NEUROBIOLOGY, PHYSIOLOGY, & BEHAVIOR, BACHELOR OF SCIENCE

College of Biological Sciences

The Neurobiology, Physiology, & Behavior Major Program

Neurobiology, Physiology, & Behavior (NPB) is a major that emphasizes the understanding of vital functions common to all animals. All animals perform certain basic functions—they grow, reproduce, move, respond to stimuli, and maintain homeostasis. The physiological mechanisms upon which these functions depend are precisely regulated and highly integrated. Actions of the nervous and endocrine systems determine behavior and the interaction between organisms and their physical and social environments. Students in this major study functional mechanisms; the control, regulation, and integration of these mechanisms; and the behavior that relates to those mechanisms. They do so at the level of the cell, the organ system, and the organism.

The Program

In the freshman and sophomore years, students majoring in Neurobiology, Physiology, & Behavior build a broad scientific background, taking courses in chemistry, biology, physics, and mathematics. As juniors or seniors, students can enroll in a variety of Neurobiology, Physiology, & Behavior courses and related upper division courses. The NPB major contains three tracks: the Neurobiology track, the Physiology track, and the Organism-Environmental Interactions track. If you wish to propose an alternative to these tracks for yourself, please meet with your Biology Academic Success Center (BASC) advisor who can approve such individualized plans. Students can also participate in a number of advanced laboratory courses or may design an individual, independent project guided by a member of the faculty.

Career Alternatives. Completion of the Neurobiology, Physiology, & Behavior major provides the foundation for advanced study leading to careers in high school teaching, college level teaching or research. It also serves as the basis for further training in the health professions, including but not limited to human and veterinary medicine, medical technology, physical therapy, pharmacy, nursing, dentistry, and optometry. The major is also appropriate for those intending to seek careers in biotechnology or other biologically related industries.

Graduate Study

Information on graduate study in neuroscience, physiology or behavior may be obtained by writing the Graduate Advisor, College of Biological Sciences, Graduate Academic Programs. See also the graduate course offerings listed under Animal Behavior (Graduate Group), Molecular, Cellular, & Integrative Physiology (Graduate Group), and Neuroscience. See also Graduate Studies (http://gradstudies.ucdavis.edu/).

Faculty Advisors

William DeBello, Ph.D., Lee Miller, Ph.D.

Advising

Biology Academic Success Center (BASC) (https://basc.biology.ucdavis.edu/) in 1023 Sciences Laboratory Building; 530-752-0410.

<table>
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<tr>
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 Chemistry

Choose the 002 series or 004 series: 1

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<td>CHE 129A &amp; CHE 129B</td>
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 Mathematics

Choose the 017 series or 021 series: 3

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<td>Calculus and Calculus</td>
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 MAT 021C | Calculus (Recommended) | 8-12   |

 Physics

Choose the 007 series or 009 series: 12-15

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<td>General Physics and General Physics and General Physics</td>
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<td>General Physics and General Physics and General Physics</td>
<td>12-15</td>
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 OR
Students may be able to complete their Physics requirement by blending the PHY 007 & PHY 009 series. For more details about how to do so and course placement, students will need to follow up with the PHY department. Students will also need to follow up with a BASC advisor to discuss their plans.

Preparatory Subject Matter Subtotal  

| Preparatory Subject Matter Subtotal | 56-70 |

### Depth Subject Matter

#### Biological Science

<table>
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<tr>
<th>Course</th>
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<tr>
<td>BIS 101</td>
<td>Genes &amp; Gene Expression</td>
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<tr>
<td><strong>or</strong> BIS 102 &amp; BIS 103</td>
<td>Structure &amp; Function of Biomolecules and Bioenergetics &amp; Metabolism</td>
<td>3-6</td>
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#### Neurobiology, Physiology, & Behavior

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<tr>
<td>NPB 110A</td>
<td>Foundations 1: From Molecules to Individuals</td>
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<tr>
<td>NPB 110B</td>
<td>Foundations 2: Neurobiology</td>
</tr>
<tr>
<td>NPB 110C</td>
<td>Foundations 3: Physiology</td>
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<tr>
<td>STA 100</td>
<td>Applied Statistics for Biological Sciences</td>
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### Laboratory Requirements

Choose 3 units of laboratory work from the track-specific list:

#### Neurobiology Track

- NPB 100L | Neurobiology Laboratory |

#### Physiology Track

- NPB 101L | Systemic Physiology Laboratory |

#### Organism-Environmental Interactions Track

- NPB 101L | Systemic Physiology Laboratory |

#### Integrative Principles Track

- NPB 100L | Neurobiology Laboratory |
**or** NPB 101L | Systemic Physiology Laboratory |

### Depth Electives

All students must do a minimum of four depth electives: three Track-Specific Depth Electives, and one Additional Depth Elective. At least two of these electives must be upper division NPB or EXB courses.

#### Track-Specific Depth Electives

Choose three Track-Specific Depth Electives from one of the following:

- Neurobiology Track (p. 3)
- Physiology Track (p. 3)
- Organism-Environmental Interactions Track (p. 3)
- Integrative Principles Track (p. 4)

#### Additional Depth Elective

Choose one Additional Depth Elective in addition to completing three Track-Specific Depth Electives. The course cannot have been used in satisfaction of any other major requirement.

- ANT 151 | Primate Evolution |
- ENT 104 | Behavioral Ecology of Insects |
- ENT 153 | Medical Entomology |
- EVE 100 | Introduction to Evolution |
- EXB 101 | Exercise Physiology |
- EXB 102 | Introduction to Motor Learning & the Psychology of Sport & Exercise |
- EXB 106 | Human Gross Anatomy |
- EXB 106L | Human Gross Anatomy Laboratory |
- EXB 110 | Exercise Metabolism |
- EXB 112 | Clinical Exercise Physiology |
- EXB 117 | Exercise & Aging in Health & Disease |
- EXB 124 | Physiology of Maximal Human Performance |
- EXB 125 | Neuromuscular & Behavioral Aspects of Motor Control |
- MIC 102 | Introductory Microbiology |
- NPB 100L | Neurobiology Laboratory |
- NPB 101L | Systemic Physiology Laboratory |
- NPB 102 | Animal Behavior |
- NPB 106 | Experiments in Neurobiology, Physiology, & Behavior: Design & Execution |
- NPB 107 | Cell Signaling in Health & Disease |
- NPB 109 | Kinesiology: Analysis & Control of Human Movement |
- NPB 113 | Cardiovascular, Respiratory, & Renal Physiology |
- NPB 114 | Gastrointestinal Physiology |
- NPB 116 | Stress Physiology in Health & Disease |
- NPB 117 | Avian Physiology |
- NPB 118 | Comparative Biomechanics |
- NPB 121 | Physiology of Reproduction |
- NPB 123 | Comparative Vertebrate Organology |
- NPB 124 | Comparative Neuroanatomy |
- NPB 128 | Comparative Physiology: Endocrinology |
- NPB 130 | Physiology of the Endocrine Glands |
- NPB 132 | Nature vs. Nurture: Physiological Interactions Among Genes, Nutrients & Health |
- NPB 133 | Genes & the Brain |
- NPB 134 | General Immunology for Physiologists |
- NPB 139 | Frontiers in Physiology |
- NPB 140 | Principles of Environmental Physiology |
- NPB 141 | Physiological Adaptation of Marine Organisms |
- NPB 141P | Physiological Adaptation of Marine Organisms/Advanced Laboratory Topics |
- NPB 150 | Advanced Animal Behavior |
- NPB 152 | Hormones & Behavior |
- NPB 157 | Advanced Physiology of Animal/Human Disease |
- NPB 159 | Frontiers in Behavior |
- NPB 161 | Developmental Neurobiology |
- NPB 162 | Neural Mechanisms of Behavior |
- NPB 163 | Systems Neuroscience |
- NPB 164 | Mammalian Vision |
- NPB 165 | Neurobiology of Speech Perception |
- NPB 168 | Neurobiology of Addictive Drugs |
- NPB 169 | Frontiers in Neurobiology |
Physics Track Depth Electives

EXB 110  Exercise Metabolism
EXB 117  Exercise & Aging in Health & Disease
EXB 124  Physiology of Maximal Human Performance
EXB 125  Neuromuscular & Behavioral Aspects of Motor Control
MMI 188A or MMI 188B  Human Immunology 3-4
PMI 126  Fundamentals of Immunology 3
MCC 150  Developmental Biology 4
NPB 106  Experiments in Neurobiology, Physiology, & Behavior: Design & Execution 3
NPB 107  Cell Signaling in Health & Disease 3
NPB 109  Kinesiology: Analysis & Control of Human Movement 4
NPB 113  Cardiovascular, Respiratory, & Renal Physiology 4
NPB 114  Gastrointestinal Physiology 3
NPB 116  Stress Physiology in Health & Disease 3
NPB 118  Comparative Biomechanics 3
NPB 121  Physiology of Reproduction 4
NPB 123  Comparative Vertebrate Organology 4
NPB 128  Comparative Physiology: Endocrinology 3
NPB 130  Physiology of the Endocrine Glands 4
NPB 132  Nature vs. Nurture: Physiological Interactions Among Genes, Nutrients & Health 3
NPB 134  General Immunology for Physiologists 3
NPB 139  Frontiers in Physiology 3
NPB 140  Principles of Environmental Physiology 3
NPB 141  Physiological Adaptation of Marine Organisms 3
NPB 141P  Physiological Adaptation of Marine Organisms/Advanced Laboratory Topics 5
NPB 152  Hormones & Behavior 3
NPB 157  Advanced Physiology of Animal/Human Disease 3
NPB 168  Neurobiology of Addictive Drugs 4

Organism-Environmental Interactions Track Depth Electives

Code  Title  Units
ANS 104  Principles & Applications of Domestic Animal Behavior 4
ANS 123  Animal Growth & Development 4
EVE 105  Phylogenetic Analysis of Vertebrate Structure 4
EVE 107  Animal Communication 4
EVE 147  Biogeography 4
NPB 100L  Neurobiology Laboratory 3
NPB 102  Animal Behavior 3
NPB 106  Experiments in Neurobiology, Physiology, & Behavior: Design & Execution 3

Neurobiology Track Depth Electives

Code  Title  Units
NBP 101L  Systemic Physiology Laboratory 3
NBP 106  Experiments in Neurobiology, Physiology, & Behavior: Design & Execution 3
NBP 107  Cell Signaling in Health & Disease 3
NBP 124  Comparative Neuroanatomy 3
NBP 136  Neural Networks & Machine Learning in Biology 4
NBP 162  Neural Mechanisms of Behavior 3
NBP 163  Systems Neuroscience 4
NBP 164  Mammalian Vision 4
NBP 165  Neurobiology of Speech Perception 3
NBP 168  Neurobiology of Addictive Drugs 4
NBP 169  Frontiers in Neurobiology 3
NBP 171  Physiology of Neuroimmune Interactions 4
NBP 172  Map Formation in the Brain 3
NBP 173  Neurobiology of Brain Disorders 3
PSC 130  Human Learning & Memory 4
PSC 135  Cognitive Neuroscience: The Biological Foundations of the Mind 4
PSC 137  Neurobiology of Learning & Memory 4

Physiology Track Depth Electives

Code  Title  Units
ANS 123  Animal Growth & Development 4
EXB 106  Human Gross Anatomy 4
EXB 106L  Human Gross Anatomy Laboratory 3
EXB 101  Exercise Physiology 4
EXB 110  Exercise Metabolism 3
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<td>Cardiovascular, Respiratory, &amp; Renal Physiology</td>
<td>4</td>
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<tr>
<td>NPB 117</td>
<td>Avian Physiology</td>
<td>3</td>
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<td>NPB 118</td>
<td>Comparative Biomechanics</td>
<td>3</td>
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<td>NPB 123</td>
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<td>NPB 140</td>
<td>Principles of Environmental Physiology</td>
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<td>NPB 141</td>
<td>Physiological Adaptation of Marine Organisms</td>
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<td>NPB 141P</td>
<td>Physiological Adaptation of Marine Organisms/Advanced Laboratory Topics</td>
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<td>NPB 150</td>
<td>Advanced Animal Behavior</td>
<td>4</td>
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<tr>
<td>NPB 152</td>
<td>Hormones &amp; Behavior</td>
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<td>NPB 159</td>
<td>Frontiers in Behavior</td>
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<td>NPB 162</td>
<td>Neural Mechanisms of Behavior</td>
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<td>PMI 126</td>
<td>Fundamentals of Immunology</td>
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<td>WFC 130</td>
<td>Physiological Ecology of Wildlife</td>
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<tr>
<td>WFC 141</td>
<td>Behavioral Ecology</td>
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**Integrative Principles Track Depth Electives**

Needs to be approved by a BASC advisor. Any three courses from any of the three NPB tracks.