Neuroscience

aberrebi@hsc.wvu.edu

Degrees Offered

• Doctor of Philosophy
• Joint Doctor of Medicine and Doctor of Philosophy

The interdepartmental neuroscience graduate program is committed to training the next generation of researchers and educators. Successful completion of degree requirements is based on research and scholarly achievement. Students will have opportunities to experience and acquire the skills needed for successful careers as independent scientists, including critical thinking, problem solving, and leadership. Research experiences include evaluating scientific literature, identifying critical scientific issues, experimental design, grant and manuscript writing, publication of scientific papers, and presentations at national meetings. Students with career interests in teaching will have the opportunity to gain experience in innovative teaching methods and techniques, including problem-based learning, computer-assisted learning, and integrated teaching approaches. The program faculty’s expertise spans all neuroscience sub-disciplines, including structural, cellular, molecular, and developmental. After completion of core coursework, students conduct an original research project culminating in a doctoral dissertation.

CURRENT RESEARCH AREAS INCLUDE THE FOLLOWING:

For the most up to date information regarding West Virginia University’s multidisciplinary neuroscience degree program and activities, please visit the web site at http://www.hsc.wvu.edu/wvucn/


Cognitive Neuroscience: sound recognition, spatial hearing and sensory integration using fMRI, use-dependent plasticity in motor cortex after stroke, neurogenic communication disorders.

Neural Injury: functional and structural integrity of the blood brain barrier in health and disease, role of neuroinflammation in CNS pathologies, stroke pathophysiology and neuroprotection.

Behavioral Neuroscience: airway innervation and asthma, structural and functional changes in the hypothalamus of seasonal breeders, neurobiological pathways controlling food intake and obesity, plasticity in the amygdala, development of new compounds to treat neurological and psychiatric disorders, developmental aspects of sleep and sleep disorders, molecular psychopharmacology; learning, memory, and synaptic plasticity; signal transduction pathways involved in neurodegenerative and neuropsychiatric disorders.

Interdisciplinary research projects include: structure and transcriptional mechanisms controlling neural gene expression, molecular biology and molecular genetics of neural degeneration and regeneration in the central nervous system; developmental neurochemistry and environmental influences on brain development, especially nutrition; neuroanatomy and neurophysiology of somatosensory and auditory systems, structural plasticity of astrocytes and modulation of synaptic contacts in the central nervous system, developmental neurobiology of anxiety disorders, development of synaptic connections in the neocortex, developmental genetics of rodent behavioral mutants; neural basis of pulmonary diseases, especially asthma and occupational/environmental diseases; mechanisms regulating microcirculation under pathophysiological conditions.

Seminars and Journal Clubs

Students develop skills in formal presentation, critical thinking, and scientific analysis by participating in neuroscience seminars and journal clubs.

FACULTY

GRADUATE PROGRAM DIRECTOR

• Albert Berrebi - Ph.D. (University of Connecticut)

Ph.D. Candidacy

To be admitted to candidacy for the Ph.D. degree, the student must pass a preliminary examination and present a plan for the dissertation research project for approval by the candidate’s advisory committee.
Ph.D. Dissertation

To be recommended for the Ph.D. degree, each student must satisfactorily complete a dissertation based on original research and defend the dissertation at an oral examination. Success in the dissertation research is the core of the degree.

BIOMEDICAL SCIENCES INTEGRATED CORE CURRICULUM

NOTE: The graduate curriculum is finalized with a plan of study once the mentor and laboratory have been selected in the second year. The plan of study developed by the graduate committee, in consultation with the student, is the definitive curriculum necessary for award of the graduate degree. The courses listed below include the required courses of the undifferentiated first year and a representation of electives necessary for the student to finalize their plan of study. As the student enters years 3-5 of their graduate education and transfers most of their study to work in the laboratory of their doctoral mentor, repetitive enrollments in research, seminars and colloquia are typical and will determine total hours necessary for degree completion.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMS 700</td>
<td>Scientific Integrity</td>
<td>1</td>
</tr>
<tr>
<td>BMS 705</td>
<td>Cell Structure/Metabolism</td>
<td>1-4</td>
</tr>
<tr>
<td>BMS 710</td>
<td>Fund Integrated Systems</td>
<td>1-4</td>
</tr>
<tr>
<td>BMS 715</td>
<td>Molecular Genetics</td>
<td>1-3</td>
</tr>
<tr>
<td>BMS 720</td>
<td>Scientific Writing</td>
<td>2</td>
</tr>
<tr>
<td>BMS 791</td>
<td>ADTP:Biomedical Sci Rotations</td>
<td>1-6</td>
</tr>
<tr>
<td>BMS 796</td>
<td>Graduate Seminar</td>
<td>1</td>
</tr>
<tr>
<td>BMS 797</td>
<td>Research</td>
<td>1-6</td>
</tr>
<tr>
<td>BMS 799</td>
<td>Graduate Colloquium</td>
<td>1-6</td>
</tr>
</tbody>
</table>

Electives from at least TWO of the courses below

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMS 730</td>
<td>Cancer Cell Biology</td>
<td>2-3</td>
</tr>
<tr>
<td>BMS 732</td>
<td>Cardiovasc/Respirat Biol</td>
<td>3</td>
</tr>
<tr>
<td>BMS 734</td>
<td>Cell Signaling Metabolism</td>
<td>3</td>
</tr>
<tr>
<td>BMS 736</td>
<td>Immunology &amp; Microbial Patho</td>
<td>3</td>
</tr>
<tr>
<td>BMS 738</td>
<td>Muscle Structure/Function</td>
<td>2-3</td>
</tr>
<tr>
<td>BMS 740</td>
<td>Neuroscience 2</td>
<td>2-3</td>
</tr>
<tr>
<td>BMS 793</td>
<td>SPTP:Transltnl Cardiovsclr Sci</td>
<td>1-6</td>
</tr>
</tbody>
</table>

NEUROSCIENCE CURRICULUM

The requirements for graduation with the doctoral degree are ultimately set forth in the student’s plan of study. These requirements will be determined in consultation with the doctoral mentor and approved by the graduate committee. As the student moves into years three through five of graduate coursework, multiple enrollments in the following courses are typical.

Required each semester beginning Year 2

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>NBAN 793</td>
<td>Special Topics</td>
</tr>
<tr>
<td>NBAN 795</td>
<td>Independent Study</td>
</tr>
<tr>
<td>NBAN 796</td>
<td>Graduate Seminar</td>
</tr>
<tr>
<td>NBAN 797</td>
<td>Research</td>
</tr>
</tbody>
</table>

JOURNAL CLUB

Students are required to enroll in the Journal Club each semester. The course involves presentation and discussion of current research papers and will help acquaint students with the variety of methods used in scientific research.

DOCTORAL RESEARCH

Students will work with a dissertation advisor during time in the program. Students register for research credits each semester, and their performance is graded by their dissertation advisor.

PH.D. CANDIDACY AND DISSERTATION

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 is completed during the third year of study.
DISSERTATION PREPARATION, SEMINAR, AND DEFENSE

The final examination for the PhD 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 PhD.

COURSES

**NBAN 701. Advanced Gross Anatomy. 2-6 Hours.**
PR: NBAN 703 or NBAN 724 and Consent. Morphological and functional analysis of a selected region, with dissection.

**NBAN 703. Human Structure. 1-17 Hours.**
PR: Admission to medical school or medical basic science graduate program or consent. Integrated approach combining human gross anatomy, microanatomy and embryology. Includes human cadaver dissection, microscopic anatomy of cells, tissues and organs with application to human health and disease.

**NBAN 705. Microanatomy. 5 Hours.**
PR: Admission to medical basic science graduate program or consent. Study of cells, tissues, and organs.

**NBAN 706. Advanced Neuroanatomy. 2-4 Hours.**
PR: Consent. Detailed study of selected areas of the nervous system.

**NBAN 712. Special Topics in Anatomy. 2-4 Hours.**
PR: Consent. Different topics of current interest in anatomy that are not included in the regular graduate courses.

**NBAN 714. Applied Anatomy. 2-6 Hours.**
PR: Consent. Detailed study of anatomy, adapted to the needs of the individual student.

**NBAN 716. Craniofacial Growth Maturation. 1 Hour.**
PR: Consent. The current concepts of craniofacial growth and maturation are presented and integrated for application to clinical problems.

**NBAN 718. Dental Histology. 6 Hours.**
PR: Dental student standing or consent of instructor or chairperson. Cells, tissues, organs. Structure, function, and development of oral tissues.

**NBAN 719. Advanced Head and Neck Anatomy. 1 Hour.**
PR: Admission to medical, dental or basic science graduate programs, or consent. Head and neck craniofacial anatomy as it applies to specialties in dental or medical practice.

**NBAN 724. Human Gross Anatomy. 7 Hours.**
PR: Admission to dental school or medical basic science graduate program or consent. Human anatomy including cadaver dissection for dental students. (4 hr. lec., 3 hr. lab.).

**NBAN 751. Advanced Microanatomy/Organology. 2-4 Hours.**
PR: NBAN 705 or NBAN 709 and Consent. An extension of the major topics included in NBAN 705 or 709. Special emphasis on recent contributions.

**NBAN 790. Teaching Practicum. 1-3 Hours.**
PR: Consent. Supervised practice in college teaching of anatomy. 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 S/U.).

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

**NBAN 792A-Z. Directed Study. 1-6 Hours.**
Directed study, readings, and/or research.

**NBAN 793A-Z. Special Topics. 1-6 Hours.**
A study of contemporary topics selected from recent developments in the field.

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

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

**NBAN 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.

**NBAN 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.).
NBAN 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.

NBAN 799. Graduate Colloquium. 1-6 Hours.
PR: Consent. For graduate students not seeking coursework 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.

NBAN 801. Human Structure. 19 Hours.
Integrated approach combining human gross anatomy, microanatomy and embryology. Includes human cadaver dissection, microscopic anatomy of cells, tissues and organs with application to human health and disease.