### PHYSIOLOGY: Suggested Courses for 2018-2019

**Course** | **Title** | **Description** | **Quarter Offered** | **Units** | **Prereqs**  
--- | --- | --- | --- | --- | ---  
**NPB 128** | Comparative Physiology: Endocrinology | Comparison of physiological functions in the animal kingdom: animal hormones and their functions. | Fall | 3 | NPB 101/ANS 100  
**NPB 130** | Physiology of the Endocrine Glands | Advanced presentation of concepts in endocrinology with emphasis on the role of hormones in reproduction, metabolism, and disease. | Fall | 4 | NPB 101/ANS 100  

**Students should take either or both classes listed above.**

**Course** | **Title** | **Description** | **Quarter Offered** | **Units** | **Prereqs**  
--- | --- | --- | --- | --- | ---  
ANS 103 | Animal Welfare | The application of principles of animal behavior and physiology to assessment and improvement of the welfare of wild, captive, and domestic animals. Topics include animal pain, stress, cognition, motivation, emotions, and preferences; as well as environmental enrichment methods. | Winter | 4 | ANS 104 or NBP 102 or equiv.  
ANS 125 | Equine Exercise Physiology | Basic and applied physiology of the exercising horse. Includes physiological systems, gait analysis, lameness, pharmacology, sports medicine; sport horse performance evaluation and conditioning. | Winter EOY odd | 3 | NPB 101/ANS 100  
ANS 127 | Advanced Equine Reproduction | Provides in-depth knowledge of the reproductive physiology, anatomy and endocrinology of the mare and stallion. Emphasis on structure/function relationships as they are applied to improving equine reproductive management and efficiency. | Spring | 3 | NPB101/ANS100, ANS115  
ANS 198 (133) | Animal Cell Culture Laboratory | Techniques of cell culture, with emphases on cell physiology and the actions of drugs and toxicants on cultured somatic cells. Design, performance and interpretation of experiments with animal cells in vitro. | Winter | 4 | ABI102, ABI 103, NPB 101/ANS100  
ANS 170 | Ethics of Animal Use | Ethical issues relating to animal use in contemporary society. Integration of philosophical theories with scientific evidence relating to animal behavior, mentality, and welfare. Uses of animals in agriculture, research, and as companions. Ethical responsibilities regarding wildlife and the environment. | Fall, Spring | 4 | Writing Course  

EOY = “Every Other Year”

Updated 06/14/2018
<table>
<thead>
<tr>
<th>Code</th>
<th>Course Name</th>
<th>Description</th>
<th>Term</th>
<th>Units</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVS 100</td>
<td>Avian Biology</td>
<td>Survey of avian natural history and study of the diversity, functional morphology, behavior, ecology and evolution of birds.</td>
<td>Spring</td>
<td>3</td>
<td>BIS 2AB</td>
</tr>
<tr>
<td>BIS 104</td>
<td>Regulation of Cell Function</td>
<td>Membrane receptors and signal transduction; cell trafficking; cell cycle; cell growth and division; extracellular matrix and cell-cell junction; cell development; immune system.</td>
<td>All</td>
<td>3</td>
<td>BIS 101, ABI102/BIS102</td>
</tr>
<tr>
<td>ETX 103A</td>
<td>Biological Effects of Toxicants</td>
<td>Biological effects of toxic substances in living organism. Metabolism, cellular and tissue targets, mechanisms of action, and pathological effects. Not open for students who have completed course 114B.</td>
<td>Winter</td>
<td>4</td>
<td>BIS102/ABI 102, (ETX101 and NPB101 rec.)</td>
</tr>
<tr>
<td>EXB 101</td>
<td>Exercise Physiology</td>
<td>Physiologic responses to acute exercise and physiological adaptations to both chronic exercise (training) and selected environmental stresses. Emphasis on the muscular, metabolic, cardiovascular, respiratory and renal responses and adaptations to exercise.</td>
<td>Fall</td>
<td>4</td>
<td>CHE8B, BIS1A/BIS2A</td>
</tr>
<tr>
<td>EXB 111</td>
<td>Environmental Effects on Physical Performance</td>
<td>The effects of thermal, barometric and gravitational conditions on physiological function and physical performance of humans. Acute and chronic effects, emphasizing physiological adaptations and limitations, will be studied.</td>
<td>Winter</td>
<td>3</td>
<td>EXB 101 or consent of instructor</td>
</tr>
<tr>
<td>GDB 103</td>
<td>The Microbiome</td>
<td>Examination of the structure and function of microbial communities that live inside and on host organisms. Introduction to general concepts of the microbiome and microbiota, and their relationship to host health and disease.</td>
<td>Winter</td>
<td>3</td>
<td>BIS 2ABC</td>
</tr>
<tr>
<td>EVE 150</td>
<td>Evolution and Animal Development</td>
<td>Comparative analysis of animal development and the genetic basis of morphological diversification.</td>
<td>NCO</td>
<td>3</td>
<td>BIS 101, EVE 100</td>
</tr>
<tr>
<td>MCB 123</td>
<td>Behavior and Analysis of Enzyme and Receptor Systems</td>
<td>Introduction to the principles of enzyme kinetics and receptor-ligand interactions with emphasis on metabolic regulation and data analysis. Topics include simultaneous equilibria, chemical and steady-state kinetics, allosteric enzymes, multi-reactant systems, enzyme assays, membrane transport and computer-assisted simulations and analyses.</td>
<td>Fall</td>
<td>3</td>
<td>BIS103/ABI103</td>
</tr>
</tbody>
</table>

EOY = “Every Other Year”  
Updated 06/14/2018
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
<th>offerings</th>
<th>Units</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPB 100</td>
<td>Neurobiology</td>
<td>Brains and nervous systems, neurons and neural circuits. Vision, hearing, and feature extraction by the central nervous system. Development of nervous systems. Coordination of movement. The cell biology of learning and memory. Perception, cognition, and disorders of the brain.</td>
<td>All</td>
<td>4</td>
<td>BIS 2A (PHY 7AB rec.)</td>
</tr>
<tr>
<td>NPB 113</td>
<td>Cardiovascular, Respiratory, and Renal Physiology</td>
<td>An intense and advanced presentation of concepts in cardiovascular, respiratory, and renal physiology including discussion of acid-base balance.</td>
<td>Fall</td>
<td>4</td>
<td>NPB 101, CHE 8B, (PHY 7BC rec.)</td>
</tr>
<tr>
<td>NPB 114</td>
<td>Gastrointestinal Physiology</td>
<td>Gastrointestinal anatomy and physiology. Digestion, secretion, absorption, motility, comparative physiology and pathology. Strong emphasis on neural and hormonal regulation and on cellular mechanisms of secretion and absorption.</td>
<td>Fall, Summer I</td>
<td>3</td>
<td>NPB 101 (BIS103/ABI 103 rec.)</td>
</tr>
<tr>
<td>NPB 117</td>
<td>Avian Physiology</td>
<td>Physiology of the various systems of birds with emphasis on digestion, respiration, excretion, and endocrine systems.</td>
<td>Fall</td>
<td>3</td>
<td>BIS 2AB, CHE 2B; NPB101/ANS 100 rec.</td>
</tr>
<tr>
<td>NPB 123/ APC 100</td>
<td>Comparative Vertebrate Organology</td>
<td>Functional anatomy of major organ systems in vertebrates. Each system examined from cellular to gross level in fish, birds, and mammals. Emphasis on how differentiated cell types are integrated into tissues and organs to perform diverse physiological functions.</td>
<td>Fall</td>
<td>4</td>
<td>BIS 2AB</td>
</tr>
<tr>
<td>NPB 124/ PSC 124</td>
<td>Comparative Neuroanatomy</td>
<td>Overview of the Neuroanatomy of the nervous system in a variety of mammalian and non-mammalian vertebrates. Examine changes of modifications to neural structures as a result of morphological or behavioral specializations.</td>
<td>Winter</td>
<td>4</td>
<td>PSC 101 or NPB 101</td>
</tr>
<tr>
<td>NPB 132</td>
<td>Nature vs. Nurture: Physiological Interactions Among Genes, Nutrients, and Health</td>
<td>Biochemical, physiological, genetic, and nutritional causes of important medical problems such as obesity, anorexia, heart disease, and diabetes.</td>
<td>Fall</td>
<td>3</td>
<td>BIS 2A or consent</td>
</tr>
<tr>
<td>NPB 140</td>
<td>Principles of Environmental Physiology</td>
<td>Physiological aspects of interactions of organisms and environmental, cellular, system, and organismal levels. Emphasis on regulatory responses/mechanisms to thermal, pressure, gravity and light environmental variables. Not open for credit to students who have completed course 148.</td>
<td>Winter</td>
<td>3</td>
<td>NPB 101 (BIS 102/ABI 102 rec.)</td>
</tr>
</tbody>
</table>

EOY = “Every Other Year”  
Updated 06/14/2018
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
<th>Term</th>
<th>Units</th>
<th>Corequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPB 152/</td>
<td>Hormones and Behavior</td>
<td>Endocrine physiology with an emphasis on the principles of behavior. Fundamental relationships between hormones and various behaviors engaged in the organism during its lifetime. Role of hormones in behavioral homeostasis, social behavior, adaptation to stress.</td>
<td>Spring, Summer I</td>
<td>3</td>
<td>NPB 101/ANS100, NPB 102 or PSC 101</td>
</tr>
<tr>
<td>PSC 123</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPB 161</td>
<td>Developmental Neurobiology</td>
<td>Issues, theoretical concepts, and methodologies in developmental neurobiology. Topics include prenatal and postnatal differentiation of neurons, and plasticity in the mature and aging brain. Integration of neurochemical, structural, physiological and behavioral perspectives.</td>
<td>Winter</td>
<td>3</td>
<td>NPB 100 or NPB 101</td>
</tr>
<tr>
<td>NPB 168</td>
<td>Neurobiology of Addictive Drugs</td>
<td>Neurobiological basis for the effects and mechanisms of action of drugs with addictive potential, including opiates (morphine, heroin, methadone), amphetamines, cocaine, nicotine, marijuana (cannabinoids), alcohol, caffeine, and mind-altering drugs such as LSD and antidepressants.</td>
<td>Spring, Summer I</td>
<td>4</td>
<td>NPB 100 or NPB 101 or equiv.</td>
</tr>
<tr>
<td>NUT 122</td>
<td>Ruminant Nutrition and Digestive Physiology</td>
<td>Study of nutrient utilization as influenced by the unique aspects of digestion and fermentation in ruminants, both domestic and wild. Laboratories include comparative anatomy, feed evaluation, digestion kinetics using fistulated cows, computer modeling, and microbial exercises.</td>
<td>Spring</td>
<td>4</td>
<td>ABI 103/BIS 103, BIS 2C, NPB 101/ANS 100 (MAT16B rec.)</td>
</tr>
<tr>
<td>NUT 123</td>
<td>Comparative Animal Nutrition</td>
<td>Comparative nutrition of animals; including laboratory, companion, zoo, and wild animals. Digestion and metabolic adaptations required for animal species to consume diverse diets ranging from grasses and leaves to nectar to insects and meat. Relation of nutrition to metabolic adaptations and physiological states, including growth, reproduction, and diseases.</td>
<td>Spring</td>
<td>3</td>
<td>ABI 103/BIS 103</td>
</tr>
<tr>
<td>NUT 123L</td>
<td>Comparative Animal Nutrition Laboratory</td>
<td>Laboratory exercises leading to written reports on establishment of nutritional requirements and formulation of complete diets for laboratory, companion, zoo and wild animals.</td>
<td>Spring</td>
<td>1</td>
<td>ABI 103/BIS 103, NUT 123 (conc. ok)</td>
</tr>
</tbody>
</table>

EOY = “Every Other Year”
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
<th>Term</th>
<th>Units</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMI 126</td>
<td>Fundamentals of Immunology</td>
<td>Overview of immunology including components of the immune system, initiation and regulation of the immune response, infection and immunity, hypersensitivity and immune dysfunction. Clinical immunologic techniques, immunodeficiency and vaccinology.</td>
<td>Winter</td>
<td>3</td>
<td>BIS 102/ABI 102 or consent</td>
</tr>
<tr>
<td>PSC 121</td>
<td>Physiological Psychology</td>
<td>Relationship of brain structure and function to behavior, motivation, emotion, language, and learning in humans and other animals. Methodology of physiological psychology and neuroscience. **Pass 1 major restricted.</td>
<td>All</td>
<td>4</td>
<td>PSC 1, PSC 41, PSC 101</td>
</tr>
<tr>
<td>VMB 101Y</td>
<td>Principles of Pharmacology and Toxicology</td>
<td>This <strong>hybrid</strong> course provides training in core concepts of pharmacological and toxicological sciences. Develop higher-order problem solving and critical thinking skills.</td>
<td>Spring</td>
<td>3</td>
<td>Upper Div standing, CHE 8AB, BIS 2ABC</td>
</tr>
<tr>
<td>VMB 101V</td>
<td>Principles of Pharmacology and Toxicology</td>
<td>This <strong>virtual</strong> course provides training in core concepts of pharmacological and toxicological sciences. Develop higher-order problem solving and critical thinking skills.</td>
<td>Fall</td>
<td>3</td>
<td>Upper Div standing, CHE 8AB, BIS 2ABC</td>
</tr>
</tbody>
</table>