Cellular and Integrative Physiology

rbrock@hsc.wvu.edu

Degrees Offered

• Master of Science
• Doctor of Philosophy
• Joint Doctor of Medicine and Doctor of Philosophy

Physiology is a dynamic life science that focuses on the study of biological systems at many levels of complexity, ranging from genes and molecules to cells and organisms. Thus, training in physiology has the ultimate goal of linking molecular and cellular information to functional outcomes. Currently, groundbreaking research and discovery in the life sciences are more interdisciplinary than ever, and students studying within the realm of physiology can expect to work with a wide range of scientists. Our program provides a multidisciplinary approach to modern life sciences, drawing on faculty expertise from several departments and centers in the School of Medicine.

The program’s participating research faculty consists of scientists from the Center for Cardiovascular and Respiratory Sciences, NIOSH/CDC, Center for Neuroscience, and the Blanchette Rockefeller Neurosciences Institute. As a result, this multidimensional program includes activities in the following:

• Integrative and systems physiology
• Pathophysiology
• Pharmacology
• Translational research
• Small animal physiology, biomedical engineering
• Biophysics

It also integrates information from genetics, functional genomics, and proteomics into whole animal and human physiology.

This interactive and cross-disciplinary environment, together with an atmosphere filled with enthusiasm and passion for scientific discovery, makes our program a uniquely exciting place for doing research and the training of students. Specific topics of research emphasis include the following:

• Hemodynamics and Cardiovascular Control in Health and Disease
• Microcirculation and Cellular Biophysics
• Respiratory Function and Control in Health and Disease
• Neuroendocrine Control of Reproduction
• Neural Control of Sensory Physiology

The goal of the cellular and integrative physiology graduate program is to engage students in creating a new approach to the life sciences, with the aim of explaining how the higher-level properties of complex systems appear from the interactions amongst their parts. Students will leave our program better able to identify important unsolved scientific problems and with an appreciation of how to select problems for which quantitative and theoretical approaches will be most productive.

Qualifying Examination

After successful completion of their second academic year, students take a two-part qualifying examination. The exam consists of an oral examination covering the major areas of physiology followed by a written and oral research defense of the student’s research proposal. Upon successful completion of the qualifying examinations, the student is admitted to candidacy for the degree of doctor of philosophy. Our graduates obtain excellent postdoctoral research training opportunities in prestigious laboratories and develop productive and satisfying careers in academics, industry, and government. Graduates have become departmental chairs, industrial department heads, university vice presidents, and entrepreneurs.

FACULTY

GRADUATE PROGRAM DIRECTOR

• Dr. Robert W. Brock - Ph.D. (University of Western Ontario)

MAJOR REQUIREMENTS

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<tr>
<td>BMS 700</td>
<td>Scientific Integrity</td>
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CANDIDACY EXAMINATION

Admission to candidacy occurs following successful completion of the qualifying exams, which have both written and oral components. The written qualifying exam is given at the end of the second year of study. The dissertation proposal defense is completed no later than six months after the oral qualifying exam.

EXTERNAL EXAMINER

An external examiner is required for all final examinations. The external examiner is an expert in the dissertation content who is not affiliated with West Virginia University but is appointed as a voting member of the final examination committee only.

DISSERTATION PREPARATION, SEMINAR, AND DEFENSE

The final examination for the Ph.D. will consist of presenting a dissertation seminar before the advisory committee and others before continuing on with the dissertation defense before the advisory committee. Satisfactory performance in the oral defense will result in recommendation for granting of the Ph.D.

SUGGESTED PLAN OF STUDY

First Year

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Total Hours: 100
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### Fourth Year

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Total credit hours: 101

### COURSES

**PSIO 741. Physiological Methods 1. 1-5 Hours.**
PR: Consent. Research techniques and strategies for physiology.

**PSIO 742. Physiological Methods 2. 1-4 Hours.**
PR: Consent. Research techniques and strategies for physiology.

**PSIO 743. Fundamentals of Physiology. 5 Hours.**
PR: College physics, algebra, chemistry, and consent. (For dental students and a limited number of full-time graduate students.) Analysis of basic facts and concepts relating to cellular processes, organ systems, and their control.

**PSIO 744. Graduate Seminar. 1-3 Hours.**
PR: Graduate standing and consent. (Grading may be S/U.).

**PSIO 746. Neurophysiology. 1-4 Hours.**
PR: (MATH 126 or MATH 341) and (PHYS 101 and PHYS 102) or consent. (For graduate students in the Health Sciences Center’s basic sciences departments and a limited number of regular full-time graduate students.) Properties of excitable tissues (nerve and muscle), synaptic transmission, reflexes and central nervous system function, and behavior. (1-3 hr. lec. 1 hr. conference.).

**PSIO 750. Graduate Physiology. 7 Hours.**
(For graduate students in HSC graduate programs and a limited number of other full-time graduate students.) PR: Consent. Survey of quantitative level of basic concepts and experimental approaches to cellular, endocrine, and neural mechanisms controlling physiological processes.

**PSIO 760. Human Physiology. 6 Hours.**
A blended online medical physiology course with weekly face-to-face class meetings for first-year medical students who took a leave of absence and will repeat their first year.

**PSIO 790. Teaching Practicum. 1-3 Hours.**
PR: Consent. Supervised practice in college teaching of physiology. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It will also present a mechanism for students not on assistantships to gain teaching experience. (Grading may be P/F.).

**PSIO 791A-Z. Advanced Topics. 1-6 Hours.**
PR: Consent. Investigation of topics not covered in regularly scheduled courses.

**PSIO 792A-Z. Directed Study. 1-6 Hours.**
Directed study, reading, and/or research.
PSIO 793A-Z. Special Topics. 1-6 Hours.
A study of contemporary topics selected from recent developments in the field.

PSIO 794A-Z. Seminar. 1-6 Hours.
Special seminars arranged for advanced graduate students.

PSIO 795. Independent Study. 1-9 Hours.
Faculty supervised study of topics not available through regular course offerings.

PSIO 796. Graduate Seminar. 1 Hour.
PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

PSIO 797. Research. 1-15 Hours.
PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.)

PSIO 798. Dissertation. 1-6 Hours.
PR: Consent. This is an optional course for programs that wish to provide formal supervision during the writing of student reports (698), or dissertations (798). Grading is normal.

PSIO 799. Graduate Colloquium. 1-6 Hours.
PR: Consent. For graduate students not seeking course work credit but who wish to meet residency requirements, use the University’s facilities, and participate in its academic and cultural programs. Note: Graduate students who are not actively involved in coursework or research are entitled, through enrollment in their department’s 699/799 Graduate Colloquium to consult with graduate faculty, participate in both formal and informal academic activities sponsored by their program, and retain all of the rights and privileges of duly enrolled students. Grading is P/F; colloquium credit may not be counted against credit requirements for masters programs. Registration for one credit of 699/799 graduate colloquium satisfies the University requirement of registration in the semester in which graduation occurs.

PSIO 801. Summer Medical Physiology. 7 Hours.
An online course designed for medical students who need to remediate the physiology portion of WVU SOM: CCMD 730 (or equivalent), prior to entering their second year. Course will be taught on a Pass/Fail basis.