

**Texas Tech University Health Sciences Center
Graduate School of Biomedical Sciences**

**Ph.D. Graduate Concentration in the Department of Cell
Physiology and Molecular Biophysics**

Procedures and Requirements

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PH.D. CONCENTRATION IN CELL PHYSIOLOGY AND MOLECULAR BIOPHYSICS

Preface:

The GSBS has undergone substantial changes over the past few years, resulting in the creation of a single GSBS program, with independent concentrations in different areas. One of these concentrations is Cell Physiology and Molecular Biophysics (herein referred as CPMB) that provide training for both Master's and Ph.D. professionals. This document provides both general and specific guidelines for the Ph.D. degree. The Master's guidelines can be obtained from the Department coordinator. This document surpasses any other guidelines provided in the past. It is expected that students and faculty review and follow these guidelines.

I. Introduction

Welcome to the Department of Cell Physiology and Molecular Biophysics (CPMB). No doubt, incoming students have many questions about the graduate training they are about to receive. Veteran students will also need to evaluate these policies and guidelines to be in compliance with our requirements.

The *Procedures and Requirements for the Ph.D. Concentration in Cell Physiology and Molecular Biophysics* outlines the requirements for the Doctor of Philosophy degrees in the CPMB department. In most instances, the departmental requirements are the same or more stringent than the minimums for satisfactory performance approved by the Graduate School of Biomedical Sciences (GSBS) and Texas Tech University Health Sciences Center (TTUHSC). For details of GSBS policies, refer to the most recent *Policy and Procedures Manual*, available on the GSBS website @ www.ttuhsb.edu/gsbs. Although it is the faculty's intent to avoid alterations in the graduate concentration, changes may occur at any time in the requirements, deadlines, schedules, fees, curriculum, and courses described in this document. However, students entering the concentration are expected to satisfy the requirements in place at the time of matriculation. Revisions to the degree concentration requirements may vary following enrollment. Thus, students and supervisors are advised to be aware of such changes that will be made available to both faculty and students in our concentration area.

This document also outlines the procedures by which the department conducts the evaluation and performance of students enrolled in the CPMB concentration. It was generated with the philosophy that full disclosure is the best way to avoid misunderstandings. Graduate life is very different from the experiences of most students as undergraduates, and many enter the concentration unsure of what they can expect. Just as challenging, students are uncertain of the criteria by which they will be evaluated, especially after they have moved beyond the classroom. The remaining sections of this document should answer many of those questions. Admittedly, graduate training may prove to be one of the greatest challenges and opportunities a student has experienced. It may also prove to be one of the most exciting in the student's personal and academic life.

II. Graduate Academic Life

Graduate students are expected to develop disciplined work habits that exemplify the professional nature of their chosen career. This requires regular attendance and active participation in classes and seminars, as well as the successful completion of examinations. Although these activities play a critical role, graduate training also includes self-initiated study of the scientific literature in the student's areas of interest and contributions to the scholarly environment of the institution such as involvement in journal clubs and Student Research Week. Progress is best achieved by maximizing the time spent in the scientific efforts of the department and those of the student's mentor laboratory. At a minimum, all students are required to participate fully in professional activities (i.e., classes, research) and be available during the full work day. However, additional time beyond the regular work day is often necessary to succeed in science.

Successful completion of the Ph.D. concentration requires satisfactory achievement in three distinct academic areas: 1) Course Work 2) Examinations; and 3) Research.

III. Mission for Ph.D. Concentration

In support of the GSBS's mission of educating the next generation of health-related professionals in a dynamic and productive research environment that fosters creativity and discovery, the mission of the CPMB concentration is: 1) to develop each student's understanding of cellular and molecular biology, membrane biophysics, and membrane transport physiology; 2) to develop each student's ability to formulate hypotheses, design experiments and think critically and creatively, i.e., to become a highly competent, independent and ethical investigator; 3) to develop each student's ability to teach effectively in a professional curriculum; and 4) to develop each student's ability to communicate clearly and concisely with others.

IV. Goals for Ph.D. Concentration

The goals of the CPMB Ph.D. degree concentration are to provide the student with the academic background and research expertise to facilitate his/her understanding in experimental design using state-of-the-art technology, communicate verbally and in writing with scientific colleagues, and advance scientific knowledge. Specific goals include providing the student with the following 1) a broad background in the basic biomedical sciences, 2) advanced knowledge in a specific area of cell physiology and molecular biophysics; 3) the ability to identify specific research problems and formulate testable hypotheses related to these problems, and 4) the technical competence to develop new or adapt existing laboratory techniques for solving research problems. The major differences in the Ph.D. degree from the Master's degree are the nature and scope of the research project and the number of didactic courses. The Ph.D. degree requires original, independent research conducted under the supervision of a research mentor and seeks to develop a knowledge base for advanced research and teaching in physiology. The student is expected to reach a high level of creativity, expertise and independence that exceeds the requirements of the Master's concentration.

V. Outcome Goals for Ph.D. Graduates

The concentration in Cell Physiology and Molecular Biophysics is designed to place our Ph.D. graduates in successful postdoctoral research fellowships so that upon completion of their postdoctoral training, they can enter into a research-related environment in government, industry or academia as a basic scientist or with medical training, a clinical scientist in one of the defined environments. Another successful outcome goal of our concentration would be for the graduate to become an educator in a four-year undergraduate college.

VI. Admission Requirements

Candidates for the Ph.D. degree generally have bachelor's degrees in the chemical, physical, or biological sciences. Prospective students are expected to have completed courses in biological science, chemistry, physics, and mathematics. Exceptional applicants who have not completed all of the prerequisite course work may be accepted provided that the necessary leveling work is taken during the first year. Acceptance of students is based on their overall application package, which includes letters of recommendation, Graduate Record Examination (GRE) scores, undergraduate grade point average (GPA) and, for foreign applicants, a TOEFL score. A personal interview may be required and is always encouraged. Completed application forms should be submitted electronically directly to the GSBS office. Applications are considered by the departmental Graduate Committee as they are received, with a *deadline of May 15* for admission the following fall semester. Acceptance into the CPMB Ph.D. concentration is based upon recommendation by the departmental graduate faculty, approval by a majority vote of the GSBS Admissions Committee, and final acceptance by the Dean of GSBS.

Admissions procedure for matriculated GSBS undeclared students and declared students changing concentrations/ majors:

After an undeclared student has chosen a faculty mentor in the CPMB concentration, the faculty mentor must e-mail a request to the Graduate Concentration Advisor requesting the student be admitted to the CPMB concentration. Declared students must first meet with the Graduate Concentration Advisor to determine if there are any available dissertation advisors for mentoring the student, and afterwards interview with available faculty to identify a dissertation advisor prior to initiating a Change in Major request. Upon receipt of the request, the Graduate Concentration Advisor(s) will review pertinent GSBS admission application documents such as transcripts, official GRE results, reference letters, and GSBS lab rotation evaluations. The advisors may also request a personal interview with the student and/or faculty mentor. This request will be evaluated by the graduate advisor(s) and the results will be communicated to the student and mentor via email. If the student is accepted into the CPMB concentration, the Graduate Concentration Coordinator will submit the GSBS Application for Change in Concentration form to the graduate school office. Any undeclared students who have not taken Molecular Cell Physiology (GPHY 5320) or Experiments in Molecular Cell Physiology (GPHY 5220) must take them during the spring semester of their second year. These are required courses in our concentration and will not be waived or substituted by any other course.

VII. Degree Progression and Credit Requirements

The concentration of study leading to the Ph.D. degree with a concentration in Cell Physiology and Molecular Biophysics consists of a didactic component and a research component that are pursued simultaneously. Students will proceed through the concentration as follows:

During the fall semester the student will complete the GSBS First Year Core Curriculum courses in Core I: Molecules (GSBS 5471), Core II: Cells (GSBS 5372), Core III: Genes (GSBS 5373), Core IV: Biomedical Seminar Series (GSBS 5174), and Core V: Introduction to Biomedical Research (GSBS 5275). The students will also begin the process necessary to select a Supervising Professor in whose laboratory the dissertation research will be conducted. During the second semester the students will complete advanced courses in Molecular Cell Physiology (GPHY 5320), Experiments in Molecular Cell Physiology (GPHY 5220), Human Physiology (GPHY 5302), CPMB Seminar (GPHY 7101-7110), Readings in CPMB (GPHY 7120-7130), Research (GPHY 7000-7010) and the GSBS course Responsible Conduct of Research (GSBS 5101). **By the end of first year summer, the typical student will have chosen a Supervising Professor and may begin dissertation research.** In the succeeding two semesters the student will complete the required courses while continuing the research program. The courses for the third and fourth semester include: Advanced Topics in CPMB (GPHY 6305), CPMB Seminar, Readings in CPMB, Research, and two electives. The Qualifying Examination will be scheduled for the summer of the second year. Upon passing the examination and completion of course work requirements, a student will be admitted to Candidacy for the Doctor of Philosophy degree. The final requirement is a presentation and public defense of a dissertation based upon original research. In addition, prior to graduation with a Ph.D. degree, students are required to have at least one manuscript published in a peer-reviewed journal. If necessary, the Doctoral Advisory Committee can petition to waive this requirement and accept, at a minimum, that the student should have submitted at least one manuscript for publication in a peer-reviewed journal. This requirement will better ensure that the student's research efforts are meritorious and should provide a more competitive posture for acquiring postdoctoral fellowships.

The GSBS requires a minimum of 72 hours of graduate course work which includes 12 hours of research, 12 hours of dissertation, and 48 didactic hours for graduation with a Doctoral degree. All transfer credit from other institution(s) are subject to review and approval by the graduate advisor and the GSBS office. There is no automatic transfer of credit from another university toward a graduate degree. Please see the GSBS Student Handbook for maximum and minimum enrollment requirements. Students on fellowships, assistantships, or other appointments designed for the support of graduate study must enroll for at least 9 hours in each regular semester and at least 6 hours in the summer term. Students will generally register for a 12 month period per academic year. The student's schedule will be determined in consultation with the Graduate Concentration Advisor or the Supervising Professor and the student's Doctoral Advisory Committee. The student should consult with the Doctoral Advisory Committee prior to registration. A detailed description of procedures for online registration can be found on the GSBS website.

VIII. Ethics and Retention Policy

A student whose GPA drops below 3.0 in any one semester will be put on academic probation, as required by the GSBS. This is based on a grading scale of 0 to 4, with a 4 representing an "A." The student must then maintain a current GPA of 3.0 or better during the next semester of enrollment and each succeeding semester to avoid dismissal from the concentration. A "P," indicating a passing grade for a course, does not constitute an "A" for the purposes of increasing a GPA to 3.0 or above. Essentially, scores of "P" do not contribute to an overall GPA score in any way. An overall GPA of 3.0 or better is required for graduation. If two or more "C" grades are earned in the same semester, the student will be dismissed from the concentration. If a student accumulates two "C" grades in different semesters, he or she will also be dismissed from the program. Failure in the Qualifying Examination on the second attempt will also result in dismissal from the Ph.D. concentration area. In that case, a Master's degree can be offered provided that sufficient experimental research is performed no later than the following Fall semester. Sufficient experimental research will be determined as the ability of the student to formulate a working hypothesis with several experimental approaches that support the hypothesis.

Unethical conduct may be considered grounds for immediate dismissal from the concentration. Each student shall be responsible for his/her conduct from the time of the application for admission through the actual awarding of the degree, even though unethical conduct may occur before classes begin or after classes end, as well as during the academic year and during periods between terms of actual enrollment. Unethical conduct will be evaluated by the grievance committee before a final decision is made.

Ethical standards of conduct will be discussed with students upon entering the Cell Physiology and Molecular Biophysics Ph.D. concentration by the Graduate Concentration Advisor, presented to all GSBS students during orientation, present in every course syllabus, and are described in detail in the *TTUHSC Student Affairs Handbook, Code of Professional and Academic Conduct* which is available online. Evaluation of students ability to recognize ethical issues and behave in accordance with these ethical standards of conduct are based on their conduct in the laboratory: experimental data are not manipulated, laboratory notebooks reflect the results that were obtained, verification of experimental results by replication of experiments, proper allocation of credit for work done by others, and respect for the rights of fellow lab workers.

IX. Mentoring of Students

During the first year, or until a Supervising Professor is selected, the Graduate Concentration Advisor will serve as the primary advisor, assisting in course-related activities and directing the student's course load. The Graduate Concentration Advisor relinquishes this responsibility once the student identifies her/his mentor. It is expected that this will occur no later than the end of the first year (summer). Subsequently, the Supervising Professor who is chosen after completion of all laboratory rotations will provide instruction and advice concerning research activities. To assist in selecting a research area and Supervising Professor, faculty will maintain a written and oral

description of their research on the departmental website which will be reinforced during laboratory rotations and seminars. Additionally, coursework will provide an additional opportunity to become acquainted with various faculty members. Once a Supervising Professor is chosen, the student will form a Doctoral Advisory Committee. The composition of this committee will be determined by the student and the Supervising Professor. For Ph.D. students, five faculty members (with at least three from CPMB) will be needed. The remaining two Doctoral Advisory Committee members may be from any department. An odd number is needed since decisions are made by majority vote that includes the advisor.

After each semester, the Graduate Concentration Advisor or Supervising Professor will meet with each student separately and provide them with a detailed description of various facets of their performance for each course as assessed using the rubrics and accompanying comments. Rubrics also will be used to provide remedial and improvement strategies. In addition to providing constructive feedback from the graduate concentration, the student will be allowed an opportunity to make suggestions and comments concerning their evaluation, curricular modifications and/or general concerns that will be presented to the faculty for discussion, if needed.

X: Selection of Supervising Professor and Advisory Committee

Probably the most important decision made by a graduate student is the selection of a Supervising Professor and the members of the Doctoral Advisory Committee. These faculty members act as educators, counselors, and examiners for the student following the Qualifying Examination. Selection of the Supervising Professor is crucial for each student, since the Supervising Professor serves as Chair of the Doctoral Advisory Committee and most, if not all, of the dissertation research is conducted in the Supervising Professor's laboratory. Therefore, in selecting a Supervising Professor, it is the policy of the CPMB department that each incoming graduate student shall become familiar with the CPMB faculty and their research areas as soon as possible. In most cases, the procedure below will be followed in selecting a Supervising Professor:

The student will complete Core V: Introduction to Biomedical Research (GSBS 5275) during their first semester of enrollment. This will serve as the first lab rotation. Declared students will perform laboratory research within the CPMB department in the laboratory of an interested faculty member identified by the student in consultation with the Graduate Program Advisor. Expectations and policies for research during the first semester of classes will be discussed with the director of Core V, in coordination with the Graduate Concentration Advisor.

A second and third lab rotations are highly recommended and will be completed during the spring and summer semesters of the first year. The second and third lab rotations, unlike the first one, will require that the student spend significant time in their chosen laboratory without compromising their course work in the Spring semester. It should be clear that the third lab rotation (Summer) is where the most time will be dedicated since the student does not take course work and is fully dedicated to research. Besides facilitating selection of a Supervising Professor, these rotations will be particularly valuable for those students with no research laboratory experience. The concentration faculty recognizes that

circumstances may preclude rotations, and therefore, more than one rotation is not mandatory providing the Supervising Professor is willing to accept a student after a single rotation.

The hours per week dedicated for each lab rotation will be determined in consultation with the Graduate Concentration Advisor and will be mutually agreeable to both the hosting faculty member and the student. This time may be influenced by such factors such as the course load for that semester, examinations, the nature of the project assigned to the student, and other factors. The lab rotations will be generally for a complete semester, but can be six to eight weeks if needed. After each rotation, the faculty member involved shall file a written laboratory rotation evaluation in the form of a grading rubric on that student for inclusion in the student's departmental file folder. A copy shall also be provided to the student. This will provide information to the student to prepare for the next rotation and/or their dissertation research.

Under special circumstances, the incoming student may choose to do fewer than three laboratory rotations, for instance, if the student already has a Master's degree, previous work experience as a laboratory technician or for other clearly justifiable reasons has decided on a Supervising Professor. However, the student's request must be reviewed by the Graduate Concentration Advisor. Nevertheless, the student shall not commit to that laboratory earlier than the end of the first semester. Likewise, the faculty member shall not commit to the student until the end of the first semester. **The student cannot select a Supervising Professor until at least one rotation has been satisfactorily completed.** After the rotation, the faculty member shall file the laboratory rotation evaluation for the student with the Graduate Concentration Advisor and the Concentration Coordinator.

After all rotations are complete, if agreeable to the faculty member and the student, the student may request a faculty member as Supervising Professor. This request will be submitted **in writing** to the Graduate Concentration Advisor and Concentration Coordinator. The Graduate Concentration Advisor may consult with the graduate faculty on the merit of the request. If recommended by the Graduate Concentration Advisor, the request will be presented to the Department Chair for approval. However, preliminary to this formal appointment, the prospective Supervising Professor and graduate student should discuss the issue of graduate student stipend funding.

If a student for any reason wishes to change Supervising Professors, the student must first discuss the situation with that faculty member to attempt a resolution of any problems. If that approach is not successful, the student should next discuss the matter with the Cell Physiology and Molecular Biophysics Graduate Concentration Advisor(s) for further advice. If no resolution is reached, the student should petition the Graduate Concentration Advisor in writing for a transfer to another concentration within the GSBS. The request should state the desired transfer and provide specific details of the reasons for requesting this transfer. The final authority for the decision will rest with the Department Chair. If after this due process, the decision is still unsatisfactory to the student, the student may file a grievance with the Dean of the Graduate School of Biomedical Sciences. This procedure will be followed regardless of whether or not a student has selected a Doctoral Advisory

Committee. A new Doctoral Advisory Committee will be constituted with membership of this committee decided by the student and the new supervisor.

A fully constituted permanent Doctoral Advisory Committee shall be established no later than 6 months after completion of the last rotation. The student and the Supervising Professor should consult to determine a suitable Doctoral Advisory Committee, and present these choices to the Graduate Concentration Advisor and Concentration Coordinator. The Graduate Concentration Advisor will initiate the process of appointment of the Doctoral Advisory Committee by submitting the request to the office of the Graduate School of Biomedical Sciences.

For a Ph.D. degree, the Doctoral Advisory Committee should consist of at least five members, including the Supervising Professor, who serves as Chair. Additional members, possibly from other departments at TTUHSC, TTU, or other institutions, may be necessary to ensure that all areas of expertise required for advice and judgment of the research project are available. At least three members of the Doctoral Advisory Committee must be from the CPMB graduate faculty (primary or adjunct members). The remaining members may come from CPMB, other departments at TTUHSC, TTU, or other institutions.

Once appointed, the Doctoral Advisory Committee takes on day-to-day supervision of the student's training. It should meet soon after formation to determine if there are gaps in the student's basic knowledge that require additional course work. Subsequent meetings should be scheduled at least once a semester to ensure adequate supervision of the research work. Minutes of the meeting should be provided to the Graduate Concentration Advisor and the Graduate Coordinator to be placed in the student's file. Similarly, Doctoral candidates should prepare a dissertation proposal for approval at least two years prior to completion. Following each meeting, the Supervising Professor should prepare and submit to the Graduate Coordinator signed minutes summarizing the student's progress (progress reports). These minutes should be signed by each member of the Doctoral Advisory Committee and the student. The Supervising Professor should ensure that any concerns or recommendations are stated explicitly and acknowledged by the student and other committee members. This document must be on file

XI. Degree Plan

The graduate student's degree plan represents a contractual agreement between the graduate student, her/his Doctoral Advisory Committee members, and the Department of Cell Physiology and Molecular Biophysics. As such, all parties must indicate their approval explicitly. The degree plan will be submitted to the GSBS during the spring semester of the second year of course work. The student, the Chair, and all members of the Doctoral Advisory Committee should sign the degree plan. The student should then provide the Graduate Concentration Advisor a copy of the signed degree plan so that both departmental representatives can sign and approve the proposed plan. This ensures that the student's plan is consistent with the requirements of the graduate concentration. Although the graduate faculty will endeavor not to change a student's degree plan after it is approved, the CPMB concentration reserves the right to initiate a change that may be required due to continual evolution of the missions and goals of the departmental

concentration and/or those of the GSBS. Such departmental-sponsored changes are comparable to the opportunity that a student has to revise his/her degree concentration in response to new interests or research directions.

XII. Graduate Student Assistantships

A. Teaching and Research Assistantships

Graduate Teaching and Research Assistantships are considered part-time (usually 0.5 FTE) positions that are available to graduate students who are enrolled full-time. They are intended to provide a stipend that is compatible with full-time pursuit of a graduate degree. Full-time enrollment is required for a 12-month period per academic year, and this is minimally 9 hours in a regular semester and 6 hours in the summer term. Once a student has passed candidacy and accumulated 120 hours, the student may register for 3 hours each semester for up to one year. Ex: 3 hours in the fall, 3 hours in the spring, and 3 hours in the summer. If the student elects the 3-3-3 enrollment and does not complete the degree requirements within that period, the student must resume full-time status (9 hours per long semester). F-1 and J-1 students are required by U.S. immigration law to study full-time during the fall and spring semesters. For graduate students, full-time study normally means enrollment and completion of at least 9 hours per semester. There are certain exceptional situations that may qualify a student for a waiver or alternate interpretation of the full-time enrollment rule. The student must notify the Office of International Affairs of the basis for any apparent under-enrollment prior to registration for an academic term and prior to any change of registration during an academic term. This should be done using the Notification of Alternative Full Time Enrollment Form located on the GSBS website. Questions concerning immigration-based full-time enrollment rules should be directed to an International Student Counselor at (806) 742-3667.

Appointment to an assistantship is a departmental option depending on the availability of assistantships and the student's qualifications relative to requirements of the specific assistantships. Graduate Assistants are expected to devote a full-time effort to their overall course, research, and assistantship obligations and should therefore not be involved in additional employment activities which will detract from or prolong their training concentration without explicit permission from the Graduate Concentration Advisor. If for any reason the student takes on additional employment activities, then the Supervising Professor, the Doctoral Advisory Committee and the Graduate Concentration Advisor must be informed prior to the initiation of this activity. If the activity is undertaken and the Supervising Professor and the Doctoral Advisory Committee determine that this activity is detrimental to the student's progress, the Doctoral Advisory Committee will meet to determine what action is required. If a satisfactory resolution of this matter does not occur, the Chair of the Department will be informed. The final authority for the decision rests with the Chair of the Department. If after this due process, the decision is still unsatisfactory to the student, the student may file a grievance with the Dean of the Graduate School of Biomedical Sciences.

Graduate Research Assistantships are stipends which, as such, **do not provide formal vacation time**. The overall work schedules of graduate assistants are flexible to the extent required to complete their full-time concentration of studies, research, and assistant

obligations. There are specific GSBS Guidelines dealing with leave time with and without pay. The complete guidelines can be found in the GSBS Student Handbook but will be summarized here:

Students must be registered every semester or be on an approved official leave of absence (medical or personal). Mentors have at their discretion the ability to grant 10 days of personal leave (with pay) for each student employee per year. Personal leave may not be accumulated and carried forward to the next year. Students exceeding 10 days of personal leave must get approval for extended leave. If extended leave is approved by the GSBS, the department will place the student on leave-without-pay. Leave periods will not extend the maximum time requirement to complete a degree. Students must be continually registered once they begin thesis/dissertation hours. The enforcement of this policy will be the responsibility of the mentor, who will document personal leave days for each student.

University policy provides that non-resident students who serve as Research Assistants employed at least half time, with an effective date of employment on or before the official census date of the relevant term(s), may pay the same tuition as a resident of Texas for themselves, their spouses, and their dependent children, regardless of the length of residence in the state.

Students are encouraged to pursue extramural (*i.e.*, from outside TTUHSC) training grants, research assistantships, fellowships, or scholarships. Recipients of extramural support will be subject to any restrictions on employment imposed by the funding agency, and cannot be guaranteed such support past the end date of the grant.

B. Awarding of Stipends

Acceptance of students into the Graduate Concentration of Cell Physiology and Molecular Biophysics is considered separately from awarding stipends. Consequently, incoming graduate students will be evaluated and competitively ranked by the GSBS Admissions Committee. Ph.D. students will receive stipend support in order of their ranking, until such sources of stipend support are exhausted. Graduate student stipend support may come from a variety of sources, such as institutional research funds (departmental support), training grants, or individual research grants. The Department will strive to insure continued financial support of all graduate students through completion of their Ph.D. graduate training (barring unforeseen financial exigencies beyond the control of the Department).

Stipend support for the student is contingent upon continued satisfactory performance, as judged by the Doctoral Advisory Committee (semi-annual evaluations) and the Graduate Concentration Advisor. The Graduate Concentration Advisor will review annually the student's progress for recommendation of continued support for a period of up to one year. In the event the evaluation of the student's performance is unsatisfactory or marginal, the student will be warned in writing by the Departmental Chair and placed on probation. The student will be expected to correct these deficiencies during the next semester; otherwise the student may lose stipend support and could be dropped from the concentration. Alternatively, the student may be advised by the Doctoral Advisory Committee or the

Graduate Concentration Committee to apply for the Master of Science concentration as a terminal degree.

The Department will not normally expect to provide support beyond five years, but if support beyond this five year period is required, the student and the Supervising Professor must petition the Graduate Concentration Advisor in writing, specifying the reasons for the need of the extended support and how long this will be required. The formal request for extended support should normally be filed with the Graduate Concentration Advisor at least six months prior to the anticipated need for the extension. The Graduate Concentration Advisor will review each request and will recommend to the Department Chair that the stipend be renewed and extended for specified periods for students in good standing.

XIII: Requirements for the Doctor of Philosophy Degree

A. Leveling Requirements

Admission to the Ph.D. concentration requires prior coursework in biological sciences, chemistry, physics, and mathematics. Exceptional applicants who have not completed all of the prerequisite course work may be conditionally accepted, however they must successfully complete leveling courses prescribed by the Graduate Concentration Advisor. Courses taken for leveling purposes cannot be utilized to satisfy the course work requirements for graduate degree concentrations.

B. Graduate Course Work

Doctoral study cannot be calculated solely in terms of credit hours, but the GSBS program normally requires completion of a minimum of 48 didactic hours of graduate level coursework exclusive of credit for research or dissertation. Course work beyond the minimal requirements may be defined for the individual student by the Doctoral Advisory Committee.

The Graduate School of Biomedical Sciences implemented a one-semester core curriculum for Ph.D. students in 2011. This curriculum was designed to give all GSBS students a unified and coordinated foundation that would serve as a basis for further study in individual disciplines within the biomedical sciences. This curriculum is designed to accommodate both undeclared students and students who have declared interests in specific concentrations. Core curriculum courses will be taken during the first semester of the first year, and include Molecules, Cells, Genes, Biomedical Seminar Series, and Introduction to Biomedical Research. Additionally, GSBS students are required to complete a course in ethics (GSBS 5101, Responsible Conduct in Research) in the second semester of enrollment. Graduate students in Cell Physiology and Molecular Biophysics will also be required to take Human Physiology, Molecular Cell Physiology, and Experiments in Molecular Cell Physiology. Required courses for the CPMB concentration include:

Required Courses

GSBS 5471- Core I: Molecules

GSBS 5372- Core II: Cells

GSBS 5373- Core III: Genes

GSBS 5174- Core IV: Biomedical Seminar Series
GSBS 5275- Core V: Introduction to Biomedical Research
GSBS 5101- Responsible Conduct of Research
GPHY 5302- Human Physiology
GPHY 5320- Molecular Cell Physiology
GPHY 5220- Experiments in Molecular Cell Physiology

In addition to the core courses, each student will be required to register for Cell Physiology and Molecular Biophysics Seminar (GPHY 7101-7110) and Readings in Physiology (GPHY 7120-7130) each semester starting in the spring of their first year until graduation. Regardless of enrollment in Seminar or Readings, students are required to attend and participate in all department seminars and journal clubs. Starting with the third year of graduate study, students must present a journal club or work-in-progress style seminar within the CPMB seminar every year. First year students taking Seminar and Readings will be graded on a Pass/Fail basis. In subsequent years, they will be given a letter grade for each course.

In the event the student transfers to the Master of Science degree concentration the student will still be required to take concentration courses that are normally required of all Ph.D. students. However, additional coursework outside the concentration may still be needed to complement the M.S. Thesis, as judged by the M.S. Thesis Advisor and the Master Advisory Committee.

XIV. Qualifying Examination and Admission to Candidacy for the Ph.D. Degree

A. The Qualifying Exam

The Qualifying Exam for Admission to Candidacy is taken at the end of the 2nd year of study, during the summer. A graduate student does not become a candidate for the Ph.D. degree until granted formal admission to candidacy, so the qualifying exam is the final academic checkpoint to evaluate the abilities of a student in the CPMB concentration. This exam is designed to assess whether Ph.D. candidates are prepared and qualified to carry out their dissertation work, as well as whether they have sufficient depth and breadth of knowledge relevant to their future as scientists. Students will have 3 months to prepare the written portion of the examination. Typically, they will start at the beginning of the summer semester. This will be a grant proposal in the style of the American Heart Association "Grants In Aid" format. The format will be provided by the Graduate Concentration Advisor. The grant proposal will be evaluated by the Examining Committee (see below) to determine its quality. The examining committee will be composed of 4 faculty members (excluding the supervising professor) and a student advocate (typically the Graduate Concentration Advisor) who does not evaluate the student's written or oral examination, but ensures fairness.

The Examining Committee will be determined by the Graduate Concentration Advisors based on the expertise needed to evaluate the written proposal. Some members of the student's Doctoral Advisory Committee may or may not be on the Examining Committee based on the discretion of the Graduate Concentration Advisors.

This evaluation by the examining committee will be done within two weeks. If the written proposal is acceptable (pass grade by unanimous vote), then the student will be allowed to present the proposal to the committee (oral examination) within a week. If the written portion is unacceptable (fail grade), then the student will not be allowed to present the oral component of the examination. If the student fails the written exam, he/she will be given an additional 3 months to address the criticisms made by the Examining Committee. This may require re-writing a section of the proposal or may even require the student to write a completely new proposal. A second failure in the written portion of the exam will result in dismissal from the CPMB concentration.

Upon passing the written exam, the student will then present the proposal to the Doctoral Examining Committee through a typical PowerPoint presentation. For the oral component of the examination, the student will be assessed by the Doctoral Examining Committee (who evaluated the written portion) and one student advocate (The Graduate Concentration Advisor). One of the faculty members from CPMB serving in the examining committee will serve as Chairperson for this examination. The student's Supervising Professor will not be a member of the examining committee. Instead, the Graduate Concentration Advisor oversees the examination and (only if necessary) has the power to break a tie vote. The Graduate Concentration Advisor also ensures consistency in the examination between different students in the CPMB concentration areas.

The student advocate (Graduate Concentration Advisor) will not ask questions, but will observe the proceedings and make sure that the examination is conducted fairly. The student advocate will only vote to make a final decision if a tie breaker is needed. A student who has successfully completed the qualifying exam is formally considered a doctoral candidate, and primary training responsibility shifts from the Graduate Concentration Advisor to the student's Supervising Professor and Doctoral Advisory Committee.

B. Possible Qualifying Exam Results

- a) Pass: The committee should indicate level of enthusiasm (adequate, high, or highest) in a written report to the Graduate Concentration Coordinator.
- b) Conditional Pass: specific course work or any additional requirements, at the committee's discretion, to rectify deficits in any area or aspect of the proposal.
- c) Fail with requirement for rewriting and/or reexamination: In this case, revised proposals must be submitted within 3 months and reexaminations will be scheduled by the Graduate Concentration Advisor within 30 days.
- d) Failure of the written or oral part of the examination for the second time will result in dismissal of the student from the Ph.D. program.

Special Note: Students should keep in mind that when they are registered for research hours, they have a responsibility to maintain a presence in their lab. We strongly recommend that the candidate discuss their time commitments with their advisor prior to starting the qualifying examination.

Procedure When the Examination is Satisfactory. If the Qualifying Examination is considered satisfactory and all other requirements have been met, the Graduate Concentration Advisor will send an Admission to Candidacy request to the Dean of the

Graduate School of Biomedical Sciences. Authority for admitting an applicant to candidacy for a doctoral degree is vested in the Graduate Council of the Graduate School of Biomedical Sciences. Upon receipt of a recommendation from the Concentration, the Dean of the GSBS will submit it to the Graduate Council for action. The Council may approve the committee's recommendation, or it may, after consultation with the committee, determine additional requirements which the applicant must satisfy.

The Dean of the GSBS will transmit the results of the Graduate Council's actions in writing, to the applicant, to the Graduate Concentration Advisor, Supervising Professor, and Department Chair.

A student must be admitted to candidacy at least four months prior to the date for the defense of the Ph.D. dissertation.

Procedure When the Examination is Not Satisfactory. If the Qualifying Examination is not satisfactory, the Graduate Concentration Advisor will notify the Dean of the GSBS in writing. An applicant who does not pass the oral component Qualifying Examination may be permitted to repeat it once, at a time that is determined by the Graduate Advisor in consultation with the Examining Committee. The repetition shall be according to the decision of the Examining Committee and may encompass all or part of the oral portion or written proposal, or in extreme circumstances, may even require a completely new research proposal, followed by an oral examination on this new proposal. Failure to pass the oral component of the Qualifying Examination a second time will result in dismissal from the Ph.D. concentration. The student may be permitted to apply for admission to the Master of Science concentration.

XV. Expectations for Continuation in the Concentration and Appeals Following Dismissal

A. Continuation in the Concentration

Every enrolled student is required to maintain a high level of performance and to comply fully with the policies of the Institution and the Concentration. The Graduate School of Biomedical Sciences reserves the right to place on probation or to dismiss any graduate student who does not maintain satisfactory academic standing or who fails to conform to the regulations of the Texas Tech University Health Sciences Center. Students who are admitted conditionally to a degree concentration are automatically on academic probation. The reasons and specific conditions pertaining to this academic probation will be determined by the Graduate Concentration Advisor and presented in writing to the student. Failure to fulfill the conditions stipulated at the time of admission will result in dismissal from the concentration.

Every student is expected to maintain a high level of commitment to professional development in all areas. If any aspect of a student's professional development (for example, attention to research responsibilities, appropriate growth toward development of critical thinking skills, appropriate progress toward research goals, *etc.*) is considered to be unsatisfactory by either the Graduate Concentration Advisor or the student's Doctoral Advisory Committee (if one has been appointed), the student shall be so informed in

writing, along with a description of the recommended corrective action to be taken. If the student fails to correct the deficiency, the Doctoral Advisory Committee or the Graduate Concentration Advisor may recommend dismissal of the student from the Ph.D. program.

If a student's grade-point average for a particular semester falls below 3.0, the student is placed on academic probation (a 3.0 average is the minimum requirement of the Graduate School of Biomedical Sciences). In order to remove probationary status, a student must maintain a 3.0 GPA for the next academic session in which the student is enrolled. Failure to do so will result in dismissal. Regulations governing scholastic probation are based on semester grade-point averages and will be applied regardless of overall grade-point average.

B. Appeals and Grievance Process

Student Appeals Policy applies to specific grievances arising from matters affecting students' academic standing and performance such as disputes concerning comprehensive examinations, theses and dissertations, and graduate assistantships. Appeals may be made only when alleged prejudicial, arbitrary, or capricious action is involved. The burden of proof of unfair influence or action rests with the student.

A student wishing to appeal a decision or action first should discuss the matter with the faculty member or members involved. If the student is not satisfied with the outcome of this effort, the student should contact the Department Chair. This contact, like that with the faculty members, normally is informal, and the Department Chair may take whatever action he or she deems advisable in attempting to resolve the issue. All parties involved should make every effort to resolve the issue without going beyond this level. The Department Chair may consult with either the Graduate Concentration Advisor or an *ad hoc* committee of graduate faculty from the Concentration (when the appeal is of an action taken by the Graduate Concentration Advisor or the Doctoral Advisory Committee) for advice regarding his or her actions in an appeal. If the student still is not satisfied following these meetings and discussions, the student may make a formal appeal to the Dean of the Graduate School of Biomedical Sciences. The appeal shall be processed according to the rules of the Graduate School in effect at the time it is filed with the Dean.

XVI. Dissertation Research and Defense

The final requirement for the Doctor of Philosophy degree is submission and defense of a dissertation based upon original research. The research and other work related to the dissertation should begin after completion of the Qualifying Exam for Admission to Candidacy. This will consist of original, meritorious research planned by the candidate in consultation with the Supervising Professor and Doctoral Advisory Committee. What comprises a satisfactory dissertation is highly subjective, although some general statements can be made.

1. The dissertation should be based on a logical concentration of research designed to answer fundamental questions in some field of cell physiology or molecular biophysics.
2. The research concentration should be carried to a reasonable degree of completion.

3. The information gained should comprise a contribution to knowledge worthy of publication in standard peer-reviewed scientific journals.

At the appropriate time in the graduate student's concentration, a clear-cut agreement should be reached between the student, the Supervising Professor, and the Doctoral Advisory Committee members as to when the aims and goals of the dissertation will have been fulfilled and the research may be terminated.

The student may then prepare his or her dissertation according to the guidelines of the Graduate School of Biomedical Sciences. The dissertation shall be typed in final draft form and a copy made available to each member of the Doctoral Advisory Committee. This draft must be made available to the Doctoral Advisory Committee at least four weeks prior to the final oral examination. The format of the dissertation must conform to Instruction for Preparation and Submitting Theses and Dissertation (<http://www.depts.ttu.edu/gradschool/current/THDGuidelines.php>). If the Doctoral Advisory Committee finds the final draft acceptable, the Supervising Professor will schedule the Final Examination. Copies of an announcement containing pertinent information, including the student's name, title of the dissertation, Doctoral Advisory Committee membership, examination time, place and other relevant information relating to the examination, and a 150-word or shorter abstract must be prepared and posted throughout the TTUHSC at least two weeks before the scheduled dissertation defense.

The Doctoral Advisory Committee administers the Final Examination after all the Candidate's studies are completed and the dissertation has been found to be acceptable. The examination shall not be administered unless all members of the Doctoral Advisory Committee and the Graduate Dean's representative are present. In special cases, exceptions can be made through petition of the Dean of the Graduate School of Biomedical Sciences, according to the rules of the Graduate School in effect at that time.

The chairperson of the Doctoral Advisory Committee should convene the examination by introducing the candidate, giving his or her background, and indicating the general format of the proceedings to follow. Initially, the candidate should give an overview of his or her study for the benefit of those in attendance who have not read the dissertation (40 to 50 minutes). After this, under the guidance of the chairperson, the candidate may be questioned by members of his or her committee, the representative, and other audience members. As indicated earlier, the examination is a public affair and the candidate should be prepared to defend his or her work before anyone who may question it. A copy of the dissertation (not necessarily in final form) should be available for reference during the examination.

When ample opportunity has been given for this discussion, those not on the Doctoral Advisory Committee should be excused while the committee and the representative ask further, possibly more detailed, questions regarding both the dissertation and its research procedures. Following the examination, the Doctoral Advisory Committee will ask the candidate to leave the room, and meet to determine if the Candidate has passed the written

and oral portions of the examination. The decision will be reached by a formal vote of the Doctoral Advisory Committee members. More than one negative vote shall constitute failure. When the decision is made, the Thesis or Dissertation Oral Defense Signature Form should be signed by the committee members to record votes. The chairperson should then inform the candidate of the outcome. The signature page is sent to the Assistant Dean of the Graduate School of Biomedical Sciences, who will forward it to the Concentration Coordinator. If the outcome of either the written or oral part of the examination is failure, the student will be given a second opportunity to defend his/her doctoral work. This will be done no later than 1 year after the first dissertation presentation. Failure to pass the second examination will prevent the student from obtaining a Ph.D. degree.

The criteria for evaluation will include (but are not limited to) significance of the work, strengths of the experimental design, critical interpretation of the data, and integration of the results with the current literature. Prior to graduation with a Ph.D. degree, students are required to have at least one manuscript published in a peer-reviewed journal. If necessary, the Doctoral Advisory Committee can petition to waive this requirement and accept, at a minimum, that the student should have submitted at least one manuscript for publication in a peer-reviewed journal. This requirement will better ensure that the student's research efforts are meritorious and should provide a more competitive posture for acquiring postdoctoral fellowships.

GSBS policies for the final oral examination may be found at www.ttuhsb.edu/gsbs/current/oraldefense.aspx.

XVII. Statement of Intention to Graduate

This statement must be filed with the Graduate School of Biomedical Sciences on the proper form at the beginning of the semester of intended graduation. No candidate's name will be placed on a tentative list for graduation for any graduation date unless this statement has been received at the GSBS Office by the specified deadline on the GSBS website. Students are also required to complete the HSC Intent to Graduate on the Student Services website: <http://www.ttuhsb.edu/studentservices/commencement/default.aspx>

APPENDIX 1: COURSE DESCRIPTIONS

GPHY 5302 Human Physiology (3:3:0) This introductory graduate course provides the student with a basic understanding of the organ systems of the human body, including the functions, regulation, and interactions.

GPHY 5320 Molecular Cell Physiology (3:3:0) An introduction to the physical and chemical bases of cell physiology. This course starts with a review of physical chemistry applied to biology and focuses on membrane phenomena, muscle contraction and molecular aspects of signaling. Lecture material is supplemented by readings from textbooks, review articles, and original research papers. Can be taken together with course GPHY 5220.

GPHY 5220 Experiments in Molecular Cell Physiology (2:0:2) A laboratory course coordinated with the topics of course GPHY 5320. The students will perform experiments that illustrate basic biophysical and physiological concepts, analyze the results and interpret them. Prerequisite: concurrent enrollment in GPHY 5320.

GPHY 5904 Systems Physiology (9:4:0) Provides the student with a basic understanding of the organ systems of the human body. Their functions, regulation and interactions are emphasized. Specifically, the objectives of the course are to describe the mechanisms that underlie the functions of the cardiovascular, respiratory, renal, digestive, and endocrine systems of the body, and explain how these systems interact to maintain homeostasis of the whole body. This course is not taken by students in the Cell Physiology and Molecular Biophysics concentration.

GPHY 7101, 7104-7110 Cell Physiology and Molecular Biophysics Seminar (1:1:0) Showcases internationally acclaimed researchers and provides the student with the most current information on a variety of interesting topics in cell physiology, as well as an introduction to state-of-the-art techniques and instrumentation. The seminar series includes work-in-progress and journal club style presentations from members of the department including those of students starting with the 3rd year. This seminar series is a requirement and will be taken during the entire duration of the student's time in the Ph.D. program.

GPHY 7120-7130 Readings in Cell Physiology and Molecular Biophysics (1:1:0) This course is designed to complement the Cell Physiology and Molecular Biophysics Seminar Series and provide a forum for the students to become familiar with some of the speaker's publications. The readings course will examine the hypothesis that was tested, the techniques employed, the most important results obtained, and the conclusions that were drawn from the study and require that the students further develop skills in reading, analysis, integration of knowledge and oral presentation of original science articles and reviews. Before the seminar, students are asked to become familiar with some of the speaker's publications. The students take notes during the seminar and later submit a one-page report on the speaker's presentation. The report should include the hypothesis that was tested, the techniques employed, the most important results obtained, and the conclusions that were drawn from the study. This course is a requirement and will be taken during the entire duration of the student's time in the Ph.D. program.

GPHY 5360 Laboratory Rotations as an Introduction to Modern Physiological Research (3:3:0) This course is designed to introduce the student to state-of-the-art research in physiology and is usually taken during the summer after the first-year of classes. Students will learn molecular, cellular and/or whole-animal research techniques, which will equip them with some of the skills to investigate the physiology of the human body with a focus on cellular and molecular biology, membrane biophysics, and membrane transport physiology. The student will work in a specific laboratory, assisting in ongoing research or conducting a new project. Students sometimes decide to continue in the same laboratory for their master's or doctoral project.

GPHY 6305 Advanced Topics in Cell Physiology and Molecular Biophysics (3:3:0) These courses consist of three research tracks (molecular, cellular, biophysics) and are designed with (a) appropriate contents for the student's interests (with a potential dissertation in mind); (b) emphasis on depth (rather than breadth) of knowledge; (c) appropriate revisiting and utilization of relevant contents from first-year courses, at a greater depth; (d) development of skills in reading, analysis, integration of knowledge and presentation (both oral and written) of scientific problems. The main activity of the course will be directed reading of original science articles and reviews, developing critical thinking skills and problem solving processes. May be repeated for credit with change in content.

GPHY 6000 Master's Thesis (V1-6) provides advanced research training in a faculty member's laboratory after a student has successfully passed a "preliminary" examination based on courses taken during the first-year of study and has been admitted to candidacy for a master's degree. Students learn state-of-the-art research techniques that will allow them to investigate the physiology of the human body with a focus on cellular and molecular biology, membrane biophysics, and membrane transport physiology. The student selects an advisory committee and then works in a faculty member's laboratory, conducting his/her own research project. After completing the project, publishing the results in one or more articles and writing a thesis, the student presents a research seminar to the faculty and then defends the thesis before his/her committee. The master's thesis describes the hypotheses tested, methods used and results obtained; moreover, the results are discussed in light of the hypotheses tested and the literature in that area.

GPHY 7000 Research (V1-12) Students conduct research under the direct supervision of a mentor in selected areas of interest. It is expected that the student will learn and develop techniques pertinent to their research area. The student will also read and present literature findings and their own data to mentor and personnel in their respective laboratory.

GPHY 8000 Doctoral Dissertation (V1-12) provides the student with advanced research training in a faculty member's laboratory. It is taken after a student has successfully passed a "qualifying" examination, which includes a written grant proposal and an oral exam, and has been admitted to candidacy for a doctoral degree. Students learn molecular, cellular, and biophysical research techniques, which will equip them with some of the skills required to investigate the molecular, cellular and biophysical approaches. The student

selects a committee of faculty members to give advice and then works in a specific laboratory, conducting his/her own research project. After completing the project, publishing the results in one or more articles and writing a dissertation, which describes the hypotheses tested, methods used and results obtained, students present a research seminar to the faculty of the department and then defend their dissertation before their committee.

GPHY 7103 Supervised Teaching in Cell Physiology and Molecular Biophysics (1:1:0) This course gives the student experience in organizing and presenting lectures. The overall objective is to assist the student in developing the skills required to teach in any area of cell physiology and/or molecular biophysics. Under faculty supervision, the student will lead small group conferences for first-year medical students and may also present lectures in some departmental graduate courses.

APPENDIX 2: SUGGESTED PH.D. SCHEDULE

YEAR 1

Year 1 Fall:

Course Number	Course Title	Credits
GSBS 5471	Core I: Molecules	4
GSBS 5372	Core II: Cells	3
GSBS 5373	Core III: Genes	3
GSBS 5174	Core IV: Biomedical Seminar	1
GSBS 5275	Core V: Intro to Biomedical Research	2
TOTAL DIDACTIC CREDITS		13

-complete first lab rotation

Year 1 Spring:

Course Number	Course Title	Credits
GSBS 5101	Responsible Conduct of Research	1
GPHY 5302	Human Physiology	3
GPHY 5320	Molecular Cell Physiology	3
GPHY 5220	Experiments in Molecular Cell Physiology	2
GPHY 7101-7110	CPMB Seminar	1
GPHY 7120-7130	Readings in CPMB	1
GPHY 7000	Research	2
TOTAL DIDACTIC CREDITS		11
TOTAL RESEARCH CREDITS		2

-complete second lab rotation

Year 1 Summer:

Course Number	Course Title	Credits
GPHY 7000	Research	6
TOTAL RESEARCH CREDITS		6

-complete third lab rotation

-select a Supervising Professor

-have a business meeting with the Department Chair one month after selecting Supervising Professor

YEAR 2

Year 2 Fall:

Course Number	Course Title	Credits
GPHY 6305	Advanced Topics in CPMB	3
GPHY 7101-7110	CPMB Seminar	1
GPHY 7120-7130	Readings in CPMB	1
Varies	Elective	3
Varies	Elective	3
GPHY 7000	Research	2
	TOTAL DIDACTIC CREDITS	11
	TOTAL RESEARCH CREDITS	2

-select Doctoral Advisory Committee

Year 2 Spring:

Course Number	Course Title	Credits
GPHY 6305	Advanced Topics in CPMB	3
GPHY 7101-7110	CPMB Seminar	1
GPHY 7120-7130	Readings in CPMB	1
Varies	Elective	3
Varies	Elective	3
GPHY 7000	Research	2
	TOTAL DIDACTIC CREDITS	11
	TOTAL RESEARCH CREDITS	2

-submit the Ph.D. degree plan to the GSBS

Year 2 Summer:

Course Number	Course Title	Credits
GPHY 7000	Research	6
	TOTAL RESEARCH CREDITS	6

-complete Qualifying Exam

-apply for Admission to Candidacy

YEAR 3

Year 3 Fall:

Course Number	Course Title	Credits
GPHY 7101-7110	CPMB Seminar	1
GPHY 7120-7130	Readings in CPMB	1
GPHY 8000	Doctoral Dissertation	7
	TOTAL DIDACTIC CREDITS	2
	TOTAL DISSERTATION CREDITS	7

Year 3 Spring:

Course Number	Course Title	Credits
GPHY 7101-7110	CPMB Seminar	1
GPHY 7120-7130	Readings in CPMB	1
GPHY 8000	Doctoral Dissertation	7
	TOTAL DIDACTIC CREDITS	2
	TOTAL DISSERTATION CREDITS	7

Year 3 Summer:

Course Number	Course Title	Credits
GPHY 8000	Doctoral Dissertation	6
	TOTAL DISSERTATION CREDITS	6

YEAR 4 (and onward)

Year 4 Fall:

Course Number	Course Title	Credits
GPHY 7101-7110	CPMB Seminar	1
GPHY 7120-7130	Readings in CPMB	1
GPHY 8000	Doctoral Dissertation	7
	TOTAL DIDACTIC CREDITS	2
	TOTAL DISSERTATION CREDITS	7

Year 4 Spring:

Course Number	Course Title	Credits
GPHY 7101-7110	CPMB Seminar	1
GPHY 7120-7130	Readings in CPMB	1
GPHY 8000	Doctoral Dissertation	7
	TOTAL DIDACTIC CREDITS	2
	TOTAL DISSERTATION CREDITS	7

Year 4 Summer:

Course Number	Course Title	Credits
GPHY 8000	Doctoral Dissertation	6
	TOTAL DISSERTATION CREDITS	6

Additional:

- complete Dissertation Defense
- submit Statement of Intent to Graduate

Total Didactic Credits: 54**Total Research Credits: 18****Total Dissertation Credits: 40**

APPENDIX 3: DOCTORAL ADVISORY COMMITTEE MEETING RUBRIC

**Cell Physiology and Molecular Biophysics
Evaluation of Student Progress by the Advisory Committee**

Student Name:	
Supervising Professor:	
Committee Member:	
Committee Meeting Date:	

RATINGS:

4. Outstanding- Exceeds expectations
3. Very Good- Well done, all elements included and clearly addressed
2. Acceptable- Adequate with some weakness
1. Not acceptable

	Rating
Enthusiasm/Motivation	
Work Ethic	
Scientific Curiosity	
Ability to Think Independently	
Scientific Knowledge	
Laboratory Skills/Data Quality	
Evidence of Progress in Dissertation Research	

Additional Comments:

Committee Meeting Minutes _____ Yes _____ No

Minutes of the meeting written by the student or Supervising Professor will report comments by the committee, identify any problems discussed, and state the research goals to be met before next meeting.

Next Meeting in _____ 1 month _____ 3 months _____ 6 months _____ Other (when needed)

The following individuals have read and understand the comments on this form and the attached minutes of the meeting.

Committee Member Signature:	
Student's Signature:	
Advisor's Signature:	

Completed Form and Minutes to be returned to the CPMB Graduate Concentration Coordinator within one week after the meeting.

APPENDIX 4: STUDENT CHECKLIST

**Cell Physiology and Molecular Biophysics
Ph.D. Student Checklist**

Student Name: _____

REQUIREMENTS	DATE COMPLETED	GRADE
REQUIRED COURSES		
GSBS 5471 Core I: Molecules		
GSBS 5372 Core II: Cells		
GSBS 5373 Core III: Genes		
GSBS 5174 Core IV: Biomedical Seminar Series		
GSBS 5275 Core V: Introduction to Biomedical Research		
GSBS 5101 Responsible Conduct of Research		
GPHY 5302 Human Physiology		
GPHY 5320 Molecular Cell Physiology		
GPHY 5220 Experiments in Molecular Cell Physiology		
GPHY 7101 Seminar		
Year 1 Spring		
Year 2 Fall, Spring		
Year 3 Fall, Spring		
Year 4 Fall, Spring		
Additional Years: Fall, Spring		
GPHY 7102 Readings		
Year 1 Spring		
Year 2 Fall, Spring		
Year 3 Fall, Spring		
Year 4 Fall, Spring		
Additional Years: Fall, Spring		
Lab Rotations		
1 st Rotation with: (GSBS 5275)		
2 nd Rotation with:		
3 rd Rotation with:		
GPHY 6305 Advanced Topics in Physiology		
Year 2 Fall		
Year 2 Spring		
Electives		

Year 2 Fall (2 courses)		
Year 2 Spring (2 Courses)		
GPHY 7000 Research (at least 12 hours)		
Completed 48 hours of didactic course work		
GPHY 8000 Dissertation (at least 12 hours)		
Supervising Professor Selection (following the end of the last rotation)		
Business meeting with the Department Chair within 1 month of Advisor selection		
Selection of Doctoral Advisory Committee within 6 months of Supervising Professor selection		
Submit Degree Plan to GSBS during the Spring semester of the 2 nd year		
Qualifying Exam due by the end of the 2 nd year		
Request Admittance to Candidacy		

Doctoral Advisory Committee meetings occur whenever necessary but not less than twice a year. The evaluation form and minutes should be submitted within one week after meeting.

	Date of Meeting	Date Minutes Submitted
Committee Meeting 1		
Committee Meeting 2		
Committee Meeting 3		
Committee Meeting 4		
Committee Meeting 5		
Committee Meeting 6		
Committee Meeting 7		
Committee Meeting 8		
Committee Meeting 9		
Committee Meeting 10		

ADDITIONAL REQUIREMENTS	Date Completed
Submit Intent to Graduate to GSBS	
Submit penultimate draft of dissertation to Doctoral Advisory Committee 4 weeks prior to the intended defense date	
Final approval for dissertation defense date by Doctoral Advisory Committee (minimum 3 weeks prior to defense date)	
Dissertation defense date	
Approval by Doctoral Advisory Committee of written thesis	
Approval by Doctoral Advisory Committee of oral defense	

See checklist for graduation deadlines from the GSBS website.

APPENDIX 5: LABORATORY ROTATION SCHEDULE

Faculty Member	Time Period
1.	
2.	
3.	

NOTE: If only a single rotation is planned by the Graduate Student, it must be for an eight week period. A formal request for this singular choice should be made to the Graduate Concentration Committee in writing, specifying the reason(s) for this choice.

APPENDIX 6: GRADUATE STUDENT- ROTATION SUPERVISOR AGREEMENT

TO: The Graduate Concentration Advisor

FROM: The Graduate Student

RE: Selection of Lab Rotation Professor

DATE:

Effective, _____, the two parties signed below mutually agree to begin a formal Graduate Student- Supervising Laboratory Rotation Professor relationship to formally evaluate a potential laboratory to perform experiments towards a Ph.D. degree for the student. Although the duration of the rotation is for the complete semester, lab rotations most likely will start during the transition of semesters. The starting date will be determined by the Graduate Advisor(s). It is also agreed that termination of the rotation during a semester to switch to a different laboratory will be discussed with the Graduate Advisor(s) and it will require approval by the Graduate Advisor(s). Complete justification from either the Rotation Professor or the Graduate Student will be presented in writing for the student's file record. It is also agreeable that although the student is enrolled for 2 credits (Fall and Spring semesters) and 6 Credits (Summer semester), the time that the student must work in the laboratory will very likely exceed 6 hrs (Fall and Spring semesters) or 40 hrs (Summer semester). During the Fall and Spring, the hours spent in the laboratory will be determined by classes/examinations and student's performance in class. During the Summer semester the student must spend, at a minimum, 40 hrs a week in the laboratory.

Graduate Student

Rotation Professor

5. What do you think would improve this student's laboratory performance?

6. Other remarks.

APPENDIX 7B: LABORATORY ROTATION RUBRIC

**Cell Physiology and Molecular Biophysics
Evaluation of a Student's Laboratory Rotation**

Student's Name: _____ Rotation Date: _____

RATINGS:

- 4. Outstanding- exceeds expectations.
- 3. Very good- Well done, all elements included and clearly addressed
- 2. Acceptable- Adequate with some weakness
- 1. Not acceptable.

	Rating
A. Understanding of concepts	_____
B. Independence in laboratory work	_____
C. Commitment, enthusiasm, drive, and ambition	_____
D. Laboratory skills	_____
E. Design of experiments and interpretation of results	_____
F. Laboratory notebook and presentation of results	_____

2. Please add comments on the student's performance that will be of use in evaluating the student's progress and potential in the graduate concentration.

Faculty member name: _____ Signature: _____

Date: _____

Review:

Date evaluation reviewed with the student: _____

Student's initials (indicating evaluation was reviewed): _____

APPENDIX 8: GRADUATE STUDENT- SUPERVISING PROFESSOR AGREEMENT

TO: The Graduate Concentration Advisor
FROM: The Graduate Student
RE: Selection of the Ph.D. Supervising Professor
DATE:

Effective, _____, the two parties signed below mutually agree to begin a formal Graduate Student- Supervising Professor relationship directed toward the goal of earning a Ph.D. degree for the student.

Graduate Student

Supervising Professor

APPENDIX 9: QUALIFYING EXAM EVALUATION RUBRIC

Cell Physiology and Molecular Biophysics Qualifying Exam Evaluation Rubric

Date: _____ Evaluator: _____

Student: _____ Evaluator Signature: _____

RATINGS:

4. Outstanding- exceeds expectations.
3. Very good- Well done, all elements included and clearly addressed
2. Acceptable- Adequate with some weakness
1. Not acceptable.

The proposal summary includes:

A succinct and accurate description of the proposed work. A statement of the applicant's long term objectives and specific aims. A reference to the relevance of the research to public health. A concise description of the research design and methods for achieving the stated goals.

Rating: _____

The Specific Aims page contains:

The long term objectives and goals of the research proposed. A clearly stated hypothesis. A list of specific aims designed to address the hypothesis.

Rating: _____

The preliminary studies section provides an account of the supportive data present in published literature.

Rating: _____

The research Design and Methods section includes:

Rational and description of the research design, procedures and analyses to be used to accomplish the specific aims of the project. Discussion of the potential difficulties and limitations of the proposed procedures and alternative approaches to achieve the aims. A tentative sequence or timetable for the project.

Rating: _____

The proposal:

Follows a standard form and has a professional scholarly appearance. Is written with correct grammar, punctuation, and spelling. Includes citations for the following: direct quotations, paraphrasing, facts, and references to research studies.

APPENDIX 10: DISSERTATION RUBRIC

**Cell Physiology and Molecular Biophysics
Written and Oral Dissertation Rubric**

Date: _____ **Evaluator:** _____

Student: _____ **Evaluator Signature:** _____

RATINGS:

- 4. Outstanding- exceeds expectations.
- 3. Very good- Well done, all elements included and clearly addressed
- 2. Acceptable- Adequate with some weakness
- 1. Not acceptable.

Written Dissertation:

a. Well written and organized

Rating: _____

b. Research question and its scientific context are clearly stated.

Rating: _____

c. Logic and rigor of the arguments associated with the project hypothesis.

Rating: _____

d. Literature review is comprehensive, up to date, selective, analytical, and thematic.

Rating: _____

e. Results section contains sufficient, well presented and interpreted data.

Rating: _____

f. Experimental methods are detailed and justified.

Rating: _____

g. Discussion summarizes the finding, and provides perspectives by relating them to literature.

Rating: _____

h. Discussion includes study's strengths and weaknesses, implication for research field and future direction of research.

Rating: _____

ADDITIONAL COMMENTS

Oral Presentation and Oral Defense:

a. Quality and organization of the presentation.

Rating: _____

b. Quality of slides to illustrate concepts, data, and provide transitions.

Rating: _____

c. Engagement and enthusiasm of the student.

Rating: _____

d. Confidence and knowledge exhibited while answering questions.

Rating: _____

e. Demonstration of research project ownership during oral presentation and defense.

Rating: _____

ADDITIONAL COMMENTS

Scientific Value and Aptitude:

a. Creativity and/or challenging aspect of the research design.

Rating: _____

b. Overall contribution to the scientific research field.

Rating: _____

ADDITIONAL COMMENTS

APPENDIX 11: ACKNOWLEDGEMENT FORM

I, _____, acknowledge that I have received the *Procedures and Requirements for the Ph.D. Graduate Concentration in the Department of Cell Physiology and Molecular Biophysics*, and I have addressed any questions or concerns with the Graduate Advisor before signing this form.

Signature: _____

Date: _____