PHYSIOLOGY  
Department of Physiology  
College of Natural Science

101 Frontiers in Physiology  
Spring. 1(1-0) R: Open to freshmen or sophomores in the College of Natural Science or in the Lyman Briggs College. 
Introduction to the field of physiology and recent trends in physiological research, including an overview of biomedical careers. Campus and Internet resources to achieve academic success and career goals.

250 Introductory Physiology  
Fall, Spring, Summer. 4(4-0) R: Not open to students in the Physiology major. Not open to students with credit in PSL 310. 
Function, regulation, and integration of organs and organ systems of higher animals emphasizing human physiology.

310 Physiology for Pre-Health Professionals  
Fall, Spring, Summer. 4(4-0) P: BS 161 or BS 181H or LB 145 or ANTR 350 
Not open to students with credit in PSL 431.
Human organ system physiology with clinical applications for students entering health care fields.

311L Physiology Laboratory for Pre-Health Professionals  
Fall, Spring, Summer. 4(4-0) P: (CEM 142 or CEM 152 or CEM 182H or LB 172) and ((PSL 310 or concurrently) or (PSL 432 or concurrently)) R: Not open to freshmen. 
Laboratory exercises in human and animal physiology, including neural, sensory, muscle, cardiovascular, and urinary function, with an emphasis on the integration of physiological systems. Laboratory exercises relevant for pre-health students and the development of data analysis and problem solving skills.

331 Concepts and Critical Thinking in Physiology  
Fall, Spring. 3(3-0) P: BS 161 or BS 181H or LB 145.RB: (PSL 101) and (BS 162 or BS 182H or LB 144) R: Open to sophomores or juniors in the Physiology Major or in the Lyman Briggs Physiology Coordinate Major. 
Approval of department.
Knowledge, skills, and approaches necessary to create deep understanding of biological concepts for success in advanced physiology courses

425 Physiological Biophysics  
Fall, Spring. 3(3-0) P: PSL 250 or PSL 310 or (PSL 431 and PSL 432) RB: First semester calculus. 
The quantitative physical phenomena underlying kinetics and equilibria of physiological processes.

431 Human Physiology I  
Fall. 4(4-0) P: (BS 161 or BS 181H or LB 145) and (CEM 142 or CEM 152 or CEM 182H or LB 172)RB: BS 162 or BS 182H or LB 144 R: Open to juniors or seniors. 
Molecular basis of physiological control systems, physiology of excitable cells, autonomic nervous system, function and regulation of cardiovascular and respiratory systems.

432 Human Physiology II  
Spring. 4(4-0) P: (BS 161 or BS 181H or LB 145) and (CEM 142 or CEM 152 or CEM 182H or LB 172) and PSL 431 RB: BS 162 or BS 182H or LB 144 R: Open to juniors or seniors. 
Continuation of PSL 431. Function and regulation of the digestive, endocrine, renal, and reproductive systems. Integration of physiological responses.

450 Physiology in Health and Disease  
Fall. 3(3-0) P: (PSL 431 and PSL 432) and Completion of Tier I Writing Requirement R: Open to juniors or seniors in the Lyman Briggs Physiology Coordinate Major or in the Physiology major. 
Advanced topics in normal and abnormal physiology, chronic diseases, disease progression, and animal models of disease.

460 Topics in Physiology (W)  
Fall, Spring. 4(4-0) A student may earn a maximum of 4 credits in all enrollments for this course. P: (PSL 431 and (PSL 432 or concurrently)) and completion of Tier I writing requirement R: Open to seniors in the Physiology Major or in the Lyman Briggs Physiology Coordinate Major. 
In-depth exploration of contemporary areas of physiology and human disease, emphasizing scientific literacy and effective written and oral communication.

475L Capstone Laboratory in Physiology  
Fall, Spring. Summer. 2(1-3) P: (PSL 431) and completion of Tier I writing requirement R: Open to seniors in the Physiology Major or in the Lyman Briggs Physiology Coordinate Major. 
Laboratory exercises in human and animal physiology, including cardiovascular, respiratory, neural, muscle, sensory, and hormonal function, as well as systems physiology studies in exercise and systemic reflexes.

480 Special Problems in Physiology  
Fall, Spring, Summer. 1 to 2 credits. A student may earn a maximum of 8 credits in all enrollments for this course. RB: (PSL 431 and PSL 432) and completion of Tier I Writing requirement R: Open to undergraduate students in the Physiology Major. 
Approval of department. 
Independent study under the supervision of a faculty member.

490 Independent Research in Physiology  
Fall, Spring, Summer. 1 to 2 credits. A student may earn a maximum of 8 credits in all enrollments for this course. RB: PSL 431 and PSL 432 R: Open to undergraduate students in the Physiology Major. 
Supervised laboratory research in physiology under the direction of a faculty member.

499 Physiology Senior Research Thesis  
Fall, Spring, Summer. 2 to 8 credits. A student may earn a maximum of 8 credits in all enrollments for this course. A student may earn a maximum of 12 credits combined between PSL 480 and PSL 490 and PSL 499. R: Open to seniors in the Physiology Major or in the Lyman Briggs Physiology Coordinate Major. 
Approval of department; application required.
Independent research with faculty supervision culminating in a thesis.

535 Cell Biology and Physiology II  
Spring. 4 credits. Interdepartmental with Human Anatomy and Biochemistry and Molecular Biology. 
Modern concepts of cell biology as a basis for understanding the physiology of human tissues and organ systems in health and disease. Continuation of PSL 534.

539 Principles of Cell Biology and Pathophysiology  
Fall. 4(3-2) Interdepartmental with Human Anatomy and Biochemistry and Molecular Biology and Microbiology and Molecular Genetics. 
Modern concepts of human cell biology as a basis for understanding integration of structure (histology) and function (physiology) in health and disease (pathology). Introduction to adaptive growth response, cell injury, inflammation, hemodynamic disorders, and tissue repair.

552 Medical Neuroscience  
Spring. 4 credits. Interdepartmental with Human Anatomy and Neurology and Ophthalmology and Radiology. 
Modern concepts of human cell biology as a basis for understanding integration of structure (histology) and function (physiology) in health and disease (pathology). Introduction to adaptive growth response, cell injury, inflammation, hemodynamic disorders, and tissue repair.

611 Research Problems in Physiology Clerkship  
Fall, Spring, Summer. 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. RB: (PSL 511) and Completion of Semester 5 in the graduate professional program in the College of Veterinary Medicine. 
Individual work on a research problem.
<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
<th>Credits</th>
<th>Schedule</th>
<th>Prerequisites</th>
<th>Description</th>
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<tbody>
<tr>
<td>803</td>
<td>Molecular, Cellular and Developmental Neuroscience II</td>
<td>3</td>
<td>Spring</td>
<td>Interdepartmental with Neuroscience. Administered by Neuroscience. RB: B.S., B.A. or M.S. degree in the biological or psychological sciences. R: Open to graduate students in the Program in Neuroscience. Approval of department. Electrical and intra- and extracellu lar signaling mechanisms of neurons and glia in health and disease in the developing and mature nervous system.</td>
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<tr>
<td>813</td>
<td>Molecular Mechanism of Human Disease and Targeted Therapies</td>
<td>3</td>
<td>Fall</td>
<td></td>
<td>Mechanisms and pathways underlying human disease and therapeutic strategies.</td>
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<tr>
<td>825</td>
<td>Cell Structure and Function</td>
<td>3</td>
<td>Spring</td>
<td>Interdepartmental with Biochemistry and Molecular Biology and Microbiology and Molecular Genetics. Administered by Biochemistry and Molecular Biology. RB: BMB 401 or BMB 461. SA: BCH 825</td>
<td>Molecular basis of structure and function. Cell properties: reproduction, dynamic organization, integration, programmed and integrative information transfer. Original investigations in all five kingdoms.</td>
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<tr>
<td>827</td>
<td>Physiology and Pharmacology of Excitable Cells</td>
<td>4</td>
<td>Fall, Spring</td>
<td>Interdepartmental with Integrative Biology and Neuroscience and Pharmacology and Toxicology. Administered by Pharmacology and Toxicology. R: Open to graduate students in the College of Natural Science or in the Department of Pharmacology and Toxicology or approval of department.</td>
<td>Function of neurons and muscle at the cellular level: membrane biophysics and potentials, synaptic transmission, sensory nervous system function.</td>
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<tr>
<td>828</td>
<td>Cellular and Integrative Physiology I</td>
<td>3</td>
<td>Spring</td>
<td></td>
<td>Cellular physiology as basis for understanding integrative functions of various body systems, including nervous, cardiovascular, respiratory, urinary, muscle and kidney.</td>
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<tr>
<td>829</td>
<td>Cellular and Integrative Physiology II</td>
<td>3</td>
<td>Fall</td>
<td>PSL 828</td>
<td>Cellular physiology as basis for understanding functions of various body systems including blood, blood cells, endocrine, reproductive and gastrointestinal.</td>
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<tr>
<td>839</td>
<td>Systems Neuroscience</td>
<td>4</td>
<td>Spring</td>
<td>Interdepartmental with Human Anatomy and Integrative Biology and Neuroscience and Pharmacology and Toxicology and Psychology. Administered by Neuroscience. R: Open to graduate students or human medicine students or osteopathic medicine students in the College of Natural Science or in the College of Agriculture and Natural Resources or in the College of Human Medicine or in the College of Osteopathic Medicine or in the College of Social Science or in the College of Veterinary Medicine. SA: ANT 839</td>
<td>Anatomy, pharmacology, and physiology of multicellular neural systems. Sensory, motor, autonomic, and chemo-regulatory systems in vertebrate brains.</td>
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<td>899</td>
<td>Master's Thesis Research</td>
<td>1-6</td>
<td>Fall, Spring, Summer</td>
<td>Master's students in the Physiology major.</td>
<td>A student may earn a maximum of 36 credits in all enrollments for this course. R: Open to master's students in the Physiology major. Master's thesis research.</td>
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<td>950</td>
<td>Topics in Physiology</td>
<td>1-3</td>
<td>Fall, Spring, Summer</td>
<td>Approval of department.</td>
<td>Classical and modern concepts in selected areas of physiology.</td>
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<td>980</td>
<td>Problems in Physiology</td>
<td>1-4</td>
<td>Fall, Spring, Summer</td>
<td>Approval of department.</td>
<td>Individual research problems in physiology.</td>
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<td>999</td>
<td>Doctoral Dissertation Research</td>
<td>1-24</td>
<td>Fall, Spring, Summer</td>
<td>Open to graduate students in the Physiology major.</td>
<td>A student may earn a maximum of 36 credits in all enrollments for this course. R: Open to graduate students in the Physiology major. Doctoral dissertation research.</td>
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