted or incomplete. In such cases, the student will alter the dissertation to fulfill the wishes of the committee as well as the university requirements and resubmit the document.

The dissertation must be submitted in a timely manner to allow the committee ample opportunity to evaluate the document. The primary advisor is required to certify that he/she if satisfied that the thesis can be released to the committee for evaluation at least 3 weeks before the defense date. The thesis can then be distributed to the committee. It is recommended that the dissertation is provided at least three weeks prior to the defense date, but **no later than two weeks before the defense**. The chairperson will poll the committee members at least one week prior to the defense date to determine whether the oral defense can proceed. If the committee agrees that the dissertation is potentially acceptable, then the defense will continue. Otherwise, the student will be contacted and any problems will need to be addressed to the satisfaction of the committee and a new defense date will be set.

The student should contact the graduate studies office as soon as the dissertation defense date is set to obtain graduation deadlines from the graduate studies office and to ensure that the defense date falls prior to the deadline for that term.

The student is responsible for reserving a room that is suitable for the defense. The student is advised to reserve the room as soon as possible to prevent scheduling conflicts. The room must be of sufficient size to permit the general public to attend the defense. The student will inform the graduate program administrator of the room and time of the defense.

The defense will include a 40 to 50 minute discussion of the progress and significance of the student's work. Members of the general public will then be allowed to interrogate the student. After the question period, the student and the committee will retreat to executive session where the committee will discuss the dissertation with the student and ask any remaining questions about the work. The committee will then decide whether the dissertation and the defense are acceptable.

L. Terminal Master's Degree

The Program does not admit students whose goal is to attain a MS degree. However, it might become necessary for a PhD student to transfer to an MS track for a variety of reasons. The student must petition in writing to the Program Director to be transferred to a terminal Master's program, and must have the support of both the laboratory advisor and the Academic Affairs Committee. The MS degree requires the completion of a minimum of 30 credits with a minimum QPA of 3.0. The degree also requires successful completion of the first year course work in the PhD program as described above. The following courses are included in this requirement:

- Foundations and Foundations Conference (12 credits)
- Laboratory rotations (3 total, 3 credits)
- Core courses for the CBMP (at least 9 credits)
- A series journal club credits (at least 2 credits)
- Advanced course electives (at least 3 credits)
- Directed study (at least 9 credits)
- Passed the comprehensive exam

The University requirement for passing an MS comprehensive examination is met by an oral exam based on a brief (approximately two page) proposal for the Master's thesis research. The student's Thesis Committee will administer this examination. The scope of the Master's research proposal should be appropriate for a Master's thesis and therefore less than for a PhD dissertation. For students who transfer to the MS track after attempting the PhD comprehensive examination, the examining committee has the option of deciding that performance in the PhD comprehensive examination meets the standard required for an MS comprehensive examination. Masters students must submit and defend a thesis and comply with all applicable University requirements for the Master of Science Degree.

M. Leave of Absence

Under special conditions, graduate students may be granted one leave of absence. A maximum leave of

two years may be granted to doctoral students and one year to master's students. The length and rationale for the leave of absence must be stated in advance, recommended to the Associate Dean by the Program Director, and approved by the Associate Dean. If approved, the time of the leave shall not count against the total time allowed for the degree being sought by the student.

N. Graduation

The committee will determine when the student has progressed far enough to begin work on a written dissertation and initiate the graduation process. The chairperson will inform the graduate program director of the decision to initiate the graduation process. To be eligible for graduation, the student must have sufficient knowledge of Cell Biology and Molecular Physiology to work as an independent investigator. In addition, the student must have **at least 1 first author publication in a peer-reviewed journal**. However, it is expected that students will achieve multiple first author publications prior to graduation. Manuscripts in preparation or submitted publications do not fulfill graduation requirements. At the time that the graduation process is initiated, the student will provide the following to the program director:

1. An updated NIH style biosketch
2. A summary of potential employment opportunities available after graduation

Students are required to fill out an Application for Graduation early in the term when they wish to graduate. Check with the graduate office for specific deadlines.

II. REGISTRATION PROCEDURE

Faculty members are responsible for advising students regarding their programs and specific course selections each term. Students must adhere to registration deadlines in order to avoid the appraisal of a late registration fee. After the start of classes, registration is permitted for new and continuing students only with the written approval of the dean in unusual circumstances and with the payment of a late registration fee.

All graduate students must register for at least one credit during the 12-month period prior to graduation and must be registered for the term in which they are graduated. Waivers may be obtained by submitting a written request to the Registrar from the dean of the school. The request should be based on very extenuating circumstances, e.g., inability of the student's dissertation committee to meet during the final term when a student has given reasonable notice or the student has completed all degree requirements in a previous term.

The Registrar will withhold registration and add/drop services from students who so warrant for financial, academic or disciplinary reasons. The University reserves the right to change registration procedures. Current registration procedures are published each term in the Schedule of Classes. Doctoral students who have completed all credit requirements for the degree, including any minimum dissertation credit requirements and are working full-time on their dissertations may register for "Full-time Dissertation Study," which carries no credits or letter grade but provides students full-time status.

III. STUDENT ORGANIZATIONS

The Biomedical Graduate Student Association (BGSA) is an organization that works to support social interactions and provide an environment for the discussion of issues related to graduate education. This organization sponsors a number of events both academic and extracurricular to help foster a sense of community among biomedical graduate students.

IV. PROGRAM STRUCTURE

The Interdisciplinary Biomedical Graduate Program is comprised of four graduate programs.

- Cell Biology and Molecular Physiology
- Cellular and Molecular Pathology
- Molecular Genetics and Developmental Biology
- Molecular Pharmacology

Each program designates a Program Director, Associate Director and Administrator. The leadership for the Department of Cell Biology and Molecular Physiology is as follows:

Adam Kwiatkowski, PhD
Program Director

CBMP has an Advisory Committee to help the program directors with decision making regarding the overall running of the program and student issues. The members of the CBMP Advisory Committee are:

Gerard Apodaca, PhD
Dan Devor, PhD
Gerry Hammond, PhD
Todd Lamitina, PhD
Donn Stolz, PhD
Ora Weisz, PhD

In addition to CBMP's internal organizational structure, the IBGP has an over-arching leadership configuration that helps to keep the program running smoothly.

A. Steering Committee

The Steering Committee oversees all aspects of the Interdisciplinary Biomedical Graduate Program. The committee includes the Directors of the Interdisciplinary degree-granting programs. The Steering Committee is responsible for developing and reviewing program policies, advising first year students, conducting preliminary evaluations, leading recruitment presentations.

CBMP Steering Committee Representative: Adam Kwiatkowski, Ph.D. (alternate: Michael Butterworth, Ph.D.)

B. IBGP Admissions Committee

The Admissions Committee of the Interdisciplinary Biomedical Graduate Program is responsible for all decisions related to program admission. The Committee includes a representative from each of the programs and two graduate students. Tasks of committee members include recommending admissions policies to the Program Directors, reviewing applications, supervising interviews with prospective students, and advising admissions decisions to the Program Director to be passed along to the Associate Dean of Graduate Studies.

C. Curriculum Committee

The Curriculum Committee has oversight of all courses in the Interdisciplinary Biomedical Graduate Program. The committee is comprised of a representative from each of the programs and two graduate students. The purpose of the Curriculum Committee is to develop, maintain and coordinate up to date curriculum for the program.

CBMP Curriculum Committee Representative: ***Michael Butterworth, PhD***

D. Recruiting Committee

The Recruiting Committee will identify and help implement activities that will enhance the ability of the program to matriculate first-rate students. The committee includes of a representative from each of the programs and two graduate students. The committee will supervise the recruitment of students from the first year program to degree-granting programs in the school.

CBMP Curriculum Committee Representative: ***Gerry Hammond, PhD***