Honors Laureate: Neuroscience, Medicine, and Culture
Focus Area Checksheet

This focus area is available to **non-Neuroscience majors only** who have completed BIOL 1105: Principles of Biology.

Students pursuing the Honors Laureate: Neuroscience, Medicine, and Culture focus area must complete at least thirty (30) honors credits across the Four Elements of an Honors Education following the guidelines below. Elements Two, Three, and Four each require at least six honors credits. For more information, contact Dr. Kristin Phillips: kfphill@vt.edu.

The Four Elements are:

1. **HONORS COLLEGE CURRICULUM**

   This Element has no minimum credit requirement. Visit the Honors College website for the full course list: [https://honorscollege.vt.edu/Current/laureatediploma/01.html](https://honorscollege.vt.edu/Current/laureatediploma/01.html).

2. **DISCIPLINARY DEPTH**

   Plan at least six credits in this Element using the course options below. If a course is not already a departmental honors “H” course or an independent study, the course must utilize a Faculty-Student Agreement.

   - NEUR 2014H: Fundamentals of Neuroscience *(required)*
     
     *Taught every-other spring only*
     
     Pre: BIOL 1105
   - NEUR 3084: Cognitive Neuroscience
     
     Pre: NEUR 2014H
   - NEUR 3144: Mechanism of Learning Memory
     
     Pre: NEUR 2014H
   - NEUR 4034: Diseases of The Nervous System
     
     Pre: NEUR 2014H and NEUR 3044: Cellular and Molecular Neuroscience
     
     *Students wanting to take NEUR 3044 will need permission from Dr. Kristin Phillips to enroll.*
   - NEUR 2974/4974: Independent Study
3. TRANSDISCIPLINARY CAPABILITIES

Plan at least six credits in this Element. Courses taken in this element must be outside of a student’s primary major. Secondary major and in-minor courses, however, are permissible. A course must be a departmental honors “H” course, an Independent Study, or utilize a Faculty-Student Agreement. Course options include (see appendix for the full listing of possible courses to fulfill this Element):

- NEUR 2464: Neuroscience and Society
- NEUR 3914: Neuroscience of Drug Addiction  
  Pre: NEUR 2014H
- NEUR 3984: War and The Brain  
  Pre: NEUR 2014H
- NEUR 4364: Neuroscience of Language and Communication Disorders  
  Pre: NEUR 2014H
- NEUR 4454: Neuroeconomics  
  Pre: NEUR 2014H or ECON 3104
- NEUR 4814: Nutritional Neuroscience  
  Pre: NEUR 2014H, 3044
- HD 3114: Issues in Aging
- HIST 3724: History of Disease, Medicine, and Health
- PHIL 3324: Biomedical Ethics
- STS 3314: Medical Dilemmas and Human Experience
- BMES 4134: Global, Societal, and Ethical Considerations in Biomedical Engineering
- PHS 3014: Introduction to Environmental Health
- ENGL 3154: Literature, Medicine, and Culture
- BMVS 4064 (BMES 4064): Introduction to Medical Physiology
- GEPG 4074: Medical Geography
- XXXX 2974/4974: Independent Study

4. UNDERGRADUATE RESEARCH & GUIDED EXPERIENTIAL LEARNING

Plan at least six credits in this Element using the options below:

- NEUR 4594: Clinical Neuroscience in Practice  
  Pre: NEUR 4034
- XXXX 2994/4994: Undergraduate Research (in any department)
- UH 3204: Honors Service Learning
- Professional Development
- Study Abroad
- Partners in the Parks
- Corps of Cadets Leadership Experiences
Appendix

Course options for Element Three: Transdisciplinary Capabilities. Courses must utilize a Faculty-Student Agreement.

NO PREREQUISITES

HIST 3624: HEALTH AND ILLNESS IN AFRICAN HISTORY
Examines key subjects and themes in the history of health, medicine, and disease in African history. Topics include indigenous health systems, colonial medicine, and post-colonial health crises, including HIV/AIDS. (3H, 3C)

HIST 3724: HISTORY OF DISEASE, MEDICINE, AND HEALTH
Development of Western concepts of disease, medicine, and health with emphasis on period from eighteenth century to present. Social construction of disease and relationship between health and social, economic, and political structures. Special attention to impact of public health and the development of scientific and technological medicine. (3H, 3C)

PHIL 3324: BIOMEDICAL ETHICS
Philosophical analysis of ethical issues in medicine and biotechnology, such as problems arising in connection with the relations between physicians and patients, the challenges of cultural diversity, practices surrounding human and animal research, decisions about end of life care, embryonic stem cell research, genetic engineering, biotechnological human enhancement, and social justice in relation to health-care policy. (3H, 3C)

STS 2154: HUMANITIES, TECHNOLOGY, AND THE LIFE SCIENCES
Examines the value-laden issues surrounding the professional dimensions of research in the biological and life sciences and provides humanistic perspectives on the role and function of science in society. (3H, 3C)

STS 3314: MEDICAL DILEMMAS AND HUMAN EXPERIENCE
This course will explore medical dilemmas from a humanistic perspective, including topics related to assisted reproduction, genetic testing and treatment, organ transplantation, clinical trials, end-of-life interventions, and decisions regarding allocation of health-care resources. (3H, 3C)

BMES 4134: GLOBAL, SOCIETAL, AND ETHICAL CONSIDERATIONS IN BIOMEDICAL ENGINEERING
Overview of contemporary technological advances to improving human health. Comparison of healthcare systems, problems, and existing solutions throughout the developed and developing world. Consideration of legal and ethical issues associated with developing and implementing new medical technologies. Recognition and definition of gaps between medical needs and current methods and therapies between developed and developing countries. Conceptually design a novel technology. (3H, 3C)

PHS 3014: INTRODUCTION TO ENVIRONMENTAL HEALTH
Overview of environmental health, examining local, national, and international frameworks. Environmental factors that affect human health, including major classes of chemical, biological, and physical exposures from different environmental media (air,
water, food, and soil). Special emphasis on toxicology and epidemiology methodologies used at the individual (mechanistic) level and at the population level to determine environmental causes of disease. Find the most appropriate prevention or control measure to minimize adverse health outcomes. (3H, 3C)

PHS 3534: DRUG EDUCATION
Interpretation of multidimensional (social, psychological and physiological) scientific data regarding drugs. The major drug categories will be covered with special emphasis on substance misuse and abuse. (3H, 3C)

PHS 4044: PUBLIC HEALTH POLICY AND ADMINISTRATION
Evolution and analysis of public health policy in the United States. Public health and care systems. Administrative concepts central to public health such as human resources, strategic planning, controlling, directing, leadership and health law. Junior Standing. (3H, 3C)

PHS 4054: CONCEPTS IN ONE HEALTH
One Health refers to the dynamic interdependence of human, animal and environmental health and provides an important perspective in examining health problems. Theoretical foundations of One Health, methods for assessing animal-human linkages, policies and practices related to One Health and capacity building and public engagement. Junior Standing. (3H, 3C)

ESSENTIALLY NO PREREQUISITES REQUIRED

ENGL 3154: LITERATURE, MEDICINE, AND CULTURE
The representation of health and illness in literature and the cultural aspects of medicine as a practice. Pre: 1106 or 1204H or COMM 1016. (3H, 3C)

BMES 4064 (BMVS 4064): INTRO MED PHYSIOLOGY
An introductory to the principles of medical physiology. Designed primarily for (but not limited to), undergraduate students minoring in biomedical engineering, and other related engineering and physical sciences majors with little or no formal background in biological sciences. Basic principles and concepts of human physiology. Special emphasis on the interactions of human systems biology in their entirety rather than individual genes and pathways. Pre: Junior standing or permission of instructor. (3H, 3C)

GEPG 4074: MEDICAL GEOGRAPHY
Geographic patterns of disease and health care at various scales. Study of interactions between the physical environment and health. Analysis of spatial patterns associated with HIV/AIDS epidemic. Examination of health implications of social and cultural variation in developed a developing contexts. Pre: Junior Standing. (3H, 3C)

PREREQUISITES REQUIRED

SOC 4414: DRUGS AND SOCIETY
Examines the use of drugs, including legal and illegal drugs, from a sociological perspective. Cross-cultural and historical patterns of use are discussed and explained. Particular attention is given to drug use within the context of various social institutions. Junior standing. Pre: 1004. (3H, 3C)
SOC 4704: MEDICAL SOCIOLOGY
Social and cultural response to illness and infirmity. Emphasis on the sick role, patient role, practitioner role, organization and politics of health care delivery, stratification, professionalism, and socialization of health practitioners. Taught alternate years. Junior Standing. Pre: 1004. (3H, 3C)

STS 4314 (ENGL 4314): NARRATIVE MEDICINE
Introduction to the field of narrative medicine, with attention to narrative competencies, the use of narrative medical education, and the function of narratives in the experience of healing. Includes narrative approaches to biomedical ethics. Pre: ENGL 3154 or ENGL 3324. (3H, 3C)

4334 (SOC 4334) (WGS 4334): SEXUAL MEDICINE
Discusses sex and medicine in contemporary U.S. society. Explores how notions of sexual behavior and “normality” are defined and structured by medical discourse. Examines cultural institutions that play significant roles in formulating ideas about and definitions of deviance, perversity, and tolerated marginality. Critiques medical responses to sexual variations. Examines experiences of people who have sought out, or been the unwilling victims of, sexual medicine. Junior standing required. Pre: WGS 1824. (3H, 3C)

SOC 3324 (STS 3324) (WGS 3324): PERSPECTIVES ON THE BIOLOGY OF WOMEN
Examines historical social and cultural views on women's biology and how those views have impacted women's physical and mental health. Special attention is paid to the influence of cultural and beliefs on scientific perspectives. Pre: WGS 1824. (3H, 3C)

SOC 4714: SOCIOLOGY OF MENTAL ILLNESS
Mental illness and social systems, historically and in contemporary society. Distribution of mental illness with special reference to stratification, role, and deviance theories. Mental health occupations and organization of treatment. Implications for social policy. Taught alternate years. Junior standing. Pre: 1004. (3H, 3C)

BMES 2104: INTRODUCTION TO BIOMEDICAL ENGINEERING
Methods of mathematical modeling and engineering analyses related to human physiology. Emphasis placed on fundamental concepts such as biomaterials, biomechanics, tissue engineering, biomedical imaging and nanomedicine. Broad spectrum of current biomedical engineering research areas. Pre: (ENGE 1104 or ENGE 1114 or ENGE 1216), PHYS 2305. Co: MATH 2214. (3H, 3C)

BMES 3124: INTRODUCTION TO BIOMECHANICS
Basic principles of biomechanics. Basic musculoskeletal anatomy. Application of classical mechanics to biological systems. Emphasis placed on mechanical behavior (stress and strain), structural behavior, motion, and injury tolerance of the human body. Biomechanics of medical devices and implants. Advances in safety equipment used in automotive, military, and sports applications. Pre: 2104, ESM 2204, ESM 2304. (3H, 3C)

BMES 3134: INTRODUCTION TO BIOMEDICAL IMAGING
Introduction to major biomedical imaging modalities. Emphasis on X-rays, computerized tomography (CT), magnetic resonance imaging (MRI), positron emission tomography (PET), ultrasound, and optical imaging. Essential physics and imaging equations of the imaging system. Sources of noise and primary artifacts. Patient safety and clinical application. Pre: 2104, (MATH 2204 or MATH 2204H), PHYS 2306. (3H, 3C)
BMES 3144: BIOMEDICAL DEVICES
Design and uses of biomedical devices for diagnosis and therapy of human and animal diseases. Disease ecologies, progression, risk factors, and epidemiology. Tissue, organ, and systems dysfunction and failure and relevance to life stages (pediatric, adolescent, adult, aged). Useful characteristics of engineered materials for device fabrication, including biocompatibility. Gaps between medical needs and current medical devices. Pre: 2104. (3H, 3C)

BIOL 3134: HUMAN GENETICS
Principles of genetic analysis in humans with emphasis on genetic diseases of humans; methods of karyotyping human chromosomes; methods of pedigree and genetic analysis of humans; principles, techniques, and analysis of twin studies in humans; techniques used to identify and characterize normal and abnormal chromosomes; principles and methods of DNA fingerprint analysis of humans. Pre: 2004 or 2104. (3H, 3C)

BIOL 4554 (ALS 4554): NEUROCHEMICAL REGULATION
Neurochemical transmission within the vertebrate brain will be examined. Emphasis will be placed on the chemical coding underlying the control of various behaviors and how these systems can be modified by various drugs or diet. Pre: (ALS 2304 or BIOL 3404), (CHEM 2535). (3H, 3C)

BIOL 4704: IMMUNOLOGY
Immunochemistry of antigens and antibodies, serological reactions, chemistry of complement, control of immunity, immune response of an intact animal. Pre: 2104, (CHEM 2536 or CHEM 2566). (3H, 3C)

CHEM 4554: DRUG CHEMISTRY
Structure, synthesis, and physiological effects of major classes of pharmaceutical agents including CNS depressants and stimulants, analgesics, anesthetics, cardiovascular agents, chemotherapeutic drugs, and oral contraceptives. Pre: 2536 or 2566. (3H, 3C)

ECON 4214: ECONOMICS OF HEALTH CARE
Effects of medical care on health; cost and production of medical care; demand for medical care and its financing; structure of the health care industry; reorganization for efficiency. Pre: 2005 or 2025H. (3H, 3C)

NANO 4314: NANOMEDICINE
Medical use of nanomaterials including basic, translational, and clinical research. Nanomedical approaches to drug delivery. Diagnostic sensors. Use of nanomedical tools over conventional techniques to treat diseases/disorders. Technical issues associated with medical applications. Bioavailability of nanotherapies. Use of quantum dots for imaging. Ethical concerns and economic benefits associated with nanomedicine. Pre: 3016, (BIOL 2104 or BIOL 2124). (3H, 3L, 4C)

PHYS 4714: INTRODUCTION TO BIOPHYSICS
Selected topics from the general area of biomechanics, bioelectricity, radiation biophysics, molecular biophysics, and thermodynamics and transport in biological systems. Emphasis on the physical aspects of biological phenomena and biophysical measurement techniques and instrumentation. Pre: 2206 or 2306. (3H, 3C)
PSYC 2064: NERVOUS SYSTEMS & BEHAVIOR
Introduction to the workings of the nervous system and the relation between those workings and behavior. Special emphasis on human nervous systems and behavior. Pre: 2004 or 1004. (3H, 3C)

PSYC 3054: HEALTH PSYCHOLOGY
Major theories, strategies, and methods for understanding psychological contributions to health and disease; psychological approaches to the treatment and prevention of disease and unintentional injuries, and health and safety promotion. Pre: 2004 or 1004. (3H, 3C)

BMVS 4074: PHARMACOLOGY
A basic course in the science of pharmacology, intended to provide an understanding of the mechanisms of action and physiological systemic effects of major classes of drugs of biological, agricultural, social, and medical importance. Must have prerequisites or equivalent. Pre: CHEM 2514 or CHEM 2535 or ALS 2304 or BIOL 2406. (3H, 3C)

BMVS 4084 (VM 9204): MEDICAL TOXICOLOGY
Adverse health effects of exposure to drugs or substances of abuse. Covers principles of toxicodynamics, toxicokinetics, biotransformation, diagnosis and treatment. Emphasis will be placed on mechanism(s) of action of the various drug classes, body system(s) affected, clinical manifestations of problems and the resulting adverse effects on human health and society. Methods of treatment and client education will also be addressed. Laws controlling and governing the use of these drugs/substances and the agencies responsible for them will also be covered. Pre: third year standing in DVM curriculum. Pre: (CHEM 2514 or CHEM 2535), (BIOL 2406 or ALS 2304), (MATH 1015 or MATH 1014). (2H, 2C)

BMSP 2135-2136: HUMAN ANATOMY & PHYSIOLOGY
Structure and function of the human body for students preparing for professions in the health fields. 2135: body plan and organization, homeostasis, cell structure and function, histology, integumentary system, skeletal system, muscular system, nervous system and special senses. 2136: endocrine system, circulatory & cardiovascular system, lymphatic system and immunity, respiratory system, digestive system, metabolism, excretion, reproduction, and development. BMSP 2135-2136 duplicates BIOL 2405-2406; may not receive credit for both. Pre: (BIOL 1005 or BIOL 1006) or (BIOL 1105 or BIOL 1106) or (BIOL 1205H or BIOL 1206 H) for 2135; 2135 for 2136. (3H, 3C)

BMSP 2145-2146: HUMAN ANATOMY AND PHYSIOLOGY LABORATORY
Laboratory exercises investigating the structure and function of the human body for students preparing for professions in the health fields. 2145: body plan and organization, homeostasis, cell structure and function, histology, integumentary system, skeletal system, muscular system, nervous system and special senses. 2146: endocrine system, circulatory & cardiovascular system, lymphatic system and immunity, respiratory system, digestive system, metabolism, excretion, reproduction, and development. BMSP 2145-2146 duplicates BIOL 2414; may not receive credit for both. Co: 2135 for 2145; 2136 for 2146. (3L, 1C)