

# BIOLOGICAL AND HEALTH SCIENCES

## Overview

The Department of Biological and Health Sciences (BHS) provides Christ-centered programs of study designed to equip students for competent, effective service and stewardship in biological- and health-related fields. Students in this Department have the opportunity to choose majors in Biology, Conservation and Ecological Health (CEH), Health Science, Neuroscience, and Biochemistry and Molecular Biology (BMB; offered jointly with the Chemistry Department). Students with Biology, Health Science, or Neuroscience majors select between a Bachelor of Arts (BA) degree or a Bachelor of Science (BS) degree. CEH and BMB majors earn a BS degree. The BHS department also offers a minor in Biology. Students with specific qualifications may apply to the Biology Honors Program.

## Biology

Students of Biology learn the organization and functions of cells and genes, the diversity of living organisms, and the processes and relationships of living organisms with other organisms and their environment. Biology graduates will be prepared for participation in a wide range of professional, academic, and other types of vocations, such as teaching secondary education or continued postgraduate education leading to higher degrees for work in academia, industry, or health care professions.

Students may register for biology elective credit in courses within cooperative programs such as those offered by the Morton Arboretum or the Shedd Aquarium through the Associated Colleges of the Chicago Area (ACCA).

## Conservation and Ecological Health

Students of Conservation and Ecological Health learn about life and its processes in ecological contexts. Such knowledge prepares students to support the flourishing of life in all of its diversity. Graduates of this program will be able to participate in a variety of vocations or continue their studies in postgraduate education in fields focused on creation care.

## Health Science

Students of Health Science learn about human health and wellness from perspectives of natural, social, and behavioral sciences. This program prepares students for entry into graduate or professional schools leading to careers in medicine, public health, physical or occupational therapy, biomedical research, and others. Students may also directly enter the workforce after completing a Health Science major.

## Neuroscience

Students who complete a Neuroscience Degree will understand how the nervous system functions at all levels: from molecules and cells, to systems, to behavior and cognition, to social interactions. They will apply their understanding to a variety of issues related to neuroscience and human personhood and analyze them in a Christian framework. This program provides a strong undergraduate foundation for graduate training in neuroscience, psychobiology, clinical psychology, psychiatry, pharmacology, or psychiatric-mental health nursing.

## Biochemistry and Molecular Biology

*Offered jointly with the Chemistry Department*

Students of Biochemistry and Molecular Biology learn about chemical processes that occur between biomolecules in cells. These processes enable cells to perform their functions for the organism. Knowledge of these subcellular mechanisms prepares students for various careers and continued postgraduate education leading to higher degrees for work in academia, health care professions, or industry.

## Biology Minor

For specific details, please visit the departmental website.

## Biological and Health Science Honors Program

Students who wish to apply to the Biology Honors Program in the Spring semester of one's junior year must meet course, GPA, and research criteria. (For specific details, please visit the departmental website.)

Students who are accepted to the Honors program must fulfill the following requirements:

1. Successful completion of BIOL 499 Biology Honors Research and Seminar (2 credit hours) in the fall and spring semesters of their senior year. This course will require research conducted with a Wheaton biology professor, attendance at weekly class sessions, and presentations.
2. A written thesis evaluated in the Spring semester by the Honors student's supervising professor and a second reader (also a biology faculty member);
3. An oral defense of their research as well as their general knowledge of biology; and
4. An overall GPA of 3.5 and a 3.7 GPA in the major (including supporting courses) at the time of graduation.

All students will present their honors research in a symposium-like setting at the end of the spring semester. The departmental honors designation will appear on a student's transcript and on the printed program at graduation. All honors theses will be kept in the BHS Department and in the College library.

## Faculty

**Chair**, Associate Professor, Nathaniel Thom

**Ruth Kraft Strohschein Professor of Biology**, Kristen Page

**Professor**, Raymond Lewis, Nadine Rorem

**Associate Professors**, Brian Hunt, Jovanka Tepavcevic, Dana Townsend

**Assistant Professors**, Allison Ruark, Meredith Sommars

**Instructor/Lab Associate**, Coreen Ogilvie

**Emerita**, Nadine Rorem

## Programs

- Biochemistry and Molecular Biology Major, Bachelor of Science (<https://catalog.wheaton.edu/undergraduate/arts-sciences/bhs/biochemistry-and-molecular-biology-major-bs/>)
- Biology Major, Bachelor of Arts (<https://catalog.wheaton.edu/undergraduate/arts-sciences/bhs/biology-major-ba/>)

- Biology Major, Bachelor of Science (<https://catalog.wheaton.edu/undergraduate/arts-sciences/bhs/biology-major-bs/>)
- Biology Major with Teaching (<https://catalog.wheaton.edu/undergraduate/arts-sciences/bhs/biology-major-with-teaching/>)
- Conservation and Ecological Health Major, Bachelor of Science (<https://catalog.wheaton.edu/undergraduate/arts-sciences/bhs/conservation-and-ecological-health-major-bs/>)
- Health Science Major, Bachelor of Arts (<https://catalog.wheaton.edu/undergraduate/arts-sciences/bhs/health-science-major-ba/>)
- Health Science Major, Bachelor of Science (<https://catalog.wheaton.edu/undergraduate/arts-sciences/bhs/health-science-major-bs/>)
- Neuroscience Major, Bachelor of Arts (<https://catalog.wheaton.edu/undergraduate/arts-sciences/bhs/neuroscience-major-ba/>)
- Neuroscience Major, Bachelor of Science (<https://catalog.wheaton.edu/undergraduate/arts-sciences/bhs/neuroscience-major-bs/>)
- Philosophy Major Integrated with Biology (<https://catalog.wheaton.edu/undergraduate/arts-sciences/philosophy/integrated-philosophy-major-biology/>)
- Biology Minor (<https://catalog.wheaton.edu/undergraduate/arts-sciences/bhs/biology-minor/>)
- Departmental Honors Endorsement: Biological and Health Sciences (<https://catalog.wheaton.edu/undergraduate/arts-sciences/bhs/departmental-honors-endorsement-biological-and-health-sciences/>)
- Extended Studies in Major Endorsement: Biological and Health Sciences (<https://catalog.wheaton.edu/undergraduate/arts-sciences/bhs/extended-studies-in-major-endorsement-biological-and-health-sciences/>)
- General Studies Endorsement for Fourth-Year Majors in Biological and Health Sciences (<https://catalog.wheaton.edu/undergraduate/arts-sciences/bhs/general-studies-endorsement-for-fourth-year-majors-in-biological-and-health-sciences/>)

## Courses

See the Financial Information (<https://catalog.wheaton.edu/financial-information/>) section of this catalog for course fees.

## Biochemistry and Molecular Biology Courses

### BMB 494. Biochemistry Molecular Biology Capstone. (2 Credits)

This course focuses on the relationship between science and Christian faith from historical, philosophical and theological perspectives. It explores the practical dimensions of work and vocation. It examines interactions of science with other disciplines and ways in which these interactions contribute to flourishing. Pre or Corequisite: Senior standing.

**General Education:** SHAR

## Biological and Health Sciences Courses

### BHS 215. Principles of Exercise Physiology. (2 Credits)

This course explores fundamental concepts related to how the human body responds to acute and chronic exercise. Topics include metabolic, skeletal muscle, pulmonary, and cardiovascular. Includes labs on techniques to measure human performance and health. (Only open to Wheaton College Summer Institute students).

### BHS 252. Introduction to Biological and Health Science Research. (4 Credits)

Combines seminar and investigative laboratory approaches to focus on the processes of science. The course will include reading and discussing primary literature and reviews, and designing and conducting experiments. Three lectures, one lab. Prerequisite: BIOL 241. Additional course fee required: \$95.

### BHS 494. The Integrated Biological and Health Scientist. (2 Credits)

A senior capstone experience in which Christian perspective and biological and health science understanding are integrated to explore and better understand science, origins, environment, medicine, and ethical obligations. Offered every Fall and every Spring. Prerequisite: Senior standing, for Biology majors only.

**General Education:** SHAR

## Biology Courses

### BIOL 201. Contemporary Topics in Life Science. (4 Credits)

This course provides students with a study of concepts generally applicable to living systems, including cell structure and function, genetics, heredity, evolution, systems of the human body, and a survey of living organisms. The course is organized around recent advances in science and presents culturally relevant issues and topics for consideration and discussion. Students will be exposed to scientific vocabulary and principles while also examining the history and culture surrounding specific and recent scientific discoveries. Focus will be placed on drawing students into application and integration of science and developing the ability to engage with scientific topics in the popular culture. Three lectures and three hours laboratory. This is a course for non-science majors. Additional course fee required: \$95.

**Tags:** SIP, SP

### BIOL 241. Organization of Life: Genetics and Cell Biology. (4 Credits)

This course is a study of the basic organizational structure of living organisms, beginning with the chemical basis of life and its relationship to the higher levels of cellular organization. This course includes a systematic analysis of the roles of nucleic acids, proteins and lipids in the higher levels of biological organization. The mediation of life processes by gene expression, cell metabolism and signal transduction are considered in the context of prokaryotic populations and more complex multicellular organisms. Three lectures, three hours laboratory. Offered every Fall. Additional course fee required: \$95.

**Tags:** SP

### BIOL 242. Diversity of Life: An Introduction to Zoology and Botany. (4 Credits)

This course introduces the biology and diversity of select groups of prokaryotes, fungi, protists, plants and animals. Topics include taxonomic diversity, structure, and introductory physiology at the organ and tissue level. An introduction to plant biology studies the structure, function, and development of plants as organisms and the diversity of algae, fungi, and plants. Three lectures, three hours laboratory. Offered every Spring (main campus) and every Summer (Wheaton College Science Station in South Dakota). Additional course fee required: \$95.

### BIOL 304. Bioethics. (4 Credits)

See PHIL 304.

**Tags:** PI, SIP

**BIOL 305. Environmental Ethics. (4 Credits)**

An interdisciplinary consideration of environmental issues, exploring scientific understanding of these issues and the philosophical foundations and application of ethics to result in environmental stewardship in terms of personal and corporate responsibility. Completing a Scientific Practice (SP) course is strongly recommended.

**Tags:** PI, SIP

**BIOL 311. Reproductive Biotechnology. (4 Credits)**

This course provides an overview of various biomedical techniques that relate directly to the beginnings of human life and/or to reproductive choices or decisions. The techniques considered include various methods of birth control, different forms of assisted reproduction techniques, genetic testing, genetic engineering, and stem cell research and therapy. The course covers the basic biology of these techniques and also considers them from social, theological and ethical perspectives. May not be applied towards the Biology major. Course is offered occasionally. Prerequisite: One Scientific Practice (SP) course.

**Tags:** SIP

**BIOL 312. Contemporary Environmental Issues. (4 Credits)**

An exploration of environmental issues considering the scientific details of environmental processes and problems, the social context of people depending on the environment and human responsibility to live sustainably and care for creation. May not be applied towards the Biology major. Course is offered occasionally. Prerequisite: One Scientific Practice (SP) course.

**Tags:** SIP

**BIOL 318. Global Health. (4 Credits)**

An interdisciplinary approach to understanding the global patterns of health and disease. Students in this course will describe and analyze how ecology, social class, race and gender impact the global burden of disease. Students will also consider how our Christian call to love our neighbor impacts our response to the disparities seen in the global burden of disease. It is strongly recommended to take a Scientific Practice (SP) course first.

**Tags:** GP, SIP

**BIOL 319. Introduction to Environmental Ethics. (2 Credits)**

An interdisciplinary consideration of ethical issues in the environmental sciences. May be applied toward the legacy general education nature requirement and the Biology major. Counts as upper division science requirement under legacy general education only. Course is offered occasionally. Prerequisite: One legacy general education science laboratory course.

**BIOL 323. Introduction to Pharmacology. (4 Credits)**

A study of chemicals that affect human physiological systems and the mechanisms by which these chemicals alter cellular and molecular pathways. Class sessions will include lectures, discussion, and student presentations. Course is offered occasionally. Prerequisites: BIOL 241 and CHEM 232.

**BIOL 324. Microbiology. (4 Credits)**

The study of the biology of microorganisms will emphasize aspects unique to bacteria and archaea, and a brief overview of viruses. Topics include microbial cell structure, metabolism, physiology, genetics, taxonomy, ecology and evolution. Laboratory exercises include techniques for detecting, isolating, cultivating, quantifying, and identifying bacteria. Three lectures, three hours laboratory. Prerequisite: BIOL 241. Additional course fee required: \$95.

**BIOL 325. Immunology and Microbial Pathogenesis. (4 Credits)**

This course is a study of the molecular and cellular interactions and principles of the vertebrate immune system. Topics include immune system development, humoral and cell-mediated immunity, and the immune system in health and diseases. In addition, immunization, immunodeficiency, autoimmunity and cancer immunology will be discussed. The application of immunology techniques in both basic research and clinical settings will be explored. The immune response to microbial pathogens (bacteria, viruses, parasites) will be integrated through both lecture and primary literature discussion. Class periods will involve lectures and discussion. Prerequisite: BIOL 241.

**BIOL 326. Advanced Cellular and Molecular Biology. (4 Credits)**

An in-depth study of the types and functions of molecules associated with cells and their effects on cellular structure and function. Topics include macromolecules, energy and catalysis, cellular membranes and transport, the extracellular matrix, organelles, the cytoskeleton, the cell cycle and cancer, and cellular differentiation. Lecture and three hours laboratory. Prerequisite: BIOL 241. Additional course fee required: \$95.

**BIOL 327. Developmental Biology. (2 Credits)**

A study of the development of form and function during embryogenesis. Consideration of the mechanisms of development will include basic morphological and biochemical changes and the molecular and cellular interactions that lead to these changes. Lecture and three hours laboratory. Prerequisite: BIOL 326. Additional course fee required: \$95.

**BIOL 331. Human Anatomy and Physiology I. (4 Credits)**

Examination of human musculoskeletal, nervous, endocrine, and cardiovascular systems with an emphasis on their structure, function, and integration. Three lectures, three hours laboratory. Prerequisite: BIOL 241 and BIOL 241L or CHEM 231 and CHEM 231L. Additional course fee required: \$150.

**BIOL 332. Human Anatomy & Physiology II. (4 Credits)**

Continuation of BIOL 331. Structure, function, and integration of structure and function within the human lymphatic, immune, respiratory, digestive, renal, and reproductive systems. Integration of systems is emphasized. Three lectures, three hours laboratory. Prerequisite: BIOL 331 and BIOL 331L. Additional course fee required: \$150.

**BIOL 334. Parasitology. (2 Credits)**

Includes classification and identification of major groups of endo- and ecto-parasites. Lifecycles and ecology of parasite transmission will be emphasized. Three lectures. Prerequisite: BIOL 242.

**BIOL 335. Invertebrate Zoology. (4 Credits)**

A study of the systematics, functional morphology, ecology and research with non-vertebrate organisms. Students are introduced to the amazing diversity of terrestrial and aquatic invertebrates. Field trips to local habitats in addition to the Field Museum and Shedd Aquarium are included. The purpose of this course is to introduce students to often overlooked organisms in the animal kingdom with the goal of cultivating a greater appreciation for this wonderful part of God's creation. Three lectures and three hours laboratory. Prerequisite: BIOL 242. Additional course fee required: \$95.

**BIOL 336. Neurobiology of Health. (4 Credits)**

A neuroscience course with three major units: the basics of neuroanatomy, neurophysiology, neuroimaging, and the stress response; several key cellular and systems-level circuits within the brain that regulate metabolism, immunity, pain, memory, sleep, and interoception; and behaviors (nutrition, exercise, meditation and prayer) that promote brain health. Class sessions will include lectures, discussions, and student presentations of current research. Prerequisite: BIOL 241 or NEUR 241.

**BIOL 338. Economic Botany. (4 Credits)**

Principles of plant biology (plant anatomy, biochemistry, physiology, genetics, taxonomy, and ecology) that relate to uses of plants for food, fodder, drugs and other chemicals, lumber, and other uses. Three lectures, three hours laboratory. Prerequisite: BIOL 241 and BIOL 242. Additional course fee required: \$95.

**BIOL 339. Plant Physiology. (4 Credits)**

Basic principles of plant physiology including photosynthesis, mineral nutrition, water economy, respiration, nitrogen and lipid metabolism, development, growth, and plant growth substances. Three lectures, three hours laboratory. Prerequisite: BIOL 241 and 242 and CHEM 232. Additional course fee required: \$95.

**BIOL 342. Introduction to Bioinformatics. (2 Credits)**

This course introduces students to bioinformatics tools and analysis methods. Upon completion of the course, students should be more comfortable working with the vast amounts of biomedical and genomic data and online tools that will be relevant to their work in the coming decades. Methods for sequencing DNA and the analysis and comparison of genome data, methods for examining the transcriptomic and proteomic profiles, as well as phylogeny, will be discussed. Implications of various types of bioinformatics data for markers of disease, genetic mechanisms, biosystematics, biodiversity, and ethics of biotechnology will be considered. Prerequisite: BIOL 241.

**BIOL 343. Plant Taxonomy. (4 Credits)**

Includes systems of classification, distinguishing characteristics of groups, observation, and classification of vascular plants of the Black Hills and environs. Offered during the summer at the Wheaton College Science Station in South Dakota. Course is offered occasionally. Prerequisite: BIOL 242.

**BIOL 344. Conservation Biology. (4 Credits)**

Conservation Biology is discipline that develops and uses scientific approaches to protect, maintain and restore the biological diversity of Earth's ecosystems. Students will be introduced to the conceptual and theoretical and practical foundations of conservation biology, including the ethical and theological motivations for the practice of the discipline. Specifically, the course will explore the importance of biodiversity, the causes of biodiversity decline, and the primary tools of mitigation such as reserve design, population viability analysis, sustainable harvest, and metapopulation models. Prerequisite: BIOL 351. Additional course fee required: \$20.

**BIOL 345. Disease Ecology. (4 Credits)**

An interdisciplinary approach to understanding the global ecological patterns and dynamics of disease. Students in this course will describe and analyze how ecology, social class, race, and gender impact the global burden of disease. Students will also consider how our Christian call to love our neighbor impacts our response to the disparities seen in the global burden of ecological stewardship and disease presence and transmission. Prerequisite: BIOL 241 or BIOL 242, and BIOL 351.

**BIOL 346. Ecosystem Health. (4 Credits)**

Ecosystem Health refers to the state or condition of the dynamic attributes of an ecosystem and the links of ecosystem functioning to human health. Students in this course will learn to assess the health of ecosystem components, processes and services including climate, soil, nutrient cycles, and species relationships, and evaluate the role of humans in changing these processes. Additionally, the course will investigate the relationship between ecosystem and human health through the discussion of topics ranging from sustainable agriculture, zoonotic disease emergence, pollution, and human population growth. Prerequisite: BIOL 351.

**BIOL 347. Evolutionary Biology. (4 Credits)**

This course will consider the basic principles, mechanisms, and patterns of evolutionary biology including a historical survey of related ideas. The course will also consider the historical and current relationship between evolutionary science and Christian faith. Prerequisite: BIOL 241, 242, and BIOL 351.

**BIOL 348. Marine Biology. (4 Credits)**

Study of the biology of marine organisms in the context of the geological and physical features of the ocean. Lectures, field trips, and learning snorkeling skills on campus are followed by a field trip to the Caribbean over spring break to apply these concepts to tropical marine environments. Additional fee assessed to cover travel and accommodation costs. Course is offered occasionally. Prerequisite: BIOL 242.

**BIOL 349. Animal Behavior. (4 Credits)**

This course is designed to help students gain a deeper understanding of the nature of animal behavior, spanning the animal kingdom from invertebrates to vertebrates: from bees to grasshoppers to fish to birds to primates. A comparative and integrative overview of how and why animals as diverse as insects and humans behave the way that they do, linking behaviors to the brain, genes, and hormones, as well as to the surrounding ecological and social environments. Three hours of lecture and three hours of lab will be offered. Prerequisite: BIOL 241. Additional course fee required: \$95.

**BIOL 351. Ecology and Evolution. (4 Credits)**

This course introduces the conceptual and theoretical foundations of ecology, animal behavior, and evolution. Students will be introduced to population and ecosystem processes as well as longer-term processes of change, including evolution. Evaluation of theories of species dynamics will be viewed in a Christian perspective. Three lectures, three-hour laboratory. Prerequisite: BIOL 241 or BIOL 242. Additional course fee required: \$95.

**BIOL 356. Genetics. (4 Credits)**

Molecular, cytogenetic, classical, and population concepts of plant, animal, and human genetics. Three lectures, three hours laboratory. Offered every Spring. Prerequisite: BIOL 241. Additional course fee required: \$95.

**BIOL 372. Field Zoology. (3 Credits)**

A course emphasizing observation and classification of Black Hills animals, with a concentration on insects, reptiles, birds, and mammals. Offered during the summer at the Wheaton College Science Station in South Dakota. Course is offered occasionally. Prerequisite: BIOL 242.

**BIOL 382. Field Natural History. (4 Credits)**

Introduction to basic field and lab methods used in field natural history. Includes the basic nomenclature of flora and fauna in terrestrial, as well as aquatic systems. Basic geologic processes are discussed, and the major rock formations of the Black Hills are identified in the field. The course also provides an overview of the history and philosophy of natural history. Offered during the summer at the Wheaton College Science Station in South Dakota.

**BIOL 385. Special Topics In Biology. (2 Credits)**

Seminars or courses in special areas offered at discretion of the department.

**BIOL 386. Special Topics in Biology. (4 Credits)**

Seminars or courses in special areas offered at discretion of the department.

**BIOL 461. General Biochemistry. (4 Credits)**

The chemical reaction mechanisms of life processes. The structure and function of biomolecules. Protein purification and characterization. Enzyme kinetics. Bioenergetics and the role of metabolic interconversions in energy production. Membrane transport, regulation, and compartmentation. Prerequisites: CHEM 342 or 241.

**BIOL 495. Biological Research. (2 or 4 Credits)**

Laboratory and/or library research conducted with a Wheaton College Biology faculty member or with a biologist at another institution (if pre-approved by the Biology Department). Through laboratory research, students hone skills in using proper lab technique, keeping a laboratory notebook, critical thinking and problem solving, and presenting their findings in oral and/or written format. In library research, students identify and obtain pertinent articles; read, analyze, and critique the articles; and synthesize information presented in the articles. Students must prepare a short research proposal in collaboration with the participating faculty member as a prerequisite for enrolling in the course. Lab fee \$100. Prerequisites: BIOL 241 and BIOL 242.

**BIOL 496. Biology Internship. (2 or 4 Credits)**

Students gain practical experience during a summer or semester in a biologically-related field. Student work is monitored and assessed by an on-site supervisor and a Biology faculty member. Prerequisites: Biology major with at least junior standing and pre-approval by the Biology Department Chair.

**BIOL 497. Biology Research Seminar. (1 Credit)**

A weekly seminar featuring presentations and discussions of current research in biology. Most seminars are presented by biologists from other institutions. In the student journal club sessions, students collaborate with faculty in the presentation of recently published articles. Graded Pass/Fail. May be taken up to twice for credit. Can be counted as credit toward the Biology major and is not included in the calculation of the limit of three non-lab courses that can be counted toward the Biology major. One hour per week. Prerequisites: Sophomore or higher standing, Consult current year's course offerings.

**BIOL 499. Biology Honors Research and Seminar. (2 Credits)**

Laboratory research conducted with a Biology faculty member, and a weekly seminar involving the critique of primary literature and listening to scientific research presentations. Prerequisite: Acceptance to the Biology Honors' Program. (lin)

## Health Science Courses

**HS 311. Introduction to Public Health. (4 Credits)**

This course provides an introduction to the field of public health, focused on case studies of contemporary public health issues in the U.S. and globally. Students will be exposed to public health in historical perspective and to current career paths in the field, will gain an understanding of public health theory and public health's mandate to prevent disease in populations, and will learn to critically analyze health issues from a public health and interdisciplinary perspective. Emphasis will be given to social, cultural, and structural determinants of health, to health promotion and disease prevention interventions, and to the relationship of public health to God's promise of shalom.

**HS 312. Pandemics: Ancient and Modern. (2 Credits)**

This course presents a historical perspective on great pandemics, from the Plague and other pre-modern pandemics, to HIV and Covid-19 in late 20th and early 21st century. Particular emphasis will be given to what the pandemic revealed about the world, how the pandemic shaped the world, and how Christians and the church responded to the pandemic.

**HS 362. Orthopedic & Athletic Injury. (2 Credits)**

A study of the mechanism, treatment, rehabilitation, and prevention of musculoskeletal injury. The course begins with the study of the injury process from a physiological and biomechanical perspective. The course then progresses into the study of specific injuries to the various areas of the body. The course concludes with the study of various treatment modalities utilized in the health care arena. Departmental adjunct faculty and health professionals from the community serve to expand the course content within their area of expertise. Pre or Corequisite: BIOL 331 and BIOL 331L, BIOL 332 and BIOL 332L. Additional course fee required: \$10.

**HS 368. Concepts in Nutrition. (4 Credits)**

This course includes the theory and techniques of nutrition, dieting, and proper weight control. Digestion and absorption will be presented at the biochemical and applied physiological levels. Experimentally based research projects and case studies will be accomplished in small groups.

**HS 371. Clinical Kinesiology. (4 Credits)**

This course will study the biomechanical forces involved in human movement. Applications will include the study of normal human movement, abnormal/pathological movement (e.g. abnormal gait analysis, rehabilitation aspects of movement), as well as sport and exercise biomechanics. Attention will be given to both the quantitative and qualitative analysis of movement. Prerequisite: BIOL 331, BIOL 331L, BIOL 332, BIOL 332L. Additional course fee required: \$25.

**HS 373. Behavioral Medicine. (2 Credits)**

This course examines influences on health behavior, from the individual level to family, community, societal, and structural level factors. Students will gain in-depth understanding of key concepts related to the behavioral, social, cultural, and spiritual context of health behaviors and how this context applies to specific health issues and behaviors. Students will gain conceptual tools to understand and analyze health behaviors within this context, including tools from medical anthropology, psychology, and health behavior change and communication. This is a reading-intensive seminar which emphasizes critical thinking, discussion, and application of concepts to real-world challenges.

**HS 374. Social Determinants of Health. (2 Credits)**

This course examines the influence of social determinants of health (SDOH) on health behaviors and outcomes, and particularly the application of an SDOH framework to medicine, public health, and other allied health professions. Social determinants of health are defined as the conditions in the environments where people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks. An SDOH framework allows for consideration of social and structural determinants of health disparities and inequities, including racism, poverty, and other forms of systematic bias and injustice. Students will gain in-depth understanding of an SDOH framework and will use this framework to recognize and analyze social and structural determinants of specific health issues and behaviors. This is a reading-intensive seminar which emphasizes critical thinking, discussion, and application of concepts to real-world challenges.

**HS 381. Concepts in Epidemiology. (4 Credits)**

An introductory course of the basic science of disease prevention. Overview of epidemiologic methods and research designs to explore the variation of disease occurrence among individuals and populations and how that variation is studied to understand the causes of disease. Discussion of the biologic, behavioral, social and environmental determinants of health and disease. Description of how epidemiologic findings are applied to health maintenance and disease prevention.

**HS 382. Biostatistics. (4 Credits)**

The purpose of this course is to train students to become intimately familiar with the basics of research design and statistical modeling techniques commonly used in the health sciences. Knowledge will be gained as students learn how to go from hypothesis generation, to appropriate research design, to the implementation of a statistical model, to the interpretation of results.

**Tags:** AAQR

**HS 391. Community-Based Research in Urban Public Health. (4 Credits)**

Theory and practice of public health program planning and evaluation in partnership with community public health organizations in urban Chicago. Students will integrate principles of community building and organizing to address community-identified health issues in the context of social change. Emphasis will be placed upon the development of faith-based cultural humility for the recognition and empowerment of existing healthy community assets for the improvement of urban health and quality of life. Quantitative and qualitative research methods will be utilized and integrated throughout all phases of health planning and program evaluation. \$50 course fee. Prerequisite: HS 381. Additional course fee required: \$50.

**HS 392. Public Health Research Theory and Methods. (4 Credits)**

This course is designed to introduce students to the perspectives, methods, and techniques of qualitative and quantitative public health research. Students will gain an understanding of the theoretical foundations of human subjects research, methods of data collection and analysis, research ethics and ethics board approval, study design and participant recruitment, and presentation of research findings. Each student will engage in a research project (writing a research proposal, collecting data, and/or analyzing data), with the goal of applying course content and developing practical skills in either qualitative or quantitative research methods. Pre or Corequisite: HS 381 and HS 382.

**HS 451. Advanced Human Anatomy. (2 Credits)**

This course covers advanced concepts of human cadaver anatomy. A thorough general dissection of the entire body with various in-depth dissections throughout the course will be the focus. This course is intended to serve students interested in the health professions. Prerequisite: BIOL 331 and BIOL 331L, BIOL 332 and BIOL 332L.

**HS 452. Applied Physiology. (4 Credits)**

This course will present the applied physiology of the following conditions: heart disease, obesity, type-2 diabetes mellitus, lower limb amputations, pregnancy, and aging and the role of prescribed exercise in the management and rehabilitation of these conditions. The physiological and biochemical adjustments and adaptations to acute and chronic exercise will be presented. Experimentally based research projects will be accomplished in small groups. Prerequisite: BIOL 331 and BIOL 331L, BIOL 332 and BIOL 332L. Additional course fee required: \$95.

**HS 494. Integrative Seminar. (2 Credits)**

This course is designed to provide an integrative conclusion to the major by reflecting on how a Christian liberal arts education has shaped students' knowledge and character, to connect the discipline of Applied Health Science within the broader context of liberal arts and the Christian faith, and to clarify/reaffirm vocational calling.

**General Education:** SHAR

**HS 495. Problems in Health Science. (1 to 4 Credits)**

Special projects and independent research study. These projects must offer a unique learning experience for the student and will usually be an experimentally based research project with the purpose of developing critical thinking and with the intent of being published.

**HS 496. Internship. (4 to 8 Credits)**

Practical experience under supervision in an approved program. Prerequisite: Junior or senior standing as a Health Science major.

## Neuroscience Courses

**NEUR 222. The Brain: A Neuroscience Primer. (2 Credits)**

This course explores how neuroscientists study the human brain and the contemporary issues that arise. Lectures and lab experiences will focus on the tools used to study and understand the brain and their impact on understanding human thought, behavior, and emotion. Morning sessions will include lectures and seminar discussions that examine how the central nervous system is understood and related cultural/philosophical issues. Afternoon sessions will involve work with neural specimens, tissue, and other neuroscience lab techniques. (Open to Wheaton College Summer Institute students only)

**NEUR 241. Foundations of Neuroscience. (4 Credits)**

This course is an overview of the basic structure and function of the nervous system. Emphasis is placed on divisions of the nervous system, neural development, cellular and molecular systems and neurophysiology. Two lectures, three hours laboratory. Additional course fee required: \$95.

**Tags:** SP

**NEUR 321. Cellular and Molecular Neuroscience. (4 Credits)**

The course offers a comprehensive introduction into the cellular and molecular biology of the nervous system. The covered material ranges from classical studies to the current state of knowledge. All parts of the course provide an overview of standard techniques and approaches analyzing neuronal function in vitro and in vivo. The following topics are considered in substantial detail: a) neuronal cell biology, b) electrical properties of neurons; c) function of voltage- & ligand-gated ion channels; d) structure & function of synapses; e) molecular mechanisms underlying synaptic plasticity; f) cellular, molecular and genetic approaches & techniques in neuroscience. Prerequisite: NEUR 241. Additional course fee required: \$95.

**NEUR 369. Neuroscience Research Techniques. (2 Credits)**

A junior/senior level course where students are trained in the use of various neuroscience research techniques and methodology. Prerequisite: NEUR 241 or BIOL 339; and PSYC 269 or BHS 252; or consent of instructor. Additional course fee required: \$95.

**NEUR 385. Special Topics in Neuroscience. (2 Credits)**

Seminars or courses in special areas offered at discretion of the program. Prerequisites: NEUR 241 or BIOL 336 or consent of the instructor.

**NEUR 386. Special Topics in Neuroscience. (4 Credits)**

Seminars or courses in special areas offered at discretion of the program. Prerequisites: NEUR 241 or BIOL 336 or consent of the instructor.

**NEUR 494. Neuroscience Capstone. (2 Credits)**

A junior/senior level course with an interdisciplinary research component is developed as the culmination of a certificate. Students will develop a research study using tools from multiple disciplines to answer a question related to the field of neuroscience. Prerequisite: NEUR 369.

**General Education:** SHAR

**NEUR 495. Independent Study in Neuroscience. (1 to 4 Credits)**

Individual library or experimental research carried on under the supervision of a faculty member approved by the Neuroscience Program Coordinator.