

# HEALTH AND HUMAN PHYSIOLOGICAL SCIENCES

## Department Overview

The Health and Human Physiological Sciences major comprises the study of physiology and the ways in which it impacts human health and performance. Course work and research emphasize an understanding of the interplay between environmental factors, nutrition, exercise, and disease on human function, as well as the physiological mechanisms regulating human health and performance. Bolstering our progressive curriculum is a commitment to integrating knowledge from the molecular to the public health level, across all physiological systems. This is accomplished by utilizing state-of-the-art facilities and working with students as collaborators to conduct nationally and internationally recognized research. Our integrative approach to physiology provides a foundation for our students as they pursue graduate studies or embark on careers in the health professions or in biomedical research.

*Chair of the Department of Health and Human Physiological Sciences:* T.H. Reynolds

Professors: Paul Arciero, Patricia Fehling, Thomas H. Reynolds, Jeffrey Segrave, Denise Smith

Associate Professor: Stephen Ives

Visiting Assistant Professors: Justin DeBlauw, Christopher Kotarsky

Senior Instructor: Karen Arciero

Lecturer: Sue D'Isabel

Research Associates: Catherine Anderson-Hanley, Thomas Rowland

## Health and Human Physiological Sciences B.S.

Fulfill the General College Requirements

Code	Title	Hours
<b>Required Health and Human Physiological Sciences Courses</b>		
HP 111	Introduction to Exercise Physiology	4
HP 126	Human Anatomy and Physiology I	4
HP 127	Human Anatomy and Physiology II	4
HP 131	Introduction to Public Health	3
HP 241	Exercise Testing and Prescription	4
or HP 255	Research Techniques in Health and Human Physiology	
HP 242	Principles of Nutrition for Health and Performance	3
HP 311	Advanced Exercise Physiology	4
HP 355	Research Design	4
Select one of the following:		
HP 312	Cellular Aspects of Skeletal Muscle Physiology and Metabolism	
HP 313	Integrative Physiology of Adipose Tissue	
HP 314	Applied Anatomy and Kinesiology	
HP 315	Cardiovascular Physiology in Health and Disease	
HP 316	The Physiology of Aging	
HP 317	Clinical Cardiovascular Disease	

HP 318	Human Endocrine Physiology	
HP 351	Topics in Health and Human Physiological Sciences	
<b>Additional Requirements</b>		
CH 125	Principles of Chemistry (preferably in the first year)	4
MS 204	Statistical Methods	4
<b>Total Hours</b>		<b>42</b>

The Department of Health and Human Physiological Sciences recommends that students have CPR certification by the end of the second year.

Students interested in professional courses of study at the graduate level should consult with the chair of the department so that the necessary biology, chemistry, physics, psychology, and other prerequisites become part of the four-year curriculum plan.

## Health and Human Physiological Sciences Minor

The minor consists of six courses to include:

Code	Title	Hours
HP 111	Introduction to Exercise Physiology	4
HP 126	Human Anatomy and Physiology I	4
HP 127	Human Anatomy and Physiology II	4
HP 241	Exercise Testing and Prescription	4
or HP 255	Research Techniques in Health and Human Physiology	
HP 242	Principles of Nutrition for Health and Performance	3
HP 311	Advanced Exercise Physiology	4
<b>Total Hours</b>		<b>23</b>

## Honors

To be considered for honors in Health and Human Physiological Sciences, students must meet the College GPA requirement of 3.0 overall and 3.5 in the major. Students must also receive a grade of at least A- in HP 375 Senior Research in Health and Human Physiological Sciences.

## Course Listing

### HP 111 - Introduction to Exercise Physiology

Credits: 4

An introduction to the scientific basis of physical activity. Emphasis is placed upon the study of the physiological change and adaptations that occur as a result of the stress of exercise. Students will be active participants in laboratory experiments that examine the body's response to exercise.

**Note(s):** Three hours of lecture, two hours of laboratory per week. Fulfills Natural Sciences requirement; fulfills Scientific Inquiry requirement.

### HP 115 - Kinetic Anatomy: The Moving Body

Credits: 4

An introduction to the principles of functional anatomy. Students will explore the muscles enabling human movement. Geared to students interested in careers in the health professions, this course covers physiology, gross anatomy, and biomechanics.

**Note(s):** Fulfills Natural Sciences requirement.

**HP 126 - Human Anatomy and Physiology I**

Credits: 4

Students will actively study the structure and function of the human body. Students will acquire an understanding of fundamental principles of biochemistry, cell biology, and histology, as well as the integumentary, skeletal, muscular, and nervous systems. Students will explore the interdependence of structure and function at both the cellular and system level.

**Note(s):** Three hours of lecture, two hours of lab per week. Fulfills Natural Sciences requirement; fulfills Scientific Inquiry requirement.

**HP 127 - Human Anatomy and Physiology II**

Credits: 4

A continuation of the study of the structure and function of the human body. Students will study the circulatory, respiratory, digestive, urinary, endocrine, immune, and reproductive systems. Emphasis is placed on understanding the interrelationships among the body systems and their role in maintaining homeostasis. Three hours of lecture, two hours of lab per week.

**Prerequisites:** HP 126

**Note(s):** Fulfills natural sciences requirement; fulfills scientific inquiry.

**HP 131 - Introduction to Public Health**

Credits: 3

Introduction to the principles and practices of public health, emphasizing the prevention of disease and promotion of health and well-being. Using a case-study framework, students will explore both the historical and current roles of public health, and will investigate basic epidemiological concepts including study design, rates, causation, and surveillance. Environmental, behavioral, biological, and socioeconomic determinants of health will be explored, and students will study both health issues that impact larger society and those that threaten vulnerable populations.

**HP 241 - Exercise Testing and Prescription**

Credits: 4

Exploration of the theoretical and applied aspects of exercise testing and exercise prescription. Students will study the role of exercise testing in predicting disease, assessing fitness level, and prescribing exercise programs. Attention will be given to the development of appropriate exercise prescriptions to various populations.

**Prerequisites:** HP 111.

**Note(s):** Not for liberal arts credit.

**HP 242 - Principles of Nutrition for Health and Performance**

Credits: 3

A theoretical and applied study of human nutrition. Particular emphasis will be placed on the metabolism of the macro- and micronutrients and the nutrient requirements of various populations (young and old, sedentary and active, healthy and unhealthy). The goals of this course are to describe and calculate nutritional requirements and to gain an understanding of techniques of body composition analysis, energy expenditure, nutritional intake, and clinical and biochemical nutritional assessments. Students will apply the nutrition principles learned in the course to evaluate case studies and develop a full dietary analysis.

**Prerequisites:** HP 126 or HP 127.

**HP 255 - Research Techniques in Health and Human Physiology**

Credits: 3

Hands-on experiential learning in laboratory techniques commonly used in human physiology. After learning the theoretical basis for a variety of common laboratory techniques used to assess physiological function, students gain extensive hands-on experience with laboratory techniques used to measure cardiovascular function, cardiorespiratory capacity, substrate metabolism, muscular strength and power, and body composition. An integral component of this course is for students to be able to independently use these laboratory techniques to quantify the cardiovascular, respiratory, and metabolic responses to submaximal and maximal intensity exercise. Furthermore, students will write a methods section style description of all procedures and develop a "turnkey" human physiology laboratory manual that provides a step-by-step guide for each laboratory technique. Students also gain valuable experience administering health history questionnaires and informed consents for theoretical research subjects.

**Prerequisites:** HP 111, HP 126, and HP 127.

**HP 299 - Internship in Health and Human Physiological Sciences I**

Credits: 1-3

An internship opportunity for students whose curricular foundations and cocurricular experience have prepared them for professional work related to the major field. With faculty sponsorship and department approval, students may extend their educational experience into such areas as sports medicine, physical therapy, and related fields. The internship experience must take place for at least five weeks and follow the guidelines for contact hours (1 credit requires at least 45 contact hours; 2 credits requires at least 90 contact hours; 3 credits requires at least 135 contact hours).

**Prerequisites:** CPR certification may be required, depending upon the nature of the internship.

**Note(s):** Not for liberal arts credit. Must be taken S/U.

**HP 311 - Advanced Exercise Physiology**

Credits: 4

Exploration of the physiological changes in the human body that occur during physical activity as well as the structural and physiological adaptations that occur as a result of a training program. Students will be active participants in laboratories that investigate the physiological mechanisms responsible for the exercise response and training adaptations.

**Prerequisites:** HP 126, HP 127, and HP 241.

**Note(s):** Three hours of lecture, three hours of lab per week.

**HP 312 - Cellular Aspects of Skeletal Muscle Physiology and Metabolism**

Credits: 4

An analysis of skeletal muscle physiology and metabolism as it relates to exercise and health. Particular attention is given to the molecular and cellular effects of exercise and exercise mimetics on skeletal muscle metabolism. Students initially review skeletal muscle anatomy and physiology to prepare for discussion of muscle fiber types as well as the genes that regulate fiber type expression. Students will examine how muscle fiber type transformation alters whole body metabolism and gain an understanding of the metabolic pathways necessary for skeletal muscle to produce energy for contractions with a particular emphasis on post-translational regulation of enzymes responsible for energy production. Students will discuss muscle "special topics" in physiology and metabolism such as skeletal muscle hypertrophy/atrophy, signal transduction, mitochondrial biogenesis, and gene expression. An integral part of the "special topics" will involve students developing a novel research project that attempts to answer an important research question

**Prerequisites:** HP 126 or BI 105 and HP 127 or BI 106 and CH 125.

**HP 313 - Integrative Physiology of Adipose Tissue**

Credits: 4

An analysis of adipose tissue physiology and metabolism as it relates to metabolic diseases such as obesity, insulin resistance, and diabetes. Students will gain an understanding of the molecular and cellular factors that regulate adipose tissue development and function in humans. Students will interrogate adipocyte development and differentiation, cellular components of adipose tissue, types of adipocytes, adipocyte metabolism, and adipose tissue as an endocrine organ. An integral part of the course will involve student presentations of selected scientific papers and the development of a research project in an area of adipose tissue biology.

**Prerequisites:** HP 126 or BI 105 and HP 127 or BI 106 and CH 125.

**HP 314 - Applied Anatomy and Kinesiology**

Credits: 4

Advanced study of the anatomical and mechanical principles of human movement. Emphasis will be placed on the analysis of health-related movements, i.e., sitting, standing, and transitional postures, walking and running gaits, and low-back problems. Students will learn to apply these kinesiological principles to special populations including children, aged, and injured.

**Prerequisites:** HP 126 and HP 127.

**HP 315 - Cardiovascular Physiology in Health and Disease**

Credits: 4

Students will explore cardiovascular aspects of human health and disease. Students will pay particular attention to the cellular aspects of normal physiology and trained and diseased states. Students will examine both the exercise response and training adaptations of the cardiovascular system to exercise stress. Students will be expected to give specific emphasis to the neural and hormonal mechanisms responsible for regulating the cardiovascular response to dynamic exercise. Students will also examine physiological and anatomical changes to the cardiovascular system as a result of atherosclerotic heart disease, and explore ways in which exercise may help prevent and or reverse these changes.

**Prerequisites:** HP 111 and HP 127.

**HP 316 - The Physiology of Aging**

Credits: 4

An examination of the physiological consequences of aging and the importance of physical activity in maintaining function. Students will learn general theories of aging and the effects of aging on the musculoskeletal, cardiovascular, pulmonary, endocrine, and nervous systems. Students will consider age-associated changes in these physiological systems in the context of exercise as a stressor and its potential to preserve function.

**Prerequisites:** HP 111, HP 126, and HP 127.

**HP 317 - Clinical Cardiovascular Disease**

Credits: 4

Exploration of cardiovascular disease from multiple perspectives (individual, societal, public health, economic), emphasizing clinical aspects of diagnosis and treatment of cardiovascular disease and the public health issues associated with cardiovascular disease. Students will examine pathological and anatomical changes associated with atherosclerotic and hypertensive heart disease and explore ways that these disease states may be prevented, diagnosed and treated. The course will involve extensive discussion-based learning activities, guest lectures, and field trips.

**Prerequisites:** HP 111 and HP 127.

**HP 318 - Human Endocrine Physiology**

Credits: 4

A course designed to familiarize students with the fundamental principles of the human endocrine system. An emphasis is placed on the function of endocrine organs, hormones, and the regulation of growth and metabolism at target tissues. Students will integrate cellular aspects of endocrinology with whole body system physiology. Topics include general endocrine principles, the hypothalamic-pituitary axis, growth hormone and insulin like growth factors, the thyroid and parathyroid glands, the adrenal gland, the endocrine pancreas, and the reproductive system. Student will also develop an understanding of the effects of aging, disease, and exercise on endocrine physiology.

**Prerequisites:** HP126 and HP126 or BI107 and BI108.

**HP 351 - Topics in Health and Human Physiological Sciences**

Credits: 1-4

A variety of topics at the advanced level, available to students with an interest in health and physiology. Specific choice of topics will depend on student interest and background.

**Prerequisites:** HP 126, HP 127, and HP 311.

**Note(s):** The course may be offered with or without a lab.

**HP 355 - Research Design**

Credits: 4

An examination of the fundamental concepts of research design in the field of exercise science. Students will learn and practice specific research skills in exercise science. The course includes the preparation and presentation of a thesis proposal and prepares students for HP 375.

**Prerequisites:** HP 311 or concurrent enrollment in HP 311.

**Note(s):** Successful completion of this course fulfills the department's writing requirement. Open to seniors only.

**HP 371 - Independent Study in Human Physiological Sciences**

Credits: 1-3

Advanced research under guidance of a faculty member. A student may receive liberal arts credit at the discretion of both the department chair and the registrar.

**Prerequisites:** permission of the department; CPR certification may be required, depending upon the nature of the research.

**HP 375 - Senior Research in Health and Human Physiological Sciences**

Credits: 4

An opportunity for students to engage in research under the guidance of a faculty member. Students will work on a specialized topic within Exercise Science chosen in consultation with a member of the department who agrees to serve as an advisor. Students meet weekly for one hour of discussion but work individually with faculty mentors to complete their research throughout the semester. Students will present their results in the form of a written thesis and an oral presentation.

**Prerequisites:** *agreement by a faculty member to serve as a thesis advisor, completion of HP 241 and HP 311.*

**Note(s):** HP 375 may be repeated once credit. Not for liberal arts credit.

**HP 376 - Seminar**

Credits: 1

This course provides an opportunity to reflect on a Skidmore education, particularly the experience within the Human Physiological Sciences major. Students will think critically about their plans after Skidmore (short- and long-term) and reflect on how their undergraduate experience shapes their future. This will be accomplished by a variety of written assignments and presentations.

**Prerequisites:** *HP 355.*

**Note(s):** Fulfills Senior Experience Coda requirement.

**HP 399 - Internship in Health and Human Physiological Sciences II**

Credits: 1-4

Professional experience at an advanced level for juniors and seniors with substantial academic experience in the major. With faculty sponsorship and department approval, students may extend their educational experience into such areas as laboratory or clinical research, or allied health fields. The internship experience must take place for at least five weeks and follow the guidelines for contact hours (1 credit requires at least 45 contact hours; 2 credits requires at least 90 contact hours; 3 credits requires at least 135 contact hours).

**Prerequisites:** *Completion of at least one related 300-level course (as determined by the department).*

**Note(s):** Not for liberal arts credit. Must be taken S/U.