DOCTOR OF PHILOSOPHY

GRADUATE PROGRAM

IN

PHYSIOLOGY

AT

THE UNIVERSITY OF LOUISVILLE

SCHOOL OF MEDICINE

PROGRAM OVERVIEW AND OBJECTIVES

The Department of Physiology is located in the Health Sciences Center of the University of Louisville, which provides an active and intellectually stimulating environment and a wide variety of course options. The graduate program permits studies in related disciplines, such as anatomy, neurobiology, pharmacology, toxicology, biochemistry, microbiology, immunology, and molecular biology.

The doctoral program of the Department of Physiology is offered through the School of Medicine at the University of Louisville. As such, one major goal of the Department is to provide students with advanced training, which leads to the Ph.D. Degree in Physiology. The research interests of the Department are broad enough to provide each student with a wide selection of possible research and graduate education opportunities. Our doctoral graduate program is designed primarily to prepare students for an **independent research career in basic and applied physiology**.

I. ADMISSION

A. APPLICATION PROCEDURES

The University of Louisville Graduate School catalog gives a general description of admission procedures. Application information can be found on the website (www.graduate.louisville.edu). The following application items must be submitted to the Graduate School Admissions Office at the University of Louisville.

1. One official transcript of the applicant's previous work for each college or university that has been previously attended.
2. Two letters of recommendation from people who are well acquainted with the applicant's previous academic work.
3. TOEFL Examination scores for foreign students from non-English speaking countries.
4. A non-returnable application fee to the University of Louisville.
5. Applicants must state in a letter to the Department but submitted to the Graduate School (referred to as the Personal Statement in the application materials), why they desire a Ph.D. degree in this Department of Physiology.
6. Applicants for combined degrees (Ph.D.- M.D. or Ph.D.- D.M.D.) must apply and be accepted by the appropriate professional school (e.g., School of Medicine or Dentistry) before final action will be taken on the Departmental doctoral application.

B. ADMISSION REQUIREMENTS

Admission to the Ph.D. program in the Department of Physiology requires:

- A genuine interest in graduate work and the desire for a significant independent research career in the health sciences,
- A cumulative undergraduate grade point average that is usually 3.00 or higher on a scale of 4.00 (A=4, B=3, C=2, D=1),
- International students for whom English is not their primary language must show English language proficiency by demonstration of proficiency on the TOEFL examination (defined as 213 or higher on the computer-based test; 550 or higher on the paper-based test; or 79 or higher on the internet-based test) or by successfully completing the exit examination for the advanced level of the Intensive English as a Second Language Program at the University of Louisville or by demonstration of a degree award from an acceptable English language institution.

C. ADMISSION PROCEDURES

The Department attempts to hold a personal interview with all qualified applicants. Typically, this interview will be with two to four Department faculty members. If the applicant cannot come for an interview, then consideration of the application without the interview or, in some cases, a telephone interview will be conducted.

II. FACULTY ADVISING

A. FIRST YEAR TEMPORARY ADVISOR AND RESEARCH EXPERIENCE

The Director of Graduate Studies will meet with the new student to discuss the student's academic and research interests. The Director of Graduate Studies will serve as a Temporary Advisor until a Permanent Advisor is selected.

B. SELECTION OF PRINCIPAL ADVISOR

During the first semester, beginning graduate students will visit research laboratories in which they have an interest. First-year students must select a Principal Advisor within the first 5 months of their graduate study. The selection process involves approval by the student, the Principal Advisor, the Director of Graduate Studies, and the Department Chair. The Principal Advisor must be a Graduate Research Training Faculty of the School of Medicine.

C. ADVISORY COMMITTEE

The Advisory Committee in this Department is an integral part of the graduate student's training. This Committee is to be **extremely proactive** in planning the student's curriculum and providing an appropriate breadth in the student's research experience. To that end, not only does the mentor provide guidance in developing the dissertation research plan, but the Advisory Committee has the additional responsibility to assure the **independent** research design will provide appropriate results for the proposed hypotheses.

After selection of the Principal Advisor, the student's Advisory Committee will be determined. This Committee must have at least five members, and will contain; the Principal Advisor, as Chair, at least three Departmental faculty members, and at least one Graduate Faculty member from outside the Department. All must be appointed as Members of the School of Medicine Graduate Faculty. In cases where the Principal Advisor holds a primary appointment in a department other than the Department of Physiology, one of the full time Physiology Faculty will serve as Co-Advisor. The Co-Advisor will also serve on the student's Advisory Committee and serve as the Second Reader of the Dissertation Reading Committee. Approval of the Committee membership by the Director of Graduate Studies and the Chair will be contingent upon the potential role of each Committee member in the training, or in the career plans of the student. The Dissertation Defense Committee, selected by the Principal Advisor, must be approved by the Director of Graduate Studies, the Department Chair, and by the Dean of School of Medicine (or his/her designee).

III. MINIMAL REQUIREMENTS FOR THE DOCTOR OF PHILOSOPHY DEGREE IN PHYSIOLOGY

A. GENERAL

The Ph.D. degree is designed for the student who wishes a professional life that involves original, independent research and who desires knowledge that will permit competent advanced teaching in a physiology area. The Ph.D. degree requires that the student reach a high level of creativity and expertise. Therefore, mere completion of a prescribed number of courses is not adequate for receipt of the doctoral degree. Ph.D. students are expected to make steady and satisfactory progress toward the completion of the degree.

To document the satisfactory progress of the Ph.D. students, each Advisory Committee must hold at least two mandatory, semi-annual meetings and report on the student's progress (presentations, publications, grades and research progress). The mentor will submit a written report to the Director of Graduate Studies who will collate and distribute these reports to the faculty. Twice a year, the Director of Graduate Students will lead a Departmental faculty discussion of these reports to determine the student's progress.

B. MINIMAL PROGRAM REQUIREMENTS

The University of Louisville Ph.D. degree does not require a specific number of hours of academic credit. However, the Department requires that a minimum of two consecutive semesters (9 credit hours in the Fall or Spring semesters and/or 6 credit hours in the Summer) shall be taken to fulfill the full time one-year doctoral residency requirement at the University of Louisville. With the approval of the Dean of the School of Medicine (or his/her designee), a maximum of 12 semester hours of this requirement may be credited for post-baccalaureate work from other professional or graduate degree programs. By the end of the Program, the student must demonstrate the ability to conduct independent research.

C. MINIMUM COURSE REQUIREMENTS

The required program of academic studies must include (if not completed with a grade of B or better prior to admission to the Department) the following courses:

1. Systemic Membrane, Nerve, and Muscle Physiology (PHZB 640) or equivalent
2. Systemic BF, Heart, and Circulatory Physiology (PHZB 641) or equivalent
3. Systemic Respiratory, Renal, and Acid-Base Physiology (PHZB 642) or equivalent
4. Systemic Endocrine, Reproductive, and Gastrointestinal Physiology (PHZB 643) or equivalent
5. Biochemistry (BIOC 645) or equivalent
6. Experimental Physiology Laboratory (PHZB 625) or equivalent
7. Seminar (PHZB 617) two semesters
8. Cell Biology (MBIO 667) or equivalent
9. Responsible Conduct of Research (BIOC 630)
10. Advanced Human Cardiovascular Physiology (PHZB 611) or equivalent
11. Integrated Systemic Physiology (PHZB 609)
12. Applied Physiology Statistics (PHZB 616.02) or equivalent

D. ACADEMIC PERFORMANCE

A student must have at least a 3.00 accumulated GPA (on a 4.0 scale) in order to take the Ph.D. Qualifying Examination and to qualify for the Ph.D. degree. In general, a student with a GPA of less than 3.00 after two consecutive semesters (excluding summer sessions) will require a 2/3 majority vote of the Departmental faculty to continue in the Ph.D. Program. The student must not have received a total of more than 6 credit hours of a grade of "C" in their academic work. For Departmental purposes, pass grades will not be included in the GPA calculation; however, a failing grade in a pass/fail-graded course will be included in the GPA calculation at zero quality points per credit hour. Students will not be allowed to graduate with failing grades on their transcript.

E. THE PH.D. QUALIFYING EXAMINATION

Before the Ph.D. Qualifying Examination may be taken, the student must have completed the Minimum Course Requirements listed above and have a cumulative GPA of at least a 3.0 for all coursework. It would normally be expected that the student would take the Ph.D. Qualifying Examination by the end

of five semesters of graduate studies**.** If the student has not taken the Ph.D. Qualifying Examination by the end of the second year, a letter of justification for the delay must be submitted by the Principal Advisor to the Department Chair.

A Ph.D. Qualifying Examination must be passed by the applicant in order to be admitted to Ph.D. candidacy. The Qualifying Examination Committee will be comprised of members of the student's Advisory Committee. The membership must be approved by the Director of Graduate Studies and the Department Chair. A passing recommendation shall not involve more than one negative vote of this Committee. If the student does not pass the Qualifying Examination, one additional retake will be allowed if approved by a majority vote of the Departmental faculty.

The purpose of the Ph.D. Qualifying Examination is to test the student's independent use and depth of core physiology through its application to the student proposed research. This examination shall consist of a written research proposal outlining the dissertation research and an oral examination of the student's depth of current understanding of the basic physiological concepts underlying the proposed research. The student will receive the Master of Science Degree in Physiology, upon satisfactory completion of the Qualifying Exam.

F. MAINTENANCE OF GRADUATE STATUS

A candidate for the Ph.D. degree who has completed all residency requirements, all of the approved required program of academic studies, and passed the Qualifying Examination may register for "DOCT" to maintain doctoral candidacy until the degree is awarded. Continuous registration in this status is required. Semiannual progress meetings will continue to be expected. To complete the Ph.D. degree, the student must continue to make satisfactory progress during the candidacy period. In order to be eligible to receive the Ph.D. degree, the student must have been admitted to candidacy and registered for doctoral candidacy for the two consecutive semesters prior to the awarding of the degree.

G. DISSERTATION

The dissertation shall represent a scholarly achievement which embodies results of independent research and which demonstrates a thorough understanding of research concepts in the field of inquiry. The completed dissertation must be in the appropriate format as required by the Graduate School and must be approved by a Dissertation Reading Committee (the Candidate's Advisory Committee). Then, at least two weeks before the scheduled dissertation defense and at least 30 days before the expected date of graduation, the dissertation shall be submitted to the Dissertation Defense Committee. The Dissertation Defense Committee, selected by the Principal Advisor, must have been approved previously by the Director of Graduate Studies, the Department Chair, and by the Dean of School of Medicine (or his designee) (see section IIC) . Two unbound copies of the accepted dissertation, signed by the Dissertation Defense Committee, must be deposited with the Dean of the Graduate School and one copy must be given to the Department Chair before graduation.

H. DISSERTATION DEFENSE

The dissertation defense is an oral defense of the dissertation and a demonstration of mastery of the candidate's research field. The defense is administered by the Dissertation Defense Committee. The defense of the dissertation is a public examination and the Graduate School will notify all faculty members that they are invited to the Dissertation Defense, but only members of the Dissertation Defense Committee will vote on the student's performance. For the student to pass the Dissertation Defense, the vote of the Dissertation Defense Committee may not include more than one negative vote. The Dissertation Defense must take place at least 14 days before the end of the semester in which the degree is anticipated.

I. The Department will not approve the granting of the Ph.D. degree until the student has submitted at least one first-authored manuscript on the dissertation research and one co-authored manuscript for publication in a refereed journal. The manuscript and the choice of journal must be approved by the Principal Advisor before manuscript submission.

J. In any case where the Departmental requirements are less restrictive than those described in the School of Medicine Minimal Guidelines for Graduate Education, the School of Medicine guidelines will apply.

IV. EXCEPTIONS

A. The above are statements of minimum Departmental requirements. However, it is recognized that there could be cases in which exceptions should be allowed. The student and advisor should consult with the Department Chair if the basis for an exception exists.

B. In the above guidelines, the Director of Graduate Studies has considerable responsibility for program quality. To avoid any possibility of a potential conflict of interest, the Department Chair (or designee) will fulfill the role of Director of Graduate Studies for any Ph.D. or M.S. student who has the Director of Graduate Studies as their Principal Advisor.

V. APPENDIX A

A. TYPICAL DOCTORAL PROGRAMS

1. Traditional Doctoral Program

First Semester (1st FALL)

Systemic Membrane, Nerve, and Muscle Physiology (PHZB 640 – 3 CH)
Systemic BF, Heart, and Circulatory Physiology (PHZB 641 – 3 CH)
Graduate level Biochemistry (BIOC 645 – 4 CH)
Experimental Physiology Lab (PHZB 625 – 1 CH)
Seminar (PHZB 617 – 1 CH)

Second Semester (1st SPRING)

Systemic Respiratory, Renal, and Acid-Base Physiology (PHZB 642 – 3 CH)
Systemic Endocrine, Reproductive, and GI Physiology (PHZB 643 – 3 CH)
Cell Biology (MBIO 667 – 3 CH)
Seminar (PHZB 617 – 1 CH)
Responsible Conduct of Research (BIOC 630 – 1 CH)
Research (PHZB 619 – 1 CH)

Third Semester (1st SUMMER)

Research (PHZB 619 – 6 CH)

Fourth Semester (2nd FALL)

Integrated Systemic Physiology (PHZB 609 – 3 CH)
Research (PHZB 619 – 6 CH)

Fifth Semester (2nd SPRING)

Advanced Human CV Physiology (PHZB 611 – 2 CH)
Statistics (PHZB 616.02 – 3 CH)
Research (PHZB 619 – 4 CH)

M.S. Final Exam (Ph.D. Qualifying Exam)
Master of Science Degree and Ph.D. Candidacy program

Sixth Semester	(2nd SUMMER)	DOCT
Seventh Semester	(3rd FALL)	DOCT
Eighth Semester	(3rd SPRING)	DOCT
Ninth Semester	(3rd SUMMER)	DOCT
Tenth Semester	(4th FALL)	DOCT
Eleventh Semester	(4th SPRING)	DOCT

Dissertation Defense

If more research/dissertation time is needed, the student will continue to register as DOCT ("Active Status"), until completed.

V. APPENDIX A (Continued)

2. **Doctoral Program for Residents/Fellows**

This sequence is based on the premise that the clinician will be given the equivalent of two full calendar years ("Research Leave") free to complete research without clinical duties**.** The Director of Graduate Studies will see that the Graduate School is notified of the transfer of the preclinical courses applicable to the Departmental doctoral requirements. The clinician will take: a) Advanced Human Cardiovascular Physiology, b) Integrated Systemic Physiology, (c) Statistics, d) Seminar, and e) complete initial research (PHZB 619) to define a doctoral research problem.

First Semester (1st FALL)
Integrated Systemic Physiology (PHZB 609 – 3 CH)
Research (PHZB 619 – 6 CH)

Second Semester (1st SPRING)
Advanced Human CV Physiology (PHZB 611 – 2 CH)
Statistics (PHZB 616.02 – 3 CH)
Seminar (PHZB 617 – 1 CH)
Responsible Conduct of Research (BIOC 630 – 1 CH)
Research (PHZB 619 – 2 CH)

Ph.D. Qualifying Exam

Third Semester (1st SUMMER)
Research (PHZB 619 – 6 CH)

Fourth Semester (2nd FALL)
(DOCT)

Fifth Semester (2nd SPRING)
(DOCT)

Sixth Semester (2nd SUMMER)
(DOCT)

Dissertation Defense

If more research/dissertation time is needed, the clinician will continue to register as DOCT ("Active Status"), until completed, and dissertation defended.