

MASTER OF SCIENCE  
GRADUATE PROGRAM  
IN  
PHYSIOLOGY

AT

THE UNIVERSITY OF LOUISVILLE  
HEALTH SCIENCES CENTER

JULY 2019

# GENERAL PROCEDURES AND REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN THE DEPARTMENT OF PHYSIOLOGY

## I. PROGRAM OVERVIEW AND OBJECTIVES

The Department of Physiology is located in the Health Sciences Center of the University of Louisville which provides our graduate students with an active and intellectually stimulating environment. Our Graduate Program offers a Master of Science Degree to provide several career options. The **Pre-HealthCare track** is for students who wish to enhance their credentials for admission to and performance in professional healthcare programs. The **Research track** is to: 1) develop competence in directed research for advanced technical positions in industry, government, and university medical research laboratories; 2) prepare students with a good general knowledge of human physiology to enable them to communicate physiological concepts to future students; and 3) explore the possibility of a future career as an independent scientist in medically-related research.

The typical Master of Science (M.S.) Graduate Program consists of thirty (30) semester hours typically over a twelve-month (3 semesters) period to include the following: 18 credit hours of physiology and biochemistry and at least 12 credit hours of electives.

## II. 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 SIGS website ([www.graduate.louisville.edu](http://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. At least two letters of recommendation from people who are well acquainted with the applicant's previous academic work.
3. Applicants must forward scores from the Analytical, Verbal and Quantitative portions of the Graduate Record Examination (GRE). Professional school admission tests may be used instead of the GRE.
4. TOEFL Examination scores for foreign students from non-English speaking countries.
5. A non-returnable application fee to the University of Louisville.
6. Applicants must state in a letter to the Department but submitted to the SIGS (referred to as the Personal Statement in the application materials), why they desire a M.S. degree in this Department of Physiology.

## B. ADMISSION REQUIREMENTS

1. A cumulative undergraduate grade point average that is usually 2.80 or higher on a scale of 4.00 (A=4, B=3, etc.)
2. A Graduate Record Examination Score which usually averages at the 40<sup>th</sup> percentile or higher in the verbal, quantitative and analytical sections.
3. Satisfactory MCAT, DAT, OAT or similar test scores may also be accepted *in lieu* of the GRE  
In the case of a foreign applicant from a non-English speaking country, the applicant must achieve a TOEFL Examination score of 550 (paper) or 213 (computerized).

## III. **REQUIREMENTS FOR THE MASTER'S DEGREE**

### A. ADVISOR SELECTION

#### 1. FIRST SEMESTER TEMPORARY ADVISOR

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

2. During the first semester of their graduate study, **Research track** students visit research laboratories in which they have an interest. First-year students must select a principal advisor. The selection process involves approval by the student, the Principal Advisor, the Director of Graduate Studies, and the Department Chair.
3. The Director of Graduate Studies will serve as the Academic Advisor for students in the **Pre-HealthCare track**.

### B. MINIMUM PROGRAM REQUIREMENTS

At least 30 semester hours beyond the Baccalaureate Degree are required for the degree of Master of Science. A maximum of 6 semester credit hours (CH) may be credited from post-baccalaureate work in other professional or graduate degree programs.

C. MINIMUM COURSE REQUIREMENTS

The typical M.S. Program must include (if not completed prior to admission to the Department) the following courses taken on a grade basis:

Fall semester:

PHZB 605 or equivalent (required)	5 CH
BIOC 645 or equivalent (required)	4 CH
Electives	3 CH

Spring semester:

PHZB 606 or equivalent (required)	5 CH
BIOC 647 or equivalent (required)	4 CH
Electives	3 CH

Summer:

Electives	6 CH
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All electives must be graduate levels courses. See Appendix B for suggested electives.

D. ACADEMIC PERFORMANCE

A student must have at least a 3.0 accumulated GPA to be graduated with a degree of Master of Science in Physiology. In general, a student with a GPA that is less than 3.0 at the end of the second semester will require a 2/3 majority vote of the Departmental faculty to continue in the Program. A student may not be graduated with more than 6 CH of "C" grades in their required courses.

E. FINAL EXAMINATION

The **Research track** M.S. student will take a Final Examination during the last semester of the M.S. Program. The Final Examination shall consist of an oral presentation. This exam may take the form of a presentation of the research experience or a detailed review of a selected topic.

The **Pre-HealthCare track** M.S. student will give a final presentation as part of the Clinical Physiology course during their last semester. The topic will be determined by the student and the Course Director.

A positive recommendation for the Master of Science Degree shall require a majority vote of the Final Examination Committee (consisting of at least the Principal Advisor who will serve as Chair and two additional members of the Graduate Faculty, one of whom is from outside the Department). The Committee must have been approved by Director of Graduate

Studies, the Department Chair, and the Dean of the School of Medicine (or his/her designee) prior to the Final Examination. This recommendation shall be made at least one week before graduation. In the event of an unfavorable vote of the Final Examination Committee, the student may be considered for re-examination only by a recommendation of a 2/3 majority of the Departmental faculty.

## Course Descriptions

### REQUIRED COURSES:

#### **Fall Semester**

##### Systemic Physiology I (5 cr.)

Course #: PHZB-605

Offered: Monday, Wednesday and Friday, 1:00 to 3:00 PM

Description: Systemic Physiology I is the first of two human physiology courses that are offered the first year of the graduate programs in the Department of Physiology at the School of Medicine. This course contains four hours of lecture and two hours of recitation/application per week.

##### Advanced Biochemistry I (4 cr.)

Course #: BIOC-645

Offered: Monday 3:00 to 4:00 PM, Tuesday & Thursday 9:00 to 10:15 AM, and Friday, 9:00 to 9:50 AM

Description: Chemistry of amino acids, peptides, proteins, nucleotides and nucleic acids; methods of analysis and laboratory synthesis; nucleotides; RNA, DNA and protein biosynthesis. Lectures concurrent with CHEM-545; one added lecture hour each week covers advanced topics.

#### **Spring Semester**

##### Systemic Physiology II (5 cr.)

Course #: PHZB-606

Offered: Monday, Wednesday and Friday, 1:00 to 3:00 PM

Description: Systemic Physiology II is the second of two human physiology courses that are offered the first year of the graduate programs in the Department of Physiology at the School of Medicine. This course contains four hours of lecture and two hours of recitation/application per week.

### Advanced Biochemistry II (3 cr.)

Course #: BIOC-647 (Prerequisite: BIOC-645)

Offered: Monday 3:00 to 4:00 PM, Tuesday & Thursday 9:00 to 10:15 AM, and Friday, 9:00 to 9:50 AM

Description: Cellular metabolism of carbohydrates, lipids, amino acids and nucleotides; enzyme properties, kinetics, and control mechanisms, ligand binding; biomembrane phenomena. Lectures concurrent with CHEM-547; one added lecture hour each week covers advanced topics.

### **ELECTIVE COURSES:**

#### **Fall Semester**

#### Stem Cell Biology and Regenerative Medicine (3 cr.)

Course #: PHZB-604

Offered: Tuesday, 1:00 to 4:00

Description: The course will focus on the biology of stem cells and their role in health and disease. Emphasis will be placed on development, carcinogenesis and tissue engineering.

#### Principles of Oral Presentations: Self, Science, and Interview Skills (3 cr.)

Course #: PHZB-607

Offered: Tuesday and Thursday, 1:00 to 2:30

Description: The plan for Oral Presentations will be centered on four steps: Plan, Produce, Practice and Present. This course will include: an instructive component, a "how to" leverage and/or optimize PowerPoint (or other presentation software), standing up and presenting in a room, best practices for presentations in the virtual world and how to strengthen interview skills.

#### Seminars in Physiology (1 cr.)

Course #: PHZB-617

Offered: Both Fall and Spring Semesters; Tuesday, 11:45 AM to 12:45 PM

Description: This course includes the attendance at the weekly seminar series with a submitted, brief, written, critique of the science presented by the speaker.

### Research in Physiology (1 - 3 cr.)

Course #: PHZB-619

Offered: To Be Determined

Description: There is a limited enrollment in this course for those who wish to complete physiologically relevant research with one of our faculty and/or associates. The number of credits will depend upon the level of commitment by the student in agreement with a faculty mentor and the Director of Graduate Education for Physiology.

### Biomedical Applications of Physiology of the Eye (3 cr.)

Course #: PHZB 630

Offered: Tuesday, 1:00-4:00

Description: Overall, this course offers a solid background in physiology, pathophysiology, measurement methods, and biomedical aspects of the eye which will well-prepare a student for pursuit of a career in professions related to eye health. Fall elective

### Molecular Microbiology (2 cr.)

Course #: MBIO-601

Offered: Tuesday and Thursday, 3:00 to 4:00

Description: The course is an introduction to microbiology, focusing on the molecular make-up, function, and diversity of microorganisms, primarily bacteria. The pathogenic potential of bacteria will also be explored.

### **Spring Semester**

### Advanced Cardiovascular Physiology (3 cr.)

Course #: PHZB-611 (Prerequisite: PHZB-605)

Offered: Tuesday, 1:00 to 4:00 PM

Description: PHY 611 utilizes lectures on the physiological and biochemical processes in the heart, blood vessels and blood elements to provide more detailed mechanisms from molecular to systematic levels and normal to pathological states.



### Seminars in Physiology (1 cr.)

Course #: PHZB-617

Offered: Both Fall and Spring Semesters; Tuesday, 11:45 AM to 12:45 PM

Description: This course includes the attendance at the weekly seminar series with a submitted, brief, written, critique of the science presented by the speaker.

### Research in Physiology (1 - 3 cr.)

Course #: PHZB-619

Offered: To Be Determined

Description: There is a limited enrollment in this course for those who wish to complete physiologically relevant research with one of our faculty and/or associates. The number of credits will depend upon the level of commitment by the student in agreement with a faculty mentor and the Director of Graduate Education for Physiology.

### Cell Biology (3 cr.)

Course#: BIOC 667

Offered: Mon and Wed, 10:-11:30

### Cancer Biology (4 cr.)

Course # BIOC 675

Offered: Tues and Thurs, 1:00-3:00

## **Summer Semester**

### Clinical Physiology (6 cr.)

Course #: PHZB-615 (Prerequisites: PHZB-605 and PHZB-606)

Offered: Monday, Wednesday and Friday 9:00 to 11:00 AM

Description: This is a course that uses clinical situations to examine and reinforce mechanisms important to understanding systemic physiology. There are six areas covered:

- 1) electrical functioning of the heart
- 2) blood pressure and circulatory control mechanisms
- 3) ventilation and perfusion of the lungs
- 4) gastrointestinal blood flow and acid production
- 5) blood flow and oxygen utilization by the heart
- 6) control of the many endocrine functions

This course utilizes a combination of faculty-lead teaching techniques that include: team based learning (TBL), problem based learning (PBL), and in-class exercises. All course materials have been prepared by the supervising faculty and will be available to students online as needed.

### Research in Physiology (1 - 6 cr.)

Course #: PHZB-619

Offered: To Be Determined

Description: There is a limited enrollment in this course for those who wish to complete physiologically relevant research with one of our faculty and/or associates. The number of credits will depend upon the level of commitment by the student in agreement with a faculty mentor and the Director of Graduate Education for Physiology.