PHYSIOLOGY AND BIOPHYSICS

biomed.med.miami.edu

Overview
Physiology and Biophysics is focused on how human organism function by applying principles of physics to the underlying molecules and cells. The training and research emphasis in the Graduate Program in Physiology and Biophysics at the University of Miami School of Medicine is directed at determining the molecular mechanisms underlying physiological functions, such as how does the heartbeat, how does the brain work, and how do we see, smell, and taste, using biophysical techniques and analyses. More specifically, research facilities and guidance for graduate work are available in developmental neurobiology, sensory receptor mechanisms, axonal electrophysiology, ionic mechanism of the nerve impulse, electrophysiological and molecular aspects of synaptic and neuromuscular transmission, mechanisms of ion channel gating, selectivity and conductance, metabolic aspects of nervous function, molecular neuroscience, neuroimmunology, protein structure-function studies, molecular recognition, ligand-receptor interactions, axonal growth, neurotrophic factors, cytokines, gene targeting, neuronal apoptosis, nerve regeneration, molecular adhesion, and regulation of muscle contraction.

The Graduate Program in Physiology and Biophysics trains its students to use and develop state-of-the-art biophysical techniques that address fundamental questions related to molecular and cellular physiology and biophysics and developmental and molecular neuroscience. In addition, the students receive training in related biological disciplines and also in systemic physiology in order to obtain a broad viewpoint. This training prepares the students for future careers in research and teaching in academic institutions and also for careers in industry.

Contact Information
H. Peter Larsson, PhD, (plarsson@med.miami.edu)  Graduate Program Director
Diane Dames, (ddames@med.miami.edu) Senior Program Coordinator

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305 243 6821
physiology@miami.edu

Admission

Admission Requirements
Applicants to biomedical programs should have a bachelor degree in a biological or related discipline (e.g., psychology, chemistry, engineering, physics). Although there are no prerequisite requirements, courses in general biology, cell/molecular biology, calculus, general physics, organic chemistry, physical chemistry, and biochemistry are encouraged. Applications are generally accepted from September to December for fall entry only. Select applicants will be offered an interview.

COMPETITIVE CANDIDATES WILL HAVE THE FOLLOWING:
• Excellent academic record
• Competitive GRE exam scores
• Research experience in a laboratory setting
• Publications of abstract and / or papers
• Co-authorship in a peer-reviewed journal is recommended
• Strong letters of recommendation from research scientists who know the candidate well
• Motivation to pursue state-of-the-art biomedical research

APPLICANTS MUST SUBMIT THE FOLLOWING:
• Online Application
• Application Fee
• Official Academic Transcripts
• GRE General Test
• English Proficiency Exam (non-native speakers)
• Statement of Purpose
• Resume / CV

Full application instructions can be found at: http://biomed.med.miami.edu/apply

Program Plan

Program Plan

The Department of Physiology and Biophysics' PhD program trains highly qualified students for successful careers in research, teaching and industry. A high faculty to student ratio assures that each student receives individualized help from the faculty together with access to the latest scientific instrumentation.

Student training is enhanced by research seminars and student-oriented discussions presented by world-renowned visiting scientists, as well as by participation in research seminars and research discussion groups. We seek to provide a congenial and supportive environment in which each student develops to the fullest his abilities to reason critically, design and conduct incisive experiments, and communicate research results effectively in both written and oral formats. Our faculty's wide collective experience as successful researchers, teachers, journal editors, and peer reviewers is available to help graduates prepare for and attain research and teaching positions in academia and industry.

Please note that the following is only a sample curriculum plan. Current students must discuss their plan with their program director to make adjustments as needed. It is the student's responsibility to contact the program to verify the information.

<table>
<thead>
<tr>
<th>Year One</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td><strong>Fall</strong></td>
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<tr>
<td>PIB 701</td>
<td>Introduction to Biomedical Sciences 5</td>
</tr>
<tr>
<td>PIB 702</td>
<td>Scientific Reasoning 3</td>
</tr>
<tr>
<td>PIB 731</td>
<td>Laboratory Research 2</td>
</tr>
<tr>
<td>PIB 700</td>
<td>Journal Club 1</td>
</tr>
<tr>
<td>PIB 780</td>
<td>Research Ethics 1</td>
</tr>
<tr>
<td>PIB 782</td>
<td>Professional Development: Skills for Success 1</td>
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</tbody>
</table>

Term Credit Hours: 13

<p>| <strong>Spring</strong> |          |
| PIB 700   | Journal Club 1 |</p>
<table>
<thead>
<tr>
<th>Year Four</th>
<th>Course</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>Fall</td>
<td>PHS 840 Doctoral Dissertation- Post Candidacy</td>
<td>3</td>
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<tr>
<td>Spring</td>
<td>PHS 840 Doctoral Dissertation- Post Candidacy</td>
<td>3</td>
</tr>
<tr>
<td>Summer</td>
<td>PHS 840 Doctoral Dissertation- Post Candidacy</td>
<td>1</td>
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Term Credit Hours: 18-19

<table>
<thead>
<tr>
<th>Year Five</th>
<th>Course</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>Fall</td>
<td>PHS 840 Doctoral Dissertation- Post Candidacy</td>
<td>3</td>
</tr>
<tr>
<td>Spring</td>
<td>PHS 840 Doctoral Dissertation- Post Candidacy</td>
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</tr>
<tr>
<td>Summer</td>
<td>PHS 840 Doctoral Dissertation- Post Candidacy</td>
<td>1</td>
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Term Credit Hours: 1

Total Credit Hours: 68-96

Courses

PHS 610. Cell Physiology Biophysics. 2 Credit Hours.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

PHS 611. Neurophysiology. 2 Credit Hours.
Physiology of the mammalian nervous system. Course is intensive, adapted to the schedule of the medical curriculum and comprising roughly five hours of lecture and four hours of conference weekly for five to six weeks. A lecture course coordinated with neuroanatomy.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

PHS 612. Systemic Physiology. 4 Credit Hours.
Physiology of the mammalian cardiovascular, respiratory, renal, digestive, endocrine, and reproductive systems. Course is intensive and adapted to the schedule of the medical curriculum, occupying the equivalent of about two days a week for most of semester. Lecture and laboratory are included.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.
PHS 620. Neurophysiology. 3 Credit Hours.
Physiology of the mammalian nervous system. The course will consist of
both didactic lectures and discussions of current research literature.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

PHS 669. Nerve and Synapse. 2 Credit Hours.
An advanced seminar course in the basic mechanisms underlying the
propagated nerve impulse and synaptic transmission.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

PHS 700. Research Seminar in Membrane Biophysics and Neurobiology.
1 Credit Hour.
The student may be required to present a short talk on a research area of
interest. All students in the Department of Physiology and Biophysics are
required to register for this seminar. For other students, permission of the
Departmental Graduate Studies Committee is required.
Components: SEM.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

PHS 720. Research in Residence. 0 Credit Hours.
Used to establish research in residence for the master’s
degree after the student has enrolled for the permissible cumulative total
in PHS 710 (usually six credits). Credit not granted. May be regarded as
full time residence.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

PHS 741. Principles of Membrane Physiology and Biophysics I. 2 Credit
Hours.
Course discusses chemical and physical structure of membranes,
model systems, permeability and transport, membrane potential, ionic
channels, excitability in nerve and muscle, ionophores, active transport,
and membrane receptors. Identical with MCP 641.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

PHS 742. Principles of Membrane Physiology and Biophysics II. 2 Credit
Hours.
Course topics include osmosis and cell volume, tracer analysis of
permeability and compartmentation, theory of channels and carriers,
cable properties, Hodgkin-Huxley formalism, Na, K, and Ca ion channels,
regulation of cellular Na, Ca activities, single-channel analysis, chemical
synapses, membrane receptors, cell junctions, excitation and E-C
coupling in muscle. Identical with MCP 642.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

PHS 810. Master’s Thesis. 1-6 Credit Hours.
The student working on his/her master’s thesis enrolls for credit, in most
departments not to exceed six, as determined by his/her advisor. Credit is
not awarded until the thesis has been accepted.
Components: THI.
Grading: SUS.
Typically Offered: Offered by Announcement Only.

PHS 830. Doctoral Dissertation. 1-12 Credit Hours.
Required of all candidates for the Ph.D. The student will enroll for credit
as determined by his/her advisor but not for less than a total of 24. Not
more than 12 hours of PHS 730 may be taken in a regular semester, nor
more than six in a summer session. Where a student has passed his/her
(a) qualifying examinations, and (b) is engaged in an assistantship, he/she may still take the maximum allowable credit stated above.
Components: THI.
Grading: SUS.
Typically Offered: Fall, Spring, & Summer.

PHS 840. Doctoral Dissertation- Post Candidacy. 1-12 Credit Hours.
Components: THI.
Grading: SUS.
Typically Offered: Fall, Spring, & Summer.

PHS 850. Research in Residence. 1 Credit Hour.
Used to establish research in residence for the Ph.D., after the student
has been enrolled for the permissible cumulative total in appropriate
doctoral research. Credit not granted. May be regarded as full-time
residence as determined by the Dean of the Graduate School.
Components: THI.
Grading: SUS.
Typically Offered: Offered by Announcement Only.